TRANSACTIONS
OF THE
PHILADELPHIA
ACADEMY
OF
SURGERY

VOL. XII.

1910

TRANSACTIONS

OF THE

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ACADEMY OF SURGERY

VOLUME XII

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1910

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The present volume of *Transactions* contains the papers read before the Academy from January, 1909, to December, 1909, inclusive.

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1894
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DEFOREST WILLARD
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ACTIVE FELLOWS OF THE PHILADELPHIA ACADEMY OF SURGERY

1905.* Allen, Francis Olcott, Jr., M.D., 323 S. Sixteenth Street. Dispensary Surgeon to the Presbyterian Hospital; Dispensary Surgeon to the Methodist Hospital.

† Allis, Oscar H., M.D., 1604 Spruce Street. Surgeon to the Presbyterian Hospital; Member American Surgical Association.

1906. Ashhurst, Astley P. C., M.D., 2000 West De Lancey Place. Surgeon to the Out-Patient Department of the Episcopal Hospital; Assistant Surgeon to the Orthopædic Hospital; Surgeon to the Dispensary of the Children's Hospital; Chief of the Gynæcological Dispensary of the Pennsylvania Hospital; Prosector to the Associate Professor of Applied Anatomy in the University of Pennsylvania.

1898. Boger, John A., A.M., M.D., 2213 N. Broad Street. Surgeon to St Mary's and the Samaritan Hospitals; Surgeon to the Dispensary of the Episcopal Hospital.

1905. Brooks, Macy, M.D., 1314 Spruce Street. Assistant Genito-Urinary Surgeon, Philadelphia Hospital; Chief of Out-Patient Surgical Department of the University of Pennsylvania and Howard Hospitals.

1907. Carmany, Harry S., 366 Green Lane, Roxborough. Surgeon to St. Timothy's Hospital; Out-Patient Surgeon to Episcopal Hospital.

* Figures denote year elected to membership.
† Denotes Original Fellows.

1909. CARNETT, JOHN B., 318 S. Fifteenth Street. Associate in Surgery, University of Pennsylvania, Medical Department; Assistant Surgeon to the University and Philadelphia General Hospitals; Consulting Surgeon to the Phœnixville Hospital.

1896. DA COSTA, JOHN CHALMERS, M.D., 2045 Walnut Street. Professor of the Principles of Surgery and Clinical Surgery in Jefferson Medical College; Surgeon to the Philadelphia Hospital.

1896. DAVIS, GWILYM G., M.D., M.R.C.S. (Eng.), 1814 Spruce Street. Assistant Professor of Applied Anatomy, University of Pennsylvania; Surgeon to the Episcopal, St. Joseph's, and the Orthopædic Hospitals.

1896. DEAVER, HENRY C., M.D., 1534 N. Fifteenth Street. Surgeon to the Episcopal, St. Agnes, Stetson, and Children's Hospital of the Mary J. Drexel Home; Professor in Surgery in Woman's Medical College.

1890. DEAVER, JOHN B., M.D., 1634 Walnut Street. Chief of the Surgical Department, German Hospital.

1908. DESPARD, DUNCAN LEE, M.D., 1806 Pine Street. Instructor in Surgery, Jefferson Medical College; Chief Assistant in the Surgical Clinic at Jefferson Medical College.

1884. DULLES, CHARLES W., M.D., 4101 Walnut Street. Lecturer on the History of Medicine, University of Pennsylvania; Consulting Surgeon to the Rush Hospital.

1909. ELMER, WALTER G., M.D., 1801 Pine Street. Instructor in Orthopædic Surgery in the University of Pennsylvania and Assistant Orthopædic Surgeon to the University Hospital; Orthopædic Surgeon to the Jewish Hospital; Surgeon to the Presbyterian Hospital Dispensary; Surgeon to the Pennsylvania Training School for Children at Elwyn.

1898. FRAZIER, CHARLES HARRISON, M.D., 1724 Spruce Street. Professor of Clinical Surgery, University of Pennsylvania; Surgeon to the University Hospital, and Episcopal Hospital.

1899. GIBBON, JOHN H., M.D., 1608 Spruce Street. Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College; Surgeon to the Pennsylvania and Bryn Mawr Hospitals; Consulting Surgeon to the Woman's Hospital.

1902. GIRVIN, JOHN H., M.D., 3924 Walnut Street. Gynæcologist to the Presbyterian Hospital; Instructor in Obstetrics, University of Pennsylvania.

1892. HARTE, RICHARD H., M.D., 1503 Spruce Street. Associate Professor of Surgery, University of Pennsylvania; Surgeon to the Pennsylvania Hospital, and to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Surgeon to St. Mary's, St. Timothy's, and Bryn Mawr Hospitals.

1882. HEARN, W. JOSEPH, M.D., 1120 Walnut Street. Emeritus Professor of Clinical Surgery, Jefferson Medical College; Surgeon to the Philadelphia Hospital; Consulting Surgeon to the Phœnixville Hospital, and to the General Hospital of Salisbury, Md.

1890. HEWSON, ADDINELL, M.D., 2120 Spruce Street. Surgeon to St. Timothy's Hospital; Professor of Anatomy, Philadelphia Polyclinic and College for Graduates in Medicine.

1905. HODGE, EDWARD B., M.D., 346 S. Sixteenth Street. Surgeon to the Children's Hospital; Surgeon to the Out-Patient Department of the Pennsylvania Hospital; Dispensary Surgeon to the Presbyterian Hospital; Assistant Surgeon to the Orthopædic Hospital.

1890. HORWITZ, ORVILLE, B.S., M.D., 1721 Walnut Street. Professor of Genito-Urinary Surgery, Jefferson Medical College; Surgeon to the St. Agnes Hospital and the State Hospital for the Insane; Consulting Surgeon to the Jewish Hospital.

1898. HUTCHINSON, JAMES P., M.D., 133 S. Twenty-second Street. Surgeon to the Pennsylvania, St. Timothy's, Methodist Episcopal, Children's, and Bryn Mawr Hospitals.

1900. JOPSON, JOHN H., M.D., 1824 Pine Street. Surgeon to the Presbyterian, Children's, and Bryn Mawr Hospitals, and to the Philadelphia Home for Incurables.

† KEEN, WILLIAM W., M.D., LL.D., F.R.C.S. (Hon.), 1729 Chestnut Street. Emeritus Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Membre correspondant étranger de la Société de Chirurgie de Paris; Membre honoraire de la Société Belge de Chirurgie, Ehrenmitglied der Deutsche Gesellschaft für Chirurgie; Honorary Member of the Clinical Society of London.

1895. LE CONTE, ROBERT G., M.D., 1530 Locust Street. Surgeon to the Pennsylvania and Bryn Mawr Hospitals; Consulting Surgeon to the Germantown and Gynecean Hospitals.

1899. LOUX, HIRAM R., M.D., 1614 N. Broad Street. Associate Professor of Genito-Urinary Surgery, Jefferson Medical College; Surgeon to the Philadelphia Hospital.

1885. MCCLELLAN, GEORGE, M.D., 1116 Spruce Street. Professor of Anatomy, Jefferson Medical College; Consulting Surgeon to Howard Hospital; Professor of Anatomy, Pennsylvania Academy of the Fine Arts.

1900. MARTIN, EDWARD, M.D., 1506 Locust Street. Professor of Clinical Surgery, University of Pennsylvania; Professor of Clinical Surgery, Woman's Medical College; Surgeon to the Philadelphia, University of Pennsylvania, and Howard Hospitals; Consulting Surgeon to the Bryn Mawr, Phœnixville, Wernersville, and Norristown Hospitals.

1907. MILLER, MORRIS BOOTH, M.D., 2117 Pine Street. Professor of Surgery, Philadelphia Polyclinic and College for Graduates in Medicine; Assistant Surgeon, Philadelphia General Hospital; Surgeon to the Douglas Hospital.

1904. MITCHELL, CHARLES F., M.D., 1503 Spruce Street. Surgeon to the Germantown Hospital; Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Surgeon to the Eastern State Penitentiary; Surgeon to the Out-Patient Department of the Pennsylvania Hospital.

1906. MULLER, GEORGE P., M.D., 334 S. Fifteenth Street. Associate in Surgery in the University of Pennsylvania; Surgeon to St. Christopher's Hospital; Assistant Surgeon to the University Hospital, Philadelphia Hospital, and the Home for Crippled Children; Consulting Surgeon to the Chester County Hospital.

1902. MUTSCHLER, LOUIS H., M.D., 2030 Tioga Street. Surgeon to the Dispensary of the Episcopal Hospital; Surgeon to the Dispensary of the Samaritan Hospital; Assistant Surgeon to the Orthopædic Hospital.

1905. NASSAU, CHARLES F., M.D., 1831 Chestnut Street. Surgeon to St. Joseph's Hospital; Consulting Surgeon to the Frankford Hospital; Prosector, Jefferson Medical College (Chair of Regional Anatomy).

1890. NEILSON, THOMAS R., M.D., 122 S. Seventeenth Street. Surgeon to the Episcopal Hospital and to St. Christopher's Hospital for Children; Clinical Professor of Genito-Urinary Diseases in the University of Pennsylvania.

1906. NORRIS, HENRY, M.D., Rutherfordton, North Carolina.

1890. PENROSE, CHARLES B., M.D., Ph.D. (Harvard), 1720 Spruce Street.

† ROBERTS, JOHN B., M.D., 313 S. Seventeenth Street. Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Methodist Hospital.

1898. ROBINSON, J. WEIR, M.D., 326 S. Sixteenth Street. Assistant Surgeon to the Presbyterian Hospital.

1900. RODMAN, WILLIAM L., M.D., LL.D., 1904 Chestnut Street. Professor of the Principles of Surgery and Clinical Surgery, Medico-Chirurgical College of Philadelphia; Surgeon to the Medico-Chirurgical Hospital, Presbyterian, and the Philadelphia General Hospitals.

1900. ROSS, GEORGE G., M.D., 1721 Spruce Street. Surgeon Germantown Hospital; Assistant Surgeon, German Hospital; Surgeon to the Out-Patient Department, German Hospital.

1894. SHOEMAKER, GEORGE ERETY, A.M., M.D., 1831 Chestnut Street. Gynæcologist to the Presbyterian Hospital.

1909. SHOBER, JOHN B., B.A., M.A., Princeton, M.D., University of Pennsylvania. Associate Surgeon, Gynecean Hospital, Philadelphia; Surgeon, Bar Harbor Medical and Surgical Hospital.

1903. SITER, E. HOLLINGSWORTH, M.D., 2038 Locust Street. Surgeon to the Out-Patient Department, St. Agnes' Hospital; Surgeon to the Out-Patient Department of the Children's Hospital; Chief Surgeon, Genito-Urinary Diseases of the University Hospital; Instructor in Genito-Urinary Diseases, University of Pennsylvania, Surgeon of the British Consulate.

1909. SPEESE, JOHN, M.D., 248 S. Twenty-first Street. Instructor in Surgery, University of Pennsylvania; Surgeon to the Out-Patient Department of the University Hospital and the Children's Hospital.

1898. SPELLISSY, JOSEPH M., A.M., M.D., 110 S. Eighteenth Street. Surgeon to the Methodist and to St. Joseph's Hospitals, the Elwyn Training School, and to the Out-Patient Department of the Pennsylvania Hospital; Assistant Surgeon to the Orthopædic Department of the University Hospital.

1890. STEINBACH, LEWIS W., M.D., 1309 N. Broad Street. Professor of Surgery, Philadelphia Polyclinic; Surgeon to the Philadelphia and to the Jewish Hospitals.

1903. STEWART, FRANCIS T., M.D., 311 S. Twelfth Street. Surgeon to the Germantown Hospital; Professor of Clinical Surgery in Jefferson Medical College; Surgeon to the Out-Patient Department of the Pennsylvania Hospital.

1908. SWEET, J. EDWIN, A.M., M.D., 301 St. Mark's Square. Assistant Professor of Experimental Surgery, University of Pennsylvania.

1890. TAYLOR, WILLIAM J., M.D., 1825 Pine Street. Surgeon to St. Agnes' and the Orthopædic Hospitals; Consulting Surgeon to the West Philadelphia Hospital for Women.

1908. THOMAS, THOMAS TURNER, M.D., 2005 Chestnut Street. Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital; Assistant Surgeon to the Philadelphia Hospital.

1907. UHLE, ALEXANDER A., M.D., 1831 Chestnut Street. Assistant Instructor, Genito-Urinary Department, University of Pennsylvania; Assistant Genito-Urinary Surgeon, Philadelphia Hospital; Surgeon to Urologic Dispensary of the German Hospital.

1907. WALKER, WARREN, M.D., 1632 Spruce Street. Surgeon to the Out-Patient Department of the Episcopal and Children's Hospitals.

1892. WHARTON, HENRY R., M.D., 1725 Spruce Street. Clinical Professor of Surgery, Woman's Medical College; Surgeon to the Presbyterian and to the Children's Hospitals; Consulting Surgeon to the Bryn Mawr Hospital, St. Christopher's Hospital, and to the Pennsylvania Institution for the Deaf and Dumb.

1883. WHITE, J. WILLIAM, M.D., 1810 S. Rittenhouse Square. John Rhea Barton, Professor of Surgery, University of Pennsylvania; Surgeon to the Rush Hospital.

1902. WHITING, A. D., M.D., 1523 Spruce Street. Surgeon to the Germantown Hospital; Assistant Surgeon to the German Hospital; Surgeon to the Southern Home for Destitute Children; Surgeon to the Out-Patient Department, German Hospital.

† WILLARD, DE FOREST, M.D., Ph.D., 1901 Chestnut Street. Professor of Orthopædic Surgery, University of Pennsylvania; Surgeon-in-Chief, Widener Industrial Training School for Crippled Children; Consulting Surgeon to the Presbyterian Germantown, Jewish, Phœnixville, Atlantic City, Seashore and South Mountain Hospitals.

1890. WILSON, H. AUGUSTUS, A.M., M.D., 1611 Spruce Street. Professor of Orthopædic Surgery, Jefferson Medical College; Emeritus Professor of Orthopædic Surgery, Philadelphia Polyclinic; Orthopædic Surgeon to the Philadelphia Hospital; Consulting Orthopædic Surgeon to the Lying-in Charity Hospital and to the Kensington Hospital for Women.

1898. WOOD, ALFRED C., M.D., 128 S. Seventeenth Street. Assistant Professor of Surgery in the University of Pennsylvania; Surgeon to the University, Philadelphia and St. Timothy's Hospitals; Consulting Surgeon to Charity Hospital and the State Hospital for the Insane, Norristown.

1902. YOUNG, JAMES K., M.D., 222 S. Sixteenth Street. Professor of Orthopædic Surgery, Philadelphia Polyclinic; Clinical Professor of Orthopædic Surgery, Woman's Medical College of Pennsylvania; Associate in Orthopædic Surgery, University of Pennsylvania; Assistant Orthopædic Surgeon, Hospital of the University of Pennsylvania.

LIST OF FELLOWS WHO HAVE DELIVERED THE ANNUAL ADDRESS

1881. S. D. Gross.
1882. D. Hayes Agnew.
1883. William Hunt.
1884. John H. Brinton.
1885. John H. Packard.
1886. R. J. Levis.
1887. J. Ewing Mears.
1888. C. B. G. de Nancrede.
1889. John B. Roberts.
1890. De Forest Willard.
1891. William G. Porter.
1892. T. G. Morton.
1893. C. W. Dulles.
1894. W. B. Hopkins.
1895. John B. Deaver.
1896. James M. Barton.
1897. Thomas R. Neilson.
1898. O. H. Allis.
1899. William J. Taylor.
1900. None.
1901. H. R. Wharton.
1902. J. M. Spellissy.
1903. R. G. LeConte.
1904. G. G. Davis.
1905. J. Chalmers DaCosta.
1906. Richard H. Harte.
1907. Edward Martin.
1908. Charles G. Frazier.
1909. John H. Gibbon.

WINNERS OF THE SAMUEL D. GROSS PRIZE

1895 "Inquiry into the Difficulties Encountered in the Reduction of Dislocations of the Hip."—Dr. Oscar H. Allis, Philadelphia, Pa.

1902 "The Treatment of Certain Malignant Growths by Excision of the External Carotids."—Dr. Robert H. W. Dawbarn, New York, N. Y.

1905 "The Biology of the Microorganisms of Actinomycosis."—Dr. James Homer Wright, Boston, Mass.

HONORARY FELLOWS

ELECTED.		
1881	*Sir James Paget	London, England.
1881	*Theodor Billroth	Vienna, Austria.
1881	*Bernhard von Langenbeck	Berlin, Germany.
1881	*Willard Parker	New York, N. Y.
1881	*Lewis A. Sayre	New York, N. Y.
1881	*Moses Gunn	Chicago, Ill.
1881	*John T. Hodgen	St. Louis, Mo.
1881	*W. W. Dawson	Cincinnati, Ohio.
1881	*T. G. Richardson	New Orleans, La.
1881	J. Collins Warren	Boston, Mass.
1881	*W. T. Briggs	Nashville, Tenn.
1881	*Christopher Johnston	Baltimore, Md.
1881	*D. W. Yandell	Louisville, Ky.
1898	Maurice H. Richardson	Boston, Mass.
1898	George M. Sternberg	Washington, D. C.
1898	Charles B. McBurney	New York, N. Y.
1898	*Nicholas Senn	Chicago, Ill.
1898	*Theodore F. Prewitt	St. Louis, Mo.
1898	L. McLane Tiffany	Baltimore, Md.
1898	Nathaniel P. Dandridge	Cincinnati, Ohio.
1898	Roswell Park	Buffalo, N. Y.
1898	Robert F. Weir	New York, N. Y.
1898	Frederick S. Dennis	New York, N. Y.

* Deceased.

1900	W. H. A. Jacobson	London, England.
1900	Theodor Kocher	Berne, Switzerland.
1900	Vincenz Czerny	Heidelberg, Germany.
1906	William J. Mayo	Rochester, Minn.
1906	Dudley P. Allen	Cleveland, Ohio.
1906	Robert Abbe	New York, N. Y.
1906	C. B. G. deNancrede	Ann Arbor, Mich.
1907	John C. Munro	Boston, Mass.
1908	J. Ewing Mears	Philadelphia, Pa.
1909	Stephen Pilcher	Brooklyn, N. Y.

CONTENTS

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

STATED MEETING, HELD JANUARY 4, 1909.

The President, Dr. William J. Taylor, in the Chair.

CONGENITAL UMBILICAL HERNIA.

Dr. Francis T. Stewart reported the history of a male infant, born at 7½ months of gestation. The umbilical ring was about 2 inches in diameter, and the cord maintained this calibre for a distance of about 4 inches, when it began to taper to the point where it had been ligated. The cord was filled with a thick, glistening, gelatinous fluid, except at its base, where a sac, continuous with the peritoneum and about 2 inches long, was found separating the vessels of the cord, the arteries lying below and the vein above. A collar of abdominal skin extended up on the cord for perhaps one-fourth inch. Several coils of small intestine could be seen distending the sac through the transparent tissues of the cord, which were as thin as paper. There were no other abnormalities except a small postanal dimple. Several hours after birth the child ceased breathing, became cyanotic, and was restored only after the administration of oxygen and artificial respiration. Operation was undertaken nine hours after birth, without an anæsthetic. The sac was resected, the recti muscles approximated with catgut, and the skin sutured with silk-worm gut. The umbilical arteries felt as firm as the vas deferens and did not bleed when severed, although they could be felt pulsating within the abdomen a short distance below the umbilicus. The skin about the umbilicus was bloodless and resembled white leather. The child was in good condition at the end of the operation but about three hours later developed another attack of apnœa which proved fatal.

Dr. Stewart remarked that congenital umbilical hernia was rare. Adler found one in 5887 new-born infants, and Lindfors one in 5184. Coley says 4 cases were seen among the 75,000 cases of hernia treated at the Hospital for Ruptured and Crippled in New York. Of 37 cases assembled by Lindfors 22 were boys and 15 girls, of the 69 in Buschan's collection 43 were boys and 26 girls.

These herniæ are divided into the embryonic and the fetal, the former developing as the result of arrested development of the abdominal wall, the latter after the umbilicus is closed and lined with peritoneum.

The *embryonic variety,* strictly speaking, is a congenital malformation and not a hernia, because, since its contents have never resided within the abdomen, they cannot have herniated. The blastodermic layers of the embryo arrange themselves in two layers, the somatopleure (ectoderm fused with the external lamella of the mesoderm) and the splanchnopleure (endoderm fused with internal lamella of the mesoderm). These layers curl in from the side so as to form two closed tubes, one within the other, the outer or somatopleure becoming the thoracic and abdominal walls, and the inner or splanchnopleure the primitive digestive tube. The vitelline sac, which is continuous with the primitive intestine, thus becomes constricted at its embryonic attachment, forming the vitelline or omphalomesenteric duct, the intestinal opening of which has been called the intestinal umbilicus. Occasionally this duct persists in after life and is then called Meckel's diverticulum. Between the periphery of the intestinal umbilicus and that of the cutaneous umbilicus is an annular space, large above where it corresponds to the cardiac fossa, and smaller below where it gives passage to the allantois. The primitive abdominal wall (membrana reuniens inferior of Rathke) is an exceedingly thin membrane, which progressively advances over the viscera until, at the beginning of fetal life (end of third month), the cutaneous umbilicus is represented by a small circular space through which passed the umbilical vessels, the allantoic and the vitelline pedicles having vanished. When this process is arrested before its completion an embryonic hernia exists.

The coverings of this hernia consist of two avascular layers separated by a greater or lesser quantity of Wharton's jelly. The external layer, corresponding to the amnion, merges with the

collar of skin at the base of the tumor; the internal is continuous with the peritoneum, some believing it to be peritoneum, and others, because of its avascularity, a vestige of the membrana reuniens inferior.

The size of the defect varies greatly. An early arrest of development may leave a gap extending from the manubrium to the symphysis pubis. In these cases the heart may be found outside the thorax, but the lungs are retained in position by their pedicles. The pancreas is the only abdominal organ which has not been found in the hernial sac. Such extensive defects are rare, but not infrequently the opening extends from the umbilicus to a point somewhat above the middle of the upper half of the linea alba, giving passage to the liver, with or without a portion of the intestine, the umbilical cord lying below, either in the middle line or more often to the left. In living infants the tumor is generally much smaller, seldom exceeding a mandarin orange in size, and either separating the vessels of the cord or pushing them to the left. Ordinarily one or two coils of small intestine are in the sac and occasionally a portion of the liver or the cæcum. The presence of the last-mentioned structure is explained by its contracting adhesions with the hernial envelopes before it descends to its final position, or by persistence of the omphalomesenteric duct, which arises from the ileum near the cæcum. The omphalomesenteric duct itself may therefore be found in the hernia, either as a blind pouch springing from the ileum, or as a canal which opens externally at the summit of the tumor, thus forming an abnormal anus. In the latter instance the normal anus may be absent and the large intestine undeveloped. Usually, however, the presence of an omphalomesenteric duct reveals itself by a minute fistula, arising spontaneously or as the result of ligation of the cord. If the intestinal end closes there is an umbilical fistula or, consequent upon hypertrophy of the everted mucous membrane, an umbilicus polypus or adenoma. If both ends close the tube may distend with mucus and form an umbilical or vitelline cyst. When the allantoic duct persists it may appear on the surface of the hernial sac, after ligation of the cord, as a pseudopenis discharging urine. Like the vitelline duct it may close at one or both ends and give rise to similar fistulæ, polyps, and cysts. The persistence of these vestiges in the cord have led some to think that they cause the hernia by preventing closure of

the umbilicus. Among other deformities which may be present are epispadias, exstrophy of the bladder, imperforate urethra, imperforate anus, atresia of the large intestine, spina bifida, sacrococcygeal tumor, branchial cyst, etc.

The *fetal variety* of congenital umbilical hernia develops after the third month of intra-uterine existence when the umbilicus is lined with peritoneum. It is therefore covered with peritoneum and is a true hernia. When developing in the early part of fetal life it occupies the centre of the cord and separates the vessels. At a later period the vessels are fixed at the inferior segment of the umbilical ring and are pushed below and to the left by the hernia, which thus corresponds to the usual situation of umbilical protrusions in infants and adults. These herniæ are rarely of large size and usually contain nothing but small intestine. Of the numerous theories given for their origin none is satisfactory; those who are interested in this portion of the subject will find the matter fully discussed by Cumston (*Med. Rec.*, Sept. 3, 1905).

Symptoms.—Children with enormous abdominal fissures are usually born dead before term, the hernial coverings frequently tearing during labor, or yielding even before this time so that the viscera float free in the amniotic fluid. Large herniæ are frequently irreducible, owing to adhesions between the viscera and the sac or to lack of room within the abdominal cavity.

The smaller herniæ are more common and are as a rule easily recognized. The coverings of the tumor are ordinarily so thin and transparent that the viscera can be seen, and the usual features of a hernia are present. When the protrusion is very small, however, it may be overlooked by the obstetrician and be ligated with the cord, particularly if there are adhesions detaining the contents within the sac. A urinary omphalocele is fluctuating, transparent, dull on percussion, and often associated with imperforate urethra.

The *prognosis*, aside from the complications mentioned above, depends largely upon the size of the hernia and the duration of gestation. In infants who survive birth large herniæ usually rupture within the first few days, as the result of ulceration or sloughing of the sac, which has been deprived of its means of nutrition, peritonitis and death following. Spontaneous recovery, however, is possible, the sac becoming covered with granulations and these with epidermis, the abdominal muscles gradually closing in at a later period.

The *treatment* is operation, as early as possible, in all cases excepting the enormous defects incompatible with existence, and the very small reducible herniæ in which a firm, vascular peritoneal sac is present. The latter should be protected from injury and infection, and reduction maintained with a suitable bandage.

Anæsthesia is not necessary and perhaps is better omitted. The best operation is excision of the sac with the collar of skin at its base and closure of the defect with through-and-through silk-worm gut sutures, through-and-through sutures to save time, silk-worm gut to resist the sudden and frequent augmentations in the intra-abdominal pressure as the result of crying. The subcutaneous ligature is blind and dangerous. The extraperitoneal method of Olshausen, in which the sac is reduced without being opened, may be followed by gangrene of this structure. In any method in which the sac is not opened one may fail to discover complications, *e.g.*, a persistent omphalomesenteric duct.

The recent statistics of Ritterhaus (*Deutsche Zeit. für Chir.*, 1907, Bd. 89, p. 257), comprising 94 laparotomies up to 1907, show 65 recoveries and 29 deaths, a mortality of 31 per cent. According to Adler laparotomy within the first 24 hours gives a recovery rate of 88 per cent., after 48 hours, 33 per cent.; of the 72 cases which he collects 27 per cent. died. Jaboulay and Patel (*Nouveau Traité de Chir.*, 1908, T. 25), to whom we are indebted for many of the facts cited above, state, after Aribat, that the mortality of expectant treatment is 50 per cent.

PROPERITONEAL HERNIA.

Dr. Stewart reported the history of a man, aged 46 years, who was admitted to the Pennsylvania Hospital, November 28, 1908, in the service of Dr. Gibbon. The patient had been suffering with acute intestinal obstruction for three days. He had been wearing a truss for a left-sided inguinal hernia since childhood, but the hernia had not been down for many years. He had never noticed a hernia on the right side. Both inguinal canals were empty, although on coughing an impulse could be obtained in each. The testicles were normal in form and position. The abdomen was not rigid and only slightly distended, but no tumor could be felt externally or by rectal examination. Peristalsis was active but unproductive, the vomitus black but not fecal in odor. The pain and tenderness were generalized and perhaps

most marked in the left iliac fossa. The condition was thought to be a volvulus or a strangulated internal hernia. After making a median abdominal incision below the umbilicus it was discovered that a loop of ileum had entered a sac of peritoneum lying immediately behind the internal inguinal ring of the right side. The neck of the sac, which was dense and resistant, was nicked with scissors and the bowel extracted. The furrow of constriction had passed exactly across the mesenteric border of the affected loop, hence almost determining a Richter's hernia. The bowel was not gangrenous. The sac was about two inches in diameter and passed neither outwards nor inwards. No communication with the scrotal sac could be found. A similar sac, empty however, was discovered behind the left internal ring. After suturing the orifice with catgut the abdomen was closed, the patient making a smooth recovery.

The rarity of properitoneal hernia is shown by the statistics of Breiter (*Beiträge zur klin. Chir.*, Bd. 13, 1895), who has been able to add only 45 cases to the 24 collected by Krönlein in 1880; about a dozen additional cases might be added to this list. Of these 69 cases 59 were inguinal and 10 femoral.

Of the *inguinal variety* 33 were right-sided, 20 left-sided, and 6 undetermined. Fifty-eight occurred in males, and 23 of these had maldescended testicles. The youngest patient was 18, the oldest 74, and the majority were between the twentieth and fortieth year. An external hernia was present in all but two cases; in one of these the tip of the little finger just entered the internal ring, from within outwards, and in the second there was a small hydrocele. In his own case an external sac could not be found on either side, although one had surely existed on the left side. The average duration of the external hernia was 19 years. Of the 58 males the hernia was congenital in 36, acquired in 10, and undetermined in 12. With a single exception all were incarcerated, and in only two of these was the hernia reduced before operation. In 22 of the 36 inguinal cases collected by Breiter a sausage-shaped tumor could be felt above Poupart's ligament, running outwards towards the anterior superior spine of the ilium (intra-iliac variety). If the sac passes into the small pelvis (obturator variety) it might be felt by rectum; an antevesical sac could possibly be palpated through the abdominal wall. In three instances the hernia was partial (Richter's hernia).

With a bilocular hernia strangulation may occur at the common opening of the two sacs into the abdominal cavity or at the orifice of either sac. The first of these is the more frequent, thus explaining the large number of deaths even after herniotomy, the operator often failing to discover the inner constriction and simply reducing the contents of the outer into the inner sac. This phenomenon may be determined by observing an increase in the size of the iliac tumor, if present, when the outer sac is emptied, and by passing the finger into the abdominal cavity to investigate the parts in the vicinity of the internal ring, a measure which should be insisted upon in all operations for strangulated hernia. The symptoms of obstruction are said to be often insidious in development and less severe than in an ordinary strangulated hernia. Sometimes the patient states that there is a feeling of incomplete reduction even after the outer hernia has been replaced, in other cases severe pain follows, particularly if the testis is in the inguinal canal.

Of the *femoral variety* only 10 cases are recorded, all in women. In but two of these was the inner sac discovered as a tumor before operation. Seven were strangulated.

The *diagnosis* of properitoneal hernia is seldom made before operation, and sometimes not even at operation. The following features should lead one to suspect this condition: An irreducible external hernia in an adult, with a tympanitic tumor above Poupart's ligament which increases in size when pressure is made on the outer sac, and *vice versa;* maldescent or late descent of the testes, particularly the right; long duration of the hernia; the feeling of incomplete reduction which the patient may have previously experienced, hence failure of truss treatment; and the mild character of the obstructive symptoms.

While before 1880 all cases ended fatally the mortality at the present time is in the neighborhood of 34 per cent.

Several theories have been advanced to explain the formation of a properitoneal hernia. (1) The neck of an external hernia is displaced upwards and forms a diverticulum, as the result of narrowing of the mouth of the sac, which hinders reduction of the contents. The same result follows conditions which, while narrowing or closing the external ring, do not prevent the entrance of the hernia into the canal, *e.g.*, badly fitting truss, maldescended testicle, etc., and traction on the neck of the sac by adherent

omentum or bowel. (2) Reduction in mass. (3) A congenital deformity of the vaginal process. (4) A properitoneal sac is formed first, perhaps by traction of a mass of fat or accentuation of a peritoneal fossa, the external hernia developing secondarily.

HERNIA INTO THE RETROCOLIC FOSSA.

Dr. Stewart reported the history of a man, aged 86 years, who was subjected to a suprapubic prostatectomy in April, 1896. Three days later he complained of abdominal cramps after the administration of calomel. After a copious bowel movement the pain became steady and localized itself in the right iliac fossa, in which region palpation disclosed tenderness and slight muscular rigidity. The following day the bowels moved again and the pain had disappeared, although there was hiccoughing and slight distention, both of which increased during the next 24 hours, during which time another bowel movement was reported. The pulse, temperature, and respirations were normal and there was no vomiting. On the fourth day from the onset of pain the patient suddenly vomited a large quantity of dark, foul-smelling fluid and died quickly thereafter.

A limited and hurried autopsy showed that a loop of the lower ileum had passed up behind the cæcum into a cavity about 4 inches in diameter. The anterior wall of this cavity was formed by the cæcum, the posterior by parietal peritoneum, the outer or right by a fold of peritoneum passing from the cæcum to the posterior abdominal wall, and the inner or left by a similar fold of peritoneum. The mouth easily admitted two fingers. The appendix with its mesentery was situated to the front and left, stretched over the neck of the sac. The bowel was not gangrenous, but a well-marked furrow could be seen at the point of constriction.

The retrocolic or retrocæcal fossa, according to Moynihan ("Retroperitoneal Hernia," London, 1899), is determined by two peritoneal folds, an outer and upper, and a lower and inner. The former, or parietocolic fold, called also right or superior ligament of the cæcum, is triangular in shape, the posterior border being attached to the abdominal wall from the lower pole of the kidney or higher to the iliac fossa, the anterior or internal to the postero-external aspect of the colon and sometimes the cæcum, and the lower or free border extending from the intestine to the iliac fossa. The lower and inner, or mesentericoparietal fold, called also inferior ligament of the cæcum, is in reality the insertion of the enteric mesentery into the iliac fossa. It too is triangular in form, the base being inserted into the iliac fossa at about the point where the spermatic vessels cross the external iliac arteries; the intestinal border, into the small intestine and postero-internal aspect of the cæcum and ascending colon; and its free edge, concave, looking downwards and to the right. The fossa is bounded in front by the posterior surface of the ascending colon and sometimes by that of the cæcum, and behind by the parietal peritoneum. Its orifice looks downwards, and will not infrequently admit the index finger.

Moynihan mentions 11 cases which have been looked upon as hernia into the retrocolic fossa and rejects all but two. This form of hernia is so rare, according Treitz, because its orifice looks downwards, and therefore the intrusion of the gut is to some extent prohibited by gravity, and because the orifice of the sac is not resistant, and does not contain any vessel. These remarks do not apply to the vermiform appendix, which is not infrequently found in the retrocolic fossa. In some of these cases the appendix is described as lying between the layers of the mesocolon or behind the peritoneum, and it is in such cases that an inexperienced operator may fail to find the organ.

FRACTURES OF THE PELVIS.

Dr. Henry R. Wharton reported three cases of fracture of the pelvis, as follows:

Case I.—Man, aged 34 years, a locomotive fireman, was admitted to the Presbyterian Hospital May 5, 1908, having been caught between the tender of a locomotive and a water tank. On admission he was suffering from shock, contusion of the back, and tenderness over the lower portion of the abdomen. There was some bleeding from the urethra. A rubber catheter introduced into the urethra withdrew several drachms of blood, and the catheter could not be introduced into the bladder. A metal catheter was then passed and drew clear urine. The following day the patient complained of pain over the lower portion of the abdomen, and there was some discoloration of the skin over the perineum and posterior portion of the scrotum; the patient was able to pass his urine, which was slightly tinged with blood.

There was some rigidity over the lower portion of the abdomen. The patient's condition remained the same for some days, and repeated examinations failed to elicit any symptoms of fracture of the pelvis. An X-ray examination was made with a negative result.

The patient, ten days after admission, still complained of tenderness on pressure over the pubis, and a mass three inches in diameter could be demonstrated in this region. About this time there was a moderate elevation in his temperature, and there was a decided leucocytosis.

On June 2 a small abscess developed upon the upper left side of the perineum, which was incised. As the patient's condition was not improving, and the mass over the pubes was still tender upon pressure, it was decided that this should be incised. An incision in the median line, two inches in length, one and a half inches above the pubis, opened an abscess which contained several ounces of broken-down blood-clot and offensive pus. Exploration of this cavity with the finger revealed a fracture of the horizontal ramus of the pubes, with the fragments in good position, and the sinus resulting from the abscess previously opened was found to communicate with the abscess cavity. A week after the suprapubic opening had been made urine began to escape from this opening. An X-ray examination made at this time showed a fracture of the pubic bone on the left side. The patient did not improve in spite of the free drainage, the temperature became more elevated, and he developed marked septic symptoms; and he died on July 22.

In this case injury of the bony pelvis was not suspected, as the symptoms pointed to a contusion of the lower abdomen, with the formation of a blood-clot above the pubes, and it was only when this had become infected, and abscess had formed, that the true nature of the injury was disclosed. It is possible in this case that earlier operative interference might have averted the fatal issue.

Case II.—Man, aged 25 years, a moulder employed in a steel mill, was struck upon the pelvis by a flask weighing about 1000 pounds, which produced a fracture of the pubes and a lacerated wound of the perineum, from which there was free bleeding. He was brought to the Presbyterian Hospital May 26, 1906, ten hours

after the accident, when examination showed that there was a fracture of the pubis involving the left side, a lacerated wound of the perineum which exposed the anterior wall of the rectum for a considerable distance; the abdomen was moderately distended, and the bladder was also markedly distended; a small amount of blood-stained urine escaped from the perineal wound.

The patient was etherized, and exploration of the perineal wound with the finger showed that it extended to the base of the bladder; a fracture of the pubes, with some displacement of the fragments, could also be demonstrated. It was found impossible to pass a catheter into the bladder through the penis or through the perineal wound. It was then decided to open the bladder above the pubis and attempt a retrograde catheterization. This was done, a catheter was passed through the bladder into the urethra and secured in this position, and the suprapubic wound was closed. Drainage was also introduced into the perineal wound. The suprapubic wound opened and discharged urine in a few days, and free purulent discharge occurred from the perineal wound for several weeks, which was accompanied by marked febrile disturbance, but at the end of three weeks the bladder drainage was removed, and at this time he voided urine partly through the urethra, the suprapubic opening, and the perineal wound. A sound was passed each day through the urethra into the bladder, and the leakage of urine from the perineum gradually ceased. The suprapubic and perineal wounds gradually healed, and he was able to pass the urine freely by the urethra, and was discharged from the hospital on August 25, 1906, in good condition.

He was advised to continue the passage of the sound at intervals, and when last seen, a year after the accident, he was in good health, and had no difficulty in passing urine, but was still passing the sound at intervals.

Case III.—Boy, aged 12 years, was run over by an ice wagon loaded with 1800 pounds of ice, the wheels passing obliquely over the pelvis from left to right. He was admitted to the Presbyterian Hospital July 14, 1908, a few minutes after the accident, and exhibited the symptoms of shock in a most marked degree. Examination revealed a lacerated wound, exposing the abdominal muscles three inches to the right of the umbilicus; also an abrasion

of the upper part of the left thigh, 4 inches by 6 inches, with several other less serious abrasions. Examination also revealed separation of the left sacro-iliac joint, and a marked separation of the pubic bones at the symphysis; the right leg was abducted and showed apparent lengthening. A catheter passed into the bladder drew clear urine. Examination of the rectum showed no blood, so that it was concluded that these viscera had escaped injury. X-ray examination showed that the injury to the pelvic bones was very extensive, consisting of the marked separation of the left sacro-iliac joint, complete separation of the pubic bones with downward displacement, and a fracture through the right iliac bones just above the acetabulum.

The patient was actively treated for the condition of shock, the wounds and abrasions were dressed, and a firm muslin binder was applied around the pelvis and was reinforced by broad straps of adhesive plaster.

The patient gradually reacted from the condition of shock, and as soon as the condition of the wounds would permit, a plaster-of-Paris bandage, including the pelvis and upper portion of each thigh, was applied.

The patient made an uninterrupted recovery and was discharged from the hospital August 18, 1908, but was kept in his bed at home, with the plaster-of-Paris bandage in position, for a month subsequently. The reporter has been informed that the boy is now able to walk without difficulty and is in good condition. The remarkable feature in this case was the extensive damage to the pelvic bones without damage to the pelvic viscera.

LARGE GALL-STONE REMOVED FROM THE COMMON DUCT.

Dr. Wharton reported the history of a man, aged 56 years, who was admitted to the Presbyterian Hospital with the history that he had suffered for the last few years with recurrent attacks of pain in the epigastrium, and jaundice. At the time of his admission he was very markedly jaundiced, and complained of pain on pressure over the gall-bladder. His temperature was elevated and there was tenderness on pressure over the gall-bladder.

The gall-bladder was exposed and opened, and contained several ounces of pus and two gall-stones. The region of the common duct was explored, but no stone could be felt. The gall-

bladder was drained, and the patient's general condition improved, and the jaundice disappeared. The sinus leading to the gall-bladder still continued to discharge a large quantity of bile. He left the hospital some weeks after the operation with the sinus still discharging a large quantity of bile.

He returned a short time ago, stating that the bile still continued to escape freely from the sinus. His general health at this time was good. Upon opening the abdomen the common duct was found to be obstructed by a large stone, which was removed and the duct drained. The common duct in this case seemed to occupy a much lower position in the abdomen than is usual, possibly being dragged downward by the weight of the contained stone, which may account for the fact that it was not discerned at the first operation. The patient made a rapid recovery, the wound being entirely healed in three weeks.

Dr. John B. Deaver said that this stone presented by Dr. Wharton was a particularly large one. He had extracted as large stones, and in a few instances larger ones, but they are very unusual. That very day he had operated on a physician, 77 years of age, whom he had had under his care before. He was first operated upon some six years ago, when he had a larger stone in the common duct than the one shown by Dr. Wharton. He had a choledochoduodenostomy formed by nature which explained the absence of jaundice. There was no difficulty in removing the stone, but a good deal in dealing with the gall-bladder. He made an uneventful recovery. A year later he came back with a forming abscess in the region of the field of operation, which was opened and drained and he went home well. Later he reported that he had slight jaundice with renewed symptoms of stone in the common duct. At the operation that day he was found to have three stones in his common duct and two stones in the right hepatic duct; one of the stones in the hepatic duct was removed without difficulty; the second, as it could be felt with the finger but could not be delivered, was broken up until the gall-stone scoop could be passed well into the hepatic duct, which so far as could be seen was clear. The stones in the common duct were not as large as this of Dr. Wharton's, but were of good size. Those in the right hepatic duct were smaller.

Now the lesson he had learned from this, as well as from other cases of this kind, is, never to do a cholecystectomy when a

cholecystostomy will suffice. One of the reasons why the gall-bladder should not be removed, from a physiological standpoint, is that if the patient is the subject of subsequent stone formation, the stones will form in the common or hepatic ducts, while if the gall-bladder had been left they would more than likely have formed in it. The hepatic duct stones in the case now reported formed because the common duct was practically filled by the three large stones. He was pretty sure that he did not miss these stones in his first operation, because he had the common duct wide open; therefore he believed these stones to be a subsequent formation. However he had had the same experience as Dr. Wharton, that of opening the gall-bladder and failing to find the stone, and then finding it subsequently.

GOITRE AS AFFECTED BY THE X-RAY.

Dr. William J. Taylor reported the history of a young girl, aged 15 years, who had a goitre involving both lobes of the thyroid, which was not large, but was distinct and at times interfered somewhat with her breathing. In view of her age and the small size of the growth, and because her mother was much opposed to any operation, the use of the X-ray was advised.

She therefore went to Dr. S. Mason McCollin quite frequently from the middle of January, 1905, to June of that same year, for treatment by the X-ray. Under its influence the circumference of the neck diminished one and one-half inches, that is from thirteen and one-half to twelve inches. An extraordinary chain of symptoms, however, developed. After the exposures had been continued for this length of time, and coincident with the diminution in the size of the goitre, she became very nervous, her eyes prominent, her heart action very rapid, and she presented all of the symptoms of exophthalmic goitre. As soon as the exposures to the X-ray were stopped all these symptoms subsided, and while there was no increase in the growth of the thyroid, her general condition was very much improved.

That the X-ray is powerful in its action is undoubted; and the peculiar behavior of this growth, simulating so closely the symptoms of an overdose of thyroid secretion, would tend very much toward confirming the theory that exophthalmic goitre is due to an excess or systemic poisoning by this secretion. It is known that the X-ray produces an overgrowth of fibrous tissue and a gradual contraction of all glandular tissue. Is it not possible that the long continued use of the X-ray squeezed the thyroid and thus produced systemic poisoning from the secretion?

Dr. C. L. Leonard (by invitation) remarked that he had had under treatment cases which exhibited not so marked symptoms of Graves's disease, since they resulted from overdosage and carrying the treatment too far. In his first case, the goitre disappeared, but the treatment was carried too far and the patient had temporary disturbance in the gait and unsteadiness, which has now been entirely recovered from. That was over four years ago, and the patient is now in perfect health. In the second case treated four years ago, in a young girl of 18, the treatment was suspended before the goitre disappeared completely in order not to carry it too far. Six months later the continued effect of the treatment was shown in the complete reduction of the growth. He had had another case of simple goitre in which treatment was stopped about six months since. The patient is now perfectly free from any symptoms or signs of goitre. But the most remarkable effects he had seen had been in the forms of exophthalmic goitre. One patient had all the symptoms of exophthalmic goitre, with the exception of exophthalmos. She recovered completely from all the symptoms of Graves's disease. When asked if she had any more trouble with her heart, she said, only when she ran for trolley cars! Dr. Leonard had seen in the Liverpool Hospital cases of exophthalmic goitre which were most remarkable, the patients having been referred for treatment in the last stages of the disease, when they were completely bedridden. They recovered to such a degree that they were about the wards but were not fully recovered at the time he saw them, although markedly improved, their charts showing a rapid decrease in the symptoms and pulse rate. The remarkable results achieved by Röntgen treatment are the more remarkable since these patients are only referred for treatment when the disease is far advanced. The case reported is only an evidence of the efficiency of this treatment and a warning that the treatment must not be carried too far or, as in the older complete operations, the total removal or destruction of the gland will produce grave symptoms.

Dr. John B. Deaver said that he could not see the philosophy of treating simple goitre with the X-ray, because the surgical treatment is so brilliant and satisfactory. Dr. Taylor's patient

objected to operation. In the case of exophthalmic goitre it may have a field. His recent experience, since he had given up the removal of the cervical ganglia of the sympathetic nerve, had been satisfactory. He now confined the patient to bed for several days before operation, gave Beebe serum, ligated one or more of the thyroid arteries, and later removed half of the gland. His results are now so good that he would hesitate about advising X-ray treatment until it was demonstrated to be more beneficial. Where the X-ray has been applied for any length of time it makes the dissection more difficult, another thing which would make him hesitate to use it. He had used the X-ray for the purpose of thickening the capsule but latterly had given this up.

Dr. William J. Taylor said that he had purposely said nothing about exophthalmic goitre in his report, as this case was one of true goitre, and not Graves's disease. The patient was a healthy, bright, strong, lusty girl of 15. She had no tachycardia, no symptoms whatever except that the goitre produced a little pressure on her trachea and gave her some dyspnœa on exertion. The question of treatment of exophthalmic goitre by the X-ray of course is a very different subject, and one to be gone into with a great deal of elaboration. The results of any form of treatment of exophthalmic goitre are to his mind somewhat doubtful, as he had seen a number get well if kept in bed. Many cases come to the Orthopædic Hospital and Infirmary for Nervous Diseases, are put to bed on a rest treatment, are built up, and get entirely well in a short time. If the X-ray was used they would say the X-ray had produced that result. He would not say that the X-ray will not produce good results, as he had not had any experience with them. Personally, he should feel very anxious about the use of the X-ray in an exophthalmic goitre case, because if one squeezes still more of the secretions into the individual a more profound intoxication is produced. The operative results in the very persistent exophthalmic cases are so very good that personally he was inclined toward the operative treatment rather than the X-ray. He agreed with Dr. Deaver in the statement that the X-ray produces a change in the tissues and makes dissection much more difficult. This is demonstrated very effectually in cases of glandular disease of the neck. Several times he has been unfortunate enough to be compelled to operate after X-rays had been used, and at times it was almost impossible to tell one tissue from

another, and where one could ordinarily use a blunt dissector a knife or scissors is required.

Some of these patients at the Orthopædic Hospital have remained well, and personally he would not consent to operate on cases of exophthalmic goitre without a preliminary trial of the rest treatment. Some, of course, will get progressively worse in bed. One of the cases upon which he operated for Dr. Mitchell, some four or five years ago, was in bed for months; every possible means was tried to help him, and standing by this man's bed you could see the mattress shake. He removed his thyroid, first attempting it without an anæsthetic, but he was so agitated that chloroform had to be given to complete the operation. The next morning he was really hollow-eyed; he was better than for weeks, and eventually made a good recovery.

One of the essential points in operation in exophthalmic goitre is drainage. In any case of exophthalmic goitre in which any portion of it is removed it is absolutely necessary to provide largely for drainage, otherwise there will be a still further intoxication.

STATED MEETING, HELD FEBRUARY 1, 1909.

The President, Dr. William J. Taylor, in the Chair.

OBSTRUCTION OF BOWEL AFTER REDUCTION OF A STRANGULATED FEMORAL HERNIA.

Dr. Edward B. Hodge reported the history of a woman, aged 59 years, who was admitted Nov. 4, 1908, to the Presbyterian Hospital, in the service of Dr. W. L. Rodman, complaining of abdominal pain and vomiting. For four years she had had a painless lump in the left groin, the size of a walnut. This never disappeared or changed in size. Three days before admission, the lump became painful and a little larger. She began to have abdominal pain, diffuse at first, localized to the epigastrium in the last twenty-four hours. Vomiting appeared early, and lately has occurred every 15 to 20 minutes. It was not fecal. There has been no bowel movement since the attack began. A small mass was felt in the region of the left femoral ring; it was not tender.

A diagnosis of strangulated femoral hernia was made and immediate operation performed.

A two-inch vertical incision exposed the sac of a femoral hernia, containing a loop of dark purple small intestine. The constriction was relieved by several nicks about the circumference of the ring, a few recent adhesions were loosened, and more bowel pulled down. One limb showed a band darker than the rest, ¼ in. wide and two-thirds around the bowel. Under hot moist sponges the circulation returned except in this band and a small spot, ⅛ in. in diameter, an inch or two from it. Acting on a suggestion of Summer's, this suspicious band of gut was invaginated into the healthy intestine by silk Lembert sutures, reinforced by a continuous silk suture. The small area was turned in by a silk purse-string suture reinforced by one or two interrupted sutures. The intestine was replaced in the abdomen, and the wound sutured with interrupted silkworm gut around a cigarette drain. The patient left the table in good condition, with a pulse of 110.

She did well for two days, when vomiting began. This steadily increased, as did distention. No flatus was passed, and on the fourth day distended intestinal coils, with visible peristalsis, could be made out. The pulse began to rise, with normal temperature. Mechanical obstruction was evident. Ninety-six hours after the first operation, the abdomen was opened in the median line above the pubis. There was considerable clear, bloody fluid in the pelvis. Coils of collapsed and of moderately distended small intestine presented. A finger passed to the region of the femoral ring showed no great swelling, but the bowel was adherent to the paries, and there seemed to be a sharp angulation. Acting on Dr. Rodman's suggestion, no attempt at resection was made, but, without disturbing the adhesions, lateral anastomosis was done with clamps between the afferent and efferent loops, as close to the site of the obstruction as allowed easy delivery in the wound; No. 1 chromic gut was used for the inner row of sutures and No. 2 Pagenstecher for the outer. The latter was reinforced at one or two points with interrupted sutures. On removal of the clamps gas passed freely from the afferent to the efferent loop. Gauze in a split rubber tube was used for a drain. The abdomen was closed with through-and-through silkworm gut, and continuous No. 2 chromic catgut in the fascia.

The patient left the table in fair condition and did well thereafter. Flatus was passed in a few hours. The distention steadily lessened and vomiting did not occur. No attempt to move the bowels was made. At the end of a week they moved naturally. Her further convalescence was uneventful.

PERFORATING PYLORIC ULCER.

Dr. John H. Jopson related the history of the following two cases:

Case I, male, aged 43 years, was admitted to the Bryn Mawr Hospital April 13, 1906. He was by occupation a gardener; used tobacco and malt liquors freely. He had suffered for ten or fifteen years from indigestion. Pain and discomfort were present in the epigastric region, most marked about two hours after a meal. He never vomited, and there was no history of bleeding. He attributed his present attack to the recent ingestion of considerable quantities of porter. On the evening before admis-

sion, after eating his supper, and while lying down smoking, he was seized with sudden, severe abdominal pain, which persisted, in spite of treatment during the night; and he was admitted to the hospital at 9 A.M. of the following day.

His temperature on admission was $101^{2}/_{5}°$, pulse 60, respirations 20. He was seen by Dr. Jopson in the evening of the same day in consultation with Drs. Christie and Laird. His general condition was excellent, temperature $99^{3}/_{5}°$, pulse 72, respirations 18. At this time his symptoms were those of acute appendicitis. The pain, tenderness, and rigidity which were present were most marked in the right iliac region. There was moderate tenderness and rigidity in the right hypochondrium, and the possibility of a gastric perforation was considered and discussed; it was considered unlikely, however.

He was operated upon at 8.30 P.M., twenty-four hours after the onset of his acute illness. Right iliac incision. A small quantity of gas escaped on opening the peritoneal cavity, and there was considerable free turbid fluid in the abdomen. The appendix was picked up and found normal. The incision was at once extended upward and the pyloric region explored. Patches of lymph on the intestine were noted in this direction. A small perforation at the pylorus was detected. It was apparently on the stomach side of the pylorus. It was small, not much over pinhead size, circular, and was easily closed by a purse-string suture of silk, reinforced by Lembert sutures. The pelvis was drained by cigarette and glass tube, and the pyloric region by iodoform gauze. The wound was drawn together by several through-and-through silkworm-gut sutures. The patient stood the operation exceedingly well and without shock. His pulse soon fell to below 100, and the temperature remained around 99° and 100° for a couple of days, and was thereafter normal. He was treated in the sitting posture with continuous enteroclysis, and nourished by rectal enemata for several days before mouth-feeding was begun, malted milk, a favorite rectal nutrient at the Bryn Mawr Hospital, being used. He was in the hospital six weeks.

It is now nearly three years since the operation. The man did not resume his usual work for nearly a year, but he has since that time been at active work as a gardener in his old place. He says he is quite well, except for some tendency to fermentation and gas; eats heartily; smokes heavily; has no pain referred to his stomach. His health is very much better than before his illness, but he has some pain in the right side after stooping or heavy lifting, probably from adhesions.

CASE II.—Male, white, aged 52, was admitted to the Presbyterian Hospital Nov. 21, 1908, with a diagnosis of perforated duodenal ulcer. His previous history showed him to be an active man, of somewhat irregular habits, periodically indulging in alcohol to excess, but not a steady drinker. Uses tobacco to excess. He gives a history of gastric trouble dating back for about twelve years. His symptoms consisted of eructations, gastric pain, and distress before meals and at bedtime, and gastric pain and nausea coming on several hours after a meal, which would be relieved by the taking of food, only to return after three or four hours. Vomiting was often self-induced to relieve gastric distress and hyperacidity. These symptoms have been growing worse for two or three months. There has been no marked loss of weight, and he has been able to attend steadily to his work, which involves considerable walking.

On the day of admission he had submitted to a stomach examination for diagnosis, a stomach-tube being passed by his physician after usual test breakfast, and the following data obtained: Free HCl, 0.26; total acidity, 0.39. Lactic, butyric, and acetic acids absent. Bile absent, and pepsin in normal amount. Microscopic examination showed many starch granules, broken and unbroken, and occasional epithelial cells. A blood examination at this time showed 90 per cent. hæmoglobin, and 4,500,000 red cells, with 8,400 whites. Four hours after the test breakfast he took a lunch of eggs, toast, and tea; and while walking home an hour thereafter was taken with sudden, agonizing abdominal pain and retching. He was unable to proceed, and was taken home in a patrol wagon. He was seen by Drs. Bryan and Turnbull, and later by Dr. W. E. Hughes, who made a diagnosis of duodenal ulcer with perforation. Pain was with difficulty controlled by large doses of morphine. He was admitted to the Presbyterian Hospital at 11.30 P.M. At this time, nine hours after onset of pain, he was in good condition; temperature $98^{3}/_{5}°$, pulse 124. The pain had been partly controlled by morphine. The abdomen was of board-like rigidity, and the upper half very tender, the tenderness most pronounced on the right

side. There was no distention. No vomiting, but some retching.

Operation, eleven hours after onset. Right rectus incision. There was immediate escape of gas on opening the peritoneum, followed by free and persistent expulsion of great quantities of turbid fluid which had been confined under pressure in the rigid abdomen. The entire abdominal and pelvic cavities were filled with this exudate. A large ragged opening in the anterior wall of a much infiltrated pylorus was easily found. It admitted the gloved index finger, which easily passed into the duodenum. It could not be stated definitely that the perforation was to the duodenal side of the pylorus, which was deeply fixed in the abdomen. There was much lymph over the pyloric end of the stomach and the duodenum. Owing to the fact that the pylorus was practically torn in half by the ulceration, some uneasiness was experienced as to the possibility of closure by sutures. With care, however, it was successfully and apparently tightly closed by a double layer of Pagenstecher sutures applied in interrupted fashion—the first layer, through-and-through stitches of the edges; and the second, covering in this with Lembert's. The lesser omentum was pulled down over the wound at its upper angle. A suprapubic opening was then made and a glass tube inserted into the pelvis. The peritoneum was thoroughly flushed until clear fluid returned from both wounds. A cigarette drain and two strips of gauze drained the pyloric region, and the upper and lower parts of the wound were sutured. A glass and rubber tube were left in the pelvis.

The patient was not in the least shocked by the operation, his pulse being only 104 when removed from the table. He was placed on the Fowler-Murphy treatment, and nothing given by mouth for 40 hours. He was fed for several days by nutritive enemata, and mouth-feeding started after three days. He was in bed three weeks, and left the hospital at the end of four weeks. He has continued to gain in weight and strength. His diet is now a fairly generous one. He has a little fermentation at times, but has no pain to speak of. He still, at the end of two months, has a narrow sinus in the upper wound.

Dr. Jopson remarked, further, that he had sutured three gastric ulcers which had perforated, all in middle-aged men, and located in or near the pylorus, and all had recovered. As to the exact location of the perforation, and whether it is on the stomach or

duodenal side of the pylorus, it is difficult in these perforated cases to state, as Eliot has recently emphasized. The pylorus is often the site of so much œdema, and is so deeply fixed in the abdomen, that it is frequently impossible to say that an ulcer is on this or that side of the dividing line. The symptoms of the perforation in any event are the same. For the first few hours the localized tenderness and muscle spasm are especially pronounced in the abdominal wall over the site of perforation; but after this, as the infectious material gravitates down along the right side of the abdomen and as the peritoneal inflammation accompanies it, the symptoms in pyloric and duodenal perforation later become those of the usual right iliac inflammation, appendicitis; and hence we find a larger number of cases seen late diagnosed as appendicitis. In his first two cases, seen twenty-four hours or more after perforation, this diagnosis was made. An appendix incision, extended upward sufficiently far, gives good exposure and good drainage of the infected right abdomen. When the perforation is in other portions of the stomach, late cases show, perhaps, only general peritonitis. Some years ago he operated on a case of this type, with advanced general peritonitis, in which the lesion was found only at autopsy.

Of the methods of closure of the perforation little need be said except, as in the last case, in connection with the suture of large perforations, where tamponing, omental flaps and plugs, overlapping by neighboring organs, and even gastrostomy have been suggested, although the last-mentioned has given very poor results. Jejunostomy has been recommended for perforation by Von Eiselsberg, to relieve tension and put the stomach at rest; and he and his associates have so treated 12 cases with 5 recoveries. Excision, pylorectomy, or pyloroplasty have also been recommended and practised. The most vital question is, of course, as to the performance or non-performance of gastro-enterostomy after closure of the ulcer. Moynihan advises it in cases seen early and in good condition; while Eliot, as a result of careful, recent study, advises against it as a primary measure, on account of the slightly greater mortality, and the fact that the after history of these cases shows practically as little danger of recurrence as do cases subjected to primary gastrojejunostomy without perforation. He advises waiting until subsequent (and unusual) symptoms may demand it.

Hemorrhage from, and perforation of other ulcers has occurred both early and late after suture of perforated ulcers, and persistent gastric symptoms have called for secondary and usually successful operation; but it is true that the majority of cases that recover from the acute attack of perforation remain well without gastro-enterostomy being required. In perforated cases operated upon after twelve hours, few would advise it. Eliot analyzed 51 cases treated by gastro-enterostomy with 33 recoveries and 18 deaths, a mortality of 35.5 per cent., and not a bad showing. Eighty-two cases sutured, without gastro-enterostomy, gave a mortality of 34.1 per cent. Whether gastro-enterostomy is indicated except when suture of the ulcer causes excessive narrowing of the pylorus, is still somewhat of a question. It would seem to be justifiable to surgeons of special experience in cases seen early after perforation and in good condition. He had been much impressed with the absence of shock in his cases. Indeed the operation could have been reasonably prolonged in all three without serious detriment to the patient.

PERFORATED GASTRIC ULCER.

Dr. Morris Booth Miller related the history of a man, aged 32, who was admitted to the Polyclinic Hospital on October 2, 1908, about seven o'clock in the morning. All the history obtainable at that time was to the effect that at about eleven o'clock the previous night he had been suddenly taken ill with severe pain in the right side of the abdomen followed by moderate vomiting. He was promptly seen by Dr. Henry Tucker and later by Dr. David Riesman, both of whom advised that he be sent to the hospital without delay. This advice was not accepted; but as his condition grew worse during the night he was finally removed to the Polyclinic early in the morning. Prior to operation he was unable to give any account of previous ill health; but during his convalescence he gave them the interesting data that for over a year he had suffered at frequent intervals from epigastric pain, distention, gaseous eructations, and constipation, and that, further, he had been seen during this time by Dr. William E. Hughes, who had diagnosed gastric ulcer and had spoken of operation.

When admitted to the hospital he presented to a striking degree the clinical picture of abdominal disaster. He was pinched, anxious-looking, and blanched, sweating slightly, and evidently in great pain. The temperature was $96^{4}/_{5}°$, pulse 92, respiration 32, The belly walls were sunken, board-like in texture, and the rigidity seemed equal on both sides. He located the maximum of pain on the right side and about the umbilicus. Immediate operation was undertaken and inasmuch as a provisional diagnosis of acute perforating appendicitis had been made one incision was made in that area. There escaped at once a considerable quantity of turbid fluid containing flocculent particles, but aside from the pervading congestion the appendix was normal. An incision was then made through the upper right rectus, and at once the characteristic sound of air sucking in and out was apparent. With no difficulty the perforation was located on the anterior and under surface of the stomach about one inch from the pylorus. The opening was punched-out, irregular in outline, hardly large enough to admit a pencil and it apparently had occurred not at the centre of but near the pyloric edge of an indurated area about an inch in diameter. One through-and-through suture closed the perforation, and the whole ulcer was turned in with a continuous Lembert suture in the general axis of the stomach. Gastrojejunostomy was considered, but not done, as his condition would hardly warrant it. A rapid search revealed no evidence of other ulcers. An additional opening was made above the pubis for pelvic drainage; and after a quick toilet by mopping, thorough drainage by wicks and split rubber tubes was established at all three incisions.

When sent back to the ward he was placed in a semi-recumbent posture and enteroclysis with normal salt solution was continuously used for nearly a week, with its usual admirable results. Aside from a bronchopneumonia which appeared the next day and which lasted four or five days, his convalescence was uneventful and he was discharged on the twenty-ninth day. He has since been under observation and there has been no recurrence of his former gastric symptoms. This case may be placed on record as having been operated on nine hours after perforation.

Dr. John B. Deaver said that in cases of perforating gastric ulcer the question of diagnosis in many instances is an uncertain one. Many cases of perforation had been diagnosed as appendicitis, but as experience grows richer such errors are less liable to occur. Personally he did a posterior gastrojejunostomy in the majority of instances. He never hesitated on account of the patient's condition, because the operation adds practically nothing

to the risk. In these cases of excessive indurations, as in Dr. Jopson's case, it is a safer procedure. The cases that he had been able to follow had been entirely relieved of digestive disturbances, eructation of gas, hyperchlorhydria, etc. He always drained suprapubically, but rarely at the point of attack. He never flushed the abdomen. Most of his cases had been duodenal, and all had recovered. It is a safe operation certainly within 36 to 48 hours. The percentage of mortality is not large. Posterior gastrojejunostomy was especially indicated in cases where there is much induration and where one cannot be sure about the lumen of the duodenum or of the pylorus, as the case may be.

Dr. John H. Gibbon said that he had had eight cases of perforating duodenal and gastric ulcer with three recoveries, which, according to statistics, is about the average. The mortality rate will depend largely upon the time at which the operation is done after the perforation has occurred. In one of his cases he was fortunate enough to operate within a few hours, and in another within nine hours after perforation, and each of these recovered. In one case, done thirty hours after perforation, the patient died on the twenty-fourth day from a pelvic abscess due to faulty drainage, and in spite of the subsequent drainage of this abscess. All of the cases which had gone over thirty hours before operation died, most of them being very ill from an extensive general peritonitis.

The general practitioner needs to be impressed with the importance of prompt operation in all cases of acute abdominal crises. In his last case, operated upon a few weeks ago, thirty hours had elapsed since perforation and the patient had received a grain of morphine during the previous night for his severe abdominal pain. This greatly masked the symptoms and in this way influenced the fatal result. In the early cases of perforation, where there is little extravasation, or where there is a small opening and none of the contents have escaped, a gastrojejunostomy is contraindicated unless the pylorus is obstructed by the ulcer. Drainage, where extravasation of the gastric and intestinal contents has taken place, and where more than a few hours have elapsed, should be employed, both at the site of perforation and perhaps also suprapubically. He thought that none of the cases which he had lost could have been saved by the additional operation of gastrojejunostomy. This operation in the presence of an extensive peritonitis opens up the lesser peritoneal cavity to infection, and where the patient is in bad condition greatly jeopardizes his chances of recovery. In one case which recovered from an acute perforation, he had to do a gastro-enterostomy eighteen months later for a return of symptoms; but this is not the rule unless the ulcer is situated at the pylorus and produces obstruction.

The secret of success in these cases is the same as in acute appendicitis, namely, early operation. It is not so much a question of technic as it is of getting at the case early. Where a gastro-enterostomy is not done the important point in the postoperative treatment is the keeping of food out of the stomach and feeding the patient by the rectum.

Dr. Robert G. Le Conte did not believe there were many cases of gastric and duodenal perforation which require an immediate gastro-enterostomy. The object of an immediate gastro-enterostomy is to drain the stomach during the period of healing of the ulcer and to afford a new outlet for food, when closing of the perforation has produced a stenosis of the pylorus. The same results, however, may be accomplished for two or three weeks without gastro-enterostomy, by withholding all food from the mouth and feeding the patient by the rectum. Where the ulcer has a large indurated base, and is situated near the pylorus, its closure contracts the pyloric opening; but this contraction is frequently a temporary one, which is relieved as the indurated area is absorbed. In such a condition, then, if gastro-enterostomy is done at the time of closure of the ulcer, the patient is subjected to the immediate risk of an operation prolonged for, perhaps, twenty minutes, and the ultimate probability of a useless opening in the dependent portion of the stomach when the pylorus has returned to its original calibre. He recalled a case of Dr. Gibbon's, where a firm closure of the ulcer could not be secured by direct suture, and an omental patch was used to re-enforce the closure. This case made a perfect recovery without gastro-enterostomy, by withholding all food from the mouth for a period of three weeks. Mayo has twice lately in chronic gastric ulcer deliberately cut out the base of the ulcer with a sharp knife, and then closed the defect, producing the picture of an acute perforation. The immediate results have been most favorable, without a gastro-enterostomy.

As to lavage of the peritoneal cavity in these cases, in perito-

nitis following appendiceal perforation he did not usually wash the peritoneum; but in a gastric perforation, with the possibility of particles of undigested food having entered the peritoneum, he believed that lavage often does good, for he had in such cases washed out bits of meat and tomato skins which he felt confident would have been a source of trouble had they been allowed to remain within the peritoneal cavity.

Dr. Astley P. C. Ashhurst said that two points which had arisen in this discussion were illustrated in an unusual manner in the case of a patient with duodenal perforation on whom he had recently operated at the Episcopal Hospital in the service of Dr. Frazier: first, the differential diagnosis from appendicitis; and second, the question of irrigation and drainage. In the patient under Dr. Ashhurst's care Dr. Frazier had removed the appendix during an acute attack just one year previously; and in the present illness this fact tended to confuse the diagnosis, for the patient was thought to be suffering from intestinal obstruction resulting from his previous operation. On opening the abdomen in the suprapubic region, however, the true condition was manifested by finding fecal matter free in the peritoneal cavity. An incision was then made in the epigastric region, and the perforation (of the duodenum) sutured, about seven hours after perforation occurred. A culture from the fecal matter in the lower abdomen remained sterile. This seemed an important point in relation to the question of irrigation and drainage; but as it was not known at operation that this matter was sterile, the entire abdominal cavity was thoroughly irrigated, removing pieces of potato and other material, as well as quantities of flocculent lymph; and the abdomen was drained from both wounds. (A culture made a week later from the depths of the upper wound showed the presence of the colon bacillus.) Gastro-enterostomy was not done, as the peritonitis appeared too widespread to make prolongation of the operative justifiable. The patient made an uninterrupted recovery.

Dr. Jopson said, as to mortality, that the percentage of deaths in large series of cases of gastric and duodenal ulcers is not far from 50 per cent., although Moynihan reports twenty-four cases of gastric and duodenal ulcers with nine deaths, a mortality rate of 37.5 per cent. Eliot gives two series, one with gastro-enterostomy, and the other without, with a mortality of 34 per

cent. or 35 per cent., being a little less in those cases in which the operation of gastro-enterostomy was not added to that of repair.

While he seldom used lavage in abdominal infections it seemed to him that in cases in which the abdominal cavity is filled with fluid which may be sterile, but is suspicious, it does no harm to replace it with a fluid which is known to be sterile. The procedure cannot spread infection, as the whole abdominal cavity is already involved. When abdominal infection is localized few irrigate. In perforated gastric ulcers, however, the conditions are different.

Regarding the performance of gastro-enterostomy he recalled the case of a patient under the care of one of the Fellows of this Academy in which perforation occurred and was repaired and the patient died a few days after of perforation of other ulcers. Unfortunately the surgeon seldom sees these cases within the first few hours, when gastro-enterostomy would seem safe and easy; and after ten or twelve hours, when there is diffuse infection, one runs greater risks by an extensive and prolonged operation.

CONGENITAL MESENTERIC CYSTS.

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THE rarity of mesenteric cysts, coupled with their interesting and by no means established *status* in pathological anatomy, entitles hitherto unreported cases to a place in the literary annals of the day.

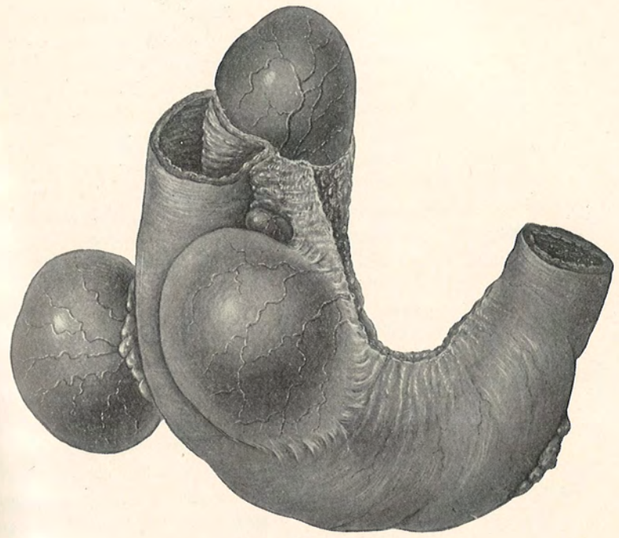
On May 20, 1908, I operated upon the following little patient in the Children's Hospital of the Mary J. Drexel Home:

E. B., aged 7 years, school-girl, was admitted May 19, 1908, complaining of abdominal pain and vomiting. Two years previously she had suffered from a malady then diagnosed as gastritis. Two weeks before admission she suffered with abdominal pain and vomiting. Nine days later, her mother noticed a yellowish vaginal discharge. The pain and discharge subsided, and the patient arose from her bed eight days after onset, but even then complained of soreness in the right lower abdomen, and walked bent forwards. Patient was about for four days, during which time she suffered an attack of pain and vomiting. The night before admission she complained of increased abdominal pain and frequent emesis. The next day brought ease and much comfort, when the bowels moved at 3 o'clock in the afternoon. On admission at 8 P.M. the temperature was 103° F., and the pulse 126 per minute.

Examination revealed slight abdominal distention with bilateral mural rigidity and marked tenderness below the umbilicus. There were points of greater tenderness in both iliac fossæ, these points spanning an area in which two tumors were distinctly felt.

After cœliotomy the tumor was so juxtaposed that at first sight it resembled a distended cæcum over an abscess or a cyst of ovary. Further manipulation however revealed the condition reproduced in Fig. 1. The first cyst seen encroached upon the

FIG. 1.



Cysts of the mesentery.

ileum, and increased the non-peritoneal area of the latter by pushing apart the lamellæ of the mesentery at its intestinal border. This cyst had a diameter of 5 cm. and was situated about 15 cm. proximal to the ileocæcal valve. Close by it, resting on the right aspect of the gut and partly on the anterior lamella of the mesentery, was a second cyst of the same dimension; and adjoining this latter cyst on the right, between it and the first, was a smaller cyst, the size of a bean. A loop of ileum was so related to these two cysts that it was distal to the first and dorsal to the second. A third large cyst was found on the left lateral aspect of the coil of ileum, nearly opposite to the second, but lying more deeply in the right iliac fossa. As the sketch shows, the loop of the ileum was partly throttled by the grasp of the three cysts, and was free only opposite its mesenteric attachment.

As seen by the figure, the cysts and involved loop (25 cm.) of ileum were removed *in toto*, and lateral anastomosis performed. A glass tube in the pelvis sufficed for drainage. The patient was soon on the highroad to recovery and left the hospital June 13, 1908.

Here then was a patient suffering from incomplete intestinal obstruction the cause of which is plainly evident. The abdominal pain was doubtless due to the spasmodic contractions of the laboring intestine. Posture seemingly determined the obstruction, for when the patient was up and about, the latter appeared, but was relieved by recumbency. The mechanical action at play here may be worked out by reference to the sketch.

A case that nearly parallels the above was in the Leeds Infirmary, under Mr. Jessop (cited by Moynihan: *The Medical Chronicle,* September, 1902):

> M. J., aged 6 years, female; admitted June 9, 1892. For three months the child had complained of occasional attacks of sickness and vomiting, with pain across the front of the abdomen; there were two such attacks; and altogether there have been about one dozen. Their frequency has latterly been increasing. . . . A single attack may last a few hours or a few days.
>
> On examining the abdomen there is a trilobed tumor situated almost in the midline. The swelling is dull, but on two occasions a resonant band has been distinguished running across the middle. The area sur-

rounding the tumor is everywhere resonant. The tumor is usually movable in all directions, and can be rotated freely round its central point.

Under ether the tumor was removed. It was found to be a mesenteric cyst and multilobular, each loculus containing clear fluid. The mesentery and intestine were removed and the cut ends of the bowel united by Paul's tubes. The patient made a good recovery.

The cysts above described are the multilocular types of serous cysts, the other type being the simple. But what strange factor determines the presence of such cysts in such an unusual locality? Braquehays (*Archiv gén. de. Méd.,* Paris, September and November, 1892; also *Revue de Chir.,* 1892) classified mesenteric cysts under five headings, and Moynihan (*loc. cit.*) under eight; but Dowd (ANNALS OF SURGERY, 1900, vol. xxxii, p. 515) furnishes the following simple, but scientific, classification: (1) Embryonic cysts, (2) hydatid cysts, (3) cystic malignant disease.

My case fits in the first category, namely, that of embryonic cysts. Moynihan (*loc. cit.*) says: "One may remark with some assurance on the great probability of embryonic origin of most of the cysts found in the mesentery being established. The more closely cysts of the mesentery are studied the more likely does it become that, with the exception of parasitic and malignant cysts, all the forms are embryonic in origin, and are due to "rests" derived from the Müllerian or Wolffian organs or ducts, or from the ovary." Dowd (*loc. cit.*), by reviewing the anatomy of the primitive genito-urinary organs and alimentary canal, shows how easily a sequestration from the Wolffian body, or the embryonic genital gland, could be included between the folds of the mesentery, and proceeds with the statement: "It is altogether within the bonds of probability that such a separation should from time to time take place from the Wolffian body or the germinal epithelium at an early time in embryonic life; and, if such portions are separated, it is not strange that they should be carried into the mesentery, mesocolon, or mesorectum in the course of their development, and there form cysts such as this one or like many of the others which have been described."

The first mesenteric cyst was reported as an anatomical curiosity by Benivieni, a Florentine anatomist of the sixteenth century. No more significance was attributed to these cysts from that time until the middle of the past century. From 1850 to 1880, mesenteric cysts were occasionally found at operation when the expected lesion was ovarian cyst. It is only within the past thirty years that systematic clinical studies of these cysts have been made. One of the most meritorious and widely quoted of these studies was that contributed by Dowd (*loc. cit.*) in 1900. The author reported a case of dermoid cyst between the layers of the transverse mesocolon, emphasized the morphological significance of these tumors, offered a new classification, and showed the importance of histological examination of the cyst wall and analysis of its contents. Unfortunately this last could not be done in my case, because the specimen was lost after it was sketched.

The next important contribution was made in 1902 by Moynihan in a paper entitled "Tumors of the Mesentery" (*Mesenteric Chronicle,* Sept., 1902). Moynihan classifies cystic disease of the mesentery under eight headings, and describes examples of each. After a brief *résumé* of the subject from the clinical standpoint, he concludes with a short account of solid tumors of the mesentery. Speaking of chylous cysts, Moynihan says: "These are the most common form of mesenteric cysts, and may arise in two ways: either they are primarily dilated and varicose lymphatic vessels, which, gradually enlarging, form cysts; or they are *primarily serous cysts,* the lacteals bursting into the cyst on account of stretching and thinning of their coats. *The latter mode of origin is, in all probability, the more common.*"

In 1906 appeared a paper by Ayer entitled, "Enteric and Mesenteric Cysts with Report of an Unusual Case (*Am. Jour. Sc.,* Jan., 1906). The cyst in question was situated at the angle formed by the mesentery of the ileum and the reflection of the peritoneum at the descending colon. It was the size and shape of a duck's egg, and occupied the lumen of the cæcum. The cyst contained about four ounces of clear, viscid

fluid. Ayer's cyst was apparently similar in structure and origin to mine, falling, therefore under the heading of serous cysts. Speaking of the origin of the cyst, Ayer says: "Let us suppose that the cyst in question has its origin in the Wolffian body, the Wolffian duct, or Müller's duct. Recognizing the tendency of these 'rests' to undergo cystic degeneration and postulating the existence of such a process in the present instance, it is not difficult to conceive the chain of events, beginning with a tiny retroperitoneal 'rest' *in fœtu* and ending with the same structure which has undergone cystic degeneration, has become many times enlarged, and has migrated between the layers of the mesentery during the development of that structure as far as its attachment to the gut, there pushing before it the structure forming the wall of the intestine, and eventually lying, to all intents and purposes, within its lumen, though, anatomically speaking, outside it." Ayer represents schematically, by five figures, the probable course and final resting place of the cyst. Ayer's patient, like mine, suffered from chronic intestinal obstruction; his cyst, however, encroached more directly upon the lumen of the bowel than mine, since, situated at the cæcum, it had not the same breadth of mesentery in which to develop as had mine, located farther up on the ileum. To Dowd's aforementioned classification into (1) embryonic cysts, (2) hydatid cysts, (3) cystic malignant disease, Ayer adds (4) cysts arising from the glandular structures of the intestinal wall, and (5) cysts of the normally placed retroperitoneal organs. These two minor amplifications were suggested by reports of recent cases.

In 1907 F. Niosi, assistant in Professor Ceci's Clinic at Pisa, wrote an exhaustive monograph entitled: "Mesenteric Cysts of Embryonal Origin, etc.", which was translated and published in *Virchow's Archives* (cxc, No. 2, pp. 217–338). Niosi's cyst lay in the mesocolon, between the anterior leaf of the transverse mesocolon and that of the descending colon. After a most thorough and exhaustive histological examination of the cyst wall and chemical examination of its contents, Niosi attributed its genesis to the Wolffian body upon two grounds: (1) From the structure of the wall, which was

lined by cylindrical epithelium, and contained tubules formed of cylindrocubical cells; (2) from the presence of nodules of suprarenal tissue. Niosi believes there is a similarity between the structure of his cyst and the mesonephron cysts of the broad ligament, and that from this similarity further convincing arguments arise for the origin of the latter cyst from the Wolffian body.

Niosi's classification is: (1) Cysts of intestinal origin proceeding from the concave side of Meckel's diverticulum, which insinuate themselves between the two layers of the mesentery; or cysts from rests which spring from the intestinal wall, and during development have been enclosed in the mesentery. (2) Dermoid cysts. (3) Cysts which spring from retroperitoneal organs, as from the urogenital organs (germinal epithelium, ovary, Wolffian body, Müllerian duct). He collected 44 cases of embryonal mesenteric cysts, which fell into his classification as follows:

1. Cysts of intestinal origin	16
Doubtful cases of cysts of intestinal origin	7
2. Mesenteric dermoid cysts	14
3. Cysts derived from sequestrated anlage of the urogenital tract	5
4. Cases which do not belong in any of the three categories mentioned	2
Total	44

By taking the total number of mesenteric cysts other than embryonal (184, of which Braquehays in 1892 collected 104; Becker from 1892 to 1900 collected 40; and from 1900 to 1907 there were 40 more) and dividing all mesenteric cysts into five varieties (chylous, lymphatic, bloody, hydatid, and embryonal), with the 42 cases of embryonal cysts collected by Niosi, it follows that this last variety is not, as formerly thought, so exceptional, but rather occurs almost as often as the other varieties.

Etiology.—As to the causation of embryonal mesenteric cysts, Niosi states that heredity plays no part in their development.

Sex.—Given in 39 of the 44 cases: 24 females and 15 males.

Age.—Given in 43, as follows: fœtus, 1; new-born, 1; under one year, 3; from one to ten years, 5; ten to twenty, 14; twenty to forty, 11; forty to fifty, 5; over fifty, 3. Moynihan cites three cases in which the ages were 73, 77, and 80 years.

Pathological Anatomy.—The cysts are usually round or spherical, but may be oval, pyriform, or club-shaped. In those that were pyriform or club-shaped there was a pedicle, which in the first case sprang from the vertebral column, and in the other inserted into the wall of the intestine. The size varies greatly, as from the wholly insignificant enterocystoma of Hueter, which was scarcely the size of a split pea, up to mine, which was as large as a man's head, or even the colossal cyst of Fehleisen, which contained 8.2 litres of fluid, and the cystoma of Nager, which was adherent to all the abdominal viscera. Moynihan cites Portal's case, which ended fatally by mere physical bulk of the cyst. The cyst wall varies in thickness from an almost transparent membrane to 1 cm., as in Niosi's case. Upon the surface at times run large vessels. In Dowd's case, a vessel the size of the femoral vein was present. Adhesions, particularly in large cysts, not infrequently involve the abdominal viscera (intestine, liver, spleen, pancreas, and bladder).

Intestinal disturbances caused by the cysts are often of more moment than adhesions. Sprengel notices invagination of the cæcum into the colon from a cyst scarcely 3 cm. in size. Eppinger observed volvulus; Bogers, volvulus with subsequent peritonitis; Fawcett, kinking; and Buchwald and Hediger, intestinal obstruction. Intestinal disturbances are severer the more intimately adherent cysts are to the intestines.

The position of a cyst in the mesentery is usually in relation with the terminal part of the ileum, at a varying distance from the ileocæcal valve. Less frequently, cysts are found in relation with the mesentery of the jejunum, cæcum, and mesocolon.

The contents of the cysts vary in color, consistency, specific gravity, and chemical constitution.

Symptomatology.—There are no definite symptoms peculiar to mesenteric cysts, as they do not cause pain nor any other subjective troubles; and they do not even engage the attention of their bearer until they have attained a certain size, or have caused acute intestinal obstruction. Moynihan emphasizes one symptom, namely, that of extremely rapid and serious wasting, probably due to interference with the lacteals.

Other symptoms described are a sensation of weight, nausea and vomiting, and constipation from pressure of the cyst upon the gut. So, too, colicky pains frequently arise from pressure upon the nerves, or from hindrance to the escape of fæces or of gas, or from adhesions. Such symptoms characteristic of no abdominal lesion, and common to many, are frequently attributed to "dyspepsia" or "indigestion," both by physician and by patient. This is but one of many maladies in which careful examination of the abdomen would, in all probability, clinch the diagnosis. On the other hand the omission of such a precaution may expose the patient to intestinal obstruction, which would lead to a sure, but by no means desirable, method of diagnosis.

Physical Signs.—Inspection is of value only for large cysts, in which case the tumor is usually most prominent near the navel.

Moynihan states that the most obvious and the most characteristic sign of the tumor is the mobility, transverse excursion being greater than vertical. This mobility is limited, if not entirely prevented, by adhesions. According to Niosi, the consistency is very elastic and fluctuation indistinct when the cyst wall is very thick, consists of several compartments (multilocular), or if the contents are inspissated, as in dermoid cysts. Confusion might arise between such fluctuation and the elasticity of a lipoma in the omentum or mesentery.

Percussion reveals an area of tympany around the tumor, and thus its independence of regional organs. If dulness should extend to the os pubis, by placing the patient in the Trendelenburg position, the tumor, if a non-adherent mesenteric cyst, would gravitate towards the diaphragm, thus completing the ring of resonance. It is stated that, when the gut is empty, light percussion determines a band of tympany across

the tumor, since the gut is interposed between the abdominal paries and the tumor.

Moynihan summarizes the most characteristic signs of a cyst thus:

1. Prominence of the fluctuating tumor towards the umbilicus.

2. Great mobility, especially in the transverse direction, and the possibility of rotation round a central axis.

3. The presence of a zone of resonance around and a belt of resonance across the cyst.

I believe that exploratory puncture is wholly unjustifiable here.

Differential Diagnosis.—Mesenteric are not commonly mistaken for ovarian cysts. In avoiding this error, it is helpful to ascertain if the tumor has grown from the abdomen towards the pelvis or *vice versa;* if an inferior zone of resonance can be obtained by the Trendelenburg position; and if both ovaries are independent of the tumor. Furthermore, there must be excluded hydronephrosis, omental, pancreatic, and renal cysts, cysts of the urachus, and lipoma of the mesentery. It is probable that, as in the past, most of these cysts will be diagnosed first on the operating table. Gas cysts of the intestine, of which Finney recently (*Jour. Am. Med. Assoc.,* Oct. 17, 1908, vol. li, pp. 1291–1297) collected 19 cases, might at first sight cause confusion at operation; but these, it seems, occur in clusters of very small cysts, which explode on pressure.

Prognosis.—The prognosis of mesenteric cysts conforms with that of abdominal lesions of similar magnitude. Uncomplicated cases, operated upon with good judgment, should recover, especially since infection is not concerned in the etiology of such tumors. In adhesions and intestinal obstruction, however, lurk dangers commensurate with the extent of the one and the duration of the other.

Treatment.—As soon as discovered, an intramesenteric cyst should be removed even in the absence of symptoms, and this, if for no other reason, as prophylactic against intestinal obstruction. It is known that chyle cysts frequently cause emaciation, and it is conceivable that operative delay here

might dangerously impair the operative stamina of the patient. It is not absurd to refer to malignant degeneration in these cysts. Now and then a branchial cyst becomes malignant, so why not an intramesenteric? One well-known theory concerning the origin of malignant tumors puts the onus on misplaced embryonal tissue, and surely the tissue of some of these cysts is misplaced embryonal tissue. We shall watch further case reports for such a mishap.

There are four ways of dealing with intramesenteric cysts: (1) By aspiration; (2) by cystostomy and drainage, with or without the use of caustics; (3) by enucleation; (4) by resection of the involved intestinal segment. The first method (aspiration) was followed by recurrence in over fifty per cent. of cases, and is now obsolete. The second method (cystostomy and drainage), first employed by Sir Spencer Wells, is useful in the presence of numerous adhesions, to dissever which might impair the nutrition of the intestinal wall, or in an emergency. The third method (enucleation) is considered by many ideal, and is ideal when practicable. The fourth method (resection) I recommend in multiple, juxtaposed cysts, when it is deemed that too much surgical interference, as from dealing with the cysts one by one, carries more risk than simple resection.

Dr. William M. L. Coplin said that he had not had opportunity to examine many of these cases at autopsy. He had seen Dr. Kalteyer at autopsy at the Philadelphia Hospital remove a chyle cyst; it was an accidental finding at autopsy without clinical data. He had also seen two other chyle cysts which were also accidental findings at autopsy; also serous cysts, one a true mesenteric cyst, the other they were not so certain about. There were peritoneal adhesions and he thought it had resulted from the closure of the serous membrane by adhesions that formed a sac. An epithelial lining would probably interfere with operative recovery. He had seen one of these cysts containing a stone. There was the suspicion that it might have been a tuberculous mesenteric lymph-node which had been surrounded by lacteal fluid.

OSTEOSARCOMA OF THE MANDIBLE.

BY ADDINELL HEWSON, M.D.,

OF PHILADELPHIA.

Professor of Anatomy in Philadelphia Polyclinic Hospital; Surgeon to St. Timothy's and American Oncologic Hospitals.

In reporting a case of osteosarcoma of the mandible, my object is to point out how it may be possible to remove half of the mandible with the least possible deformity resulting.

As pointed out in many of the text-books, the performance of this operation without ligation of the external carotid is still in practice; but as the patients are usually aged, and since loss of blood without ligation cannot be avoided, it seems best to me to discard the old operation and insist upon the necessity of primary ligation of the external carotid artery.

In doing the operation without ligation, the surgeon must count upon the rapidity of his work and the dexterity of his action and that of his assistants to control the loss of blood. This very often miscarries, and the patient loses a terrific amount of blood. The operation by ligation of the external carotid as a primary procedure and the closure of this wound may be performed without entering into the field of removal of the mandible, even though the bifurcation of the carotid may be as high as the greater cornua of the hyoid bone, provided there is no glandular involvement, as is possible and probable in carcinoma.

This primary ligation, while it prolongs the operation slightly, renders the removal of the mandible much more efficient; and the operator is not impeded by the loss of blood or the possibility of septic pneumonia dependent thereon.

It is argued by some that the artery forceps will control the hemorrhage and save the time of the operator and necessarily the length of the anæsthesia; this some are willing to assign as the cause of the pneumonia rather than the septic material, plus the loss of blood, injury to the part in manipulation, and

the non-warming of the inspired air before it enters the lungs. It is known that in the removal of so vital a part as half of the mandible, as in all major operations, the minimum loss of blood, the minimum interference with the temperature of the inspired air, the minimum incision in the removal of any part, and the minimum of time in its performance are all factors tending toward favorable termination.

Having followed the usual course as given in the text-books in former procedures and in the bloody clinical services in which I have been a participant, it seemed possible that the desired end could be reached in carrying out the principles above stated. A suitable case presenting itself at the American Oncologic Hospital, I applied the principles as above outlined.

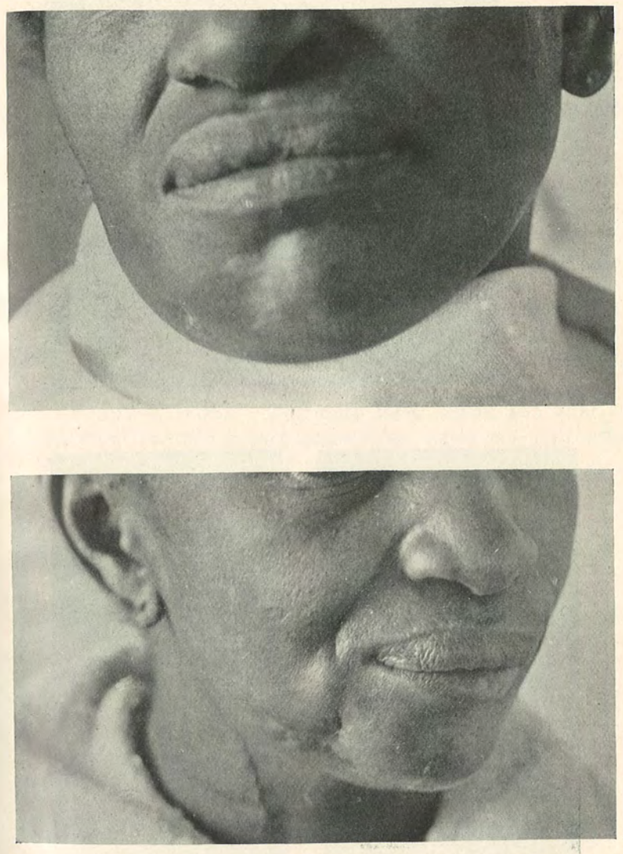
The patient, C. S., colored, aged 36, married, a domestic, was admitted on February 10, 1908.

About ten years ago noticed vague pains in the right side of the mandible. There was no history of any injury from outside sources. The first thing she noticed was a small hard lump in the navel of the sixth-year molar, ten years ago. Eleven months ago, following a bad toothache, she had the lower second bicuspid and sixth-year molar extracted on account of pain. Since the extraction of the teeth the tumor has grown rapidly and was at the time of her admission about the size of an English walnut. In Sept. 1907, ulceration took place on the face; she has had the projection into her mouth removed two or three times since teeth were extracted. The growth on the right side of the body of the mandible occupied the site of the second bicuspid and of the sixth- and twelfth-year molar teeth. This was very dense and occupied the alveolar process and extended caudad into the body of the mandible, and was connected with the outside of the face by a sinus which discharged blood and pus. The growth was seen to occupy the vestibular and buccal surfaces of the alveolar process, and surrouded the first bicuspid and extended to the middle and partly surrounded the twelfth-year molar. Apparently the wisdom tooth had not been erupted. There were no glands anywhere in the submandibular triangle. The thoracic and abdominal organs were all normal. Blood and urinary examinations were made.

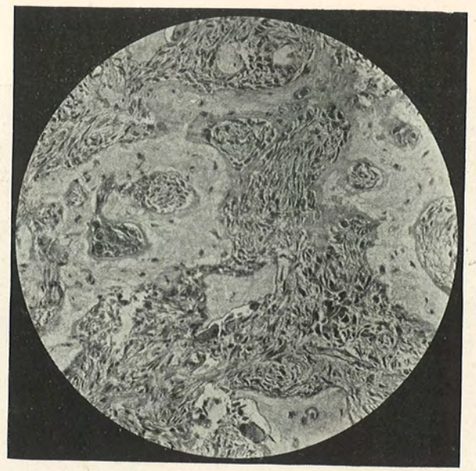
Patient was in the house sixteen days under observation before operative interference was considered, and during this time all preparations and examinations possible were made.

On March 19, 1908, the patient was placed under chloroform anæsthesia and the external carotid artery of the right side ligated. The performance of this operation was rather difficult because of the unusual position of the artery. Bifurcation did not take place until the great cornu of the hyoid bone was reached. This of course increased the length of time of the performance of this operation, first because of its unusual position, and second because it was necessary to avoid entering the buccal cavity. The vertical incision was made in the middle line through the lip to the caudal margin of the mandible, dividing all the muscles to the bone. The left inferior coronary artery was ligated; the skin incision followed the caudal margin of the mandible as far dorsal as the position of the facial artery. The levator menti, depressor labii inferioris, depressor anguli oris, platysma myoides, and buccinator muscles were divided by the scalpel, care being taken to leave muscular attachments and not tear away the periosteum. These manipulations extended up to but not through the vestibular fornix of the mucous membrane. The scissors were now substituted for the scalpel and divided the masseter muscle, the stylomandibular ligament, and part of the capsular ligament on the ventral and lateral parts of the condyle. The mandible was divided by a chain-saw, after pulling the right central incisor. The bone was violently depressed and the temporal muscle, severed from the mesial surface and apex of the coronoid process and caudal fornix of the mucous membrane, was now divided, taking pains to adhere as closely as possible to the ventral margin of the ramus and to pass as far cephalad on this margin, thus avoiding all interference with Stenson's duct. The buccal mucous membrane, together with one geniohyoid muscle and the mylohyoid, the internal and external pterygoid muscles, and the sphenomandibular, internal lateral, and the remaining part of the capsular ligaments were divided, severing also in this procedure the inferior dental artery and nerve, the myoid artery and nerve, and their accompanying veins. The half of the mandible was now easily removed by a twisting movement and the free use of scissors close to the bone, the condyle being practically twisted out of its capsule and the socket in the temporal bone. There was decided venous ooze from the pterygoid region, but this was easily controlled by

FIG. 1.



Osteosarcoma of mandible. Appearance of patient before and after removal of the affected half of the mandible.



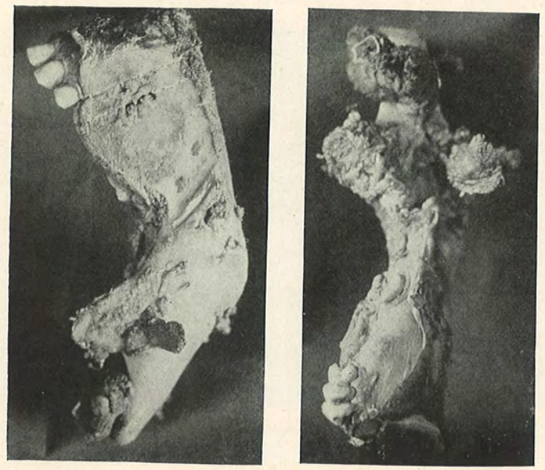


FIG. 2.

Osteosarcoma of mandible. Portion of mandible removed, and microscopic section from growth.

iodoform gauze packing; all apparent glands were removed. Buccal and vestibular fornices of mucous membrane were united by interupted silkworm-gut sutures. The drainage for forty-eight hours was through the most dependent portion of the facial wound. One and a half metres of iodoform gauze were packed into the interval between the masseter and pterygoid. The sinus in the skin of the face, of course, was cut out and independently sutured. There was slight oozing for forty-eight hours after the operation, but after the removal of the packing and irrigation of the cavity there was no further trouble.

Present Condition.—The patient is not able to adjust the mandibular with the maxillary incisors owing to the contraction of a fibrous band in the position formerly occupied by the removed portion of the mandible.

The patient has no difficulty in masticating soft food; and I have to report at this time that she is in perfect health without any recurrence anywhere, and is under weekly observation, as she is employed about the institution.

I have to submit photographs taken before and after the operation; one of the part removed, an autochrom, microscopic slides of the growth, together with microphotographs (Figs. 1 and 2).

The patient at no time during her entire stay in the institution, before, during or after the operation, except as the reaction after her operation, had a temperature above 99 $^{2}/_{5}$°.

The pathological investigation was made by Dr. John M. Swan, who pronounced the growth a round- and spindle-celled sarcoma of the body of the mandible. The section is composed of irregular trabeculæ tissues which correspond to the trabeculæ of the bone, between which are spaces occupied by altered marrow tissues. In the tissues corresponding to bone trabeculæ there is no evidence of normal bone tissue except out in the periphery of the section. The tissue is composed of numerous large round cells with occasional spindle cells separated by a distinctly fibrillar connection of tissue. The marrow tissue occupying the space is poor in cells and has undergone myxomatous degeneration. There are giant cells in places in the altered marrow tissues. The bone trabeculæ which have not been invaded by the new growth is poor in cells. No canaliculæ are visible, and the matrix looks as though it had undergone myxomatous change.

REPORT OF SATURDAY SURGICAL CLINICS FOR STUDENTS.

HELD AT THE GERMAN HOSPITAL OF PHILADELPHIA, 1907 AND 1908.

BY JOHN B. DEAVER, M.D.,
OF PHILADELPHIA,
Surgeon-in-chief.

DURING the 26 clinics 271 operations were performed on 215 patients, there being 94 operations upon 38 patients.

Appendicitis.—Of the 104 cases of appendicitis, 42 were acute. Of these, 23 were males and 19 females. The appendix, acutely diseased, was removed in 6 patients operated for other conditions: one male with cholelithiasis, another male with fecal fistula, and four females with various pelvic maladies.

Of these 42 acute cases 10 had abscesses and 8 had fluid in the pelvis, whilst from another patient 500 c.c. of liquid fæces escaped upon opening the abdominal cavity. Thirteen of the 23 non-abscess cases were operated upon in their first attack, and 11 of the 19 abscess cases in their first attack.

In 4 cases the appendix was not searched for, incision into the abscess cavity completing the operation. In one case a friable appendix was removed piecemeal.

Drainage was introduced in 24 of the 42 acute cases. The character of the drainage varied with the character and amount of the exudate: in one patient a cigarette drain was required on account of oozing; while in another as much as three pieces of gauze and one glass tube, the whole surrounded by rubber dam, was required because of associated tubo-ovarian disease. A glass tube in the pelvis was inserted in 11, or about one-quarter of the cases, while a rubber tube was used only twice. Most of the 24 drained cases were satisfactorily treated by gauze, variously disposed about the infected area. In the re-

maining 18 undrained cases the wound was closed with tier suture of iodized catgut, reinforced now and then by through-and-through sutures of silkworm gut.

The 18 leucocyte counts made in the 23 non-abscess cases, that is, those in which the disease was strictly intra-appendiceal, showed 5 in which the figures ranged from 5,000 to 10,000; 9 from 10,000 to 15,000; 3 from 15,000 to 20,000; and one of 21,700. Of the 19 cases with exudate, those in which the disease was extra- as well as intraperitoneal, counts made in 17 showed 8 in which the figures ranged from 10,000 to 15,000; 7 from 15,000 to 20,000; one of 24,500; and one of 32,800. To put these figures another way, of the 18 non-abscess cases in which counts were made, 14 were below 15,000, and 4 were 15,000 or more; and of the 17 cases with exudate in which counts were made, 8 were below 15,000, and 9 were 15,000 or more. These figures are strikingly similar to those I presented last year.

As regards the presence or absence of extra-appendiceal abscess, both extremes of the count alone are of value, there being a large middle class in which the figures range from 10,000 to 20,000 as often in the non-abscess cases as in the cases with exudate. Taking the extremes, we observe that below 10,000 there are more cases of *minus*-pus and *plus*-resistance than of *plus*-pus and *minus*-resistance. What few counts there are very much above 20,000 almost certainly indicate *plus*-pus and *plus*-resistance. With regard to resistance, however, more is learned from the differential leucocyte count.

Microscopic examination in 38 of the 39 cases in which the appendix was removed showed acute interstitial in 6, in 4 of which it was suppurative; acute ulcerative in 7; obliterative in 1; chronic with acute exacerbation in 14; chronic interstitial in 6; and inconspicuous lesions in 4. With regard to the case of obliterative appendicitis, it must be remembered that in some people the lumen of the appendix is naturally obliterated; and it is significant that this patient gave no history of any attack preceding the one which brought him

to the hospital. The histological diagnosis of "inconspicuous lesions" expresses doubt in the mind of the pathologist whether the disease was present in the organ examined, or, if not that, at any rate is mentioned out of courtesy to the operator. There were 14 cases diagnosed histologically "chronic appendicitis with acute exacerbation"; and of these, 10 were in accord with the clinical history, while not one of the remaining 4 gave any history of previous attacks. On the other hand, the 6 appendices diagnosed histologically "chronic appendicitis" were all removed from patients either in the throes of, or just recovering from, an acute attack, and yet no mention of such an attack was made in the laboratory report. The former group of cases, namely, those four in which the microscopical findings of chronic appendicitis with acute exacerbation were not supported by the clinical history of previous attacks, may, as I observed last year, be accounted for by latent or masked infections of a very mild type.

Bacteriologically, *B. coli communis* predominated, but *S. pyogenes* and *B. pyocyaneus* were also found.

Careful consideration of these and of the histories of the chronic cases to follow shows that many patients who complain of dyspepsia or indigestion, constipation, or dysmenorrhœa are, in reality, subjects of the appendiceal syndrome.

The appendiceal history of one patient began two years previously, after an attack of enteric fever. The last acute attack was apparently the sequel of a mild throat infection. Four days previous to admission the patient took to bed with chills, sore throat, and aching in legs and arms. Two days later pain was felt in the lower abdomen, and was followed by nausea. At operation the appendix was acutely diseased at its tip. Last year I reported a case of tonsillitis and purulent parotitis which developed after the evacuation of an appendiceal abscess. This year a patient developed acute tonsillitis four days after operation for appendicitis with localized fibrinoplastic peritonitis, and serofibrinous exudate in the pelvis. In the first case, the infection *via* the throat was probably instrumental in developing the attack of

appendicitis. The second and third cases, as well as others I have described in the past year, show that the effects of appendiceal pus may be manifested remote from the right iliac fossa.

In two patients the acutely inflamed appendix was found to be associated with bilateral salpingitis. Another patient, operated upon for acute appendicitis, was found to have, in addition, hydrops of the gall-bladder caused by blocking of the cystic duct by a large stone. Another patient exhibited, in addition to acute appendicitis, a dermoid cyst of the right ovary.

One patient, whose acute attack developed two days before the operation, showed, after abdominal section, an acutely inflamed appendix which extended low down into the pelvic cavity, where it was surrounded by much cloudy fluid. Five days after the operation signs of intestinal obstruction developed; the second operation showed angulation of the ileum in the right side of the pelvis, caused by a recent, moderately soft adhesion. A hasty convalescence ensued. This is the occurrence of one case of acute intestinal obstruction in 42 cases of acute appendicitis, which is practically in keeping with our past experience in acute intestinal obstruction taking place under these circumstances.

In this series of 42 cases of acute appendicitis, there were 3 deaths, all from diffuse peritonitis, associated in two cases with perforation of the bowel. Two of these patients had had their acute attack a week before they were brought to the hospital, the third was admitted to the hospital with a fecal fistula of three months' duration, he having been operated elsewhere.

Of the 62 cases of chronic appendicitis, 21 were in males and 41 in females. Of the 62 cases 37 were operated upon for chronic appendicitis alone, while 25 were operated upon additionally for other conditions, such as, in 21, associated pelvic disease (which accounts for the predominating number of females); and in the remaining 4, cholecystitis, cholelithiasis, cancer of the liver, and movable kidney, respectively.

The number of attacks in the 37 pure, uncomplicated cases of chronic appendicitis was: 1 in 7; 2 in 6; 3 in 3; 4 in 4; 5 in 1; 9 in 1; 16 in 1; 32 in 1; and in 13 there were numerous attacks over an extended period of time, a definite number, however, not having been stated.

The patient who had the greatest number of attacks furnished a history typical of chronic appendicitis.

For nine years he had had recurring attacks of abdominal pain, about three to four per year. During the six months previous to operation, he had six attacks, the last three weeks before. The attacks usually began suddenly at night, and the pain was at first general abdominal, later localizing in the right iliac fossa. He was usually nauseated, but seldom vomited. He was badly constipated, his bowels never moving without a laxative. Examination showed slight tenderness on deep palpation at McBurney's point. A much thickened and firm appendix was removed from behind the cæcum, to which it was closely adherent by a short, thickened meso-appendix.

In the complicated cases, it was impossible to differentiate the attack of appendicitis from those of the complicating condition, so the number of attacks cannot be stated.

The symptoms complained of in these 37 cases were, in 12, sudden, diffuse abdominal cramp, followed by nausea and vomiting and localizing shortly to the right iliac fossa. In 15 patients the attack began as sudden, severe cramps, or else as soreness in the right iliac fossa, with or without chill, nausea, or vomiting. Five patients complained most of pain or soreness in the epigastrium. In 4 cases the complaint was most definitely localized, and the remaining case suffered most from dyspepsia. Other prominent symptoms were, in 6 cases, indigestion; in 5, constipation; and in 4, dysmenorrhœa.

One patient gave himself appendicitis by dieting on hard-shell crabs, ham and cabbage, and ice cream, belly-ache appearing half an hour later, and then syncope. Another patient was operated upon in the second month of pregnancy.

In two patients there was a history of traumatism. One patient was struck on the abdomen in a railroad accident, while the other strained himself, both exhibiting, later, symptoms of appendicitis.

Tenderness at McBurney's point was almost constant, being present in 30 of the 37 uncomplicated cases. Rigidity

was not so frequent, being present in only 7. The McBurney incision was used in 25 cases, and the short rectus incision in 12.

The lesson learned from dealing with appendiceal abscesses is that nearly every subject of the same is also the subject of indigestion, in fact, all cases of appendicitis commence in acute indigestion. Therefore, if a patient consults a doctor for supposed indigestion, he should never be dismissed from the office without a thorough abdominal examination having been made; otherwise, should a subsequent attack occur which would cost the patient his life, the doctor has placed himself in a position in which he is morally responsible.

In the 25 complicated cases of chronic appendicitis, which complications, be it remembered, were pelvic in 21, microscopic examination revealed the appendix chronically inflamed in 11; the seat of obliterative appendicitis in 7; and of minor lesions in 7. These figures show that the appendix shares so often in disease of the uterine adnexa that I believe it should be removed in practically every case of this nature, the risk to the patient being practically *nil*.

There was only one death in this series, that of a patient who, at operation, was found to have carcinoma of the liver in addition.

NOTE.—In chronic appendicitis there occurs in a percentage of cases pylorospasm, which condition cannot be said to be due to the appendix until the upper abdomen has been opened and the findings prove negative. I have now had a number of these cases in which relief of the pain and discomfort in the epigastrium was permanent after removal of the diseased appendix.

Carcinoma of Appendix.—To several other cases I have met with in the past decade, I may add this example of appendiceal carcinoma.

The patient, a German girl aged 27, suffered for two years from symptoms referable to the gall-bladder, such as pain in the right upper abdominal quadrant which radiated to the right shoulder, one-time jaundice, considerable tenderness and some rigidity about the right costal margin. Examination of fæces

showed a faint trace of occult blood. The hæmoglobin was 78 per cent.; leucocytes 6,500. Through a McBurney incision the appendix was removed. Microscopic examination showed carcinoma.

Cholelithiasis.—There were 16 cases of cholelithiasis, 2 in males and 14 in females. The youngest patient was 23, and the oldest 59 years of age.

A history of definite infection preceding the onset of gall-bladder disease was obtained in 2 cases, in both of whom the infection was enteric fever. This disease preceded manifestations of gall-bladder symptoms by six and ten years respectively. In both cases, however, cultures from the gall-bladder proved sterile.

The least number of attacks was two in 2 cases; next lowest four in 2 cases; then six in 2 cases; those in the remaining ten cases being designated as numerous. All of the cases had pain, and this symptom was described in 15 of the cases as colic or cramp in the epigastrium, and in the remaining cases the pain simulated that of renal colic. The pain was referred in 9 cases to the right scapula, and in 4 around the right costal margin to the back, while in the case that simulated renal colic it traveled towards the iliac crest. Vomiting followed the pain in 13 of the cases, while 9 suffered from chills.

Digestive derangements were frequent, there being gaseous eructations in 6, indigestion in 4, and loss of appetite, diarrhœa, and constipation in one each. Four patients had to be very careful of their diet, lest an indiscretion precipitate an attack, and one patient even lived on milk and custards for three months before operation. Four patients were subject to nocturnal attacks of gall-stone colic. Too much stress cannot be placed upon the significance of seemingly insignificant symptoms referred to the stomach, for such is frequently the plaintive cry of calculi for liberty. Sometime jaundice was present in 11 of the 16 cases.

It is important to bear in mind that nearly all gall-stone possessors have stomach trouble, that is, that the early, the prodromal, the initial symptoms of gall-stone disease are referred

to the stomach, the epigastrium. The failure to recognize this has been at the cost of many a valuable life, due to late operation. In practically every article I have written on gall-stone disease I have seized the opportunity to refute the false and not-to-be-proven statement that gall-stones can exist without causing symptoms. Until this false assertion is erased from text-books and no longer appears the authors of them will still have to share a responsibility. The early symptoms of gall-stone disease are referred to the stomach; upon these symptoms a diagnosis should be made and operation done, at which time there will be practically no mortality. Fulness, weight, distention or oppression in the epigastrium, coming shortly after eating, within an half, three-quarters, or an hour, relieved by belching and disappearing entirely immediately upon vomiting, are, I might say, pathognomonic.

Note.—The patient frequently complains of a sensation of tightness which, if unrelieved by loosening of the clothing, may become a pain. Relief is sometimes obtained by bending the body forward, or, as we used to do as youngsters with ordinary belly-ache, getting down on the stomach over a chair. Frequently at the end of a deep breath there is pain at the right costal margin. Sensations of chilliness after eating, particularly in the latter part of the day, are observed in a certain percentage of these cases.

Physical examination revealed tenderness at or near the gall-bladder in 14 of the 15 cases; rigidity of the supra-umbilical portion of the right rectus muscle in 3; and involuntary spasm of the same on palpation in 2.

There were stones in the gall-bladder alone in 7 patients, in the cystic duct alone in 1, in the gall-bladder and cystic duct in 4, in the gall-bladder, hepatic, and common duct in 2, in the gall-bladder and common duct in 1, and in the common duct alone in 1. In 2 patients the cystic duct was blocked sufficiently to produce hydrops. The ampulla of Vater was blocked twice. The largest single stone was in the gall-bladder, and measured 2.5 x 3.5 cm.; the next largest were two stones in the common duct, each 2 cm. in diameter. The largest number of stones in the gall-bladder was 33, and in the

common duct, 32. One patient had passed numerous calculi in the course of her gall-bladder disease, and this is the patient from whose gall-bladder 33 stones were removed. This case shows that while the passage of gall-stones at stool is of diagnostic value, yet it is of no aid in prognosis. Perhaps the patient from whose common duct 32 stones were removed can serve to emphasize this point. One of the 32 stones was the size of a hickory nut, and had any hopes of cures been based upon the hypothetic passage of this large stone, there would still remain, as shown by operation, 31 stones to be reckoned with.

The walls of the gall-bladder were thickened in 5 cases, the gall-bladder enlarged in 4, contracted in 3, and impacted with calculi in 4. Three cases illustrated variations in the gall-bladder contents, one case revealing thick and black bile, another the clear mucoid of hydrops, and another, whitish-yellow mucopus. Adhesions, present in 12 cases, were described as pericystic in 1, pericholedochal in 1, between the gall-bladder and liver in 1, gall-bladder and stomach in 5, gall-bladder, liver, and stomach in 2, gall-bladder and omentum in 1, and gall-bladder, omentum, and colon in the remaining case. In one case the gall-bladder was completely hidden by adhesions below the liver margin, the severance of which revealed a spontaneous fistula, the diameter of a goose-quill, between the gall-bladder and the stomach. I sever adhesions only when their separation is indicated.

Bacteriological reports returned in 14 of the 16 cases showed the gall-bladder sterile in 7, *B. coli* from the gall-bladder in 3, *B. coli* from the common duct in 1, unidentified bacillus from the common duct in 1, *B. typhosus* from the gall-bladder in 1, and *B. typhosus* from the common duct in the remaining case. The patient from whose common duct the typhoid bacillus was obtained gave no clear history of enteric fever, unless being in bed 17 days with "gastric fever" be considered such. Neither did the patient from whose gall-bladder the typhoid bacillus was obtained give any history of the disease; but in this case the identity of the culture was

proven because it was positive to agglutination tests by the Widal method, the organism being agglutinated not only by the patient's own serum, but also by serum from a positive typhoid patient.

The following operations were done: Cholecystostomy in 7 patients, choledochostomy in 2, cholecystostomy and choledochostomy in 1, cholecystectomy in 4, and cholecystectomy and choledochostomy in the remaining 2. Further operations required were, for conditions due to the gall-stone disease itself, lumbar incision and drainage of a pancreatic abscess in 1 case, gastrorrhaphy for the case in which a spontaneous cholecystogastrostomy had occurred and posterior gastro-jejunostomy for postoperative obstruction; and for conditions due to other causes, appendectomy in one patient for acute appendicitis, in another for chronic appendicitis, and curettage of the endometrium in one for granular endometritis.

As for drainage, it is unnecessary to report in detail for each case. Whatever part of the biliary tract I invaded, I drained with a rubber tube, this applying to cholecystostomy and choledochostomy. After cholecystectomy the cystic duct is injected by a rubber tube and held there by a stitch, and if this is not feasible, the tube is placed in the common duct, in order amply to drain any infection, when present. Tubal drainage is usually supplemented by a Mikulicz drain to absorb leakage should it occur, and sometimes additional gauze drainage is required either in the subhepatic region or in the foramen of Winslow. Latterly in place of carrying gauze down to the subhepatic space I place a glass tube in this space, the tube being removed in 24 hours.

Although numerical and coagulative estimations of the blood were made in all cases, yet they proved after all of very little value to me.

The only death occurred in a woman aged 50 with myocardial disease, whose entire extrahepatic choledochal apparatus was badly infected, and who died the day of operation from acute dilatation of the heart. The myocarditis was to

my mind the result of the toxæmia consequent upon the infected bile passages.

Cholecystitis.—In addition to the cases of chronic cholecystitis and pericholecystitis associated with the 16 cases of cholethiasis, there were 4 instances of non-calculous cholecystitis, one of which was acute, in a female, and the others chronic, in males. Two of the latter were associated with chronic interstitial pancreatitis, a diagnosis established only by the questionable method of palpation. Indigestion was a salient symptom in all these cases, and included epigastric heaviness and distress, gastric tympany with belching, meteorism, and constipation. In fact, one patient maintained a restricted diet for fear of precipitating an attack by gormandizing; and a dyspepsia of seven years' standing was relieved when adhesions between the gall-bladder and stomach were broken up, and the small, thickened gall-bladder drained. The gall-bladder was distended with bile in one case in which adhesions were present between it and the transverse colon, and in another was the seat of hydrops. Operation comprised cholecystostomy in 3 cases, which included the two of chronic pancreatitis, and in one of the latter choledochostomy was also performed. The remaining case required cholecystectomy, since hydrops was present in a chronically inflamed organ. Furthermore, a chronically inflamed appendix was removed from one of the patients.

Carcinoma of the Liver.—Carcinoma of the liver was seen twice, in the patient from whom a chronically inflamed appendix was removed, which has been already referred to, and in another patient in whom it was secondary to carcinoma of the stomach and duodenum.

Pancreatitis.—In addition to two cases of chronic inflammation of the pancreas, I have this year to report a case of acute pancreatitis, in which operation was followed by uneventful recovery. This patient has already been referred to among the cases of cholelithiasis.

A machinist, aged 27 years, suffered a year before operation from four to five attacks, at short intervals, of abdominal cramps,

which were largely confined to the upper abdomen. These attacks were moderately severe, the pain lasting from two to six hours, and were accompanied by slight jaundice. He was free from attacks until two and a half weeks before operation, when there took place a very severe attack of epigastric pain with nausea and vomiting. This pain started in the epigastrium, radiated throughout the abdomen, and extended to the back and to both shoulders. With frequent exacerbations, the pain and jaundice continued up to the time of operation.

Examination showed slight epigastric fulness, spasticity of both recti, enlarged liver, and marked tenderness at Robson's point, and, to less degree, over the entire right hypochondrium and the epigastrium.

Intra-abdominal examination revealed adhesions between the gall-bladder, colon, and omentum; a thickened gall-bladder containing calculi; fat-necrosis in the preperitoneal fat; and, in the lesser peritoneal cavity, a soft, fluctuating mass about the size of two fists, which shoved the stomach forwards.

From the gall-bladder were removed about 40 c.c. of whitish-yellow mucopus and four large, irregular, grayish, facetted stones, and 24 smaller ones from the gall-bladder and cystic duct. Drainage consisted of a rubber tube in the gall-bladder and a cigarette drain in the subhepatic space. The bursal abscess was evacuated posteriorly and to the left, carrying the direction in front of kidney and behind the peritoneum, and consisted of 500 c.c. of bloody, purulent fluid, from which the colon bacillus was obtained. The culture from the gall-bladder was sterile. It might be added that occult blood was found in the fæces, and that the hæmoglobin was 72 per cent. the whites 11,500, and the coagulation time 10 minutes, three days previous to operation.

The two instances of chronic pancreatitis were features in two of the cases of cholecystitis already referred to. In one case the gall-bladder disease was of seven years' standing and the head of the pancreas was nodular. In the other case the cholecystitis had existed two years, and the pancreas was markedly thickened and the whole organ much firmer than normal, with small localized areas of great density. That pancreatitis existed in these two cases was only presumed by

the feel of the organ. The removal of a piece of the pancreas for histological examination I did not consider justifiable.

Carcinoma of the Stomach.—There were 5 cases of gastric cancer, of which 2 proved inoperable. Four were males aged 39, 53, 54, and 64 respectively; and the remaining patient was a female aged 54. Family history of the malignancy was present in one case only, namely, that of a male whose sister died of carcinoma of the breast. The ages of the carcinomata were, of course, beyond calculation, but symptoms referable to the disease had existed for 2, 7, 11, 24, and 24 months respectively.

Dyspeptic symptoms were common and included gastric distress and abdominal distention with belching and borborygmi after eating, epigastric pain, acid eructations, and constipation. Vomiting, present in three cases, resembled coffee-grounds in two, and was obstructive in one of the latter. One patient lost 20 pounds in 6 months, and another 30 pounds in three months.

A distinct tumor could be palpated clinically in 2 cases. Anæmia, present in 3 cases, was the equivalent of 44 per cent., 51 per cent., and 53 per cent. of hæmoglobin respectively. Free hydrochloric acid was present in 4 cases, in 3 of which lactic acid was found; and occult blood was present in 3 cases, in one of which it was found in the stool.

Since the site of the cancer determined the operative procedure in each case, I shall consider these captions together, and abstract each case *seriatim*.

Case I showed a band of adhesions between the gall-bladder and the lower surface of the pylorus, many adhesions about the pylorus and first part of the duodenum, and a small, hard tumor on the lower surface of the pylorus. This case indicated gastrectomy, so a segment which included the pyloric two and a half inches of the stomach, and the proximal two inches of the duodenum, was removed. The operation was completed by gastrorrhaphy and posterior no-loop gastrojejunostomy. Recovery was uneventful. Histological examination of the tumor revealed adenocarcinoma.

Case II revealed inoperable carcinoma of the lesser curvature of the pylorus, for which posterior no-loop gastrojejunostomy was performed in palliation. A week later sudden cardiac failure occurred.

Case III showed carcinoma involving the pylorus, the first part of the duodenum, the lumen of which was nearly completely occluded, and the liver. Posterior no-loop gastrojejunostomy. Patient lived but a few days.

Case IV exposed an extensive carcinoma which infiltrated the greater curvature and posterior wall of the stomach. The pylorus was patulous. Nothing was done.

Case V exhibited a large, firm, nodular neoplasm of the stomach extending into the pylorus for about two inches. The regional mesenteric lymph-nodes were enlarged. The transverse colon was thickened and infiltrated for a width of four inches. Since this was manifestly inoperable, the patient was discharged unimproved.

Ulcer of the Duodenum.—There was one case of chronic duodenal ulcer.

A Russian tailor, aged 33, six months before operation suffered from sudden, sharp, cutting pain, which started in the epigastrium and radiated around the right costal margin to the spine of the right scapula. This pain lasted two hours, and was attended with nausea and vomiting. These attacks occurred at intervals of from two to three weeks until two weeks before operation, since which time they have appeared almost daily, but varied in severity. Between attacks there was pain in the right hypochondrium upon exertion.

Clinical examination revealed tenderness in the epigastrium and right hypochondrium, but most acute at Robson's point. Free hydrochloric acid 22, total 41; occult blood negative. Intra-abdominal examination revealed a dense mass of adhesions, the size of a lemon, intimately connecting the pylorus, omentum, bile-duct, arch of the duodenum, and head of the pancreas. The lumen of the duodenum was encroached upon just beyond the pylorus. The stomach was slightly enlarged, and the gall-bladder distended with bile.

The usual operation of posterior no-loop gastrojejunostomy

resulted in cure. In such cases it is often difficult to determine whether the tumor mass is malignant or benign.

Fecal Fistula.—There were two cases of fecal fistula after operation for appendiceal abscess, occurring three and ten months. One rent was in the ileum, one inch proximal to the ileocæcal valve; and the other was in the cæcum. Operations of closure of the openings and lateral ileocolostomy were done in both, and appendicectomy in one, under which heading this case was referred to above. Both patients died.

Intestinal Obstruction.—Acute intestinal obstruction occurred in a patient who had been operated upon five days previously for acute appendicitis, under which the case has been referred to.

At 11.30 A.M. on fifth day after operation patient vomited a small amount of greenish material, and complained of slight abdominal pain. At 2.30 P.M. he vomited greenish fluid and had marked abdominal cramps. He was very restless. At 6 P.M. he vomited considerable amount of dark brown fluid. Although the bowels moved slightly and considerable flatus was passed through a rectal tube, he remained much distended and complained of much abdominal pain. A high enema did not move the bowels.

Operation relieved an angulation of a coil of ileum in the pelvis by a recent soft adhesion.

In cases of intestinal obstruction following appendicitis, where loops of bowel are glued together by fibrinoplastic exudate, I have obtained excellent results by uniting adjacent coils by entero-enterostomy. The following case will illustrate the advantage of this procedure.

Boy. Acute Perforative Pelvic Appendicitis. Operation showed in addition to the perforated appendix a pelvic peritonitis with pus. Gauze and glass tube drainage. For ten days everything went along normally. On the forenoon of the tenth day patient was attacked by abdominal cramp and nausea, with inability to pass flatus. I saw him in the early afternoon and

opened the abdomen, when practically all of the coils of small bowel occupying the pelvis were very adherent, causing obstruction. Adherent coils of bowel released, when the collapsed portion immediately distended. Abdomen closed, patient immediately relieved, passed gas, etc. The following afternoon a return of the obstruction symptoms; immediately I opened the abdomen and made an entero-enterostomy between the loop of small bowel to the proximal and the loop to the distal side of the obstructed coils, which corresponded to those found adherent and obstructed the day previous. Recovery. I have done this a number of times when nothing else in my judgment would have resulted in the recovery of the patient.

Intestinal Neurosis.—One case presented, as follows:

A girl, aged 16, whose appendix had been removed five months previously, complained of pain about the incision and, at times, in the lower left abdomen, severe enough to cause vomiting. Furthermore there were attacks of cardiac palpitation with shortness of breath.

Examination revealed marked tenderness and rigidity in the right iliac fossa just external to the old scar, and moderate tenderness on the opposite side.

Abdominal section did not show adhesions nor any other abnormality. The old scar was excised, and the patient made a good recovery. This method of dealing with such cases seems necessary at times.

Hernia.—Of the 10 operations for inguinal hernia, 9 were in males, 1 in a female. Six were on the right, 2 on the left side, and 2 bilateral. A history of traumatism in 2 cases. The duration varied from 4 weeks to 6 years; two of the hernias were recurrent. .

There were 2 cases of femoral hernia, both in females, and both left-sided. One patient was operated upon at the same time for chronic appendicitis and bilateral pyosalpingitis.

There were 3 cases of incisional hernia, 1 in a male and 2 in females. All had been operated for appendiceal abscess, drainage having been used. From one patient both tubes and

ovaries were removed on account of bilateral suppurative salpingitis and acute öophoritis with cystic degeneration.

Wandering Kidney.—There were 2 cases of wandering kidney, one in a male, on the left side, and the other in a female on the right side.

A Russian weaver, aged 23, began to have pain seven months previous to operation, in left lumbar region; pain was constant and dull, and referred anteriorly to the left inguinal region, at times sharp and sticking. Also suffered from loss of appetite and constipation. Examination revealed the left kidney distinctly movable and palpable. The kidney was hammocked by a gauze sling beneath its lower pole, and three additional pieces of gauze were placed about it.

The history of the other patient, a female aged 32, refers only to symptoms produced by the chronic appendicitis, for which she was also operated upon. The right kidney was freely movable, but if it was giving rise to any symptoms they were overshadowed by those of the chronic appendicitis. It seemed rational, since the appendix was to be removed, to anchor the kidney also, in prophylaxis against the psychasthenic state that too often follows the self-discovery of such a misplaced organ. The triangular flap of the true fibrous capsule was separated, twisted, and sutured into the anterior layer of the lumbodorsal fascia and quadratus lumborum muscle.

Pyonephrosis (Renal Calculus).—On *a priori* grounds, this case should be classified under nephrolithiasis, since the latter was the forerunner of the pyonephrosis.

The patient, a male aged 44, passed 87 biliary calculi eight years previous to operation. Seven months before, a stricture of the urethra, which resulted from an attack of specific urethritis, was cut.

Four years before the kidney operation the patient had an attack of chills and fever, and such an attack was repeated at irregular intervals, four or five times a day for two weeks. There was a feeling of uneasiness in the left groin, which was suddenly relieved by the passage of half a pint of greenish-yellow

pus. Since then he has always passed small amounts of pus and mucus *per urethram.* After exposure to cold there was discomfort about the left kidney region. He never had hæmaturia, although the Röntgen rays showed five calculi.

At operation an enlarged kidney was found and calculi palpated. The kidney was removed and gauze drainage placed. The laboratory examination reported chronic pyonephrosis.

Ureteral Calculus.—One case was operated on.

A male, age not given, had a sudden attack of severe pain in the right side of back, just below twelfth rib, one year before admission. Pain traveled diagonally downwards, and became generalized over the abdomen. Altogether there were six such attacks, of which four were very severe; each attack, except the first, was accompanied by vomiting. Last attack occurred the night before admission.

Rectal examination revealed a hard, slightly tender nodule, high up on the right side of base of bladder, probably a stone in the lower portion of the right ureter.

At operation, the right ureter was found dilated to site of obstruction. A small stone was found in the vesical end of the ureter, 4 cm. from its termination; it was pushed upwards and removed.

Hypertrophy of the Prostate Gland.—One case was operated on.

The patient, age 71, led a catheter life for 20 years. Throughout the latter half of this stage he urinated at two or three o'clock mornings. Up until five years before operation he occasionally urinated in dribbles, since then he has been compelled to use the catheter five times daily. A month before admission noticed a dark red, bloody appearance of the urine; this cleared in three days. Four days thereafter, there was an ammoniacal odor to the urine. Four days before admission again noticed blood in urine and since has had much hæmaturia.

Operation, perineal prostatectomy, the small size of the prostate endorsing this route. Histological examination revealed parenchymatous prostatitis. Hæmoglobin estimation was 68 per cent., being lowered by hæmaturia.

Goitre.—Two cases of simple goitre, both in females. The mother and two sisters of one of the patients had small goitres.

About thirteen years before admission the patient noticed a swelling upon the left side of the anterior surface of the neck, which gradually increased in size. Five years later swelling appeared on the right side; this is now the larger. Patient complains of throbbing pain on exertion and, after any excitement, tumors interfered somewhat with breathing.

Examination showed, in the midline, a freely movable goitre, about three inches in width. On the left side of the neck, but higher, was a smaller tumor; both followed the movements of the larynx in deglutition. On auscultation, a rough sound was heard all over the chest, from encroachment of the goitre upon the trachea. The goitre was extirpated through a horseshoe incision, and the field of operation upon the gland painted with carbolic acid, and this followed by alcohol. Histologic examination showed the goitre to be cystic.

The other patient noticed, five years previously, that the circumference of her neck was increasing, there was no localized swelling. Gradually the tumor developed in the thyroid region and in the midline.

Examination revealed a central, symmetrical, painless, smooth tumor occupying the midline of the neck, extending from side to side the width of the neck, and almost filling up the anterior cervical triangles. Just to the left of this is a smaller, almost unrecognizable prominence, which was probably the left lobe of the thyroid. The tumor had the consistence of a tense cyst. The heart sounds were transmitted to the tumor. The voice was high pitched and husky.

After removal of the goitre the field of operation on gland was painted with carbolic acid, followed by alcohol.

Histological examination showed that the walls consisted of degenerated fibroconnective tissue, necrotic towards the centre, better preserved and more vascular towards the periphery; and here too, were a few atrophic acini with colloid contents.

Carcinoma of the Breast.—But one case of carcinoma of the breast happened to fall into the clinics this year, but the remaining cases I shall report with a large series later on.

A woman, aged 40, was accidentally struck on the left breast about four weeks previous to admission, since then there has been a painful, hard tumor in the breast. Examination showed in the left upper quadrant of the left breast a hard, palpable tumor the size of a walnut. No enlarged axillary lymph-nodes were palpable. Radical operation was performed and a rubber tube used for drainage. Histological examination showed carcinoma, but there were no metastases in the lymph-nodes examined.

Fibroid of the Uterus.—Three cases of fibroid tumor of the uterus in women aged 36, 47, and 49 respectively. Duration of disease 8, 12, and 24 months. Dysmenorrhœa was present in all cases, leucorrhœa in two, menorrhagia in one, and metorrhagia in one, while one patient suffered from frequency of micturition. The operations were complete abdominal hysterectomy in two cases, and supravaginal amputation without the adnexa in the remaining case. All the patients had more or less anæmia, the hæmoglobin estimation amounting to 42, 70, and 78 per cent. respectively.

Histological examination revealed in one case fibroleimyoma and endometritis; in another, fibroleimyoma, hyperplastic endometritis, metritis, chronic salpingitis, and chronic cystic öophoritis; and in the third, hyperplastic glandular endometritis, fibroid metritis with considerable hyaline degeneration of connective tissue and atrophy of the muscular layer, marked arteriosclerosis, and chronic öophoritis and cyst formation.

In fibroid uterus on account of risk of carcinomatous change it is always a question whether to do a complete or partial removal of the uterus. Personally I am of the opinion that the greatest good will be accomplished by complete removal in all cases. The sense of touch and the naked-eye appearance of the cervix is not sufficiently reliable to decide the question. In a few cases in which I have operated lately, doing a supravaginal amputation, the pathological report has come back, "Commencing carcinomatous degeneration."

Displacements of the Uterus.—There were 5 cases of retroversion, and one of anteflexion of the uterus. Appendicectomy for chronic appendicitis was performed incidentally upon all of these patients except one with anteflexion. The operations were intra-abdominal shortening of the round ligaments in 3 cases, ventrosuspension in one, and ventrofixation in one. Two of the cases of retroversion had associated

tubo-ovarian disease. The case of anteflexion was treated by dilatation of the cervix. There were 4 cases of uterine prolapse, and the operations performed were vaginal hysterectomy with apposition of the stumps of the broad ligaments in 2, and ventrofixation in the other two. One of the latter group required trachelorrhaphy, and one of the former group perinorrhaphy, appendicectomy for chronic appendicitis, and resection of a right cystic ovary at the same time.

The two uteri that were removed were examined histologically and one showed chronic fibrous metritis and endometritis, while the other showed metritis, endometritis, arteriosclerosis, hyaline degeneration, atrophy of muscles, and thickening of the squamous epithelium of the cervix. From the pelvis of one of the hysterectomy patients there was evacuated, a week after the operation, a considerable amount of old clotted blood and some pus.

Prolapse of the Vagina.—Vaginal prolapse occurred in a patient who had undergone vaginal hysterectomy nine months previously.

The patient complained of lack of pelvic support. Operation consisted in transfixing the round ligaments in two places, bringing them towards the midline, and suturing them to the vaginal wall. On account of bilateral cystic disease of the ovaries, bilateral salpino-öophrectomy was also done.

NOTE.—In all cases of hysterectomy, complete or incomplete, abdominal or vaginal, the stumps of the broad and round ligaments should be carefully attached, and sewn into the cervix when supravaginal amputation has been made; to the walls of the vagina, when complete abdominal hysterectomy is done; and apposed to each other in vaginal hysterectomy, otherwise vaginal prolapse will occur.

Chronic Metritis and Endometritis.—There were 8 cases of chronic metritis and endometritis, of which four have already been referred to, two under fibroids and two under prolapse of the uterus. Of the remaining 4 cases, two were associated with chronic salpingitis and chronic appendicitis, and one with pyosalpingitis.

This last patient, a young woman aged 20, showed clearly the ravages of gonorrhœal infection. Four years previous to admission she had an abortion, and two and a half years later, profuse yellowish vaginal discharge. A year before admission she had had her appendix and left tube and ovary removed in San Francisco. Examination of the vaginal discharge revealed Neiser's organism. Hæmoglobin, 52 per cent.; white blood cells, 19,600 per cm. Abdominal section showed an enlarged, boggy uterus surrounded by chronically thickened tissues and dense adhesions. The uterus with the right tube and ovary removed.

The remaining patient, a Russian, aged 32, had had six children, of whom four were premature. She complained of dysmenorrhœa with excessive flow. She had been curetted four times, and trachelorrhaphy had been performed, all without relief from symptoms. The uterus was removed by the vaginal route, and when examined showed, in addition to chronic hyperplastic glandular endometritis, some irregular glandular proliferation, and beginning infiltration of the myometrium. This would have been a fertile field for the development of cancer.[1]

In addition to the above case, chronic metritis alone was found in a patient with bilateral chronic salpingitis.

In this series of 9 cases, hysterectomy was performed by the supravaginal route in six, and by the vaginal in the other three.

Curettage for endometritis was done three times in the course of operations for other lesions. Of three uterine polyps excised from three other patients, one was myomatous, another submucous fibroid, and the third was organized blood-clot. Dilatation for cervical stenosis was necessary twice, trachelorrhaphy four times, and perineorrhaphy twice.

Disease of the Tubes and Ovaries.—There were 11 cases of chronic salpingo-öophoritis, in 10 of which there was associated appendicitis; in 3 of the cases there was chronic metritis and endometritis with fibroids in 2 and a dermoid cyst of the

[1] This case illustrates well the remarks I made in the clinical report for the previous year: "This may be thought to be too radical treatment, but it is the best possible safeguard against the development of carcinoma, which develops in some of these cases if left alone and, more likely, if subjected to traumatism by the ill-advised use of the curette."

right ovary in one. Excepting this last case the disease was bilateral in all, and double salpingo-öophorectomy was performed, with supravaginal hysterectomy in the 3 cases of associated uterine disease.

There were 3 cases of chronic salpingitis, and one case of pyosalpingitis. Two cases were associated with appendicitis. 2 with chronic metritis and endometritis, one with chronic metritis, and one with retroversion of the uterus. Both tubes and ovaries were removed, except in one instance in which a portion of the left ovary was left. Supravaginal hysterectomy was done in 3 of these cases, and ventrosuspension in the fourth.

There were 3 examples of chronic cystic öophoritis, one bilateral, one right-, and one left-sided. Associated conditions were chronic appendicitis, retroversion of the uterus, and endometritis in one; chronic appendicitis, prolapse of the uterus, and lacerated perineum in another; and prolapse of the vagina in the third.

There were 5 cases of ovarian cysts, 4 on the right and one on the left side. Appendicitis was present in all cases. The cysts were simple in 2 cases; dermoid with chronic salpingo-öophoritis, in one; papillomatous (adenocarcinoma), in one; and tuberculous in one case. In 3 cases of unilateral and 2 cases of bilateral salpingo-öophoritis, salpingo-öophrectomy was done. Pelvic abscess was evacuated by vaginal incision in 2 patients.

There was one case which resembled closely ectopic gestation for which complete supravaginal hysterectomy was performed, and also appendicectomy. Histological examination revealed hemorrhage and necrosis, no evidence of decidual tissue.

In addition to the operations described above, 49 others of less interest were also performed in the clinics.

STATED MEETING, HELD MARCH 1, 1909.

THE President, DR. WILLIAM J. TAYLOR, in the Chair.

OSTEOTOMY OF FEMUR FOR HIP ANKYLOSIS.

DR. RICHARD H. HARTE presented two patients upon whom osteotomy had been done for relief of ankylosis of hip in bad position.

CASE I.—Female, now twenty-five years of age, had tuberculous disease of the right hip when five years old. She first came under Dr. Harte's care at the Orthopædic Hospital, in November, 1904, at the age of 20 years. Her right hip was then ankylosed in slight adduction and marked flexion. There were scars of four old sinuses on the outer side of the thigh and in the inguinal region. She wore a shoe with a heel six inches high, walking with the foot in a position of extreme equinus, and having a marked limp. She came to the Orthopædic Hospital not for the deformity, but on account of pain in the hip. After being in bed at the hospital for one month with extension, she was discharged wearing a high shoe (six inches) which held her foot in normal position. In July, 1905, a sinus behind the great trochanter opened, and for this she was again put to bed in September, 1905.

On November 23, 1905, Dr. Harte did an osteotomy below the lesser trochanter, with osteotomes. The thigh was brought down into a position of almost complete extension and slight adduction, to overcome the previous shortening. She remained in bed with extension and sand bags for nine or ten weeks, and then gradually resumed walking. Measurements made in March, 1906, four months after the operation, are recorded as follows:

Right side, from anterior superior spine of ilium to internal malleolus, 28.5 inches.

Left side, from anterior superior spine of ilium to internal malleolus, 30.5 inches.

From umbilicus to internal malleolus, right, 32.5 inches.

From umbilicus to internal malleolus, left, 33.5 inches.

In May, 1906, the sinus back of the trochanter closed, and has remained closed since. In September, 1906, the patient was again in bed with some pain in the hip, but since then there has been no pain whatever. She now walks with a barely perceptible roll, wearing an ordinary shoe, with not even a lift on the heel. She has walked thirty city squares at a time, without experiencing discomfort.

Case II.—A lad, aged seventeen years, came to the Orthopædic Hospital in February, 1908. In July, 1907, he had had typhoid fever, being treated in St. Mary's Hospital, the typhoid being followed by an arthritis of the left hip joint. He remained in bed in the hospital until November, 1907, and was in bed for a month at home after his discharge. When he first came to the Orthopædic Hospital, in February, 1908, he walked with a marked limp, with the aid of a cane. The left hip was ankylosed in a position of twenty degrees of flexion and twenty degrees of abduction, with marked external rotation, so that as the lad lay on the bed the outer surface of his sole rested flat on the mattress. In April, 1908, osteotomy below the lesser trochanter was done, with osteotome. He was kept in bed with extension and sand bags for eight or nine weeks, and when discharged was walking with scarcely appreciable limp, the deformity having been corrected. It has been impossible to trace this patient since his discharge.

Case III.—A girl, aged fourteen years, suffered from typhoid fever in May, 1908, being treated at her home. A small abscess which formed above the right trochanter was lanced by her family physician. In June a large abscess developed in the left iliac fossa, and for this she was sent to the German Hospital, where the abscess, deep in the pelvis, was opened by Dr. Deaver, by an incision parallel to Poupart's ligament. She was discharged from the German Hospital in August, and was at home for two weeks, when she was first brought under Dr. Harte's care at the Orthopædic Hospital, September 3, 1908. There was fibrous ankylosis of the left hip in flexion and adduction, and she was put to bed with weight extension for over two months to see if any improvement could be obtained without operation. Examination November 11, 1908, showed that there was a range of motion in the left hip, of flexion and extension, of about ten degrees, extension being impossible beyond 133 degrees and flexion impossible beyond 123 degrees. Very slight rotation was possible in flexion. There was adduction deformity of 10 degrees, and no abduction was possible. A photograph made at this time shows the flexion deformity well, as well as the scars of the incisions for the iliac abscess.

Osteotomy below the lesser trochanter was done with osteotome in December, 1908, and the patient was kept in bed with weight extension and sand bags for eight or nine weeks. She now walks well without any support, only a slight limp being noticeable, and the thigh being in excellent position—very slight flexion, abduction of 15 degrees. There is no motion in the hip except very slight rotation. The shortening of the whole lower extremity is three-fourths of an inch.

Dr. Oscar H. Allis said that the point which Dr. Harte made in regard to supporting the upper fragment is an extremely important one, for if the old trouble is disturbed, even if it has been ankylosed for twenty years, it may set up trouble and carry the patient perhaps to the grave. As an illustration of this he cited the history of a woman who when a little child went through all the stages of hip disease, abscess, etc., and got well. She walked with the traditional limp until about twenty-two or twenty-three years of age, attending to her work and earning a good living. She then married. As it was impossible for her to be delivered through the natural passages, she was subjected to Cæsarian section. The operation was skilfully performed, the mother and child both recovering. Both are living to-day, but within one week of the time she was operated upon the old trouble with the hip began, extensive abscesses formed, and it has now gone through every stage of hip disease. Though Dr. Allis had resected the joint it is still suppurating; the whole hip-joint region has been involved. He believed the cause of this disaster was that the thigh was badly adducted and flexed, and since a child is to be delivered by Cæsarian section it is to be done in as short a time as possible, it is probable that an assistant in this case took the thigh, forcibly dragged it out of the operator's way, breaking up old attachments, and doing just exactly what Dr. Harte has so properly warned against.

Dr. A. P. C. Ashhurst said that there is in existence an interesting correspondence between Mr. Adams and his father (Dr. John Ashhurst) on the subject of this operation, and Mr. Adams

laid particular stress on the points raised by Dr. Harte and Dr. Allis, that it is not advisable to make a large wound or to disturb the joint too much. Mr. Adams said, in effect, that it was enough to make his hair stand on end to read and hear of the various operations done under his name, in which large wounds were made, etc. His operation was a mere puncture made over the outer surface of the femur; along the tract made by this puncture he passed his little saw; and he sawed very gently, and did everything with neatness and precision.

GUNSHOT WOUND OF THE BRAIN WITH REMARKABLE RECOVERY OF FUNCTION.

Dr. William J. Taylor presented a girl of two years of age, who was first seen by him at St. Agnes Hospital on April 1, 1907. On Sunday, March 10, 1907, twenty days before, while she was lying in bed, her little brother fired a thirty-two calibre revolver within a short distance of her head. The ball entered one-half inch to the left of the middle line, directly over the glabella, and must have passed through the frontal sinus and directly backwards and upwards and emerged from the skull on the right side over the parietal protuberance at a point two and one-half inches from the middle line and two inches back of the mid-auricular line. The ball was found on the pillow by the side of her head. There was tremendous hemorrhage, and unconsciousness for two hours. There was total palsy of the left side, and on Tuesday, the wound having been made on Sunday, she had a series of general convulsions which continued at intervals until Friday. She regained power in the left leg, but on the first of April, twenty-one days after the injury, there was still total palsy of the left hand and arm. She was so young that it was very difficult to tell whether there was any alteration in sensation or in eyesight or taste, but apparently these were normal.

On April 2, as both the wounds of entrance and exit were suppurating, and at the wound of exit there was quite a distinct swelling, she was given ether and the wound of exit explored. There was a hole in the skull about three-quarters of an inch in diameter, through which was protruding quite a distinct fungoid mass. At the side of this was a piece of bone detached from and standing at right angles to the skull. After removing this piece of detached bone and cutting away a few jagged fragments of

bones, nothing further was done. Up to this time she had been extremely restless and unable to sleep, but almost immediately quieted down and had good and restful nights. Very quickly she regained the power and control over the left arm. She was very anæmic, having only forty per cent. of hæmoglobin. By April 16 her color had improved, her appetite was good and she was taking a large quantity of various foods. She slept soundly all night and took a long nap in the day, and she had regained complete power over her left upper extremity. This she now used quite freely, could move the hand and arm in any direction and lift it high up over her head, and it was impossible to detect any want of control or movement in it. She was able to walk around by herself with perfect equilibrium and the wounds, both of exit and of entrance, had healed except for a small scab. At no time had she any rise in temperature, her convalescence being absolutely uninterrupted. On May 7 the wound of exit discharged some pus, but this soon healed and from that day to this she has remained perfectly well. There is no palsy, no evidence of any alteration in her intelligence or power of motion, there have been no convulsions or other evidence of brain irritation.

He reported this case as a remarkable example of the tolerance of the brain to mechanical interference. This bullet must have passed through the frontal sinus, through the temporal lobe and through the substance of the parietal lobe to its exit just posterior to the parietal eminence. The soft bones of the skull of a child of this age could not have presented sufficient resistance to have deflected the bullet in any way.

TRAUMATIC ASPHYXIA.

WITH REPORT OF A CASE.

BY DUNCAN L. DESPARD, M.D.,

OF PHILADELPHIA.

THE term traumatic asphyxia has been applied to the series of phenomena following the suspension of the respiratory function for a more or less prolonged period by forcible compressure of the thorax or abdomen, or both. These consist of the usual symptoms of suffocation, associated with a peculiar mottled bluish discoloration of the skin of the face and neck, sometimes extending to the upper part of the thorax, and occasionally to one or both arms, accompanied by subconjunctival hemorrhages and frequently bleeding from ears, nose and pharynx.

An interesting case of this type was admitted to the Jefferson Hospital January 28, 1908, in the service of Prof. John H. Gibbon, to whom I am indebted for the privilege of reporting the case.

CASE REPORT.—Male, age 27, a mulatto. At 4.45 P. M. on the date of admission he was on an elevator, the sides of which were unenclosed, and which was used for moving merchandise from the cellar to the sidewalk. The top of the shaft was closed at the street level by two iron doors which were usually open. When the elevator approached these doors the patient found them closed, and, becoming alarmed, attempted to jump off of the elevator. In doing so, he was caught between the moving elevator floor and the beam supporting the upper framework of the shaft, in such a manner that his head, neck, the right part of thorax, the right arm, the leg and right side of abdomen were under the beam, while the corresponding parts of the left side of the trunk, arm and leg remained on the floor of the elevator, his face being directed downward. The line of compression extended from the

left side of the base of the neck to the right lumbar region. He remained in this position about five minutes, and when found his face was said to have been almost black,—eyes bulging, mouth open, and tongue protruding. He was completely unconscious when rescued. On admission to the hospital at 8.30 P.M. he was still unconscious. Respiration 18, regular but sighing; pulse 82, fairly full and regular, increasing in rate to 96 beats per minute in a short time.

The examination of lungs and heart showed nothing abnormal. There was a dislocation of the right sternoclavicular articulation. Both arms were apparently paralyzed. Over the forehead, face, neck, and extending to the right shoulder anteriorly and posteriorly, were what seemed to be small ecchymotic spots, dark red in color, which did not disappear on pressure and were separated by normal skin. These areas were well marked over the upper part of the thorax and the left shoulder. There were also a few slight abrasions over the right shoulder. Both eyes showed marked subconjunctival hemorrhages.

About ten minutes after being sent to the ward he had a convulsive attack, shrieking with each expiration, throwing himself about, and at times raising himself in bed, as if struggling for air, apparently having difficulty in breathing. This condition lasted about ten minutes; he then became quiet with normal respirations.

It was noticed during the attacks that his arms took no part in his muscular efforts, and hung limp at his sides; and that when his name was called loudly he seemed to hear, turning his head and eyes in the direction of the sound.

He remained unconscious for seven hours, during the first part of which the convulsions were repeated at half-hour intervals, the periods between the attacks gradually becoming greater and the attacks lessened in violence and duration.

January 29, 1908. The urine examination showed it to be clear, sp. gr. 1030, acid in reaction—no reaction to test for sugar, slight cloud of albumin, a few hyaline casts and no blood.

The patient seems to be only partly in possession of his mental faculties, and could give no account of the accident. He did not complain of pain, was quiet, and slept a greater part of the time.

Examination by Dr. Wm. M. Sweet the same day showed the eye-grounds to be normal, and during the examination it was noticed that his eyes followed the light, as if he could see it.

January 30, 1908. The patient's mind was much clearer and he remembered vaguely that he was in some way injured by an elevator. His appearance was much the same as the previous day. Palsy of both arms seems to be complete, with exception of the power to move the fingers of the left hand.

February 6, 1908. Examination by Dr. Francis X. Dercum was as follows: Flaccid palsy of right forearm. The shoulder is only moved by special shoulder muscles. The pain, temperature, and tactile sense is present. Faint response to biceps tendon reaction. Stereognosis of the right side is lacking, but normal on the left, sense of position impaired at the wrist, and unimpaired at the elbow. There is no tenderness over the nerve trunks. Electrical reaction: Little response on either side to Faradic current. Galvanic current showed no sign of reaction of degeneration of facial, spinal accessory, perineal or ulnar nerves. The extensors and flexors of the forearm, around anus and legs, are normal, *i.e.,* no reaction of degeneration.

February 10, 1908. The patient was able to flex and extend the fingers of the right hand, and February 18 he was able to flex and abduct the arm to a limited degree. In other respects his recovery seemed complete. The hyperæmic spots having entirely disappeared, gradually fading, and not undergoing the chromatic changes usually seen in extravasation, he was allowed to leave the hospital, but returned to the out-patient department for electrical treatment. In about six weeks from the date of discharge, he had fairly well recovered the use of the right arm, but there was still some muscular weakness.

Tardieu, in 1870, made very extensive studies upon this subject, drawing information from the observation of the victims of a panic occurring on the Place de la Concorde, in which 30 persons were injured (with 9 deaths), and those of Prof. Hardy, where a number of women were injured by a stampede from a workshop caused by the falling of a part of a wall, as well as quoting the studies of M. Olliver of Anvers, upon those injured in the Champs de Mars, in the year 1837, of whom 23 died. All those injured presented practically the same symptoms, only varying in degree, consisting of unconsciousness, brief or prolonged respiratory and cardiac

depression, sometimes with pulmonary engorgement which was characterized by a cough and moist râles associated with bloody expectoration, and all without exception exhibited a reddish-violet, or even black, discoloration of the face, neck, in some cases extending up to the upper part of the chest. and occasionally to the arms, possessing the appearance of minute ecchymotic spots, at times so numerous as to be almost confluent. Sub-conjunctival hemorrhages were common to all and a few bled from the mouth, nose or ears. In none was there delirium, convulsion or paralysis; a few who were thought to be suffering from apoplexy when first seen, disproved this upon regaining consciousness. The post-mortem findings of 9 cases of Tardieu and at least as many of Olliver (Beek states 16) were uniform, and consist briefly of pulmonary congestion and frequently pulmonary apoplexy. Ecchymosis existed under the serous surfaces of lungs and heart and emphysema from rupture of air vessels. Among the characteristics most common was increased fluidity of the blood, which was dark in color, and its accumulation in the chambers of the heart, especially in those of the right side. Tardieu emphasizes the integrity of the brain in the two cases in which he was allowed to open the cranium, and states that Olliver in only a single instance found a considerably bloody exudate on the surface of the cerebral hemispheres. It is of interest to note that Tardieu has known similar symptoms and ecchymotic areas in women following prolonged labor, and in an epileptic, upon whom he made an autopsy.

More recently the following cases are found in the literature:

Huerter reports two cases, the first a boy, fifteen years old, was injured by being caught in a threshing machine, resulting in a penetrating wound of abdomen about 3 cm. long, through which intestines protruded. He was not unconscious when seen an hour after the accident; the face was swollen, dark blue in color, and showed a number of petechiæ, the edges of which were irregular. This condition extended over the entire face to the edge of the hair and below from the cricoid cartilage to the nape of the neck the margins of the discolored area were sharply defined. The eyes showed marked sub-conjunctival hemorrhages; there were also hemorrhages from the nasal mucous membrane. The bluish discoloration

lasted for a period of twenty-four hours, but the arterial hyperæmia persisted for three days and gradually faded. There was no injury to the head or chest.

The second case presented by this author was one of Vogt's, which occurred in a boy aged fifteen, who was run over by a wagon in a soft sandy road. He was unconscious for a brief period and when examined, shortly after the injury, was found to have a contusion of the abdominal wall which was not very marked. The eyes were bulging, and the face and neck presented the same appearance of the above case. There was no injury to the head. Recovery took place in about three weeks.

PERTHES records two cases: that of a boy fourteen years of age who was injured in a cotton mill, being pushed into a space about two hands' breadths wide between a wagon and the handles of a cylinder; the wagon also struck the right side of his face. He was unconscious when rescued, but shortly afterwards regained consciousness. Subsequently he stated that in the first hour after the injury, he could hear all that took place around him, but could not see. When examined one hour after the accident, he was found to be a weak, poorly nourished boy,—conscious, pulse regular and strong, face blue except the lower half of the right cheek, which was pale; the blue color did not disappear on pressure. Within the blue area were numerous dark red petechiæ; the latter were also present over the upper half of the left side of the neck. There was a slight exophthalmus, and sub-conjunctival hemorrhages. There was no sign of injury to the head, and no hemorrhage from the nose or ears. The facial nerves were uninjured, and the pupils of the eyes reacted to light. The left clavicle was fractured at the junction of the middle and outer thirds. Pain was elicited in the mid-axillary line over the third and fourth ribs, by pressure which almost developed crepitus. Respirations were frequent but regular. On the third day the temperature ran to 38° centigrade without any apparent cause, the pulse varying between 76 and 96 beats per minute. By the fourth day the discoloration of the skin was decidedly less, but the sub-conjunctival hemorrhages did not disappear for several weeks.

The second case was that of a male, aged thirty-six years, who was crushed between a wagon and an iron post, the force acting from before backwards. The man was held suspended with his left fore-arm imprisoned between the wagon and fence. In this position respiration was suspended and, while retaining consciousness he could see, and felt as if his eyes were going to pop out. His hearing was unimpaired. Respirations were rapid, shallow and painful. The entire face, and especially the temporal region, was swollen and colored a bluish red; this was very marked in the region of the lower eyelids. There were sub-conjunctival and scleral hemorrhages. On the upper part of the neck were isolated petechiæ. No evidence of injury was found on the head, thorax, or lower part of left chest, where there was pain. No other sign of injury was found with the exception of a compound fracture of the radius. On the third day after being hurt, the temperature rose to 39.9°, and there was bloody expectoration, with impaired resonance râles

on the left side over the area that had previously been painful. The temperature increased for four days, but in ten days all of the signs of pneumonia had disappeared. This condition Perthes calls compression pneumonia. The discoloration had largely disappeared by the fourth day, but that of the conjunctiva persisted until the thirty-ninth day after the date of injury. The eye grounds were examined on the eighth day and found to be normal.

BRAUN describes the case of a male twenty years of age, who was injured by a stone wall falling and pinning him to the ground, so as to compress the thorax and abdomen for half an hour. The neck and face were not injured. The examination of the patient showed the face to be swollen and of a dark blue color, the eye-balls were prominent with sub-conjunctival hemorrhages, especially marked in region of the palpebral fissure. The pupils were dilated and did not react to light. Later a large number of ecchymotic spots appeared, distributed over the face, neck and left arm. He complained of abdominal pain, but had no other symptoms of visceral injury. The patient was at all times conscious with normal pulse and temperature. By evening the ecchymosis was more pronounced; the pupils were still dilated, but reacted to light slowly. The urine was normal except for the presence of albumin, which persisted for two days. The eye grounds were normal on the day following the injury. There were no unfavorable developments, and the patient left the hospital on the fifteenth day, with the face still swollen and with evidence of blood extravasation still well marked.

BURRELL and CRANDON record a case of a male twenty-two years old, who was compressed by having his chest caught between an electric car and a door-post, for three minutes. On examination one hour after the accident, he was found entirely unconscious. Pulse 100; respirations 30 and shallow, with a groan at the beginning of expiration; the hands and nose were cold; bleeding from both ears, nostril and mouth. There was no wound of the head. Pupils small, equal, and did not react to light; excessive chemosis. Reflexes present, but diminished with the exception of the knee jerks, which were absent. Emphysema was present in region of the seventh, eighth and ninth ribs on left side, which obscured the localization of a probable fracture. Slight spasms of the abdominal muscles were noticed. There was a bluish discoloration over the face, extending into the scalp, over the neck and on to the chest as far as the third rib. Pressure over this discoloration only produced slight paling, the former color returning slowly upon withdrawing the pressure. A careful examination of these bluish areas showed that there were spaces of healthy skin .5 to 1 mm. in diameter, evenly distributed throughout its extent. These were limited by an illy defined bluish border, uniting to form a network. This condition was found to involve the mucous membrane of the lips to a limited extent. There were marked sub-conjunctival hemorrhages confined to the parts not covered by the eye-lids. Small retinal hemorrhages were present. The patient improved and consciousness returned in four hours. Urine contained albumin and blood, but was normal in a few days. Vision was still imperfect on the third day. By

the fifteenth day the discoloration began to grow less, and by the eleventh day had almost disappeared, but it did not pass through the usual changes of extravasated blood.

Beach and Cobb published an interesting case which occurred in a well-developed male thirty years of age, who was crushed by an elevator and subjected to pressure for three to five minutes. He was conscious for a few minutes and bled from nose and mouth. When examined one hour after the accident, he was in a condition of moderate shock. The eighth and ninth ribs on left side in axillary line were fractured, and in this region the presence of subcutaneous emphysema was noted. The skin of the abdomen was contused and hematonia was found in the left loin and back near the pelvis. The face was bluish in color; the skin seemed to be dotted with numerous black or reddish-black areas between which the skin was normal in appearance. The discoloration extended over the neck, terminating in a well-defined transverse line passing outward from the inner ends of the clavicles, posteriorly; the bluish-black discoloration was confined to the area overlying the trapezius muscles. Pressure over the discolored area did not cause it to fade completely.

The eyes were bulging and there were marked sub-conjunctival hemorrhages; pupils were equal and reacted to light. There were no retinal hemorrhages. Mind was normal.

On the third day the temperature rose, there was blood expectoration and pulmonary râles, this disturbance lasting twenty-four hours. The microscopic study of sections of skin removed from the neck, comprising some of the dark areas, showed the skin to be normal, with no evidence of blood outside of the blood-vessels.

Henry records a case of a young man twenty years of age who was crushed between two iron pillars. He was unconscious for a short time. When examined, the face, neck, and upper part of chest anteriorly were cyanotic. There was bleeding from both ears, but not from the nose or pharynx. Marked sub-conjunctival hemorrhage of both eyes was present. The mind was clear and the patient complained of pain in the head, thorax, and legs; there was a tenderness over the lower dorsal region in both groins. A perineal wound was found. This wound healed without suppuration. There developed a compression pneumonia with a right-sided emphysema, from the pus of which the pneumococcus was isolated. The patient failed to recover, and at the autopsy the right lung was found to be collapsed and the left lower lobe partially so. There were several abscesses of the right lung, and some of the branches of the pulmonary artery of both lungs were thrombosed. He now concludes that the patient recovered from the traumatic asphyxia, but died from sepsis entering the perineal wound.

Winslow narrates the incidents of an accident to a young man twenty-two years of age who was bent forward between the ceiling and an ascending elevator, compressing the abdomen and thorax. There was no loss of consciousness, but there was marked bluish punctiform discoloration of face and neck as far down as the collar line, or on a level with the cricoid cartilage. The discoloration did not fade on pressure, and

gradually disappeared without the usual changes seen in true ecchymosis. The microscopic examination of the skin removed from the discolored area, "showed the capillaries in places more or less distended with blood, but no blood was found anywhere in the tissues outside of the blood-vessels."

The appearance of a child thirteen years old, after being caught between the cow-catcher of a cable car and the ground, is described by Robertson. There were some abrasions of the thorax and thigh, his face had a peculiar bluish-black tint, with a great many minute reddish-brown spots squirming through it. Pressure did not affect it. There was a distinct line of demarcation at the level of the middle of the clavicles, below which the skin was normal. The color gradually faded, and at the end of eighteen days there was only some duskiness of the face.

Reppanner has collected from Wilm's clinic four cases, two of which were women injured in a panic following an outbreak of fire in a theatre. The area of the discoloration was not limited to the neck, but extended to the upper part of the thorax, and in one case to the upper arm, while in the other both mamma were the site of the characteristic discoloration. Both were unconscious, but became very restless and were given morphine to quiet them. The following day they had regained consciousness, but could not recall what had taken place at the time of their injury. His other two cases were men, one of which was crushed between a wall and a great weight, for about one minute. His face, neck and upper part of the thorax showed the dark red punctate area usual in these cases.

The other man was rolled by a tram car; his head and chest were free from the car. He was unconscious for a short time and sustained a fracture of the femur. The face was discolored by small punctate hemorrhages. The eye-lids were swollen and discolored, while the whites of the eyes were not visible on account of the sub-conjunctival hemorrhages. The palpebral conjunctiva and mucous membrane of the mouth showed the punctate hemorrhagic areas. The neck was free from the discoloration, but on the chest there was a triangular area corresponding to the part exposed when the shirt is open at the top.

Beatson presents a case resembling that of Winslow's in which a man twenty-four years old was bent down and forward by a pit cage. There was intense congestion of the head and neck, petechial in character, but not affected by pressure.

Ryerson describes the condition of a boy who was injured by being compressed between the springs and wheels of a wagon. There were abrasions behind the right ear, forehead, abdomen and the left thigh. His face and neck had a deep blue mottled appearance in front and behind, shading into normal skin at the upper part of the thorax. The discoloration was not influenced by pressure, and in the course of two weeks had faded without going through the usual color changes of extravasated blood.

Bolt presents the case of a man thirty-eight years old whose abdomen and lower thorax were crushed between two cars. The skin of face and neck became a violet blue, with the exception of a line corresponding

to the position of the rim of his stiff cap, which was pressed well down upon his forehead at the time of the accident; this line was normal in appearance. The patient was semi-conscious, realizing what was going on about him, but helpless, and temporarily losing the sense of sight, which returned in fifteen or twenty minutes.

Compression pneumonia developed, but seemed to reach its maximum in a few days; the patient, however, died almost twenty-seven days after the injury, from causes that were not clear even after an autopsy was performed. Microscopic examination of section of the discolored skin, showed in some places an effusion of blood outside the capillary vessels. The number of red blood-cells thus situated were relatively small.

ETTINGER has been able to collect from the literature 36 cases, and enrolls a case of his own, which was that of a young man who was knocked down and trampled upon by a mob. He was unconscious for about an hour. There was œdema, or swelling and cyanosis of face and neck. Hemorrhages in skin of face, neck, of the conjunctiva, also in the mucous membrane of the nose, mouth, fauces, and of the tympanic membrane, and blood was found in the urine. The evidences of dilatation of the right side of the heart were present. The symptoms of pulmonary disturbance were present from the first, and later a left-sided pneumonia developed.

In this form of suffocating, not only is the air prevented from entering the lungs by their inability to expand, but the contents of the thoracic vessels may be forced out, and, in the case of the veins, the current is reversed, overcoming the valves and damming the blood back into the capillaries. If the force acting is sufficiently great, it is conceivable that the capillary vessels would be dilated to a point where paresis would ensue.

Beach and Cobb advanced this view, and their microscopic studies seem to be conclusive proof of its correctness. This is further supported by the fact that pressure over the discolored surface caused only some paling in color, and that it did not pass through the characteristic changes marking blood extravasation as seen in other traumatisms. Perth believes the limitation of the discoloration to the face and neck to be due to the absence or incompetency of the valves of jugular and facial veins. The fluidity of the blood and its dark color, upon which Tardieu and Olliver lay so much stress, is explained by Draper, who attributes it to the withdrawal of atmospheric oxygen from the blood and thereby lessening its coagulability; but he does not believe this to be peculiar to

any special form of asphyxia, and states that it occurs in any case where atmospheric air is prevented from entering the lung.

Sub-conjunctival and retinal hemorrhages, and hemorrhages from the mucous membrane of the nose and pharynx, may be explained by the lack of support the capillary vessels receive from the surrounding tissue, in comparison with the capillaries of the skin, where they are surrounded with the dense fibrous tissue of the corium. This leads to the speculation as to what the condition of the smallest vessels of the brain may be, and whether the slow return of consciousness and the tardy resumption of the mental functions in some cases, is not directly traceable to a paresis if not of rupture of some of the capillary vessels of the cerebrum.

Beek quotes Olliver, that in all cases where the conjunctiva was swollen by infiltration of blood, and in those where blood had flowed from the ear, the vessels of the pia mater and of the substance of the brain were engorged with blood.

In the absence of more definite cerebral symptoms, it cannot be stated with any degree of certainty that a similar condition of the blood-vessels of brain prevailed in the case under discussion, or whether the occurrence of convulsions and their repetition was in any way attributable to circulatory disturbances of the brain or medulla, from this source.

It is, however, well understood that spasms are produced by depriving the respiratory centres of their normal blood supply, as by compression of the great vessels of the neck; or they may be brought about by irritation of these centres, dependent upon an increased carbodioxid content of the blood, thereby lessening the supply of oxygen.

The probability of the convulsions being due to the formation of toxins arising from faulty metabolism, induced by the condition of asphyxia, has been suggested. The early appearance of the convulsions after the accident militates against this hypothesis.

I am inclined to attribute the occurrence of convulsions as due to respiratory interference. This may have been occas-

ioned by injury to the phrenic nerve or its communicating branches, as the area in which the nerve is situated lies directly in the line subjected to the greatest compression.

The loss of muscular power in both arms probably is best explained by the injury of the spinal nerve trunks. The pressure must have been more or less oblique at the base of the neck and with sufficient force to overcome the natural protection afforded by the sternoclavicular articulations. The greatest injury to the nerves appeared to be on the same side as the sternoclavicular dislocation.

The treatment of this condition is directed to the re-establishment of respiratory function, such as artificial respiration, oxygen inhalations, atropine and strychnia, and when the right side of the heart is dilated venesection is indicated.

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A CASE OF STASIS CYANOSIS FOLLOWING AN EPILEPTIC SEIZURE, SIMULATING TRAUMATIC ASPHYXIA.

BY E. G. ALEXANDER, M.D.,
OF PHILADELPHIA,
Visiting Surgeon to the Out-patient Department of the Episcopal Hospital.

THE following case clinically resembled traumatic asphyxia so closely that I was at a loss how to classify it. Etiologically it was undoubtedly due to epilepsy, and this fact has forced me to describe the condition as a case of stasis cyanosis following an epileptic seizure.

E. B., American, male, age 18 years; occupation, electrician; family history good.

Previous history: Had measles and whooping-cough in infancy, typhoid fever at the age of twelve. In the fall of 1906 while at work, a fifteen-pound wrench fell from a scaffold twenty feet high, striking him on the head in the left parietal region; he was rendered unconscious from the blow for a few minutes. On regaining consciousness, he continued his work for about one-half an hour, then, owing to intense pain and headache, went to his family physician for treatment. The wound inflicted was a trivial one, the skin not being broken, and from which he entirely recovered within a few days.

The patient was perfectly well until September, 1907, nearly one year after the injury, when he was seized with an attack of epilepsy. In October, 1907, and January, 1908, he had similar attacks.

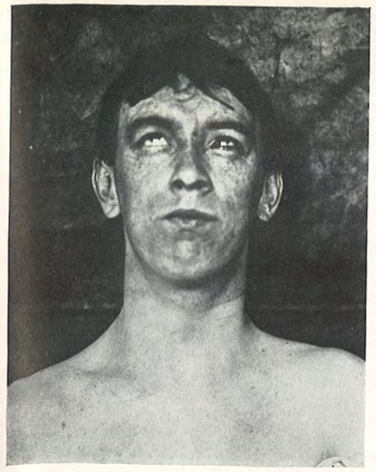
Present trouble: On the morning of March 4, 1908, he was called to a meat market to repair an electric meat-grinding machine; after finishing his work he was seized with an attack of epilepsy and fell to the floor. Two witnesses of this attack said that the patient had just finished his work and was standing behind the counter talking when he suddenly let fall a hammer from his hand, straightened up, stared across the room as if

seeing something in the distance, and then slowly sank face downward to the floor. They also said that "he puffed and snorted like a steam engine" and they believed that he would have smothered if they had not turned him over; during this seizure no convulsive movements were noticed, nor did he foam at the mouth. He was carried in an unconscious condition into an adjoining room; here the light was much brighter and they noticed that his face was blue and that his eyes were blood-shot; he remained unconscious several minutes. A patrol wagon was summoned, the patient was taken to the Episcopal Hospital and admitted to the surgical dispensary; he was transferred from the dispensary to the house and admitted to the service of Dr. G. G. Davis, to whom I am indebted for the privilege of reporting this case. On admission to the dispensary the patient had fully regained consciousness and the history he gave was that while standing on a table doing some electrical work he received a shock which caused him to fall from the table to the floor, after which he remembered nothing. (I have been unable to substantiate this history. The two witnesses were seen separately and gave almost identically the same account of the accident. The current was turned off during the repair of the machine, so that it is highly improbable that the man, who now remembers nothing of the accident, could have received a shock.)

On admission to the hospital the patient complained of nothing but the discoloration of the face and eyes.

Examination.—A young adult, well nourished, and apparently in good health. The face and neck showed a diffuse bilateral bluish and slightly punctiform discoloration of the skin that disappeared but slightly, if at all, on pressure. This discoloration stopped with a decided line of demarcation just where the collar passed around the neck. (The patient was wearing a tight collar when the accident occurred.) Below this line the skin was of a normal color. The lips showed a purple discoloration. The tongue was moist and clean, and showed no evidence of having been bitten. There was no hemorrhage from the nose or ears. The eyes showed a marked subconjunctival ecchymosis, more marked in the left, the pupils being widely dilated and failing to react to light; this was due to atropia which had been instilled a few days previously for the purpose of testing the vision; the eye grounds showed no fundus change. The chest and abdomen

FIG. 1.

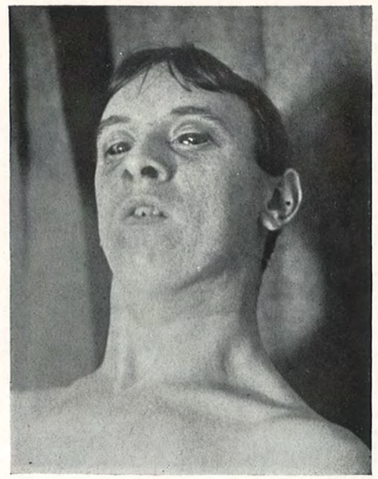


Appearance one hour after attack while wearing a tight collar.

FIG. 2.

Lateral view; appearance one hour after attack.

FIG. 3.



Appearance three days after onset of condition; the right eye shows a subconjunctival ecchymosis which was not present when first photograph was taken.

failed to show any signs of recent injury. The heart and lungs were apparently normal. Examination of the head failed to reveal any scar, depression or injury, either recent or old.

Urine.—Specific gravity 1020. Reaction, acid. Trace of albumin, no sugar, a few granular casts, leukocytes, squamous epithelial cells and urates.

March 6, 1908. Line of demarcation more pronounced than on admission. Subconjunctival ecchymosis more marked. Patient's general condition good.

March 8. Discoloration of face beginning to fade. Ecchymosis of conjunctiva still intense.

March 11. Discoloration gradually fading.

March 18. Discoloration has almost disappeared.

March 22. The patient had an attack of epilepsy.

March 24. Patient discharged and referred to the Orthopædic Hospital for treatment.

Through the kindness of Dr. Sinkler, to whose clinic the patient was admitted at the Orthopædic Hospital, I have examined their records and find the nervous history obtained almost identical with the above. The patient was treated at the Orthopædic Hospital for eight months, during which time he had no attacks of epilepsy. The parents of the patient told me that on his discharge from the Episcopal Hospital, they noticed that his face still showed a faint bluish discoloration.

Spratling [1] states that "punctiform hemorrhages covering one side of the face and neck are not infrequent after grand mal attacks in certain individuals; this condition is noticed as soon as the fit is over, the face having a dark, diffusely mottled appearance without elevation, the discoloration partly disappearing under pressure to quickly return when it is removed; as a rule, such extravasations are visible for some days afterwards, first fading in changing colors like a bruise."

That the face suffers most, Spratling attributes to "constricting bands of clothing about the turgid neck, which increases the efforts of the mechanical congestion."

Echeverria [2] reports a case in which a general petechial eruption on the face, neck and limbs, followed diurnal attacks of petit mal and nocturnal spasm; the eruption following the

nocturnal spasm was "minute and confluent in character and generally passed off within two or three days."

Pierce Clark [2] reports a case of profuse subcutaneous hemorrhage on the right side of the face and neck following epilepsy.

Gowers [3] states that "after the tonic spasm has lasted a short time, ten or twenty seconds, the face becomes congested and cyanotic; but with the increasing remission of the spasm, air becomes changed in the lungs and the cyanosis lessens."

Aldren Turner [4] says "that hemorrhages, petechial and of large size, have been described as occurring under the skin of the face, eye-lids and neck during the cyanotic stage of fits; but these must be unusual in uncomplicated cases of epilepsy."

Oppenheim [5] calls attention to the fact that "minute rupture of the capillaries of the skin and mucous membrane or circumscribed hemorrhages of the conjunctiva may occur."

Tardieu, in performing an autopsy upon an epileptic, found a great number of small ecchymoses at the base of the neck and anterior part of the chest analogous to the *tache de purpure.*

The above case I believe to be unique. It differs from the cases referred to by the authors quoted in distribution, duration, character of discoloration, and manner in which it disappeared.

In Spratling's and Clark's cases, the eruption was limited to one side of the face and neck. In Echeverria's case, there was a general petechial eruption—the discoloration, however, disappearing in two or three days. In this case, the discoloration was bilateral and lasted over a fortnight. I am unable to form any accurate conclusions as to duration, except in the cases referred to by Gowers and Echeverria. In the former's cases, the cyanosis disappeared in a few minutes after muscular relaxation was obtained, while in the latter's case, it lasted for two or three days. Spratling states, rather indefinitely, that the condition may persist for some days afterward.

The discoloration described varied from the transitory

cyanosis of Gowers, the petechial, confluent, and minute eruption of Echeverria, to the punctiform hemorrhages of Spratling. Spratling says that the cases fade "in changing colors like a bruise." This was not true in the above case; the condition simply faded gradually without the characteristic changes of extravasated blood being absorbed. With the fading the punctate character of the eruption became more pronounced.

I am inclined to believe the factors producing this condition similar to those causing traumatic asphyxia, namely, a fixed thorax, a closed glottis, an increased intrathoracic pressure, a lack of æration of the blood, and the incompetent and absent valves of the jugular, subclavian, and facial veins. That fractures and dislocations can be produced by muscular action during epileptic seizures is a well-known fact. Why, then, during these seizures cannot the intrathoracic pressure be raised by muscular action to a corresponding degree as that produced by trauma. The length of unconsciousness may have been augmented somewhat by the cerebral cyanosis. A small portion of the blood no doubt was outside of the blood vessels, but from the diffuse bilateral character of the discoloration, and the manner in which it disappeared, I believe that which was extravascular to have been very small.

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[2] Ibid: p. 252.
[3] Gowers: Epilepsy and Other Convulsive Diseases, p. 107.
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[5] Oppenheim's Diseases of the Nervous System (Mayer), p. 814.

DR. JOHN H. GIBBON said that he saw the case described by Dr. Despard. It was the first he had ever seen. The moment he saw it he was struck by the resemblance it bore to that colored plate published in the ANNALS OF SURGERY, with the paper on the subject by Cobb and Beech. Although much like the photograph referred to, the discoloration was not as sharply defined. In this case the discoloration went down on the side of the neck. The palsy is another interesting feature. Dr. Alexander's case, he

thought, was more unique, because apparently it pathologically simulates traumatic asphyxia very closely and differs from the ordinary extravasation and discoloration seen in cases of epilepsy. The long duration of the discoloration differed from the ordinary discoloration of a bruise, as did also the way in which it faded. In Dr. Despard's case, as the discoloration paled, there was not the slightest yellow or greenish discoloration, as takes place in extravasated blood. This clinical observation would tend to corroborate the findings on skin section made in the Cobb and Beech case, and in one or two others referred to by Dr. Despard, namely, that there is a stasis of the blood in the capillaries with very little extravasation into the perivascular tissue.

Dr. Duncan L. Despard said that it seemed to him that Dr. Alexander's case belongs in the same class with traumatic asphyxia. The discoloration in both cases must have been due to the same causes. In this connection, it is interesting to recall the case of Perth, in which the injury was in a boy who was lying in a soft, sandy road, and the wheels of a cart passed over the abdomen alone, not injuring the thorax, so that the increased pressure in the thorax and vessels of the neck was caused by the pushing up of the diaphragm and thereby increasing the intrathoracic pressure. In an epileptic the same condition may be produced, not only muscles of the thoracic wall but the diaphragm itself taking part in the rigidity, thereby preventing respiration. The limitation of the discoloration is a question of interest. Some of those who have reported cases, Tardieu for instance, say that the surfaces are free from the discoloration where pressure was made from the outside by clothing. Apparently the vessels were sustained and supported by this extravesicular pressure. The same thing occurred where the inspector's cap was driven down over the forehead, in the case reported by Bolt.

Dr. E. J. Alexander (by invitation) said that he had had the opportunity of seeing another case of traumatic asphyxia occurring about the same time as Dr. Despard's. The patient was admitted to the Episcopal Hospital in the service of Dr. Frazier. The man was in a railroad accident, having his chest caught between two cars. He had some discoloration, as in Dr. Despard's case, with bloodshot eyes, but unfortunately he died within two hours of admission, and there was no autopsy.

STATED MEETING, HELD APRIL 5, 1909.

The President, Dr. William J. Taylor, in the Chair.

GREEN-STICK FRACTURE OF THE LOWER END OF THE ULNA COMPLICATING FRACTURE THROUGH LOWER PART OF THE RADIUS.

Dr. John B. Shober presented a series of radiograms which, he said, illustrated the importance of studying a radiogram made immediately after the setting of fractures.

On September 25, 1907, Margaret S., age 8 years and 10 months, fell from the back of a chair, striking on her right extended hand. The typical deformity of Colles's fracture of the radius presented itself. Twenty minutes after the accident, under chloroform anæsthesia, he set the fracture and applied a Levis splint. Though exercising great care he could not set the fracture to his entire satisfaction. The next morning he removed the splint and took the radiogram (Figure 1). It shows imperfect reduction of the fracture of the radius, which is accounted for by a green-stick fracture of the lower end of the ulna. The same afternoon he again anæsthetized the child, and by manipulation succeeded in straightening the green-stick fracture and obtained perfect reduction of the radial fracture, as can be seen in Figure 2, made through a Bond splint. Compare the lines of the outer and inner borders of the ulna and the relative position of the articulating surfaces in each picture. Also compare these pictures with Figure 3, a radiogram of the normal left wrist.

The point Dr. Shober wished to emphasize was, that without the aid of a radiogram the green-stick fracture of the ulna could not have been determined, and unless it was straightened the fracture of the radius could not have been properly reduced, and the surgeon's course would have been reflected upon for a resulting partially deformed and lame wrist.

BILATERAL WRIST DEFORMITY DUE TO OSTEITIS OF RADIUS AND LUXATION OF THE ULNA.

DR. SHOBER reported the case of a little girl, 12 years old, who was referred to him December 10, 1908. She is a bright, intelligent, well-nourished child who, with the exception of an attack of chicken-pox when six years old, has always enjoyed good health.

Her parents have been married thirteen years and have one other child, born two years ago. Her mother states that she has had one miscarriage, which occurred one year before the birth of the last child, and that she has always been subject to attacks of so-called quinsy, and that before her marriage and for many years afterwards she had a series of abscesses in various parts of her body. There is no history of tuberculosis in her family. The father had an uncle who died of tuberculosis of the lungs. Otherwise his personal and family history is good.

Eight months before Dr. Shober saw the child she began to complain of dull, subacute and continuous pain in both wrists. Three months later, her mother noticed that the wrists were swollen, and they have continued to enlarge since then with some increase of pain.

Upon examination there was no limitation of motion of the wrist joint, with the exception of slightly diminished power of supination. The styloid processes of both ulnæ stood out prominently from the wrists and the skin over them seemed slightly congested. Pressure over the lower ends of the radii and ulnæ caused slight increase of pain, but there was no evidence of arthritis or enlargement of bone. The deformity was evidently due to dislocations of the radio-ulnar joints of the wrists. A radiogram not only confirmed the diagnosis but also showed the cause to be osteitis of the lower epiphyses and absorption of bone tissue of the inner side of both radii, allowing spontaneous dislocations (Fig. 4).

There being no marked tuberculous history in the family, and the lesions being bilateral and history of the mother suspicious, he was inclined to look upon the case as a late manifestation of hereditary specific disease. This theory is borne out by the result of the therapeutic test, under which improvement is taking place. The child is now taking 10 grains of potassium iodide

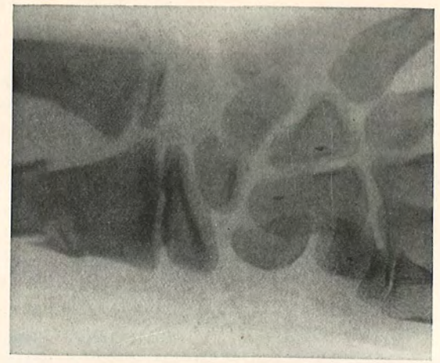


FIG. 1. Fracture of radius near its lower end simulating Colles' fracture, complicated by green-stick fracture of the ulna. Appearance after first attempt to reduce

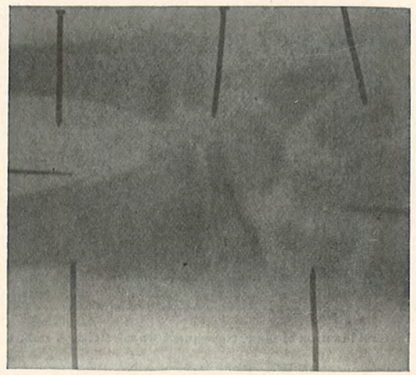


FIG. 2. Appearance after setting of green-stick fracture of ulna.

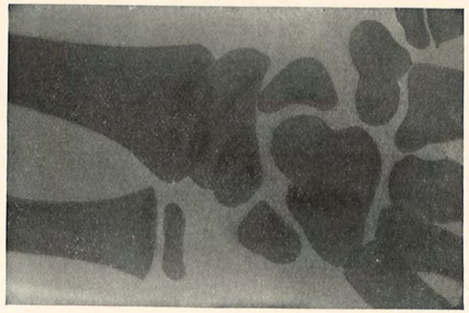
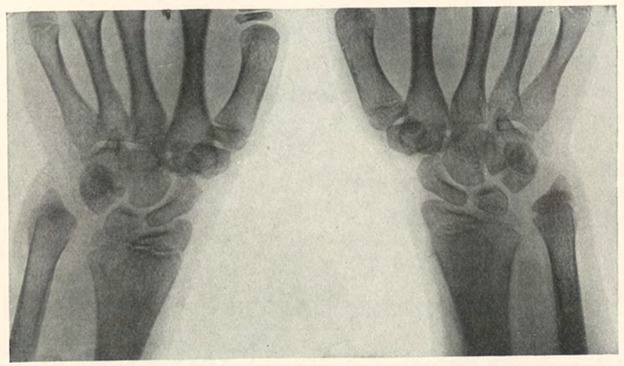


FIG. 3. Normal left wrist.

FIG. 4.



Bilateral luxation of ulnæ, consequent upon osteitis of radius.

three times daily, and since the beginning of treatment the wrists have been supported and put at rest by an easily applied splint which she wears during the day.

DR. RICHARD H. HARTE expressed the opinion that the condition of the bones of the forearm described by Dr. Shober was due to an arrest in development of the epiphyseal end of the radius, caused by either tubercular disease or syphilis. From the report, it would seem that the latter was responsible for this arrest in development, inasmuch as the patient undoubtedly improved upon specific treatment. Dr. Harte had, however, seen in a case in the Orthopædic Hospital, nearly the same condition, which was distinctly the result of tubercular disease, and improved very much upon appropriate treatment.

DR. HENRY R. WHARTON thought the deformity to be largely due to an osteitis. There was no marked osteitis at the lower ends of the ulna in either arm. The osteitis has resulted in a certain lack of growth in the length of the radius which has tended to throw the wrists into the position they now occupy. He had seen a similar deformity in a child following an injury of the lower epiphysis of the radius. The most probable explanation of this condition was specific infection of the bones.

DR. ROBERT G. LE CONTE agreed in the diagnosis of specific disease in this case, because the disease came on insidiously, without traumatism, was symmetrical and occurred at the same time in both wrists. These combinations are certainly most unusual in any other disease. The peculiar deformity was due to the inner articular surface of the radii being more prominent than the outer aspect, which has prevented the hand from rocking over to the inner side. The growth of the radii has been interfered with, and that the seeming great growth of the ulna is due to their normal development. Therefore, as the radius forms the larger part of the wrist joint, the growing ulna could not get sufficient purchase upon the carpus to rotate it inward, and dislocation had to take place.

DR. ASTLEY P. C. ASHHURST suggested the possibility of this case being one of Madelung's disease—spontaneous subluxation of the wrists. This is an affection which, within the last year or two, it has become customary to classify among the congenital dislocations, though the speaker could not see on what grounds. Its first symptoms usually are manifested about the age of

puberty; it affects particularly females; is characterized by the prominence of the lower ends of the ulnæ, by slight radial deviation of the hand, and, in its more advanced stages, by subluxation forwards of the radiocarpal joint. Especially characteristic is the widening of the interosseous space, due to the incurvation of the lower end of the radius, as is well shown in the skiagraphs presented. In the three or four cases which have come under his notice the disease was considerably more advanced, the ages of the patients varying from 15 to 18 years, and the deformity being so characteristic that no chance for error arose in making the diagnosis. In Dr. Shober's patient the affection of the wrists has existed for only a few months, and while of course it may not be a case of Madelung's disease, it would be interesting to know whether in the course of the next three or four years the progress of the case might not justify such a diagnosis.

THE TREATMENT OF DIFFUSE SEPTIC PERITONITIS.

BY ROBERT G. LE CONTE, M.D.,
OF PHILADELPHIA.

For the purpose of again bringing before the Society the subject of diffused septic peritonitis, I desire this evening briefly to report the cases which came under observation in my wards during the first month of my service this year in the Pennsylvania Hospital. They are nine in number, and in their admissions cover a period from February 5 to March 1, 1909. Three were operated upon by myself and six by my assistant, Dr. Francis T. Stewart. In my cases the essentials of the Murphy treatment were practiced: namely, a speedy operation; removal of the cause with the least possible traumatism to the peritoneal surface; no douching of the peritoneal cavity; the exaggerated Fowler position; and continuous enteroclysis by the drop method.

In Dr. Stewart's cases the peritoneal cavity was flushed with warm saline solution. The head of the bed was but slightly raised, the patients lying on the back or being turned on the right side, and salt solution was given by rectum—six fluid ounces every fourth hour.

In this series of cases there was but one death, which occurred on the fourteenth day after operation, probably from secondary infection of the liver plus secondary hemorrhage. A post-mortem examination was not allowed. In all instances the patients arrived in the hospital in such serious condition, that they were at once transferred from the receiving ward to the operating room.

Case I.—*Gall-Stones in Gall-Bladder and Common Duct; Pancreatitis; Diffused Fat Necrosis; Diffused Peritonitis.*—S. B., white, female, ætat 42, born in the United States. Admitted February 5; temperature 98.6°, pulse 118, leucocyte count 32,650.

Previous History.—Twelve years ago she had a series of attacks of epigastric pain which lasted for a period of three years.

Present illness dates from October, 1908, when she began having severe attacks of pain in the epigastrium, which would double her up and last on an average about an hour, associated always with severe constipation. These attacks were always sudden in onset and sudden in cessation. After some of them she thought she was slightly jaundiced for a day or two. February 3 she had a sudden severe attack after supper, lasting three hours. The next morning at 6 A.M. the pain again began, but was diffused over the abdomen. The pain has been continuous since then, with vomiting. There is general tenderness and rigidity over the abdomen, most marked about an inch above the umbilicus in the median line. No bowel movement for three days.

Operation (Stewart).—Longitudinal incision over right rectus. On opening the peritoneum there was an excess of bloody, turbid fluid; peritoneum injected. A fat necrosis 1 to 2 mm. in diameter was visible over the omentum and parietal peritoneum; gall-bladder small, contracted, thick-walled, filled with stones; intestines injected and hyperæmic; pancreas enlarged and firm. Gall-bladder opened, many faceted stones removed. One stone found in the common duct required an incision of the duct to remove it. Common duct and gall-bladder drained with rubber tubes. Abdomen irrigated with hot saline solution. Gauze drain in peritoneal cavity. Duration of operation, about an hour. Convalescence was slow but uneventful. Drainage ceased March 1. Patient was discharged March 10, wound entirely healed and in good condition. It is interesting to note that the drainage of bile from the common duct averaged about 6 fluid ounces a day, while from the gall-bladder but a little over 2 fluid ounces was recovered daily. Laboratory report on specimen of omentum: Fat necrosis.

CASE II.—*Gangrenous Perforative Appendicitis; Walled-off Abscess which had Ruptured into the General Peritoneal Cavity.*—W. S., male, ætat 18, born in United States. Admitted February 10. Temperature 101.6°, pulse 104, respiration 24. Has had pain in lower right abdomen for one week. Forty-eight hours before admission he was prostrated by this pain with vomiting. No chills noted. Abdomen tense, rigid, tender, with mass the size of a small fist in the right inguinal region.

Operation (Le Conte).—Small incision parallel with Poupart's ligament, over outer border of tumor. On entering the peritoneal cavity much thick, inflammatory lymph was seen, entirely masking the head of the colon. A flaccid abscess cavity was palpated through this walled-off area. As the abscess had evidently evacuated itself into the general peritoneal cavity, a second incision was made through the rectus muscle opening the general peritoneal cavity, where considerable free, foul-smelling pus was found. The intestines were injected and in places coated with lymph. Gauze packs were inserted and the abscess cavity freely opened through this second incision. The gangrenous, perforated appendix was excised. The abscess cavity was packed and drained through the first incision, and the pelvis drained with a rubber tube through the second one. Murphy treatment. Recovery was uneventful. Drainage ceased February 27, and patient was discharged March 11, with a small granulating area in the outer wound.

CASE III.—*Gangrenous Appendicitis; Diffuse Peritonitis.*—J. G., ætat 22, male, born in Russia. Admitted February 15, complaining of general abdominal pain. Temperature 101°, pulse 100, respirations 40, leucocyte count 26,200.

Present illness began two days ago with severe generalized abdominal pain and vomiting; no chill. Examination of abdomen showed signs of diffused peritonitis.

Operation (Le Conte).—Incision through right rectus; a considerable amount of free fluid and foul-smelling pus was evacuated on opening the peritoneal cavity. Appendix firmly bound down with recent lymph. At its base was a large gangrenous area, through which a concretion could be felt. No gross perforation was detected. Murphy treatment. Patient reacted well and improved nicely for four days. Some distention of the abdomen was then noted, with nausea and vomiting. For the next week there was an irregular temperature, with free discharge through the drains, but the abdominal distention continued with occasional vomiting. On the 25th and 26th the dressings were moderately saturated with blood. On the 27th several large blood clots were evacuated from the wound. The wound was irrigated with salt solution and firmly packed with gauze. At 10 P.M., signs of hemorrhage continuing, the wound was again irrigated and the cavity again firmly packed with

gauze. This seemed to control the bleeding. At 6 A.M. on the 28th the pulse rapidly failed, but no hemorrhage was visible from the wound. At 10 A.M. jaundice was noted in the skin and eyes. Pulse continued very poor in spite of free stimulation and enteroclysis. At 11 A.M. three pints of saline solution were given through the left brachial vein, but the patient did not respond and died at 11.50 A.M. Post-mortem not allowed. The examination of the wound after death showed but very slight hemorrhage in the abdominal cavity or on the dressings. The cause of death was attributed to a secondary infection of the liver, as evidenced by the jaundice, and secondary hemorrhage, due to a necrotic retroperitoneal area.

CASE IV.—*Gangrenous, Perforative Appendicitis; Diffuse Peritonitis.*—J. K., white, male, ætat 14, born in Russia, admitted February 17. Suffered at different times from indigestion. Had been ill three days with abdominal pain which began about the umbilicus and rapidly settled in the right lower quadrant, with vomiting and fever. On admission temperature 102°, pulse 96, respirations 32. Abdomen distended, rigid and tender, particularly over the region of the appendix.

Operation (Le Conte).—Incision through the right rectus. On opening the peritoneal cavity, turbid, flaky fluid poured out; intestines injected and in places coated with lymph; appendix for the most part rectrocæcal, gangrenous and ruptured; removed. Appendix region drained with gauze, and pelvis with rubber tube. Wound not sutured. Murphy treatment. Recovery uneventful. Out of bed March 5, and discharged March 13 with small granulating area in the region of the wound.

CASE V.—*Gangrenous Perforative Appendicitis; Diffuse Peritonitis.*—I. S., white, female, ætat 7, born in Philadelphia. Admitted February 17. Temperature 101.8°, pulse 128, respirations 32. Sudden abdominal pain forty-eight hours before admission, with chill and fever. Pain at first generalized over abdomen, became localized in the right lower quadrant, later again to become general. Vomiting frequent.

Operation (Stewart).—Incision through the right rectus. On opening the peritoneum foul-smelling, sero-purulent fluid was evacuated. Appendix was thick, highly inflamed, with a rupture of its distal end. Excised. Profuse lavage of the peritoneal cavity. Bed of appendix drained with gauze. Two silkworm-

gut sutures inserted to close the incision above the drainage. Recovery uneventful. March 15, out of bed, and discharged from the hospital March 20, wound entirely healed.

CASE VI.—*Gangrenous, Perforative Appendicitis; Diffuse Peritonitis; Pregnancy.*—V. H., white, female, ætat 27, born in United States, admitted February 23. Temperature 100.6°, pulse 120, respirations 22. Two days previous to admission was taken suddenly ill with severe pain in the right iliac fossa and almost continuous vomiting. Patient four months pregnant. Abdomen distended, rigid, and particularly tender in the right iliac fossa.

Operation (Stewart).—Incision through the right rectus, and on opening the peritoneum much turbid, foul-smelling fluid was discharged. The gangrenous and ruptured appendix was removed and copious lavage of the peritoneal cavity with saline solution instituted. Appendix region alone drained with gauze. The uterus was found enlarged to about the fourth month of pregnancy. Wound partially closed with silkwormgut sutures. This patient was at once placed on her right side, with the head of the bed slightly elevated. The recovery has been slow. On the 28th patient had colicky abdominal pains, with a gush of clear fluid from the vagina. March 1, there were again intermittent pains simulating labor. Examination showed the os slightly dilated. March 20, patient expelled a dead fetus with the entire placental membranes. From this time on the convalescence was uneventful.

CASE VII.—*Gangrenous, Perforative Appendicitis; Diffuse Peritonitis; Pregnancy.*—A. P., white, female, ætat 23, born in Italy. Admitted February 27. Temperature 101.4°, pulse 144, respirations 36. Has had two children, one miscarriage, and at the present time is five months pregnant. For the past twelve days has had intermittent pain in the right lower abdomen, which became very severe forty-eight hours before admission, associated with vomiting. Abdomen distended and tender.

Operation (Stewart).—Incision through the right rectus. On opening the peritoneum much free purulent fluid escaped. Appendix perforated and intimately adherent to the colon; was ligated at the base and removed from the base toward the tip. Intestines much injected and in places coated with lymph, as was also the gravid uterus. Copious saline irrigation of peritoneal cavity. Appendix region alone drained with gauze. Patient at

once placed on right side and head of the bed slightly elevated. Convalescence uneventful and without abortion.

CASE VIII.—*Abscess of Upper Abdomen, possibly Pancreatic; Diffuse Peritonitis.*—J. D., colored, male, ætat 38, admitted March 1. Temperature $101^4/_5°$, pulse 96, respirations 28, leucocyte count 21,000.

Present illness began February 16 with pain in the lower right quadrant of the abdomen, diarrhœa and vomiting. After the first day vomiting ceased but diarrhœa continued. Forty-eight hours before admission pain localized itself in the upper abdomen and became very severe; abdomen much distended, tympanitic, rigid, especially tender in the epigastrium, and dull in the flanks.

Operation (Stewart).—Vertical incision through upper right rectus. On opening peritoneum an excess of cloudy, turbid fluid was seen among the injected intestines. At the upper part of the wound between the omentum and intestines were numerous adhesions, which had to be broken up before the edge of the liver was exposed. Liver and gall-bladder normal. In the upper abdomen, to the right of the median line, an area of discharging pus was found. This reached deeply into the abdomen and communicated with a second pus cavity in the region of the head of the pancreas. The exploration of this cavity produced a considerable hemorrhage, necessitating firm packing to control it. The upper peritoneal cavity was douched with hot saline solution. Patient reacted well. Profuse pus drainage. Patient improved nicely until March 18, when the pus cavity was much diminished in size but still continued deep. At 6.30 P.M. on this day patient complained of abdominal pain, followed by vomiting. In an hour the temperature had dropped to 97°, and the pulse risen to 140; extreme pallor of the mucous membranes; pulse very poor, and thready. He was again anæsthetized, and the original abdominal incision explored with the finger. A loculated collection of pus was found on each side of the drainage tract. These were evacuated. An incision was made in the lower abdomen and free blood-tinged fluid was found in this part of the peritoneum. A second incision was made in the right flank, and both these openings were drained with rubber and gauze. Patient's condition very serious. Reaction slow in spite of free stimulation. All wounds drained freely, the one in the right flank especially well, from which large amounts of necrotic tissue were discharged. Convalescence slowly established and the patient now seems in a fair way to recover, although he is still confined to bed.

CASE IX.—*Diffuse Peritonitis,* cause unknown.—P. E., male, white, ætat 22, born in Italy. Admitted March 1. Temperature 100.8°, pulse 96, respirations 28, leucocyte count 13,500. Had a moderate attack of typhoid fever in the fall, for which he was treated in the Hospital, recovery good. For the past nine days he has complained of pain in the right lower quadrant of the abdomen, no vomiting, no chills. Bowels moved daily. On admission there was a rigid, tender, distended abdomen, with pain most marked in upper rectus region.

Operation (Stewart).—Incision through upper right rectus. On opening peritoneum a considerable amount of straw colored serum exudes. Gall bladder normal. Intestines deeply injected and covered in places with patches of lymph. Appendix slightly adherent at tip, showing areas of congestion but no perforation. It was removed. The small intestine was examined for several feet from cæcum. No perforations found. Mesenteric glands palpable and enlarged. Copious irrigation of the peritoneal cavity. No cause for the diffuse peritonitis found. Wound closed without drainage. Recovery uneventful.

Pathological Laboratory Report.—Chronic disease of the appendix, with some acute congestion but no perforation.

DR. LE CONTE said that he had brought these cases before the Society because he thought they might again with profit enter upon a discussion of the treatment of diffuse septic peritonitis. It would be noticed that Dr. Stewart and he had varied in the treatment adopted. Dr. Le Conte firmly believed in the Murphy principles—short operation, removal of the cause of the peritonitis, the least possible manipulation of the peritoneal cavity outside of the area in which work must be done, the draining of the lowest portion of the peritoneum, and, in order that the fluids may gravitate there, the exaggerated Fowler position, with the ingestion of large amounts of water by the large bowel.

He had followed the above principles in his treatment of diffuse septic peritonitis for about three and one-half years, and

was sure that he had had a far greater number of cases recover than formerly. An examination of the nine cases here reported, perhaps too few a number to make any deductions, shows that he had operated upon three with one death, while Dr. Stewart, using a different technic, operated upon six with no death. In the case that died, it is quite probable that the disease had gone beyond the peritoneum before operation, and that the death was due to absorption through channels over which he could have no control. Without having made a definite analysis of all his cases of diffuse septic peritonitis, he estimated that the mortality is now in the neighborhood of 15 per cent. where formerly it was four or five times greater.

Dr. Richard H. Harte said that the results in cases of peritonitis vary a great deal with the time the surgeon gets the case, the duration of the patient's illness, and the character of the infection.

With regard to the after treatment in these cases, the question of drainage is of paramount importance: meaning thereby, drainage by posture, gravitating the intraperitoneal contents into the pelvis and then opening the abdominal cavity and inserting large pieces of gauze drain. This has two effects: first, the removal of the purulent contents from the pelvis, and, second, the relief of tension, which is also an important factor and undoubtedly does delay the tendency to septic absorption; then thorough enteroclysis, after the method of Murphy, in which large quantities of water are kept in the rectum and even up into the colon.

The methods as mentioned by Dr. Le Conte are pretty much the same as those followed in the Pennsylvania Hospital, where the results are most favorable. The speaker said that he was very fond of placing the patients upon their side, or even on their face, when their condition will permit, so as to facilitate drainage in abdominal incision, as in that way, an immense amount of septic material can be drained from the pelvis simply as the result of gravity.

At one time he was more in favor of general douching of the peritoneal cavity, but now he is getting further away from that, and will continue to mop out the field of operation, using as little fluid as possible, except when the peritoneal cavity is distinctly soiled as the result of the escape of intestinal contents, as following typhoid perforation, duodenal ulcer, etc. The best results are when one does as little manipulation of the peritoneal cavity as possible.

Dr. G. G. Ross said it was a very interesting problem: What is the proper course to pursue in treating cases of purulent peritonitis? Dr. Stewart washes them out and gets them well, and Dr. Le Conte does not wash them out and also gets them well, and it seems to be the general experience that both methods give good results. However, one does better if one saves the time spent in washing out. Murphy explains that whether this treatment is or is not beneficial, the real question is whether the infection is confined to the inside of the peritoneal cavity or beyond it, in the retroperitoneal space and in the retroperitoneal lymph channels. If behind, it does not make much difference what you do—operate or not, wash or not, your patient dies just the same. If it is inside of the peritoneum the peritoneum will take care of the poison if you provide an outlet for the excess of the poisonous material. Dr. Le Conte's method seems the better one of the two—the removal of the cause in the shortest time, with the least amount of work inside the peritoneal cavity, and drainage, thus lowering the intra-abdominal pressure, a distinct advantage in the control of the infection.

Dr. Robert G. Le Conte, in answer to a question as to bacteriological observation in his cases, said that in some of the cases bacterial cultures were made of the peritoneal contents at the time of operation, but not in all. The colon infection is far more favorable than the streptococcus. He agreed with the statement made by Dr. Ross, that the cases one can save are those in which the infection is confined to the peritoneum, and that when the infection has already spread to the retroperitoneal spaces most of the patients die. The less done to a peritoneum coated with lymph, the better, and, for this reason he did not wash the peritoneal cavity except where he feared the presence of foreign bodies, as undigested food from perforation of the stomach. The relief from pressure which the incision gives in a lymph-coated peritoneum is usually sufficient to prevent further absorption of toxic materials, and the absorption of large quantities of fluid will tend to carry off such septic material as has already entered the circulation, through the action of the kidneys and the bowels. As to the use of morphia, he had not the slight-

est hesitancy in using this drug in sufficient quantity to make the patient comfortable after an abdominal operation, in either septic or non-septic cases. In the septic cases he was particularly prone to use it to check peristalsis and permit the inflammation to limit itself. Rest to the intestines is a great thing, and morphia gives this to perfection.

ŒSOPHAGOSCOPY AND GASTROSCOPY.

Dr. Benjamin A. Thomas reviewed the century from 1806, when Bozzini first examined the upper end of the œsophagus, to 1906, when Jackson devised and perfected his œsophagoscope and gastroscope, noting the earnest but futile efforts of such men as Mikulicz, Rosenheim, and Rewidzoff to place endoscopy of the upper alimentary tract on a sound basis. He noted the advantages of introducing the instrument by direct vision and strongly condemned the use of the bougie, coin-catcher and horse-hair probang. Attention was called to the advantages to be derived from the use of a straight tube, equipped with the light at the distal end and the elliptical form of the tube in cross-section.

The gastroscope should receive more frequent use in the early differential diagnosis of chronic gastritis, cancer and ulcer. General anæsthetic should always be employed in gastroscopy unless there exists some intercurrent grave organic disease to contraindicate the procedure. He rarely resorts to a general anæsthetic in simple œsophagoscopy.

He pleaded for more accurate methods in the diagnosis and treatment of conditions of the upper alimentary tract, and quoted statistics of the University Hospital to the effect that 50 per cent. of the cases diagnosticated "stricture of the œsophagus" died of carcinoma although the true nature of the stenotic process was undetermined at the time of admission; 75 per cent. of the cases of stomach disease suffered from carcinoma, ulcer and gastritis. He thought the differential diagnosis, therefore, between these conditions, especially early in the course of the disease, to be the most notable effort of the modern gastrologist, and believed this, at times, perplexing problem, to be nearer solution to-day by recourse to the straight, hollow-tube instrument than it has ever been. Its field of usefulness is not limited to a diagnosis of the various diseases of

the stomach and œsophagus per se, but in the removal of foreign bodies, etc., it plays an important rôle.

He cited four cases in which œsophagoscopy or gastroscopy or both were performed, submitting colored drawings of the lesions in situ, from some of which sections of tissue removed for microscopical diagnosis demonstrated carcinoma.

His conclusions are:

The straight tube is the most useful model of instrument which has ever been devised for purposes of diagnosis of lesions of the œsophagus and stomach, and its use is attended with uniform success.

By virtue of the fact that the instrument is always introduced through the lumen of the œsophagus under direct inspection, no danger can arise from injury to adjacent ulcers, venous varicosities, aneurism, neoplasm, etc.

Resort to the employment of the gastroscope offers a method for the early differential diagnosis of cancer, when the symptoms are vague and it is still in the curable stage.

General anæsthesia should always be used for gastroscopy and rarely for œsophagoscopy.

Œsophageal bougies, coin-catchers and horse-hair probangs have no place in modern surgery.

In addition to advantages in diagnosis, the use of the scopes for purposes of treatment, as in the removal of foreign bodies, is inestimable.

Dr. John H. Jopson said that Dr. George Clymer Stout and he had had a small series of cases at the Presbyterian Hospital in which they had used the Jackson instruments, and he would make brief mention of three cases:

The first patient was under the care of Dr. Musser, a boy with a tack deeply lodged in the right lung, where it had been embedded for some months. The skiagraph showed it very plainly opposite the head of the eighth rib, and located in the posterior portion of the lung. The tack was below the bifurcation of the right bronchus and a careful use of the tube failed to remove it.

The next case was in the person of a child of 10 months who was referred with a diagnosis of a safety pin in the œsophagus, where it had been embeded for between three and four weeks. The X-ray showed the pin open in the œsophagus, with the point upward, open to its fullest extent behind the clavicle and first

and second ribs. They undertook its removal by the œsophagoscope and the safety-pin closer of Dr. Sidney G. Ankauer of New York. They saw it, then it became dislodged and they did not see it again. An X-ray made immediately after the sitting disclosed the pin the stomach, and three days later he successfully removed it by gastrotomy.

The third case was one of laryngeal papilloma, in a child who had been under their care for four years and is now about seven years of age. When he was three years of age a tracheotomy was done on account of an increasing obstruction of the larynx due to laryngeal papilloma. He had worn a tracheotomy tube since then. By the use of the bronchoscope on two occasions they were able to thoroughly clear out the papilloma from above. He has had the tracheotomy tube corked up for a month and is breathing and talking in a very satisfactory manner. In these young children in whom removal of the papilloma by aid of the laryngeal mirror is very unsatisfactory, the Jackson tubes offer a very good means for their extirpation under direct inspection.

Dr. Benjamin A. Thomas, commenting upon the difficulty of examinations of the bronchial tubes, recalled the case of a colored child six years old which illustrated that the younger the child the more difficult is the operation, because of the necessity of employing smaller sized tubes. This child had the history of a tack in his lungs and the X-ray showed it to be presumably in the left bronchus about its bifurcation into the second division. The introduction of the 5 mm. bronchoscope showed an area of partially necrotic mucous membrane extending from the division of the left bronchus down into the left inferior lobe bronchus for 3 or 4 centimetres. In the lumen of the left inferior lobe bronchus was a quantity of pus, about an ounce or an ounce and a half. The tack was not visible, being evidently embedded in the mucous membrane which was considerably swollen and partially necrotic. After a rather prolonged search the operation was abandoned and two months later the child was running around and was in fairly good health, excepting for an occasional cough. About a month ago he had looked up the history of this case to see what the end result was, and learned that three months after the child left the hospital the tack was expelled one night in a paroxysm of coughing.

STATED MEETING, HELD MAY 3, 1909.

The President, Dr. William J. Taylor, in the Chair.

MULTIPLE FRACTURES, INVOLVING THE FACE BONES, THE LEFT ELBOW, AND BOTH FEMURS.

Dr. Astley Paston Cooper Ashhurst said that in a paper on Multiple Fractures, which he read before the Philadelphia Academy of Surgery in April, 1907 (Annals of Surgery, 1907, xlvi, 263) statistics were presented showing that multiple fractures form only about 1.44 per cent. of fractures in general, and that the mortality at the present day is at least 25 per cent., even when cases of crush of the extremities calling for immediate amputation and other cases dying in a few hours from shock are excluded. The mortality of fractures in general was found to be about 2.7 per cent., so that the outlook in a case of multiple fractures is just about ten times as gloomy as in ordinary cases. The case now reported, with the kind permission of Dr. Chas. H. Frazier, is one in which, in addition to numerous other fractures, both femurs were broken and could not be reduced without operation. Among the 73 cases of multiple fractures from the statistics of the Episcopal Hospital, reported in 1907, there were only two in which both femurs were fractured; both of these patients died. Among 121 recent fractures of the femur at the Episcopal Hospital, reported a year ago (Annals of Surgery, 1908, xlviii, 748) in collaboration with Dr. Wm. A. Newell, there was not one case in which operation had to be done. So that the present case is remarkable both for his recovery, and from the fact that operation was required on both femurs.

Frank R., a sailor, aged 26 years, was admitted to Dr. Frazier's service in the Episcopal Hospital at 7 P.M., December 5, 1908. While at work on a ship lying at the dock he had fallen a distance of fifty-five feet into the hold, landing on piles of copper ore.

Examination showed the following injuries: There was no vision in the left eye, the pupil being widely dilated, with hem-

orrhage into the anterior chamber, and dislocation of the lens. The left malar bone was broken near its articulation with the superior maxillary. Both the right and left superior maxillæ were fractured, the line of fracture crossing the median line of the alveolus. There was a comminuted fracture of the nasal bones. The inferior maxilla was broken in three separate places: (1) through the left ramus; (2) just to the left of the symphysis; (3) through the body on the right side. The left humerus presented a fracture of the external condyle; and there was a fracture of the head of the left radius, with dislocation, along with the fragment of the humerus. There was a comminuted fracture of the right femur into the knee-joint, the internal condyle with a fragment of the posterior surface of the external condyle being dislocated posteriorly along with the tibia and fibula, the patella being impacted between the fragments, and the external condyle jutting out and almost rupturing the skin, in the neighborhood of the head of the fibula; the skin, though much abraded and contused, was not broken. In addition to these injuries there was a compound comminuted fracture below the middle of the left femur, with rupture of the ligamentum patellæ, and a large hæmatoma over the seat of fracture.

The man was in profound shock. His temperature on admission was 95.4° F. By midnight it had risen to 97.8° F., and the next morning reached normal. He was appropriately treated for the shock, and though death seemed imminent, dressings were applied to the various fractures. A chin-cap and Gibson bandage were applied to the face; the dislocation of the radius was reduced, and the elbow was dressed in acute flexion. Buck's extension and sand-bags were applied to each lower extremity. It was imposible to reduce the fracture-dislocation of the right knee; and no great force was used in attempting to set the left femur, as the condition of the soft parts (hæmatoma and wound of compound fracture) did not warrant it.

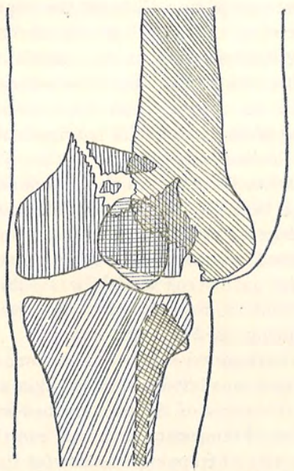
Contrary to expectation, the patient's general condition gradually improved; his temperature on the afternoon of the second day was 100.6° F., and this was the highest ever reached. The wound in the left thigh healed without becoming infected.

On December 11, six days after admission, Dr. Frazier attempted under ether to reduce the dislocation of the right knee, but was unable to do so. It seemed imperative to secure reduction, as the skin was stretched so tightly over the projecting external condyle that it was feared sloughing would soon occur. Accordingly, the next day Dr. Ashhurst operated for Dr. Frazier, as the patient, though still delirious, seemed able to stand a formal operation. In order to avoid the abraded and granulating skin, which was swabbed with iodine before beginning the operation, the joint was opened as for a fracture of the patella, by a curved incision, with convexity below (the ligamentum patellæ was not divided). This flap was turned up, and the external condyle was found projecting through the capsule of the joint, just beneath the skin. The capsule was therefore opened, but reduction was still impossible, as the patella was firmly fixed between the shaft of the femur, above the external condyle, on its outer side and the inner condyle on the inner side. The patella was rotated about 90 degrees on its longitudinal axis, so that its anterior surface looked outward (Fig. 1). To extract it, the rectus femoris had to be cut from the vastus externus, and then the patella could be pried out from behind the condyles, and the fracture reduced. As very good apposition of the fragments was obtained, no wires, screws, or plates were used to retain them. The quadriceps tendon was sutured again to the vastus externus, and the capsule was then closed, buried sutures of chromic gut being used in both instances. The skin wound was closed with interrupted sutures of chromic gut, and a small drain of plain catgut was left beneath the skin at the outer angle of the incision. This was of course absorbed in a few days, but served the purpose of temporary drainage into the dressings, and obviated the necessity of trapping the cast for its removal. Strict *asepsis* was used throughout the operation, which took thirty-five minutes. A Buck's extension was then applied, and over all the dressings a plaster cast, which extended from the toes to the groin. The entire operation was done while the patient was lying in his bed, as it was feared that removal to the operating table might injure his other femur. During this anæsthetization the patient's upper and lower jaws, which had begun to knit, were unavoidably refractured. The next day his temperature was normal, but on the second day it reached 100.6° F., and then again became normal. The cast was left on for over five weeks, and on removal (January 19, 1909) the patella was found movable, and the fragments firmly united and in excellent position.

There were a few granulations at the outer angle of the wound, where it had been drained. Passive motion was then begun.

When four weeks had elapsed from the time of the accident, it was found that there was no union in the left femur, which had been the seat of a compound comminuted fracture; and as the skiagraph showed overlapping of about two inches, and as this could not be reduced by traction, it seemed proper to operate on this femur also.

FIG. 1



Tracing of skiagraph of right knee. Comminuted fracture through external condyle of femur, with posterior dislocation of tibia and lower fragment and impaction of patella between fragments.

Accordingly, on January 2, 1909, when substituting for Dr. G. G. Davis, and after consultation with Dr. Frazier, Dr. Ashhurst operated on the left femur, through an external incision of 8 inches, excising the callus which prevented reduction, and removing some loose fragments of the shaft. The upper fragment was anterior and inward, projecting into the rectus muscle. It was possible to secure very good apposition without resecting any of the femur, as the fracture was nearly transverse, and the comminution involved the inner surface only. A silver plate, with three screws in each fragment, was used to retain the bones.

The wound was thoroughly washed out with hot bichloride, and was closed with two layers of buried sutures of chromic gut, which was also used for the skin sutures. A rubber drainage-tube was brought out through the lower angle of the wound, passing beneath the bone to the inner side of the line of fracture. The time of the operation was sixty-five minutes. A Buck's extension was applied, and over all a plaster cast from the toes to the groin. The drainage-tube was removed through a window in the cast on the second day. On the third day the temperature reached 100.6° F., and then again fell to normal. This cast was removed February 8, 1909, during the sixth week after operation. The position of the fragments was good, and fibrous union was present.

In March, the patient was about in a wheel chair, and motion in the knees was improving. Dr. Van Pelt took charge of the ocular condition, and sight gradually returned. Early in April the patient began to walk with crutches, and in two weeks time could walk with only one cane. He now walks without support of any kind. The right knee has slight lateral mobility in full extension, and for some time felt a little weak in walking. The left femur has bowed somewhat outward, but union is firm, and the silver plate is producing no irritation. The right lower extremity is only one-half a centimetre shorter than the left. Both knees have a range of motion through about 40 degrees—from full extension to about 140 degrees. The fractures of the face have healed with only slight deformity, the alignment of the teeth being perfect, and very little distortion of the features remaining. The left elbow has a range of motion from 40 to 140 degrees, full extension being impossible on account of thickening of the head of the radius. The ruptured left ligamentum patellæ gives no further trouble. The left eye can now be used for reading, and the patient declares it to be as good as his other eye; the pupil remains dilated.

RESECTION OF THE COLON FOR CANCER AND TUBERCULOSIS.*

BY JOHN H. GIBBON, M.D.,

OF PHILADELPHIA,

Professor of Surgery in Jefferson Medical College; Surgeon to the Pennsylvania Hospital.

THE following ten cases which have occurred in the last six years constitute my entire experience in resection and anastomosis of the colon for cancer and tuberculosis. I have excluded those cases of cancer of the upper rectum in which the sigmoid has been anastomosed with the lower rectum, as this operation is one of entirely different technic from that required for growths above the rectum. I have also excluded several resections of the small intestine up to the ileocolic juncture with lateral anastomosis between the ileum and the colon. I have eliminated a few cases where I have anastomosed the small intestine with the sigmoid for the purpose of side-tracking the colon. In other words, the discussion will be limited entirely to pure resections and anastomoses of the colon. Of these ten cases eight suffered from carcinoma and two from tuberculosis:

CASE I.—H. D.; male; 55 years of age; Pennsylvania Hospital. Diagnosis: *Acute intestinal obstruction; carcinoma of colon; thoracic aneurism and chronic endocarditis. Resection of descending colon and immediate anastomosis,* July 24, 1903. *Sudden death eight hours later.*

This man presented the appearance of having been a hard drinker. His abdomen was markedly distended, with no particular rigidity, pain or tenderness. He was nauseated but had not vomited. Bowels had not moved for five days, in spite of laxatives and enemata. The transverse colon was very much distended and could be easily made out. The abdomen was opened in the median line by an incision extending above and below the

* The Annual Oration before the Philadelphia Academy of Surgery, delivered May 3, 1909.

umbilicus. When the peritoneum was opened a dark-colored fluid escaped. The colon was first examined. It was found normal throughout, excepting just above the sigmoid flexure, where a hard mass could easily be felt. When this was delivered it was found to be a carcinoma, producing absolute obstruction. The abdominal cavity was filled with a quantity of dark fluid containing flakes of lymph. The carcinomatous mass, together with a proper amount of bowel, was resected; two glands were removed from the mesocolon and an end-to-end anastomosis, by means of two rows of silk sutures, was performed. A rectal tube was introduced well above the point of anastomosis; two strips of gauze were placed about the seat of anastomosis and the bowel returned to the abdomen. The cavity was then thoroughly irrigated and closed. A large quantity of gas and liquid fæces escaped through the tube. The operation occupied more time than it should have done, because of the difficulty in bringing the diseased bowel out through the median incision. In another such case I would feel inclined to make a second incision in the left iliac region. The patient did well after operation for about eight hours, when he was suddenly taken ill with cardiac symptoms and died. At the autopsy a large aneurism of the thoracic aorta was discovered, and Dr. Longcope, pathologist of the Pennsylvania Hospital, thinks that the cardiac condition present was sufficient to account for the sudden death. There were evidences, however, as there were at the time of the operation, of peritonitis.

Comments: In this case I should have made a second incision, done a colostomy and postponed the resection until later, or performed a resection and drained the bowel and made the anastomosis later. A lateral anastomosis would have been better than the end-to-end one which I did. Under the circumstances the overlooking of the thoracic aneurism would seem justifiable.

Pathology: Adenocarcinoma of colon; serofibrinous peritonitis; congestion of lungs; general arterial sclerosis; diffuse aneurism of arch of aorta; chronic aortic and mitral endocarditis; left-sided cardiac hypertrophy and slight diffuse nephritis.

CASE II.—M. D.; female; 70 years of age; Pennsylvania Hospital. Diagnosis: *Acute intestinal obstruction; adenocarcinoma of colon. Resection and immediate anastomosis,* January 7, 1905. *Death twenty-third day after operation.*

I saw the patient first about nine o'clock on the day of operation, with Drs. Bennett and Musser; there was nothing in the previous history to throw any light on the cause of the obstruction. She had suffered from moderate constipation and had had some attacks of abdominal pain. She had always been very secretive about herself and it was difficult to get any satisfactory history. One noticeable point was that she had habitually restricted her diet to very simple things. She had not lost weight. For four days previous she had been unable to have a bowel movement and had become gradually more and more distended. The distention was more marked on the right side of the abdomen, but at no time was Dr. Bennett able to feel any mass. There had been no nausea or vomiting excepting once, when oil had been given. The temperature was normal; pulse about 80; the abdomen greatly distended, slightly more so on the right side than on the left. The patient complained of some pain on the left side which came on in paroxysms. Nothing could be felt by the rectum or by the vagina. Her general condition was very good, but it was evident that she was suffering from complete obstruction of the bowels, which in a short time would end fatally unless some radical relief was offered promptly. I thought that she was suffering from a volvulus or else from a growth in the cæcal region. A notable point in view of the findings at the operation is the fact that there was no history of ribbon stools or the passage of bloody mucus. Considerable time was lost in convincing the patient of the necessity for an operation, and especially of the necessity for her removal to a hospital. This was finally accomplished, and at about three o'clock I operated. As the right side of the abdomen was more distended than the left, I determined to open through the right rectus. The moment the peritoneum was divided there escaped a quantity of peculiar gelatinous material, light in color, resembling the contents of a colloid cyst. There also presented in the wound an enormously distended cæcum, dark in color, which looked like a cyst. I supposed that there had been a rupture of a malignant ovarian cyst. When the wound was enlarged, however, the cæcum was delivered. It was distended more than I had ever seen it. The appendix was also very much thickened but not distended, and attached to it was a quantity of the same gelatinous material which had escaped from the abdomen. The cæcum

was so distended that I realized that I would be able to do nothing inside the abdomen until its size was reduced. When delivered, a quantity of its contents rushed into the small intestine, rapidly distending this portion of the bowel which had before been practically empty. I thought that in some way the opening from the ileum into the cæcum had been obstructed. The cæcum was punctured with a knife; a large quantity of gas rapidly escaped and the bowel collapsed. The opening was then closed and I made an exploration of the abdominal cavity. There was no mass in the pelvis, the uterus being very small and the ovaries atrophied. I noticed one or two small nodules over the broad ligament, however. Examining the colon I found a mass about the middle of the descending colon. This could not be delivered through the wound on the right side and I therefore opened the abdomen through the left semilunaris. Before I did this, however, I was obliged to reopen the cæcum because it could not be returned to the abdomen, as it had again become distended with gas. Through the opening on the left side I delivered the mass in the colon which seemed to be a carcinomatous growth producing an annular contraction of the bowel. With some difficulty, because of the shortness of the mesocolon, I succeeded in resecting about ten or twelve inches of this bowel, going about 8 inches above the growth and about 3 inches below it. An end-to-end anastomosis was made by means of a large Murphy button. A gauze drain was introduced down to the site of anastomosis and the wound closed. Before closing the wound on the right side I removed the appendix; and it presented the appearance already described which I had never seen before. The patient was on the operating table one hour and forty minutes. Her pulse at the end of the operation was 100 and her condition remarkably good. I was prepared for considerable shock but was surprised later to find the patient in excellent condition and remarkably free from pain.

January 9, 1905: Since the operation the patient's progress has been surprisingly satisfactory. Last night her temperature rose to about 102, but this morning it is 99 and her pulse about 110. She has been taking a moderate amount of liquid nourishment and salt solution enemata. Yesterday and last night she passed a large amount of flatus and is much more comfortable. The distention of the abdomen is greater this morning than it

has been since the operation, but there is less pain and the patient is much more comfortable. She has received small doses of calomel to relieve her distention, and this morning in addition to this she was given strychnia.

January 10: Last evening the distention had increased considerably, the patient was very uncomfortable from it,—had some difficulty in breathing and was belching a good deal. I therefore decided to open the wound on the right side and tap the cæcum. This I did without any difficulty at all, administering the patient a small amount of ethyl chloride. The colon was exposed for an area of one and one-half inches, and a small trocar introduced. A quantity of gas escaped through the cannula, which was left in position, and the patient was rendered more comfortable at once. Since doing this, there has been a marked improvement in her condition; she has had two bowel movements and her temperature and pulse are both lower. It looks now as if she would certainly recover.

January 16: Continues to improve, temperature remains about normal. On the sixth day after the operation there was a marked odor to the dressing on the left side, and when I removed the gauze packing there was an escape of gas and some liquid fæces. For twenty-four hours previous to this the patient had been unable to void the urine, and had to be catheterized. Since the change of dressing she has voided her urine. The discharge from the left wound has been quite free, and contains some fecal matter. There has been less fecal matter passed per rectum, and also less flatus. The right wound looks well; it is packed with iodoform gauze down to the exposed bowel, from which there is no leakage. To-day the patient is taking semi-solid food and looks much better. The button has not passed.

January 30: Two days ago, when dressing the left wound, I extracted two large pieces of mucus which looked like sponges. These were evidently sloughs from the colon somewhere and I suspect from the cæcum. After their passage there was some leakage from the small puncture of the cæcum of the right wound. Yesterday I introduced a glass catheter into this opening and passed quantities of salt solution through the colon, washing out a quantity of fæces but no more sloughs. I then injected some salt solution and whiskey which was followed later by malted milk. This was done because the patient declined to take sufficient food. She gradually grew much weaker and has been comatose at times. To-day she grew still weaker, and died about 2 P.M.

A post-mortem examination was made by Dr. Longcope, who found that the colon had sloughed at the point of anastomosis and that the button had dropped into a pocket behind the colon.

Comments: A primary resection should not have been done in this case nor should a Murphy button have been used. A lateral anastomosis would have been better than an end-to-end one.

CASE III.—G. D.; female; 68 years of age; Pennsylvania Hospital. Diagnosis: *Partial obstruction and carcinoma of transverse colon and sigmoid. Resection of transverse and descending colon; immediate anastomosis,* March 5, 1905. *Recovery;* well to-day.

I saw this patient in consultation with Dr. David Edsall. The history of active trouble in this case extends over but three weeks. Previous to that time, however, the patient had had considerable trouble with her digestion and, at times, difficulty in having her bowels move. She had also had attacks of acute pain, evidently peristaltic in character. Three weeks ago she was suddenly seized with severe abdominal pain, and her bowels were opened with some difficulty. There was little distention at any time, but there was a great deal of abdominal pain and marked peristalsis. The peristalsis was visible through the abdominal wall. Examination a few days later revealed a mass in the left iliac fossa which was movable and tender; it varied much in size, and sometimes a little kneading would cause it almost entirely to disappear. There was never at any time a discharge of blood or mucus. When, with Dr. Edsall, I saw her we discussed but two possibilities: one, malignant disease of the sigmoid, and the other a chronic intussusception. My inclination was toward the first of these, as the mass seemed hard and there had been no discharge of blood or mucus as would have occurred with an intussusception. The patient was removed to the Pennsylvania Hospital.

I opened the abdomen through the outer border of the left rectus, opposite the spine of the ilium. As soon as the peritoneum was divided there presented in the wound what I supposed to be a dilated colon, but which proved to be the stomach. After

some difficulty I was able to differentiate the various structures and discovered we were dealing with a large malignant mass about the middle of the transverse colon which had gravitated to the left iliac fossa, dragging the stomach with it. Here the mass had become adherent to the sigmoid, the wall of which was involved in the cancer mass, but the sigmoid was not obstructed. The distal portions of the transverse and the descending colon were perfectly flat—contracted, in fact, to about the size of the small intestine. Proximally to the growth there was not much distention. My first idea was to do a double resection, first of the transverse colon and then of the sigmoid. The entire mass was surrounded by omentum. I tied off the omentum close to the greater curvature of the stomach and included in the ligatures the mesocolon, in order to shut off the lesser peritoneal cavity. When I had done this I found that if I resected a proper amount of bowel at the two situations there would be left only about five or six inches of descending colon, and rather than leave this and make two anastomoses I concluded to remove the entire transverse and descending colon with the involved portion of the sigmoid and attach the hepatic flexure of the colon to the distal portion of the sigmoid by the end-to-end method. This I did without any difficulty after the method of Moynihan, using the Doyen forceps. The anastomosis was the most satisfactory one I have ever made; there did not seem to be the slightest possibility of any leakage. Therefore I did not insert a drain, but closed the abdomen in layers. The operation took one and one-quarter hours. The patient was anæsthetized with ethyl chloride and ether. The glands in the mesocolon and mesosigmoid were not much larger than normal. The patient reacted well from the operation. At the beginning of the operation her pulse was 120; at the conclusion it was 90.

March 6, 1905: Her temperature since the operation has not reached 100 and her pulse at one time was 108. This morning it was 88. She has passed urine frequently but without difficulty and also expelled some flatus through the nozzle of a syringe. She has been very troublesome and nervous, but so far as her general condition is concerned she is in excellent shape and, I think, should make a good recovery.

March 13: Since operation the patient has done remarkably well; the bowels have moved freely and, excepting a marked melancholic tendency, there has been nothing to worry about. For the last day or two she has complained of frequent micturition. To-day I dressed the wound and found the skin lifted up by an accumulation of very odoriferous pus. Quite a little gas escaped when the wound was opened. The skin had healed perfectly; all the stitches were removed. This infection had taken place without disturbing her general condition and without giving her any amount of pain. I believe that the infection is only a superficial one and do not think it is connected in any way with the seat of anastomosis.

March 22: Since the last note there has been more or less fecal discharge every day through the wound; at times it has been quite profuse. Lately there has been a slight rise in temperature at night, but otherwise the general condition seems to be good. Inability to control the urine at times is very distressing to the patient. For three days she has been sitting up in a wheel chair for an hour or more.

March 29: There has been no fecal discharge from the wound for three or four days and her condition is greatly improved, the bowels moving regularly without aid. She is eating much better. She spends four or five hours out of bed every day.

April 2: The wound is healing rapidly, but she developed last night a phlebitis of the left leg.

April 3: The pain in the leg is less but the swelling remains about the same, and there is a slight increase in the pulse rate with no fever.

May 10: She has been doing very well until about two weeks ago, when the sinus was so nearly healed that I thought that I might leave out the gauze packing, which I did for two days. When I came to dress it at the end of this time an accumulation of pus had taken place and some burrowing under the skin externally. Since then there has been more pus and a small amount of fecal matter discharged. To-day I determined in view of the fact that there had been a slight rise in temperature in the evening, that there must be some fault in the drainage, and gave her ethyl chloride, opened up the wound thoroughly, curetted out two pockets and packed it with gauze.

May 22: Wound has been rapidly contracting and her general health has been much better. She is able to go about and is going home to-morrow.

May 1, 1909: Patient's wound has remained healed and she is well to-day; no evidence of recurrence.

Comments: Probably a lateral anastomosis here would have given a better result, or perhaps a drain might have shortened the convalescent period.

Pathological diagnosis: Polypoid adenocarcinoma and tuberculosis of colon.

CASE IV.—J. S.; male; 40 years of age; Pennsylvania Hospital. *Tuberculous strictures of ileum; tuberculous peritonitis. Resection of ileum and cæcum,* September 28, 1905. *Second operation,* January 20, 1906, *for fecal fistula. Lateral anastomosis of ileum and transverse colon. Third operation,* January 11, 1907, *same condition; lateral anastomosis of ileum and sigmoid. Fourth operation,* May 1, 1907; *resection of transverse colon with a portion of the ileum. Fifth operation,* May 19, 1907; *jejunostomy. Died* May 21, 1907, *twenty months after his first operation.*

This patient, a negro, had been in the hospital ten days or two weeks. His symptoms were so obscure that it was impossible to make a diagnosis. He complained of general pain in the lower half of the abdomen, with considerable disturbance of digestion. He said he had vomited, but he vomited only once or twice after his admission. A test meal was given but nothing abnormal was found in the examination. His abdomen was always scaphoid and somewhat rigid. On the right side in the iliac region, on two occasions I thought I felt a distinct movable mass which was probably an enlarged gland. There was no fever at any time and no blood or mucus in the bowel movements. A rectal examination showed some tenderness behind the bladder. After keeping him under observation for a number of days I concluded that he had probably a tuberculous peritonitis, and that an operation was justifiable. When the abdomen was opened through the right rectus the first thing which the hand encountered was the ileum very much contracted at two points, one near the cæcum and the other a number of inches away from it. These areas of contraction were probably one and one-half to two inches in length and the whole thickness of the bowel was involved, the peritoneal coat being studded with small tubercles. The mesocolic glands were enormous; the mesenteric glands on either side of the diseased ones seemed perfectly normal. There

was not an excessive amount of fluid in the peritoneal cavity. There was no evidence of tuberculosis elsewhere. I determined to excise the entire diseased area together with the cæcum and the enlarged glands. In order to get out all the glands and the mesentery which contained them, I found it necessary to divide the ileum at least 12 to 18 inches away from the proximal side of disease. The colon was divided at the middle of its ascending portion and its end inverted by two rows of sutures—one of catgut and one of celluloid thread. The same was done with the end of the ileum, and then a lateral anastomosis of the ileum and transverse colon was made with the Doyen forceps. The operation was perfectly clean and there was no possible soiling. It occupied a very long time, two hours and ten minutes. This was partly due to the fact that after making one division of the ileum and inverting the ends, I found it necessary to go higher up on the bowel because of the enlarged glands in the mesentery. On examining the specimen after removal it was found that the distended portion between the two strictures contained several ounces of watermelon seeds. He said that he had not eaten watermelons for nearly a year, but considering the season and the tendencies of his race this is to be doubted.

September 30, 1905: He has done very well since the operation and shows no bad symptoms at all.

October 2: He had considerable pain in the abdomen last night and vomited. To-day his abdomen is rigid and there is some soiling of the gauze drain which was introduced. Ethyl chloride was administered and the drain withdrawn. There escaped a quantity of gas and considerable liquid fecal matter. This leak, I think, comes from the inverted ends of the bowel as the gauze drain extended down to this point and not to the point of anastomosis. Notwithstanding this leak he is now comfortable and the bowels have moved. A fresh gauze drain was introduced. The patient was discharged December 19 with a small sinus.

January 20, 1906: The patient has improved a great deal since his first operation but has continued to suffer from a slight fecal fistula. The discharge from this fistula is almost liquid, but at times—the patient says—fecal matter comes out. He complains also of painful peristalsis, and I had an opportunity

to observe this in a distended coil of bowel extending from the left iliac fossa up in the direction of the wound. Thinking that possibly the fistula led to the blind pouch of colon left at the previous operation, I determined to make the incision on the outer side of the old scar, and this I did. Before being able to make out the situation, however, I was obliged to separate the fistulous opening in the wall from the bowel and do considerable separation of adhesions. Finally I discovered that the fistula opened into the bowel probably at the point of anastomosis. The proximal portion of the ileum was enormously distended and hypertrophied. This extended up for about two or three feet. The colon was quite collapsed. As the intestines were so matted together in the right upper quadrant I determined to make a new anastomosis between the ileum and the transverse colon, and this I did after the manner of Moynihan. The fistulous opening into the bowel I closed with two catgut sutures and introduced a drain down to this point. The new anastomosis was surrounded by omentum and the abdomen closed, excepting at the point of drainage.

January 22: Patient is more comfortable to-day and has done remarkably well since his operation.

March 1: Patient was discharged from the hospital to-day, the sinus still persisting but no fecal discharge.

January 11, 1907: Since his last operation he has been free of pain and has gained considerably in weight. The fecal fistula redeveloped, however, and has continued open ever since. In March, Dr. Le Conte operated and tried to close the fistula, but unsuccessfully. There is no longer any painful or visible peristalsis, but large quantities of fecal matter escape through the fistula. I determined that the best thing to do was to open the abdomen on the left side, divide the ileum near the old point of anastomosis and attach the proximal end by lateral anastomosis to the sigmoid. I opened the abdomen through the sheath of the left rectus and found the abdominal cavity in good condition excepting for numerous small tubercles over the bowel and mesentery. There was no fluid and no enlarged glands. The last anastomosis was in good condition and working. There was no hypertrophy or distention of the bowel. At the second operation I did not divide the ileum but simply made a lateral anastomosis. To-day I cut the ileum near the old anastomosis,

inverted the two ends and attached the proximal portion to the upper portion of the sigmoid by a lateral anastomosis. The steps of the operation were easily performed and the result apparently was very satisfactory. The abdomen was closed without drainage. I did not do anything to the fistulæ on the right, hoping that they would close.

February 4: Since this operation the patient has progressed very satisfactorily. At first there was free discharge of fecal matter from the old fistula, but this stopped after a few days. The fistula was Y-shaped, having two external openings, one of which closed very promptly after operation, but the other is still discharging a small amount of mucus and pus. The patient's temperature is normal and he is able to move about and is quite comfortable.

The specimen removed at the original operation was exhibited at the meeting of the Philadelphia Academy of Surgery held on February 4, 1907. "It is 38 cm. long, 34 cm. of ileum and 4 cm. of cæcum. The mesentery is attached to the intestine and contains a number of enlarged glands. There are two constrictions, one 5 cm. from the ileocæcal juncture, and the other 13 cm. above this one. The bowel between the two constrictions is very much distended and thickened; in this distended portion between the two constrictions there were found, when the specimen was examined, two or three ounces of watermelon seeds with one grape seed. The peritoneal covering of the bowel and mesentery was studded with small tubercles, and numerous hard bodies can be felt in the intestinal wall. The mesentery is very thick and contains a number of large glands, the largest measuring 4 x 3½ x 2 cm. These glands on section proved to be caseous. The appendix is tightly bound down to the cæcum by adhesions. The lower stricture is 3 cm. in length and the lumen of the bowel at this point ½ cm. The second stricture is 1 cm. in length and the lumen 1½ cm." The pathological diagnosis was tuberculosis of the intestine with chronic ulceration; tuberculosis of the mesenteric glands, and hypertrophy of the muscular wall of the intestine.

May 1, 1907: Since the last operation the patient's general health has been very good, but there has continued to discharge from the sinus a quantity of pus and mucus. He says fecal material at times also passed out, but I have had his dressings

carefully watched for several consecutive days at the hospital, bringing him in for this purpose, but have found no fecal matter. He is very much disturbed by the discharge and the necessity of constant change of dressings, so I determined to open the abdomen again and remove all of the bowel that had been side-tracked by the last operation. To-day I opened the abdomen through the right rectus and excised the colon from the splenic flexure back to the point of original excision. Together with this bowel there were removed two feet of ileum. At the point of division of the colon the bowel was perfectly healthy, and I had no difficulty in turning it in. The whole intestine was one mass of adhesions and I had considerable difficulty in isolating the portion which I wished to remove. A thorough twisting and malposition of the small intestine made the operation long and difficult. The only portion of the bowel removed which was really distended was the ascending colon, and that was filled with tuberculous ulcers of the mucous membrane. The peritoneum generally was in much better condition than at the previous operation, and at several points on the small intestine there were cicatrices of healed tuberculous lesions. When I removed the bowel I felt that I had taken out all the diseased tissue except a few mesenteric glands, and hoped that the patient would be entirely relieved. The abdomen was closed without drainage excepting for a small piece of gauze extending just through the abdominal wall at the seat of the old fistula. The operation lasted about two hours.

May 3: Patient's temperature has remained normal since operation; he has had no vomiting, no distention, and his general condition has been very good.

May 21: The patient did very well for several days after his last operation. Then he began to have fecal discharge that I judged came from the loop of small intestine that had been adherent to the old abscess and which I had tried to cover with peritoneum. Discharge has increased during the last few days and the patient has emaciated a great deal. I tried rectal feeding, but this did not help matters. To-day I decided to do a jejunostomy or resection of the perforated bowel. The patient was in very poor shape. He was put on the operating table and four pints of normal salt solution put into his circulation. Under morphia, ethyl chloride and ether anæsthesia the wound was

opened up, the loop of bowel delivered, and the perforation found. It was too large to close, and after thoroughly cleansing the cavity the bowel was fastened in the wound with gauze packing and a tube passed down into the distal portion of the loop and fixed with a purse-string suture. The patient was immediately given a pint of salt solution and two ounces of whiskey through the tube.

May 20: Patient is in pretty bad shape, although he was much better last night than before his operation. He has been given raw eggs and peptonized milk through the tube every three hours and has vomited small amounts at times to-day. His temperature is subnormal and he seems in pretty bad condition.

May 21: Patient died to-day. At the postmortem his entire intestinal tract measured but 19 feet.

Case V.—S. B.; female; 57 years of age; Pennsylvania Hospital. Diagnosis: *Obstruction of bowels due to carcinoma of sigmoid. Operation: Colostomy, and eight days later resection and anastomosis. Recovery, with death from recurrence one year later.*

This patient was a rather thin person who gave a history of ribbon stools for some time with marked constipation. She stated that she had never passed blood excepting after the use of an enema and then only a slight amount. Had never had any previous attack of obstruction. She was a Christian Scientist, and her treatment was confined to this art until about a week ago when constipation became much more marked; she then took castor oil. For forty-eight hours she passed neither fecal matter nor gas, her abdomen becoming more and more distended, and she has vomited everything that has gone into her stomach. When I saw her at about 10 P.M., her condition was good,—the abdomen was markedly distended, coils of bowel and peristalsis being plainly visible through the abdominal wall. Dr. Lee had examined the rectum and could feel nothing abnormal. The sigmoid could be felt, and was markedly distended. Most of the pain and tenderness was located about the cæcum. I urged immediate operation, with the intention of establishing an artificial anus and later removing the cause of obstruction if it were removable. The abdomen was opened through the left rectus and a growth about the middle of the sigmoid readily found. There were a number of enlarged glands in the mesosigmoid.

The growth was of the contracting variety and had completely shut off the bowel. I had no difficulty in delivering the intestine, and then made an anastomosis between the bowel above and below the growth by means of a Murphy button. I left this knuckle of bowel completely outside the wound. In a few days, the patient being in better condition, I intended to resect all the involved intestine. I was greatly tempted to do this at the time of operation because the patient seemed in good condition, but because of past experience and the experience of others deemed it unwise.

September 10: Although patient has passed some flatus there has been no bowel movement. Some distention still exists and patient is very uncomfortable. To-day I opened the distal portion of the bowel; a prompt escape of a large amount of gas and fecal matter followed.

September 16: Two days ago, eight days after first operation, I resected the involved sigmoid. Patient had improved a great deal and seemed in good condition. I found that the wound had become infected from fecal discharge and had therefore to exercise great care to prevent infection of the peritoneum. The area was well walled off and I was able to draw the bowel out very satisfactorily. I made a wide resection of the involved portion, invaginated the two ends and did a lateral anastomosis, using linen thread. The operation was easily accomplished and satisfactory in every way. A small drain was put through the peritoneum in the middle of the wound and another down to the peritoneum at the upper angle where the infection had occurred. The patient stood the operation well and is now in good condition; her only complaint is of gas. She made a very satisfactory convalescence and was discharged October 12, 1907.

January 21, 1908: Patient came in to-day; seems perfectly well; weighs 104 pounds. Thinks she weighed 80 when she went to the hospital; weighed 79 pounds when she left. Bowels move regularly without a laxative.

June 2: Patient complains of considerable lassitude and says she has some abdominal pain. Bowels are moving, however, and I can feel no evidence of any recurrence. She thinks she has lost weight, but her weight is exactly what it was on her last visit.

July 22: Patient has been seen by a physician who told her she had a recurrence of her trouble and that all he could do for her was to make her comfortable. This has depressed her very much and tended rather to aggravate her symptoms. She says that she sleeps badly, her appetite is poor, and that she has almost constant pain in the left iliac fossa. The bowels, however, move regularly from cascara, and there has been no blood or mucus in the movements. Weight, 92½ pounds. On examination there is some hardness to be felt to the left of the wound, but it feels as if it might be in the abdominal wall. I am by no means sure she has a recurrence but have advised X-ray treatment, for which she will go to Dr. Manges.

Patient, a few weeks after this note was made, died from recurrence, but had no obstruction.

CASE VI.—M. W.; female; 58 years of age; Jefferson Hospital. Diagnosis: *Carcinoma of appendix and cæcum. Resection of cæcum, lateral anastomosis, October 5, 1907. Death on seventh day after operation.*

This patient was referred to me by Dr. Robert L. Gibbon, Charlotte, N. C. She had always been healthy, and had given birth to eight children. In February, 1906, she had an attack which was diagnosed as appendicitis. Was ill a week; the symptoms disappeared under rest and ice. Six weeks later she had a second attack which lasted but a few days. A marked symptom in these attacks was severe localized pain and slight temperature. No nausea or vomiting and no urinary symptoms in either of these attacks. She remained well until six weeks ago, when she had another attack similar to the first but more marked. There was considerable fever and, excepting for the nausea, the symptoms were typical of an acute appendicitis. In this last attack a mass could be felt in the cæcal region. She gradually improved and was quite comfortable when I saw her. Examination of the abdomen was negative excepting for a tender and slightly movable mass in the right iliac fossa. In view of the history and the absence of other symptoms it seemed likely that this was a case of appendicitis with a walled-off abscess. I advised operation, and two days later, October 5, I operated at the Jefferson Hospital.

The abdomen was opened through the right rectus and a hard mass encountered behind the cæcum. There were no omental adhesions. General abdominal and pelvic cavities were walled

off and a line of cleavage sought between the mass and the neighboring viscera. The mass was so dense that I feared I was dealing with a malignant growth. Finally I got the cæcum separated. When brought to the surface I found that the appendix had separated at its attachment and that there was quite a large opening in the cæcum. Where the appendix was detached there was evidently a malignant growth, and on examining the interior of the cæcum I found that this growth extended across the lower end of the bowel and up as far as the opening of the ileum. I then proceeded with a resection of the cæcum, going 6 or 8 inches above the growth and making a lateral anastomosis between the ascending colon and the ileum, using linen thread for the purpose. When I had completed the anastomosis I proceeded to get out what remained of the appendix; this was a difficult undertaking, as it was tightly bound down. The distal portion of the appendix, however, did not seem to be so much diseased as the proximal portion. It was impossible to ligate the mesoappendix as I simply had to dig the appendix out of its bed behind the cæcum. A gauze drain was put in and the wound partially closed.

October 8: Patient has done only fairly well since operation. Yesterday morning she seemed in good condition; but in the afternoon she suffered a great deal from nausea but vomited only once or twice, and then only small quantities. She voids urine voluntarily; her temperature range is between 99.2° and 101°. She has taken very little nourishment and drinks water in small quantities. The bowels have not moved though she passed some flatus to-day when an enema was given. There is no distention of the abdomen; the tongue is moist. Nausea and backache are the only complaints which she makes. Pulse has been somewhat rapid, ranging from 110 to 130.

October 9: Patient is better, though still has occasional nausea. She has complained of distention, but this is not perceptible, and has passed large quantities of gas by the bowel. Last night she had a slight movement following an enema. She has taken little in the way of nourishment excepting peptonoids, but she has had nutrient enemata. She passes a good quantity of urine. Her temperature varies from 99.2° to 101°.

October 11: Patient's bowels have moved very satisfactorily and a number of times. There is no vomiting but the nausea

continues, although she is able to take a certain amount of liquid nourishment and stimulation. Her temperature continues around 100° and 101°. Her pulse remains between 110 and 120. There has been a decided falling off in the urine and to-day she has passed little or none.

October 12: Her condition yesterday grew much worse. She was in a stuporous condition all day, secreted very little urine and declined to take nourishment. The bowels moved five or six times. I changed the drain the day before, and although it was soiled and had a bad odor there was no escape of fecal matter or pus on its withdrawal. Her condition continued to grow rapidly worse and she died at 4 o'clock this morning. It is hard to know exactly what caused this death. There is no doubt that the anastomosis was working perfectly satisfactorily. There was no distention and no vomiting, so I felt if there was a peritonitis it must have been a low grade of infection. There was some kidney secretion in the last twelve hours, but I think that the kidneys were largely the cause of the death.

Pathological diagnosis: Cylindric-celled carcinoma arising from an adenoma.

CASE VII.—G. N.; male; 33 years of age; Jefferson Hospital. Diagnosis: *Carcinoma of ascending colon,* March 28, 1908. *Recovery; well at the present time.*

This patient gave a history extending over 6 or 8 months. During this time he has had considerable soreness and tenderness in the right upper quadrant of the abdomen, in which a tumor has developed. He has had very black, tarry stools. Has never vomited, and pain is uninfluenced by eating. He has no pain referred to the shoulder or back. There is no apparent distention of the stomach. Examination shows a marked rigidity below the costal border and the sensation is conveyed to the hand as of a tumor beneath the upper half of the right rectus; it is exactly in the position of the gall-bladder. There is no history of colic, and I was inclined to believe that he had a duodenal ulcer with a mass of adhesions about it. Others thought that the tumor was probably a gall-bladder. His hæmoglobin was 65 per cent., but he had a good proportion of red blood cells. His bowel movements were very black, but it is reported that no blood was found. I opened the abdomen through the right rectus and found a large growth in the hepatic flexure of the colon, covered by adherent

omentum. There was no extension to the gall-bladder or liver, but there was an extensive involvement of the colic lymph-nodes. The patient was in no condition to stand an extensive operation; his pulse became quite weak on the table. I determined that it was worth while to attempt an excision of the growth, but thought it wiser to do the operation in two stages. I therefore divided the ileum near the ileocolic juncture, closed both ends and then made a lateral anastomosis (Moynihan's method) between the proximal portion of the ileum and the transverse colon. I put in a small drain down to the closed distal end of the ileum.

April 1: Patient is in good condition. Drain was changed to-day. I think in two or three days I will be able to complete the operation.

April 11: Patient has improved very much since the first operation, and seems in good condition to stand the second. The abdomen was opened through the same incision in which the drainage had been going on, and in which there was a slight infection. I had no difficulty in bringing up the cæcum and ligating its mesentery. I then divided the transverse colon and inverted it. In bringing the mass out of the abdomen, I was surprised to find a coil of small intestine adherent on its inner posterior aspect. On careful examination this proved to be the duodenum. At first it looked as if a resection of this portion of the bowel would also be necessary, but I found when I separated it that practically only its peritoneal coat was involved in the mass. Several sutures were put in to repair the loss of the peritoneum. There was no involvement of the liver or gall-bladder in the growth. The kidney was thoroughly exposed, but there was no extension of the disease to it. A posterior drain was carried out through a puncture in the loin. A small drain was then carried down to the inverted colon and another placed in the superficial wound at its lower extremity. Patient stood his operation well, considering the great extent of it.

April 15: Patient's condition is very satisfactory. Two days ago I was worried because he had considerable cough, which is probably due to the fact that he is a miner and has a miner's lung. His bowels have moved well.

April 24: Patient is making a very satisfactory recovery, although there has been considerable discharge of the wound, which was infected at the time of the second operation. Patient is sitting up and his bowels are moving normally.

May 17: Microscopical diagnosis: cylindric-cell epithelioma. Wound entirely healed. Patient gone home.

February 12, 1909: Letter from Dr. G. A. Cunningham, the patient's physician: "He has gained thirty pounds, has no indigestion, flatulence never occurred; he is now engaged at the laborious task of coal mining, but has had no complaint of any kind regarding weakness of the abdominal wall. He has had no medical assistance whatever since the operation. His bowels are regular."

Case VIII.—M. A.; female; 71 years of age; Bryn Mawr Hospital. Diagnosis: *Acute intestinal obstruction due to carcinoma of splenic flexure. Colostomy,* May 12, 1908, *followed by resection* May 20, 1908. *Death* June 6, 1908.

This patient has had more or less trouble with her bowels for about a month, and during the last four or five days has had difficulty in having a movement. When I saw her just before operation her abdomen was distended; there was no evidence of fluid and she was vomiting. Her temperature and pulse were normal and she seemed in good condition. I thought it wise to operate at once, and as I believed the obstruction to be in the upper rectum, I made an incision through the outer portion of the lower left rectus. The small intestine was considerably distended and filled the pelvis. The rectum, sigmoid and descending colon were collapsed. The transverse colon was distended. Passing my hand up to the splenic flexure I found a small hard mass in the bowel. Instead of making a lateral anastomosis between the transverse colon and the sigmoid, which I could easily have done, I made another small opening in the upper portion of the rectus, hoping that I might be able to deliver the growth through it; I found, however, that it was situated just at the splenic flexure and that only with great tension could it be brought within the wound. It was about the size of a hulled walnut and was shaped like a Murphy button, and apparently completely obstructed the bowel. I then made an opening in the transverse colon after fixing it in the wound. I used Stewart's method for draining the bowel.

May 20: Patient has made a very good recovery from first operation, and to-day I undertook the removal of the growth. I first closed the colostomy opening, increased the wound, tied off the gastrocolic omentum, divided the colon proximal to the colostomy wound, and then proceeded to remove about 8 inches

of the transverse colon together with the splenic flexure in which a small hard growth was present. I also removed about 4 inches of the descending colon. I had considerable difficulty in separating the growth from the spleen, and in doing so tore off a small portion of the spleen, which caused a rather profuse hemorrhage, which was controlled by a pack. The mesocolon was so short that it was difficult to get the ligatures behind the growth. I finally managed to get the growth out fairly satisfactorily. There was present a small hard nodule in the kidney, but I could not make out that it had any connection with the growth in the colon. The ends of the divided colon were inverted and a lateral anastomosis made. Catgut sutures were used for the deeper suture and linen thread for the outer. The operation was an extremely difficult one and required about an hour and fifty minutes for its performance. I think it would have been easier if I had made a lateral anastomosis and short-circuited the growth at my first operation instead of doing a colostomy. The removal of the splenic flexure would have been just as difficult, however, but the operation would have taken less time. The patient stood the operation fairly well.

May 25: For several days after operation she had a great deal of nausea and vomiting. Gastric lavage relieved the vomiting. During the past two days she has had a bad attack of diarrhœa; during the last 24 hours but 15 stools, but in the previous 24 hours 28 stools. These occurred without the administration of any laxative whatever. Irrigation of the rectum relieved her a great deal and she is much better to-day. There is a good deal of odor about the wound and the drain has not yet been changed. Her temperature range is between normal and 100°. Her pulse, which was quite rapid on the day after operation, reaching about 160, has recently remained in the neighborhood of 100.

May 26: To-day I removed the packing. There was no bleeding; the wound is very foul and there is some sloughing along the muscle edges. She is still very weak but the diarrhœa is much better. The great difficulty is to get her to take sufficient food. She has been gotten up into a chair and put out in the yard, which I hope will help her.

May 28: Fecal fistula has developed—but free stools by rectum.

June 6: Patient died to-day after gradually growing weaker. Temperature has not been above 100° for a week and lately has remained a little below normal. Death probably resulted from a low-grade infection. No post-mortem examination was made. Through an error in technic the sections of this tumor were spoiled and the rest of the growth lost. There can be no doubt of the clinical diagnosis, as it resembled in every way the growths found in Cases I, II, V, and X.

CASE IX.—S. B.; female; 27 years of age; Pennsylvania Hospital. Diagnosis: *Tuberculosis of cæcum and peritoneum. Resection of cæcum. Recovery;* well to-day.

This negro girl was admitted to the ward because of what was supposed to be a pus tube on her right side. She stated that she had had trouble with menstruation and considerable abdominal pain for some time, and that the week or two before she came into the hospital she had a great deal of pain and, she thought, some fever. On admission her temperature was 99½°. There was a distinct mass in the right iliac region; there was great tenderness on vaginal examination, especially on the right side; the mass was very hard for a pus tube and I thought it likely that she had an appendicitis as well as a pus tube. She had no general abdominal pain. I opened the abdomen through the right rectus near the median line and found the omentum adherent over the cæcum. Exploration of the pelvis showed numerous adhesions between the uterus and the intestine and all around the tubes and the ovaries. These were recent and were easily broken up. The rest of the cavity was well walled off with gauze from the mass in the iliac region, and then I discovered that the mass was not the appendix but was composed of a thickened cæcal wall and adherent omentum. Close investigation showed thickening and a mass in the cæcal wall with extensive infiltration, making the cæcum quite friable. The omentum was then tied off. The mass was about the size of a silver dollar and involved the anterior wall of the cæcum. There were numerous enlarged glands in the mesentery of the ileum and cæcum and numerous tubercles over the small intestine. There was quite a ring of thickening around the ileum about a foot from the cæcum, but no constriction. I determined to resect the cæcum. I then discovered another mass higher up in the cæcum, and in order to get beyond the disease was obliged to

remove the colon as far up as the hepatic flexure. The ileum was divided near the cæcum and the ends inverted with catgut and linen thread. A lateral anastomosis was then made between the middle of the transverse colon and the ileum. The transverse colon was also covered with adhesions, the omentum being adherent to it, and it was quite difficult to find a clear spot for the anastomosis. The divided mesentery of the ileum was sutured to the mesocolon to prevent any possibility of a hernia through this opening. Two small gauze drains were passed, one to the site of anastomosis, the other to the inverted colon, and the wound closed. The appendix was imbedded between the cæcum and omentum but apparently was not the original seat of the trouble.

Except for some superficial infection of the wound and two alveolar abscesses the patient made a good recovery. The wound healed by granulation, but there was no leak. Discharged February 24, 1909. The patient's present condition is normal. The pathologist expected to find tubercle bacilli because of the appearance of the specimen, but was unable to do so on repeated examination. The gross picture was typical of tuberculosis.

CASE X.—M. H.; female; 57 years of age; Mercer Hospital, Trenton, N. J. Diagnosis: *Carcinoma of sigmoid. Resection and immediate anastomosis,* January 31, 1909. *Death,* February 14, 1909.

I saw this patient in consultation with Dr. Holcombe and Dr. Ridgeway. She has one child who is 20 years of age. The mother has always been very well until seven years ago, when the left breast was removed for what appeared to be cancer. No microscopic examination of the growth was made. For some months she has been troubled with constipation, but has passed neither blood nor mucus. She has also lost some weight in the last few months. It is said that she had a tumor in the right breast; the tumor has disappeared. From the history given of this growth, I think that it was probably a cyst. Three weeks ago she began vomiting and her abdomen became markedly distended; since when she has been able to retain practically no food and has had no satisfactory bowel movement. Numerous enemata have been given and small particles of fecal matter have at times been returned. She was a thin, anæmic woman, looking older than her age, but in fairly good condition. The abdomen

was markedly distended and the vomiting was more or less persistent, but not of a fecal type. Palpation showed some rigidity in the region of the sigmoid, but more in the upper right quadrant. The ascending colon seemed to be distended, and as there was much tenderness over the sigmoid, I concluded the obstruction was probably at this point.

Following a hypodermic of morphia and atropin, she was given ethyl chloride and ether, and the abdomen opened through the left rectus. I found the descending colon very much distended, and on withdrawing the sigmoid came at once upon the cause of the obstruction, which was a growth involving the interior of the bowel and producing so marked a constriction as to practically completely obstruct it. Only one gland could be felt in the mesentery. About 6 inches of bowel was excised, including the growth, and a lateral anastomosis done. The ends of the bowel were inverted with catgut and silk and the anastomosis made with catgut and silk; as the operation was accomplished outside of the abdomen and the wound well protected with gauze, no drainage was inserted. While the abdominal wound was being closed a rectal tube was inserted into the rectum and a quantity of gas and liquid fæces escaped and the abdominal distention at the same time disappeared.

February 8: The patient's wound is healed and there is no pain or abdominal tenderness. The abdomen has been perfectly flat ever since her operation. During the last few days she has been vomiting and has had a very troublesome diarrhœa, I am told. The night before last she vomited practically everything that was taken. I talked with Dr. Holcombe over the 'phone and advised that her stomach be washed out. To-day I got a very good report from her. There has been no vomiting since yesterday morning, the bowels have moved but once, and she has been able to retain liquid food.

February 14: I had supposed that this patient was doing very well until last evening, when I received a telephone message saying she was in a bad condition and that a mass had developed in the left loin. I felt sure that there had been a leak at the site of anastomosis, and advised that the wound be laid open freely, and arranged to see the patient to-day. When I arrived I found her in an extremely low condition. On removing the dressings I found them soaked with a quantity of dark liquid fecal matter.

The wound had opened throughout its length and there were great masses of necrotic muscle and fascia. I suppose she got rid of probably a pint of fecal material, and I hoped that its removal might bring about some improvement in its condition, but was informed later that she gradually sank and died this evening. She had no further obstructive symptoms at any time and her abdomen was not distended when I saw her; on the contrary it was scaphoid. I think that there is no doubt that this death resulted from toxæmia, the result of extravasation of intestinal contents around the anastomosis.

There are a number of practical points in regard to resections of the colon about which there is great variety of opinion and practice, and most of these points are brought out in the foregoing cases. Using these as a basis, I propose to discuss the following questions. First, where should incision be made in operating for diseases of the colon? Second, is one justified in doing a resection and an anastomosis in the presence of acute obstruction, or should the obstruction first be relieved by drainage? Third, what are the relative merits of end-to-end and lateral anastomosis? Fourth, what is the best method of making the anastomosis? Fifth, should drainage be used if the peritoneum is not already infected? Sixth, to what is the operative mortality due? Seventh, is ultimate mortality due to too limited excision of the bowel?

1. In answering the first question I would say that the incision should be made as nearly as possible over the growth, and if one has been unable to locate the growth, and operates simply for the obstruction, and finds that he is unable to gain ample access to the involved bowel, then a second incision, through which the bowel may easily be drawn, should be made. A second incision is much less objectionable than the injury to the bowel through an incision which does not permit of easy handling.

2. Regarding the second question, as to resection and anastomosis in the presence of obstruction, there can be little doubt, all surgeons having agreed that however easy the

operation is it should never be done. This conclusion was reached after sad experiences, to which I think my first and second cases and possibly my tenth case, might be added. In 1903 F. T. Paul (*Brit. Med. Jour.*, Aug 15, 1903) said that obstruction more than trebled the danger of colon resection, and he reminded us that even after a simple colostomy, done for obstruction of two or three days' standing, the patient may be in a precarious state for two or three weeks, even though apparently greatly improved for twenty-four hours. There is sufficient auto-intoxication, even when the drainage operation is done fairly early, to cause severe poisoning which is characterized especially by a foul diarrhœa, loss of appetite, slight fever and general depression. This condition is well shown in Case VIII of my series, and is a picture, I am sure, familiar to us all. Not only is the patient absorbing toxins from the intestinal fermentation, but ulceration of the colon, well above the obstruction, in these cases is quite common. To do a formal resection, however quickly and easily, at this time is to invite disaster. Moynihan ("Abdominal Operations") says, "There are few rules so binding upon the surgeon as that which prohibits the resection of growths and subsequent end-to-end anastomoses of the large intestine in cases of acute obstruction." One is strongly tempted to break this rule when the growth is easily accessible, as it is in the transverse and sigmoid colon, but there is every reason why he should refrain. Experience has taught surgeons everywhere this lesson, and it should not be forgotten.

A few successful resections and anastomoses of the upper portion of the small intestine for acute obstruction may mislead the operator to the false conclusion that the same procedure will work as well in the case of the colon, but the question is an entirely different one. The small upper portion of the intestine is comparatively free from bacteria, while the tract of the large intestine teems with them, and it is this fact that accounts for the peritonitis so frequently observed in cases of long standing obstruction of the lower intestine. The bowel wall becomes distended, its circulation bad and the organisms make an easy exit into the peritoneal

cavity. It is a well-known fact that the lower down in the intestinal tract an obstruction is the greater is the infection from the absorption of the intestinal contents, and this is due not to the greater absorbing area but to the greater number of pathogenic organisms in the lower portion of the small intestine and colon. Numerous have been the contributions to surgical literature in recent years showing the danger of this absorption even after a perfect resection and anastomosis. Monks and others have laid great stress upon the importance of emptying the bowel above the obstruction at the time of the operation, and his work and experiments in this matter have contributed largely to our improved results. He has shown us how a large portion of the small intestine can be emptied by puckering the intestine up on a large blunt tube passed into its interior, and that this is the only way in which it can be accomplished. The toxicity of the intestinal contents in acute obstruction is well shown by the experimental study made by Clairemont and Ranzi ("Proceedings of the German Medical Congress, 1903"; ANNALS OF SURGERY, December, 1903.). Their results are as follows: "The intestinal contents above the stenoses, after being rendered free from bacteria by filtration, always proved poisonous, whether administered intravenously or hypodermatically. Bouillon cultures of small quantities of the intestinal contents after four to five days gave toxins equally poisonous. Thus the poison is the result of bacterial growth. It can also withstand heat. The toxic action can be paralyzed by mixing the material with the brains of normal rabbits or guinea pigs. The filtered intestinal contents in some instances showed intense hæmolytic power when administered to dogs or horses. It was impossible to establish either active or passive immunity to the poisons, which seem to show that an extension of serumtherapy to the treatment of ileus is impossible." William J. Mayo (*Jour. Amer. Med. Assoc.*, September 14, 1907) says that a fair proportion of the mortality following resection for obstruction is due to perforation from thrombosis, and he therefore urges great care in the handling of the distended bowel on this account. He advises tracing the collapsed bowel up to the obstruction rather than the distended bowel down to the obstruction. Here, then, we have another reason for primary drainage of the large intestine in cases of obstruction before doing an anastomosis.

I think my own cases bear out all these points. In two I did a resection in the presence of an acute obstruction and lost both. In two others I did the drainage operation first and the resection later. One died and one recovered. In my last case I did a primary resection because I thought that as the obstruction was not complete there would be little danger from auto-intoxication, the result of absorption. As I have said before, this, I believe, was an error. What then should be the procedure in these cases of acute obstruction? Moynihan recommends Paul's operation, which consists in loosening the bowel from its attachment, bringing the growth out through the wound, dividing the bowel well above and below the growth, and inserting into the proximal and distal ends two glass tubes connected with a rubber drainage tube, and then the removal of the growth. By this operation the growth is removed at once and free drainage of the bowel is accomplished. Later, an anastomosis is accomplished by a crushing forceps and the fecal fistula closed. Von Mikulicz, Hartmann, and Mayo, all suggest methods quite similar to those of Paul. There is no doubt that these methods are superior to colostomy performed above the growth, as it renders subsequent operation very simple and easy. Where the growth cannot be delivered easily into the wound colostomy may be done or the obstructed portion of the colon may be side-tracked by performing ileocolostomy or colocolostomy. This method I pursued in one of my successful cases (Case VII). These operations are particularly advised where the obstruction is only partial, and sometimes are advantageous where there is no obstruction.

3. The relative merits of the end-to-end and lateral anastomoses depend largely upon the portion of bowel with which one is dealing. As a rule there is greater likelihood of leakage in the end-to-end operation because of the difficulty of getting an accurate and tight approximation of the two por-

tions at the mesenteric attachment. It can, I think, be said that unless the peritoneal coat can be brought in from the two lateral aspects and made to cover the divided mesenteric attachment a lateral anastomosis should be done. In the ascending and descending colon, and at the hepatic and splenic flexures, a large portion of the posterior aspect of the bowel has no peritoneal coat, and the mesentery is short and wide, so that here there is no chance of making a complete peritoneal approximation in an end-to-end anastomosis, and therefore the lateral method must be employed. In the transverse and sigmoid colon the entire bowel is covered with peritoneum, and it can be drawn in over the mesentery. It is only in these situations that the end-to-end method should be used. Even in the transverse colon and the sigmoid, I would prefer the lateral approximation. In resection of the cæcum, the ileum should be anastomosed with the transverse colon under the omentum, and by the lateral method. End-to-side anastomosis is more difficult and not, I think, as satisfactory. Another great advantage of the lateral anastomosis is that if properly done there is little drag upon the line of suture. In order to prevent this drag the two portions of bowel beyond the anastomotic opening in both directions should be approximated by several interrupted sutures. Many of the failures due to leakage in end-to-end anastomoses have occurred because an unhealthy portion of bowel was involved in the anastomosing sutures. This is much less likely to occur in the lateral anastomosis, and the surgeon knowing that he is going to perform a lateral anastomosis is much less likely to leave any of the diseased bowel. The argument that more time is required for the lateral anastomosis, is without weight as a rule. Still another point in favor of the lateral anastomosis is that there is no danger of stricture developing at the line of anastomosis, as there certainly is in an end-to-end suture. Moynihan lays great stress upon the importance of dividing the bowel obliquely, especially where an end-to-end anastomosis is to be made, as in this way there is less danger of including in the sutures a portion of intestine the circulation of which may be impaired. He

reports that he has done seven resections of the cæcum and ascending colon with end-to-end anastomoses. In this series there was one death due to leakage. His more recent practice is to employ the lateral anastomosis. Bilton Pollard (*Brit. Med. Jour.,* Jan. 23, 1904) advocates the end-to-end method and reports several successful operations done for carcinoma. Another strong advocate of operating in two or more stages is Neumann (*Deut. Med. Wochenschr.,* xxxii, No. 14), who details six cases of carcinoma of the colon in which he first practiced drainage and later resection. His results would certainly warrant his conclusions. Jonas (*Jour. Amer. Med. Assoc.,* Sept. 15, 1906) reports 16 cases of cancer of the colon in 15 of which resection was done. In this series he had 12 operative recoveries and three deaths. The three deaths were all due to a leakage at the point of anastomosis, and in each of these a Murphy button had been used.

In the first three of my own cases I did an end-to-end anastomosis; death occurred in one eight hours after operation, and leakage in the other two; in one a Murphy button was used, and perforation took place and the button dropped out of the bowel into a pocket behind it. Death occurred on the twenty-third day. In the third case simple suture was used, and the patient recovered in spite of a fecal leak and remains well to-day. In the last seven cases lateral anastomosis with simple suture was done. Leakage occurred in three and death in two cases. One died on the twenty-fifth day and one on the fourteenth. My own experience, then, tends to confirm that of the other operators already quoted who favor lateral anastomosis.

4. As regards the best method of making the anastomosis, I would say that it is difficult and practically useless for one operator to say what is the best method of suture to be employed by another in making intestinal anastomoses. I would advise one to use that method with which he is most familiar and which has given him the best results. There is one exception to this statement, however, and that is that some method of suture is far preferable to any mechanical device such as a button or a bobbin. I employed the Moynihan

operation, done with the aid of the Doyen forceps, in all of my cases excepting Case III, in which the Murphy button was used with subsequent necrosis and perforation. In my recent cases I have used a through-and-through suture of catgut and reinforcing suture of celluloid thread or silk. Some such forceps as those of Doyen facilitate the operation considerably, as they control the fecal current and also enable the operator to manipulate the bowel with the least possible traumatism. I have never used the Magraw suture, but those who have speak well of it. Most surgeons have now become convinced that the large intestine is no place for the Murphy button, and no one has tried to impress this upon the profession as much as Murphy himself. He states ("Year Book of Surgery, 1908") that for years he has advised against the use of the button in large intestine anastomoses excepting possibly in lateral anastomoses high up in the colon, and in these cases the oblong button should be used. This advice probably answers the question as to the utility of the button in these cases—and my own experience confirms it. Numerous cases have been reported in which the button has either become blocked by a mass of fecal matter, or in which pressure from it has produced necrosis and leakage. This is well illustrated in my second case.

5. Should drainage be used if the peritoneum is not already infected? This question is not so easily answered. Given a case in which there is no obstruction, no peritonitis, the bowel wall healthy at the lines of resection, and the intestinal tract well emptied before operation, I should use no drainage. This proposition, however, presumes an early diagnosis, which is by no means a rule in cancer of the colon, and a thorough preparation of the patient before the operation. In but two of my cases did I close the abdomen without a drain; one got well in spite of a leak, and is well to-day, four years after operation; the other died on the fourteenth day with leakage due to sloughing of the bowel at the line of approximation. This was Case X, and I believe that it might have been saved had a Paul's operation been performed instead of an immediate anastomosis. In the

eight other cases I used drainage and had a fecal leak in but three; one was the case in which the Murphy button was employed, and who died on the twenty-third day; another recovered in spite of the leak, and the third died on the fifth day. I believe that leakage does not depend so much on drainage or no drainage as on the character of the intestine and the accuracy of the suture. My own greatest error in this series was in doing resections without first draining the bowel thoroughly, the result of which was that the proximal portion of the bowel was in poor condition and the anastomosis put to the severe test of having to stand at once the strain of the passage of hard masses of fecal matter and a quantity of irritating and septic intestinal contents. I believe on the whole that drainage is better than no drainage in large intestinal anastomoses. The drain should be a small one and should not rest directly upon the line of suture, as this only invites a leak.

6. To what is the operative mortality due? One of the surprising lessons learned from the study of my own cases and from those of others is that the immediate operative mortality is remarkably small, and that the late operative mortality is large. In my ten cases I have had five operative deaths. Case I died eight hours after his operation, when he was suddenly taken ill with cardiac symptoms. At the autopsy in this case the patient was found to be suffering from a marked endocarditis; he also had a large aneurism of the thoracic aorta. Dr. Longcope thought that the cardiac condition alone was enough to account for the sudden death. There was peritonitis at the time of operation in this case, and even if the patient had not died of his cardiac condition I think that he might have died of the peritonitis. Case II died on the twenty-third day after operation, from infection due to necrosis of the bowel with fecal leakage. Case VI died on the sixth day after operation, apparently from septic intoxication. Case VIII died on the twenty-fifth day after operation, from a low grade infection and fecal fistula. Case X died on the fourteenth day from the same cause. It will be observed that there was but one prompt death after the

operation, and that from a cardiac condition, and that there were but two deaths within the first week. It is apparent, then, that the operative mortality is due to conditions which do not produce death under a number of days. In other words, the shock in spite of the prolonged operation, the age of the patient and even his bad condition, is not a significant factor in the mortality. The deaths result most frequently from necrosis of the bowel and leakage, and this necrosis in most instances is due not to a faulty method of suture but to the fact that the proximal portion of the bowel is in bad condition from either complete or incomplete obstruction. I am convinced that if the bowel was drained more frequently before the anastomosis was done the operative mortality would decrease considerably. The best operative results have been obtained where this primary drainage was employed. Moynihan has collected 100 cases of resection for malignant disease of the colon from recent literature, the results of which are particularly interesting. In 68 cases a primary resection was done with 22 deaths, a mortality of 32.3 per cent.; in 12 Paul's operation (resection and drainage followed later by anastomosis) was done with one death, a mortality of 8.3 per cent.; in 17 colostomy was done first and resection later, with 3 deaths, 17.6 per cent.; in 3 ileocolostomy followed by excision, one death, 33.3 per cent. The ultimate results in these cases are given in answer to the last question.

7. Is the ultimate mortality due to too limited excision of the growth? I do not believe that it is. Most of the recurrences that have taken place have not developed at the site of the previous resection. It is well known that glandular involvement in carcinoma of the colon takes place very late as compared with malignant disease elsewhere. In fact, obstruction often occurs before any extensive glandular involvement has taken place. Again, we all realize the importance of going well above the seat of disease, and many times we are compelled to make wide excisions because of the poor circulation of the proximal portion or because of the inaccessibility of the colon near the growth. In cancer of the cæcum the entire ascending colon should be removed, if for no other

reason than because an anastomosis between the ileum and transverse colon is better than an anastomosis between the ileum and the ascending colon. In cancer of the hepatic flexure the ascending colon and cæcum should be removed for the reason that ileocolostomy is of easier performance and produces better results than an anastomosis between the ascending and transverse colon. William J. Mayo reminds us that in 4 cases out of 5 the middle colic is the sole blood supply of the transverse colon, and unless these vessels are involved they should be preserved, else the whole transverse colon will become necrotic. In my series of 8 resections for cancer 3 recurred and one died one year after operation from recurrence without obstruction. Case IV died nearly two years after the excision of the cæcum for tuberculosis and 20 days after a second excision of the transverse colon for the same condition. Three patients are well at the present time. Case III, one of carcinoma, is well four years and two months after operation; Case VIII, one of carcinoma, is well fourteen months after operation, and Case IX, one of tuberculosis of the cæcum, is well four months after operation.

In close accord with my own results are those reported by Völcker (*Presse Médicale*, Oct. 10, 1908; "Year Book," Murphy, 1909) from the Heidelberg Clinic. He gives a study of 101 cases of cancer of large and small intestine, and concludes his paper with the statement that resection of the cancerous intestine is a very serious operation (50 per cent. mortality), but the patients surviving have a good chance of permanent cure (10 out of 17 survivors, 58.8 per cent.). In Moynihan's table of 100 cases he referred to the after history as given in 64 of the 73 cases which recovered from the operation: 17 were well at the end of six months; 15 at the end of one year; 15 at the end of two and a half years; 4 at the end of three years; 2 at the end of four years; one at the end of five years and 2 at the end of seven years. It will appear, then, that if we can improve our operative mortality our ultimate mortality will compare favorably with that following operations for carcinoma elsewhere.

SURGICAL ASPECTS OF CHRONIC HYPERTROPHIC ARTHRITIS.

BY GEORGE P. MULLER, M.D.,

OF PHILADELPHIA.

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THE study of chronic disease of the joints has become enhanced in interest in recent years by the special attention given to those forms generally called rheumatoid arthritis or arthritis deformans. A perusal of the recent literature gives one the impression that the study of this disease is of comparatively recent date and that heretofore all chronic joint disease, not of distinctly infectious origin, was generally classed under the heading of chronic rheumatism. But although the use of the X-ray has made many of the symptoms and signs of the bony lesions more easily comprehended we have made but little advance in the study of the etiology of the affection nor have we learned to check the deformities with certainty. We have simply supplied new names for old conditions and the writings of Charcot, Garrod, Heberden, etc., are nearly as accurate as more recent and therefore better known writers.

The great variety of the lesions, the lack of unifomity in the symptoms, and especially the uncertainty of the etiologic factors are responsible for the existing confusion in nomenclature, there being almost as many classifications as there are monographs on the subject. Broadly, chronic joint disease can be divided into those of infectious origin and those which are supposedly non-infectious; the latter embrace those caused by a distinct trauma, by some dyscrasia such as hæmophilia, by some purely functional cause, and those types associated with anatomic change and deformity.

A deforming arthritis may arise as an apparent primary affection, may be secondary (reactive) to disturbed nutrition of the joint, or may be neuropathic, as in tabes or syringo-

myelia. By a process of exclusion we may arrive at a classification embracing a variety of chronic joint affections which at first seems all sufficient to comprise the clinical material. Actually, in a given series of cases, we may see similar lesions and symptoms due in one patient to a trauma, in another to a well-established previous attack of acute articular rheumatism, in a third to some metabolic disorder, and in a fourth without discoverable cause. An attempt was made a few years ago in England to study rheumatoid arthritis by means of a small hospital where patients could be received for a short time and studied. Bulletins were issued under the leadership of Dr. T. S. P. Strangeways and valuable information gained, but the work was discontinued for lack of funds.

Hypertrophic arthritis, sometimes called osteo-arthritis, is that form of chronic joint disease characterized by a hypertrophy of the cartilage and bone and the formation of osseous spurs at the margins of the articular cartilages or at the attachments of the ligaments. Males of about 45 years of age are most liable to be attacked, and cold, exposure, strains, and various forms of trauma are considered as factors in the etiology. Rimann in a recent paper found 25 knee-joints affected in 100 post-mortem subjects, the disease being in various stages, and in 17 the cause of death was arteriosclerosis in some of its manifestations, in 4 tuberculosis, and in 4 carcinoma. As to the exact cause nothing but speculation has so far been indulged in, the most generally accepted theory being that an autoinfection from defective metabolism causes a fibrous metaplasia of the cartilage, capsule, and ligaments, a thickening from osteosclerosis of the ends of the bones and a proliferation of the bony tissue from the diseased cartilage which is not subjected to pressure.

The cartilage and bone seem to bear the brunt of the disease, as the synovial membrane is not much thickened; there is little villous hypertrophy nor is there much fluid present unless there has been a recent sprain. The cartilage is thickened, glistening, and dense in appearance and at its margin, *i.e.*, at the junction with the synovial membrane, is congested,

often bluish and elevated into ridges and nodules. The latter are most apt to occur at the lateral margins of the knee-joint, along the epiphyseal line and superior lip of the acetabulum in the hip and extending into the lateral ligaments of the fingers, in which case the term Heberden's nodes is often used. If erosion of the cartilage occurs it takes place at points where pressure is brought to bear and is of the nature of decubitus erosions. Detached pieces of cartilage are but rarely observed. The bone is thickened and the cartilaginous masses referred to become ossified and form the characteristic spurs. If erosion of the cartilage takes place the bone may become eburnated, with a polished surface and usually white in appearance, although discoloration with blood pigment may give a reddish color. Ankylosis does not appear to supervene, as a rule, probably from the lack of deposited fibrin. Microscopically the cartilage is thickened and fibrous, the bony trabeculæ are large and thick but there is no evidence of endarteritis nor of a cellular infiltration. Without digressing further I wish to present the following case observed on the service of Dr. C. H. Frazier in the Hospital of the University of Pennsylvania and to whom I am indebted for the privilege of operating upon the patient:

C. W. B. (No. 914); age 69; male. Was first admitted to the University Hospital March 29, 1905, with the following history: Has always been exposed to cold and wet, first as a seaman and later as a locomotive engineer. Had several attacks of gonorrhœa and twenty-five years ago contracted syphilis. Five years ago (August 10, 1900) an enlarged bursa was removed by Dr. Frazier from his right popliteal space and he dates the present trouble from about the same time, although not to the effects of the operation nor to the bursa itself. He suffered from severe pain in the knee when the right leg was extended which, radiating up the thigh, was increased by use. The leg never became locked in flexion or extension. It was believed that he was suffering from some hypertrophy of the synovial membrane with "pinching" of the fringes. On March 30, 1905, Dr. Frazier explored the joint and found the lipping characteristic of a hypertrophic arthritis without displacement of the semilunar cartilages. He

was discharged April 12, 1905, with the instruction to rest the knee as much as possible and to wear an elastic support. He returned several times during the next three years but was merely examined and various forms of local applications prescribed, including the use of the baking apparatus. He was able to work as an engineer until September, 1907, without much pain or serious inconvenience, although he noted that the joint was increasing in size. From this time on the knee began to pain considerably and he was forced to give up working, but could get around with the aid of a cane. He returned to the University Hospital April 11, 1908, and was anxious to have an amputation done if the pain could not be otherwise relieved. The right knee was visibly enlarged but was not very tender nor were there any signs of effusion, the hypertrophy to the touch and to the X-ray being due to bony overgrowth. His joints were generally prominent and some of the metatarsophalangeal joints were also the seat of bony hypertrophy, but they caused no annoyance. The feet were flat and the legs showed varicose veins. He had no prostatic, cardiac, or renal troubles. On April 13, 1908, I opened the joint by a transverse elliptical incision below the patella which disclosed the typical appearance of the disease. The bony outgrowths not only involved the edges of the joint but extended upwards on the anterior surface of the femur for 2 inches. The posterior surface of the patella was similarly involved. The semilunar cartilages were small and narrow, the synovia thickened and slightly congested, there was merely a glairy fluid in the joint, and the internal articulating surfaces showed sufficient erosion of the cartilage to bare the bone. It was thus seen that the creaking and pain were evidently produced by the grinding of the bared bony surfaces and the enlargement and thickening were due to the bony outgrowths. Removal of the latter did not seem to offer any prospect of relief from pain and accordingly I performed a formal excision of the knee-joint. As an arthroplasty was also not deemed advisable the femur was sawed so that its diameter would approximate that of the tibia and allow of fixation in a slightly flexed position. The exostoses were chiselled from the shaft of the femur and from the under surface of the patella. The lateral ligaments were sutured and the patella drilled and fastened over the line of excision by catgut sutures. The skin was closed without drainage and the limb placed on a posterior splint. Healing by first intention resulted and a week

after operation a plaster-of-Paris cast was applied. The patient was discharged June 10, 1908, on crutches with apparent bony union. He returned, however, on July 28, 1908, with pain in the knee and a slight degree of motion, the pain being sufficient to prevent him from working. An X-ray picture showed a distinct line between the ends of the bones and after a week in bed I again operated (August 8, 1908) upon the limb. After dividing the hamstring tendons, a transverse incision was made over the line of excision and the bones pried apart with a chisel. The ends were well curetted and a groove chiselled on either side of the femur one inch above the line of union and from which the bones were fastened together by two silvered steel screws two inches long. The grooves had the effect of countersinking the heads of the screws and enabled them to be driven almost downwards. The wound was again closed without drainage and the leg placed immediately in a cast. It once more healed perfectly and on October 22, 1908, the patient was discharged with bony union, the leg being protected by a light steel brace at the knee owing to the spring of the long lever from hip to ankle. I heard from him in December and he was walking on the limb with but little disability and no pain.*

The treatment of the various manifestations of hypertrophic arthritis will seldom be surgical. Pain, swelling, stiffness, and deformity are the symptoms calling for relief, and an earnest attempt should be made to determine the etiology of the case. Any form of chronic infection, whether from the tonsil, intestine, prostate, etc., must be eradicated, the diet carefully regulated, general massage ordered, and rest of the limb enjoined, preferably by extension if the hip or knee is involved or affected. In hypertrophic arthritis it is obvious that incision and drainage of infected fluid is never indicated, as the disease has never been shown to be due to the presence of bacteria in the joint, nor is there any effusion. The swelling is essentially due to thickening of the bones and the presence of bony outgrowths upon the tibia and femur at the edge of

* After reporting this case to the Academy of Surgery I saw this patient in June, 1909. He had discarded his brace, had been drinking heavily and was in wretched physical condition. The knee pained him considerably at the site of the screws. I advised their removal but he has not returned.

their articular cartilages and which in most cases does not require operative interference. The performance of excision as a primary operation is not generally countenanced although in Germany a number of surgeons have performed this operation in the hope of arresting the disease in other joints. But it is probable that they have confused the acute stage of hypertrophic arthritis with an infectious polyarthritis in which disease prompt operative interference must soon be considered as the treatment of choice.

Pain due to the grinding together of the swollen and eroded cartilages can usually be relieved by rest and extension. When the acute stage has passed, active hyperæmia tends to prevent recurrence of pain, but occasionally, as in the case reported, every attempt made by the patient to resume his occupation is followed by a recurrence. This is especially true in the knee- and hip-joints, and for such cases I would urge the performance of excision, provided that a careful trial of other methods has been practised.

Stiffness or limitation of motion is due to the presence of thickened bone and of the bony outgrowths from the margins of the cartilages, and while the latter can be removed to some extent it will be apparent that in most cases such an operation would have to be very extensive to effect complete removal. When the hip is involved Goldthwait advises the removal of the entire head of the femur in preference to an attempt to remove the individual nodes, and recently Albee has reported 5 cases of partial excision of the articulating surfaces of the femur and acetabulum by a new method, with relief of the pain in every case and the ability to walk without crutches. Sometimes the spurs project into the joint and produce a hypertrophy of the synovial membrane. In occasional instances they may become detached and form loose bodies in the joint, in which case arthrotomy may be necessary.

Deformity is best treated by prevention during the acute stage which if properly managed will be found on subsidence to have resulted in but little change in the relation of the bones. If ankylosis in bad position does occur, especially in the knee or hip, osteotomy must be considered.

INSTRUMENTS FOR OPENING THE SKULL.

Dr. William W. Keen exhibited an apparatus, consisting of a brace with four bits, devised by Dr. W. H. Hudson of Montgomery, Alabama. The peculiarity of the first two (the smaller) bits is that one can penetrate through either a thick or thin skull as far as the dura and the bit will go no farther. The others are globular bits and they will penetrate, but they are provided with a slight button on the end so that when the entire thickness of the skull is penetrated, even if the middle meningeal be directly under the drill, it will be pushed off, provided it is not in either a narrow groove or in a foramen. If it is, of course any drill would cut it just exactly as the ordinary saw or chisel would. The advantage of these bits is that one can very quickly make four openings and then can add three more, intermediate openings if desired, and introduce from one to the other a Gigli saw or bite the bone between them by Devilbiss' or other forceps as desired, turning down a flap in a very few minutes.

In Dr. Keen's opinion these bits provide the best means yet devised for opening the skull, having the safety of the chisel and the speed of the saw.

STATED MEETING, HELD OCTOBER 4, 1909.

The President, Dr. William J. Taylor, in the Chair.

STRANGULATED INGUINAL HERNIA IN A TWO-WEEKS' OLD INFANT.

Dr. John H. Jopson reported the case of a two-weeks' old infant seen by him June 24, 1909, with a history indicating that a hernia had been down about 24 hours. Under taxis, reduction seemed to be effected, and a wool truss was applied. On the following morning the infant was brought to the Presbyterian Hospital with the hernia again protruding and fecal vomiting. Under chloroform, herniotomy was done. The edges of the sac were sutured with the edges of the canal and the external ring, a typical Bassini operation not being possible. Uncomplicated recovery. Dr. Jopson remarked that the strangulation of a hernia while not a very common accident in children, was proportionately more common in early infancy than in older children. It has been his experience that an operation is less frequently required to reduce a strangulation in infancy than is the case with adults. Hence taxis should always be given a trial in cases seen early, unless there is some distinct contra-indication. With regard to the frequency with which operation is required, it would seem that there has been a tendency to underestimate rather than to overestimate the number of cases that have called for operations. Coley quotes the statistics of Estor in this connection. Estor was able to collect 225 cases of strangulated hernia in children under two years of age, but found that in nine of the largest of the largest clinics of Europe the records showed not a single case. At the Hospital for Ruptured and Crippled only 17 had been operated upon in children, and of these 12 were under two years of age. Telford, as quoted by Ashhurst, collected 224 cases under four years that had been operated, and of these 112 were infants under six months, and 13 were given by Ashhurst as one month old. Fifteen cases were added by Ashhurst, the youngest 14 days, and the oldest 14 months. Dowd analyzed 125 cases under one year. It will thus be seen that the number of cases available for study is quite respectable. Mortality has been quite

low. While Estor's tables show a mortality of 23 per cent., much the same as in adults, both Coley and Dowd agree that this should be lower, the latter stating that it should not exceed 10 per cent. when the operation is done promptly. The case here reported is seen to be among the youngest, although operation has been done for strangulated umbilical hernia as early as the second day. Dr. Jopson had seen two other cases in very young children, one aged one month being under Dr. Wharton's care, and the other, aged two months, was seen with Dr. Hodge. The latter case was a case of strangulation of the ovary, which puts it in a class by itself, as the gut was not involved. All of these cases recovered.

Dr. Astley P. C. Ashhurst said that during the last year he had seen three children, one of six weeks, one of eleven months, and one of three years, in which he had diagnosed strangulated hernia and on whom he had operated with recovery. A fourth child, but four months of age, was then seen, with a history of the sudden appearance of a lump in the right groin, pain, vomiting, obstipation, and fever. Taxis had been tried but the lump could not be reduced. He thought this also to be a strangulated hernia, but on operation found a hydrocele of the cord!

Dr. J. B. Carnett said that the youngest patient he could recall ever having seen with incarcerated or strangulated hernia was a child about four years of age. For several days before admission to the University Hospital the child had abdominal pain, rigidity, fever, frequent passage of stools composed of mucus and associated with severe rectal tenesmus. On examination just prior to operation the child exhibited symptoms of extensive peritonitis. Tenderness was noted over the entire abdomen but was most pronounced over a right inguinal hernia which did not give any impulse on crying and which very gentle taxis failed to reduce. Under ether the hernia slipped back spontaneously. On opening the abdomen through a median incision there was found a wide-spread peritonitis due to a perforated appendix which was adherent by its tip to the rectum.

The hernia in this patient was not seriously considered as the primary cause of the patient's trouble. The child had been seen outside of the hospital by several competent physicians who could not have failed to observe the very obvious hernia had it been present from the onset of the illness. It therefore seems

probable that the hernia in this patient was forced out sufficiently to become incarcerated by the abdominal straining incident to severe rectal tenesmus.

The case belongs to a type of hernia which may easily lead to an error in treatment, viz., that class of cases in which a very evident strangulated or incarcerated hernia might account for all the symptoms presented at the time of examination but in which careful questioning will elicit the fact that the hernia developed secondary to some other cause for abdominal straining. Operative treatment may be necessary for relief of the hernia but is often more urgently imperative for the primary abdominal condition, the symptoms of which have been masked by the strangulated or incarcerated hernia. In the absence of an exact history the underlying primary condition may readily be overlooked and may be the cause of a lethal termination despite a skilfully performed operation for hernia.

ILEUS DUE TO GALL-STONE.

Dr. Charles F. Mitchell exhibited a gall-stone removed at the Pennsylvania Hospital, in the service of Dr. Hutchinson, from a woman, aged 61, who gave a history of having been sick ten days, the only symptoms being vomiting. On admission she had a normal temperature; pulse 120, very weak and compressible. The vomitus was fecal in character. This had been going on for some hours. She had no abdominal distention or tenderness, and no rigidity, the only symptom being the fecal vomiting. She said she had a distressed feeling in the abdomen. The abdomen was opened by an incision in the upper right rectus; the peritoneum was found perfectly normal; she had very fat abdominal walls, about four inches in thickness and took ether very badly. The hand introduced into the abdominal cavity immediately came down on a mass in the small bowel high up either in the upper part of the ileum or in the jejunum, and this mass proved to be a gall-stone. A small incision was made in the bowel wall, over the stone, through which the stone was removed, but the patient died a few hours later.

Dr. John H. Gibbon said that last spring he operated upon a case presenting symptoms quite similar to those of Dr. Mitchell's case. The patient was an old lady 68 years of age, in whose case, three months previously, he had diagnosed gall-stones and ad-

vised operation. She was taken rather suddenly ill with severe abdominal pain, persistent vomiting, and marked exhaustion. Dr. Stengel saw her on the day of operation with her physician, Dr. Mary Griscom, and thought that in addition to the gall-stone condition she probably had an acute pancreatitis. When seen by Dr. Gibbon she was very much exhausted, but her circulation was good and there was a very little rigidity and tenderness in the upper right quadrant; the rest of the abdomen was soft. The tenderness was not as marked in the gall-bladder region as it had been during the three months previous. On opening the abdomen through the upper right rectus the gall-bladder was found densely adherent to the duodenum. On separating the structures a large hole was found in the duodenum and a corresponding one in the gall-bladder. There was considerable induration around the openings; and on closing it was found that the duodenum was practically obstructed, so that a gastro-enterostomy was done. The patient continued to vomit considerably during the next twenty-four hours but gradually improved in spite of an infection of the wound. On the sixth day she passed two gall-stones, one of enormous size, quite as large as the one shown by Dr. Mitchell. The patient made a good recovery and is well to-day.

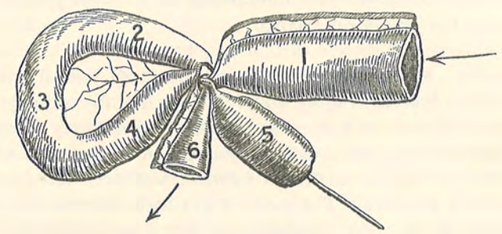
Persistent vomiting, with a flat and soft abdomen, is indicative of some obstruction high up in the intestinal tract.

INTRAPERITONEAL HERNIA OF ILEUM THROUGH RENT IN MESENTERY.—ADHERENT MECKEL'S DIVERTICULUM.

Dr. A. P. C. Ashhurst reported the history of a boy of 12 years who had never been sick, who fell and hurt his hip. On the following day he ate two large bunches of grapes, a quantity of chocolate cake, and soon afterward developed pains in his stomach, then vomited. For three days symptoms of obstruction of the bowels continued unrelieved by medical treatment. He was then admitted to the Episcopal Hospital in the service of Dr. Frazier, to whom Dr. Ashhurst was indebted for the privilege of operating. On admission the patient had a temperature of 103°, the abdomen was distended, he was vomiting fæces and passing blood and mucus from the bowel. When this child was examined, the umbilicus did not look normal,—it seemed large and thin, suggesting the possibility of the presence of a Meckel's diverticulum. An incision was made in the middle line below the

umbilicus. On opening the abdomen the omentum was adherent. On freeing the omentum there was a gush of fecal smelling bloody fluid, after the escape of which a black coil of gut was seen lying in the pelvis. This was pulled up, and seemed like a volvulus; on turning it up there appeared on the under side a Meckel's diverticulum about as thick as two fingers, not quite as long. Something snapped, and the diverticulum with a long cord attached to its tip came out of the wound. The gut was then carefully packed off and examined. There seemed to be some constriction preventing reduction of the volvulus, and as the entire loop was gangrenous and the constriction could not be relieved, it was decided to take the whole thing out. When the

Fig. 1.



Volvulus of loop of ileum strangulated in opening in mesentery, complicated by Meckel's diverticulum. The arrows show the normal fecal current. The loop of ileum (2, 3, 4) has passed through an opening in mesentery until arrested by drag on Meckel's diverticulum (5), which springs from ileum at junction of 4 with 6, and which is attached, through fibrous cord running from its tip, to anterior abdominal wall in left hypogastric region.

clamps were applied for resection the gangrenous bowel burst, but the discharge occurred only on the gauze packs. The affected portion of intestine, from 14 to 18 inches, was resected, and an end-to-end anastomosis was done; the pelvis was drained by a glass tube, and the operation hastily completed (time 40 minutes) as the child was in very bad shape. Death occurred three hours later.

It took a long time to determine what the specimen was. Finally the conclusion was reached, after careful study, that there had been a hole in the mesentery and through that the ileum had gone from the upper surface of the mesentery downward as far as it could until it was caught by the base of Meckel's diverticulum. As the diverticulum was attached to the abdominal wall it could not get through; the loop which had passed through the rent then became twisted on itself and gangrene followed.

CERVICAL SUBCUTANEOUS CAVERNOUS HÆMANGEIOMA.

WITH REPORT OF TWO CASES.

BY J. B. CARNETT, M.D.,

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INTERMUSCULAR cavernous hæmangeioma of the neck is sufficiently uncommon and interesting to warrant placing the following two cases on record.

CASE I.—A young woman, twenty years of age, first came under observation in August, 1907. Except for the ordinary diseases of childhood she had never been ill. Immediately following convalescence from an attack of mumps when the patient was eight years of age, a small soft swelling was first noted on the right side of the neck. The swelling gradually increased in size. Since 1905 it has been intermittently larger and smaller. The variations in size were apparently causeless and did not bear any relation to the menstrual periods. When small the swelling was symptomless except for the deformity, when large it produced moderately severe shooting pains in its immediate vicinity.

On examination the patient presented a tumor the size of a small hen's egg in front of the right sternomastoid muscle, just beneath the angle of the jaw. The overlying skin projected a little above the surrounding area, but was non-adherent and was normal in color. On palpation the swelling imparted the sensation of an accumulation of fluid under slight tension. During direct pressure by the fingers the tumor projected less prominently, but at the time of the examination this was supposed to be due to its being flattened. Except for its long duration the tumor corresponded to a deep-seated cold abscess. The possibility of hæmangeioma was not considered. A diagnosis of cyst probably of congenital origin, but possibly originating in the parotid gland secondary to the attack of mumps, was made before operation.

At four examinations covering a period of two months no appreciable change in the size of the tumefaction was noted.

The patient was operated upon at the University of Pennsylvania Hospital, October 30, 1907. A transverse incision through the skin and platysma exposed the tumor which presented an appearance similar to a vascular goitre. The dissection of the tumor from the surrounding tissues did not present any difficulties. Bleeding was free from one point where the tumor was nicked with the knife, but was easily controlled. The bleeding caused collapse of the tumor and facilitated its removal which was accomplished after clamping hæmostats on two small veins above and one below the tumor. On cross section the tumor resembled the erectile tissue of the corpora cavernosa. The platysma and skin were sutured in separate layers. The wound healed by first intention.

CASE II.—The second patient was a man twenty-eight years of age who had recently come to this country from Turkey. He had had a swelling of the neck from early childhood. The tumor increased slowly but steadily in size. At the age of fifteen years an exploratory incision was made under local anæsthesia but the removal of the tumor was not attempted. An immigration commissioner brought the patient to the Philadelphia Hospital to ascertain if the tumor constituted a legal barrier to his remaining in the United States. The patient was admitted on the service of Dr. Edward Martin through whose kindness I was permitted to operate.

The examination disclosed a rounded slightly elevated nonpulsating tumor of indefinite outline situated on the left side of the neck. It extended from the median line to the sternomastoid muscle and from just beneath the inferior maxilla to a line two inches above the clavicle. About the middle of the tumor was an unsightly ovoid scar resulting from the exploratory incision. The overlying skin did not present any abnormalities in color and was not adherent to the deeper tissues except at the scar. On palpation it simulated a fibrolipoma, being composed chiefly of soft tissue in which could be felt irregular fine bands and small nodules of firmer tissue. The tumor could be diminished in bulk by pressure but promptly regained its original size on relief of pressure. The most striking symptom was an enormous increase in size produced after deep inspiration by forced ex-

piratory efforts with the glottis or the mouth and nose closed. This is well illustrated by comparison of Figs. 1 and 3 with Figs. 2 and 4. The tumor would increase in size during the entire period of a single expiratory effort prolonged to the point of fatigue, but would not gain its maximum size until the patient had quickly taken a second inspiration and repeated the straining effort at expiration. In the short interval between the two expiratory efforts the tumor decreased but little in size. On cessation of straining the tumor shortly returned to its original outlines. Deep inspirations or direct pressure hastened the subsidence of the swelling. Pressure over the course of the internal jugular vein at the base of the neck caused a slight enlargement. Percussion over the tumor in its passive state yielded a tympanitic note practically identical with the corresponding area on the opposite side of the neck. When the tumor was fully distended the percussion note over it was still tympanitic but somewhat higher pitched than on the opposite side. Auscultation over the tumor during quiescence and during alterations in its size failed to elicit any adventitious sounds. The tumor did not give rise to any pressure symptoms. Examination of the mouth, pharynx and larynx failed to reveal anything abnormal. Examination of the pharynx while the tumor was fully distended was not made, but, as shown by the findings at operation, it probably would have revealed a bulging of the lateral pharyngeal wall. A diagnosis of hæmangeioma was made prior to operation.

In March, 1908, a transverse elliptical skin incision so placed as to remove part of the old scar was made across the central part of the tumor. The platysma over its area of attachment to the tumor beneath the scar was not disturbed but elsewhere was dissected back with the skin flap. The angiomatous tumor thus disclosed was approached at its lower border and gradually enucleated from below upward. The anterior projection of the tumor lay in direct contact with the wall of the pharynx between the superior and middle constrictor muscles. After removal of the tumor from this region the pharyngeal mucosa flapped in and out with each respiration. The posterior portion of the tumor was situated beneath the sternomastoid muscle in close contact with but not adherent to the internal jugular vein and carotid artery. Seven veins about the size of the median basilic vein entered the tumor at various points along an arc extending

FIG. 1.

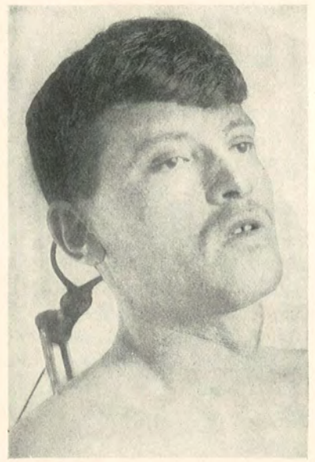


FIG. 2.

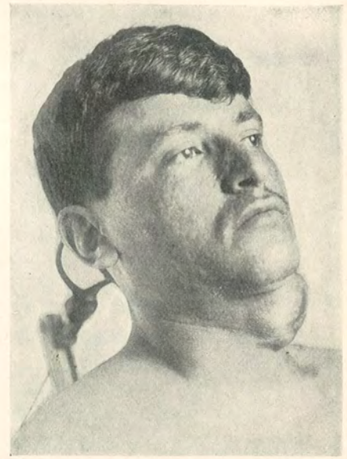
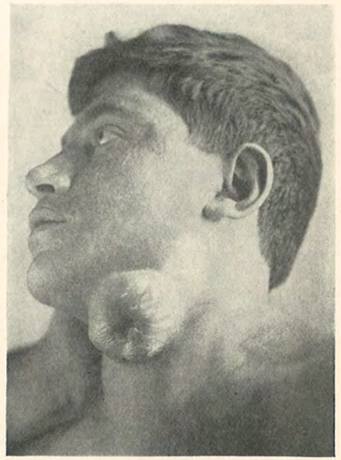


FIG. 3.

FIG. 4.



Figures 1 and 3 represent the tumor in passive state. and figures 2 and 4 the distended tumor.

from immediately below the hyoid bone to the angle of the jaw. A large venous trunk about three-fourths of an inch in length connected the deep surface of the tumor with the internal jugular vein on a level with the hyoid bone. Except for a few very fine arterioles there were no arteries entering the tumor. There was no true encapsulation of the tumor but the line of cleavage between it and the surrounding tissues was distinct and easily followed during the dissection. The operation was not difficult and was practically bloodless, but was somewhat tedious owing to the uncertainty of the conditions to be encountered. After excision of the tumor, the middle and superior constrictors were approximated with a few sutures to support the wall of the pharynx, and the platysma and skin were united in separate layers. The patient made an uneventful recovery.

Microscopical examination of the excised tumor revealed typical cavernous angioma with an admixture of fibrous and fatty tissue in both cases.

Cavernous hæmangeioma is a vascular tumor having a structure similar to that of the corpora cavernosa. The intercommunicating blood spaces are punctiform to a pea size or larger and are lined with endothelium. The supporting connective tissue network in some instances may contain a small amount of smooth muscle fibres and elastic tissue. The blood spaces of the tumor have no connection with the capillaries of the surrounding tissues (Ribbert). The blood which circulates through the tumor is supplied usually by the venous system, rarely by the arterial. Cavernous hæmangeioma may involve the skin, subcutaneous tissues, intermuscular tissues, muscles, bones and viscera. It occurs more commonly in the female sex. An hereditary tendency has been observed but not with sufficient frequency to be worthy of any great consideration. Trauma has been ascribed as a predisposing factor but it probably has served to direct attention to the lesion rather than to cause it.

Pathologists are by no means agreed as to the mode of origin of cavernous hæmangeioma. Some regard it as a primary neoplasm and others advance numerous theories to

account for its development secondary to changes in the vascular and lymphatic systems and the connective tissue. Cavernous hæmangeioma may be single or multiple. If multiple the individual lesions may be adjacent to one another or may occupy widely remote regions. Subcutaneous and cutaneous hæmangeiomata occasionally coexist either in the same region or in widely separated areas. A cavernous hæmangeioma may arise primarily as such or it may develop secondarily by transformation of a simple hæmangeioma.

Subcutaneous cavernous hæmangeioma has frequently been observed at birth, thus proving that it may be congenital. More commonly, however, it first comes under observation during childhood and occasionally later in life. Even these cases may be and probably are congenital in origin but escape attention owing to their deep situation and early latency or slow growth. As a rule, the first symptom to attract attention is the presence of a swelling which projects above the surface. The overlying skin is normal in appearance and is not adherent. A bluish tint is sometimes apparent through the semitranslucent skin of young children, particularly when the tumor is distended. Neuralgic pain from nerve pressure is sometimes present but is an inconstant symptom. The tumor is characterized by transient variations in its size depending upon the amount of blood contained in the cavernous tissue. Factors causing an increase in the general or local venous blood pressure as crying, coughing, straining, dependant position of the affected region and pressure on the efferent vessels produce an enlargement of the tumor which subsides as soon as the venous tension returns to normal. The size of the tumor can be diminished temporarily by direct pressure, by elevation of the part or by compression of the afferent vessels. The extent to which the tumor can be made to disappear by manual pressure depends upon the number and size of the blood spaces, the thickness of their intervening walls and the amount of connective tissue stroma. When fully distended the subcutaneous tumor imparts to the palpating fingers the sensation of a tense cyst. Depending upon

the relative proportion of vascular spaces and connective tissue stroma the flaccid tumor on palpation may simulate a cold abscess, a lipoma or a fibroma. Phleboliths when present are palpable as shot-like bodies. There may be a transmitted pulsation from an underlying artery and in the exceptional instances in which the hæmangeioma has an open communication with an artery expansile pulsation and bruit are present. Hæmangeiomata yield a flat note to percussion.

The clinical course of these tumors varies greatly in the individual cases. They may enlarge slowly or rapidly from the first or they may remain quiescent for years. Periods of rapid growth may alternate with periods of slow growth, latency or actual diminution. They rarely exceed the size of a man's fist. Continued growth may lead to coalescence of the central blood spaces and the formation of a blood cyst having a shell of cavernous tissue at its periphery. As the result of traumatism or infection a cavernous hæmangeioma may become swollen, hard, tender, and irreducible. The inflammatory process may subside completely without having caused any demonstrable alterations in the angioma. Thrombi, however, may form in the blood spaces and in the blood-vessels connected with the tumor, and their subsequent organization will lead to a partial or complete cure. Some of the thrombi may become calcified and persist as phleboliths. Even in the absence of inflammation a hæmangeioma may undergo retrogressive changes and spontaneous disappearance. A cavernous hæmangeioma not infrequently may participate in the formation of a mixed tumor, particularly with a lipoma or fibroma. Rarely a hæmangeioma may be the starting point of a sarcoma or an endothelioma. Cavernous hæmangeioma of the neck may originate in the skin, subcutaneous tissues or intermuscular tissues. Intramuscular hæmangeioma has never been reported in the cervical region. The deep seated hæmangeiomata tend to extend toward the surface and the superficial to extend deeply so that long standing large tumors are prone to involve all three planes of tissue. Those which begin superficially, however, commonly show

a much greater extent of cutaneous involvement than those which originate in the deeper tissues. Strictly speaking, the two cases here reported, being situated beneath the platysma, belong to the intermuscular variety, but in the further description of these cases no attempt will be made to differentiate the intermuscular from the subcutaneous forms.

The subcutaneous cervical hæmangeiomata when large may give rise to dysphagia, dyspnœa and dysphonia. An angeioma is affected by respiratory straining in the cervical region to a greater degree than in any other part of the body. A hæmangeioma located anterior to the sternomastoid muscle lies in such intimate relation with the trachea, larynx or pharynx that the percussion note over it is resonant or tympanitic. A higher pitched note is obtained, however, (1) by percussion over the tumor than over a corresponding point on the opposite side; (2) by superficial than by deep percussion and (3) by percussion over the fully distended tumor than over the compressed tumor. The lesions most apt to be confounded with a cervical subcutaneous cavernous hæmangeioma are aërocele, lymphangeioma, aneurism, cysts, hernia of the lung, cold abscess, fibroma and lipoma.

A hæmangeioma at the front of the neck may resemble an aërocele, in being resonant or tympanitic, compressible and distensible; in causing disturbances of speech and respiration and in having its volume influenced by respiratory straining. In my second case it was only after repeated examinations that aërocele was definitely excluded. An aërocele, however, is somewhat more frequent in males and it occurs with about equal frequency at all ages, whereas hæmangeioma is more common in the young of the female sex. Aërocele may give a preceding history of violent straining as during childbirth, prolonged coughing, traumatism, intralaryngeal or intratracheal ulceration or cervical abscess rupturing into the air passages. An aërocele has a direct connection with the trachea (tracheocele) or larynx (laryngocele) from which it cannot be displaced, whereas the angeioma may not present any such intimate relation. Examination of

the interior of the larynx and trachea may reveal an opening communicating with the tumor in aërocele or possibly a bluish discoloration of the mucous membrane in angioma. The aërocele is more completely reducible than the angioma and its distention can be prevented by pressure over the point of its communication with the air passages. The size of the angeioma is influenced by pressure over the vessels. As a rule, respiratory efforts produce a more prompt change in the volume of the tumor in aërocele than in angeioma.

A lower pitched resonant or tympanitic note is obtained by percussion over an aërocele than over the surrounding area or over the corresponding region on the opposite side of the neck. The percussion note is likewise lower pitched when the aërocele is distended than when it is collapsed. The reverse is true with an angeioma.

Auscultation demonstrates adventitious sounds coincident with respiration in the aërocele and is negative in angeioma except in the rare cases where the tumor has an open communication with an artery and then a bruit will be heard coincident with the pulse. A skiagraph may reveal the presence of phleboliths in an angeioma. An exploratory puncture with a hollow needle will obtain blood from the angeioma and a gush of air from the aërocele. The escape of air usually is sufficiently forcible to be manifest, but may be demonstrated by attaching to the needle a rubber tube one end of which is held beneath the surface of a liquid. Aërocele does not enter into the question of differential diagnosis in the case of an angeioma situated posterior to the sternomastoid muscles.

Cavernous lymphangeioma may present symptoms identical with cavernous hæmangeioma with the exception that the exploring needle will withdraw a serous or milky fluid in place of blood. Cavernous lymphangeioma, however, usually occupies a superficial position in the neck and is adherent to the skin, in which case the absence of skin discoloration points to the diagnosis of lymphangeioma as against hæmangeioma.

Aneurisms of the neck usually assume an elongated form in the course of the larger vessels and are found in patients

beyond middle age. Hæmangeiomata usually assume a globular or flattened outline and are found in the young. In traumatic aneurisms the history points to the diagnosis.

Hæmangeioma can be diagnosed from the majority of cysts and solid tumors of the neck by the alterations in its volume during compression and distention. The diagnosis from air cysts having an open communication with the respiratory passages has been discussed under the term aëroceles. In cases of cysts and diverticula communicating with the pharynx or œsophagus diminution in size from direct pressure is associated with a regurgitation of mucus or food.

Vascular goitre may simulate hæmangeioma by its variations in size incident to alterations in the local blood pressure, but the position and outline of the growth and the associated solid enlargement of the thyroid serve to exclude it. Intermittent enlargement of a salivary gland from incomplete obstruction of its duct might suggest hæmangeioma, but its situation, the swelling coming on during or immediately after meals, often accompanied by salivary colic, the diminution on direct pressure causing a flow of saliva from the affected duct, and the associated signs of a stone or stricture in the duct, serve to differentiate this condition.

The differential diagnosis of hæmangeioma from blood cysts which have preserved their communication with the blood-vessels is impossible. The more nearly complete the disappearance of the tumor by direct pressure the greater is the probability of its being a blood cyst. The presence of other angeiomatous tumors favors the diagnosis of cavernous angeioma as opposed to blood cyst.

Hernia of the lung is always found at the base of the neck, is usually completely reducible, can be prevented from recurring by pressure over the opening through which it escapes, yields crepitation on palpation and breath sounds on auscultation. Hæmangeioma is more common in the upper cervical region, is incompletely reducible, may be affected in size by pressure over the blood-vessels connected with it, usually presents the signs of an admixture of fatty and fibrous

tissue, may contain phleboliths and is negative to auscultation, except in rare instances when bruit may be obtained.

Subcutaneous cavernous hæmangeioma is such a comparatively rare tumor that the possibility of its occurrence was not considered in most if not all the reported cases erroneously diagnosed as cold abscess, lipoma, fibroma or fibrolipoma. In none of these cases was the erectility and compressibility of the tumor noted. Had tests been employed to determine the presence of these symptoms a faulty diagnosis might have been avoided. It is also probable in these cases that the clinical picture was not in perfect accord with the condition diagnosed. In my first case, for instance, the local findings simulated cold abscess, but the history of its beginning as a soft painless swelling and the duration of twelve years excluded that diagnosis. In the second case the collapsed tumor resembled a fibrolipoma on palpation but was atypical of the latter neoplasm by reason of its flaccidity. The difficulties of diagnosis are illustrated by Fisher's case of angiofibroma involving the tongue, floor of the mouth and upper part of the neck. Fisher recognized the fact that he was dealing with an unusual tumor and made repeated punctures from the skin surface with a hollow needle. Blood was obtained but once. The point of the needle apparently was buried in the fibrous tissue in the remaining trials.

The clinical history of a hæmangeioma resembles that of a cold abscess in those cases in which the angioma has escaped observation up to the time of its developing an inflammatory induration which may resemble a lymphadenitis, and the subsequent softening on subsidence of the inflammation may be mistaken for the breaking down of glandular tissue.

The occurrence of a fibroma or lipoma in the form of a mixed tumor tends still further to obscure the presence of the angiomatous elements.

The clinical features of a cold abscess, lipoma and fibroma are too well known to require discussion. In any given case suspected of being one of these conditions, but which in any way is atypical, the examination should be conducted with a

view to determining the possible presence of the compressibility and distensibility characteristic of angeioma.

A subcutaneous hæmangeioma of the neck which is quiescent or undergoing spontaneous resolution may be treated expectantly but should be kept under observation. A continued increase in size calls for active interference.

Electrolysis, the injection of coagulating fluids, the introduction of magnesium darts, subcutaneous ligation and similar forms of treatment are attended by serious risk of damage to adjacent important structures, particularly if persisted in to the point of complete disappearance of the tumor. One or more of these methods might be employed in cases of very large angeiomata, to reduce their size preliminary to excision, but their beneficial effect is apt to be counterbalanced by the production of adhesions.

If the claims made for radium be substantiated it will prove the most acceptable form of treatment, otherwise complete excision is indicated. Complete destruction or removal is necessary to guard against recurrence.

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OVARIAN CYST WITH TWISTED PEDICLE.

Dr. George G. Ross reported the history of a woman aged 35 years who for eight years had been aware of the presence of a palpable tumor—an ovarian cyst, for which she had refused operation. Three days before admission to hospital she had been treated by an electrotherapeutist; following this treatment she was attacked with violent abdominal pains, nausea and vomiting, for which condition she was brought to the hospital. Upon opening the abdomen a large quantity of free chocolate colored material escaped, and a cyst, the size of a man's head, springing from the right ovary, was exposed. The cyst was gangrenous, twisted about its pedicle, and a rupture in its wall of about 2½ inches in diameter was revealed. The cyst was densely adherent to adjacent structures. Its removal was successfully accomplished, but patient developed general peritonitis with double bronchial pneumonia, resulting in death after 36 hours.

OVARIAN CYST WITH TWISTED PEDICLE; CHRONIC APPENDICITIS.

Dr. Ross reported the case of a girl aged 12 years, who was brought to the hospital on the sixth day after the onset of pain in the right iliac region, she had also a palpable mass in the left lower abdomen, extending to the median line. Upon opening the abdomen the mass on the left side proved to be a cyst of the right ovary, twisted on its pedicle two and one-half turns. It was very dark in color and evidently was approaching gangrene. It was extensively adherent to the surrounding structures. Adhesions were separated and the tumor removed. The appendix was found in a state of chronic inflammation and was likewise removed. The reporter was of the opinion that a twist of a pedicle of an ovarian cyst had been occasioned by the active peristalsis of the bowel produced by an acute exacerbation of chronic appendicitis.

OVARIAN CYST COMPLICATED BY UTERINE MYOMA UNDERGOING MALIGNANT CHANGE.

Dr. Ross reported the history of a woman, 45 years of age, who for five years had been aware of the presence of a tumor within her abdomen. Recently the tumor had increased rapidly

in size. Upon admission her appearance was very striking, with drawn face, emaciated arms and chest and greatly swollen abdomen; circumference in largest part 54 inches. The weight of patient with tumor was 217 pounds. An abdominal incision exposed a multilocular cyst which was removed, bringing to view multiple myomatous tumors of the uterus, the largest one the size of a man's head, which were removed by partial hysterectomy. The operative shock was controlled by saline infusion. Subsequent uneventful recovery. After the removal of the tumors the patient weighed 115 pounds, making 102 pounds as the approximate weight of the tumors. Among the myomatous masses removed was a small nodule of tissue of a cellular constitution with comparative little intercellular substance and no well defined connective tissue aside from a small amount around a few of the larger blood-vessels; the cells making up the growth were ovoid and spindle shaped, to some extent arranged in fasciculi, particularly the spindle-shaped cells, while the ovoid cells were without such definite arrangements. These cells stained well, showing good nuclei and nucleoli; a few mytotic figures were seen.

Dr. William J. Taylor stated that many years ago he was present when Dr. Keen removed from the abdomen of a girl of 15 a tumor which weighed 118 pounds. The girl weighed 90 pounds after the tumor had been removed. The appearance of the abdominal cavity after the tumor had been removed was most extraordinary, suggesting a disembowelled subject. The girl made a good recovery.

STATED MEETING, HELD NOVEMBER 1, 1909.

The President, Dr. William J. Taylor, in the Chair.

BULLET WOUNDS OF THE CHEST, INVOLVING THE LUNG.

Dr. James A. Kelly reported the histories of three cases of bullet wounds of the chest, involving the lung, which had recovered after thoracotomy.

Case I.—*Bullet wound of lung: Hæmothorax resulting in empyæma: Thoracotomy with resection of eighth rib sixteen days after injury.*—A man, aged 21 years, was admitted to St. Mary's Hospital, September 6, 1907, with this history: While in the act of robbing a freight car he was detected, and while running away was shot in the back, about 12.30 A.M. by an officer. He was admitted to the hospital about one-half hour later. Patient stated that after being shot he was able to walk about one square when he became faint and fell to the ground.

When admitted he was in a state of marked collapse—pale, covered with a cold perspiration, extremities cold, voice weak, markedly dyspnœic. Temperature 94, pulse 140, and respirations 36. When seen about one hour after admission patient was in a state of extreme shock, and symptoms presented were about the same as on admission. Examination of the chest showed an irregular punctured wound about 1½ to 2 inches below the lower angle of the left scapula. Anteriorly, above and at the junction of the third rib and the costal cartilage there could be felt a small hard mass which was apparently the bullet. This could be felt just beneath the skin. Examination of the left lung showed the presence of moist râles at the apex, and an area of dulness extending upward to the sixth rib posteriorly. Marked cellular emphysema of anterior and lateral aspects of the left chest wall. On account of the patient's condition operative interference was not considered. He was given morph. sulph. gr. ¼ hypodermatically and an ice bag was placed over the left chest. From this time the case was treated expectantly, as he had reacted considerably by 8 o'clock the morning of admission. The tem-

perature was then 100 4/5 degrees, pulse 160, and respirations 46.

During the first week the temperature was elevated, ranging from 101 2/5 to 99 1/5, the average temperature being about 101 degrees; at the end of seven days it reached normal once and then varied between normal and 102, until the end of the sixteenth day. The pulse varied between 160 and 104, averaging about 130. The respirations varied between 46 and 24, averaging about 36. The patient did well during the first week, but during the second week his general condition did not improve as well as was expected, so that on the fifteenth day an exploratory puncture was made and a syringeful of bloody purulent fluid was obtained. Physical examination of the left chest at this time showed dulness reaching posteriorly to the second rib, and extending into the axilla. Pulmonary resonance was absent over this area, and above there were diminished breath sounds, and coarse moist râles.

Operation.—Sixteenth day: Ether anæsthesia. Thoracotomy with resection of eighth rib in posterior axillary line. On opening the pleural cavity a large quantity of bloody purulent fluid escaped, a rough estimate being between a pint and a quart. Examination of the pleural cavity showed the lung to be almost collapsed excepting where it was connected to the parietal pleura by soft adhesions. These latter were separated as well as possible and a double rubber drainage-tube introduced. The bullet was then removed through an anterior incision made over its position of lodgement. The bullet was of .38 calibre. The patient reacted well from the operation and the temperature reached normal at the end of the ninth day. At the end of two weeks the patient was out of bed, and he was discharged from the hospital with the fistula completely closed January 28, 1908, four months and three weeks after the injury.

Case II.—*Bullet wound of lung: Thoracotomy and resection of rib about four hours later: Artificial pneumothorax: Recovery.* A man, aged 23 years, was admitted to St. Mary's Hospital, September 11, 1909, soon after having shot himself with a revolver (.22 calibre). He was seen by the reporter about 3 to 4 hours after injury. He was then markedly collapsed, pale, skin covered with a cold, clammy perspiration, temperature 98 3/5, pulse 104, respiration 48. Examination of chest shows a small punctured wound, with blackened edges, over the sixth rib, about

one inch outside the nipple line. No wound of exit seen, and location of bullet can not be determined. Percussion of left chest shows an area of dulness posteriorly from third rib downward extending into the axilla. Above this area of dulness there is normal resonance; breath sounds are normal excepting for some fine friction sounds. Patient has not coughed up any blood. On account of the patient's general condition and the apparent progressive nature of the symptoms it is decided to explore the pleural cavity and control the bleeding.

Operation: Chloroform anæsthesia. The track of the bullet was followed and it was found to have penetrated the sixth rib. The incision was then enlarged and the sixth rib resected from the costochondral junction posteriorly for a distance of about five to six inches. The pleural cavity was then opened, and was found to contain about one quart of blood and active bleeding from a punctured wound of the lung which was situated about two inches from the free margin and in the lower lobe. A wound of exit in the lung and also a wound of the posterior pleura corresponding to it was present. The blood in the pleural cavity was evacuated by means of dry gauze sponges and it was found by this time that the bleeding had ceased from the lung, which was collapsed. The pleural cavity was then closed with layer sutures except at a point posteriorly, where a double rubber tube was placed for drainage. The patient was returned to the ward in good condition.

Postoperative history: The postoperative temperature rose to 100 degrees, the pulse dropped to 30, and the respirations were 34. At 9 A.M. on the second day the temperature fell to 99 degrees, the respirations were 24, and the pulse 140. The temperature remained about 100 degrees, pulse 110, and respiration 28 on the third day. On the fourth day the temperature was 101 4/5 degrees, which fell on the fifth day to 99 3/5 degrees. For the remainder of the week the temperature varied between 99 and 101 dgrees. During the second week the temperature fell to normal and the patient was allowed to sit up in a chair. During the third week the discharge, which had been serofibrinous, decreased in amount and the rubber drainage-tube was discontinued, but in a few days was reintroduced and a large collection of pus (about 14 oz.) was evacuated. Since then the patient has rapidly convalesced; the amount of discharge has rapidly

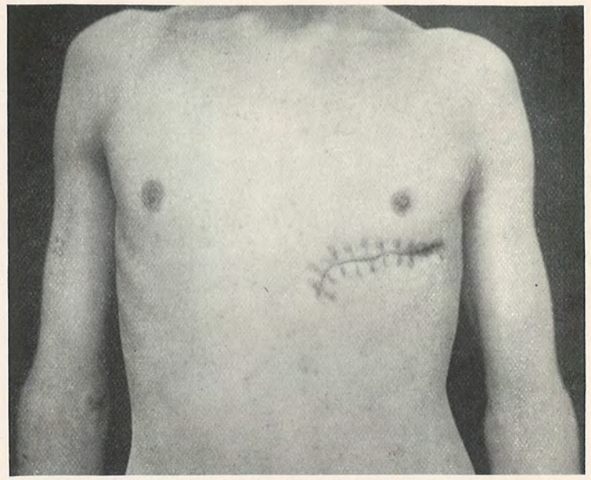
decreased, the lung has expanded so that at present there is a small cavity which contains about 2 ounces of seropurulent fluid (Fig. 1).

CASE III.—*Bullet wound of lung: Thoracotomy with resection of sixth rib one hour later: Sutures of two wounds of lung: Recovery.*—A man, aged 38 years, was admitted to St. Mary's Hospital, September 22, 1909. While suffering from delusions and mental depression the patient had shot himself in the left side of the chest with a revolver of .38 calibre. He was admitted to the hospital about one-half hour after injury, at 5 P.M.

On admission he was pale and anxious. There was marked respiratory difficulty, so that he could only breathe with difficulty when in the recumbent posture. Temperature on admission 99 degrees, pulse 164, respiration 36. Physical examination shows a bullet wound having a large ragged wound of entrance with blackened edges in the left nipple line and sixth interspace. With each inspiration and expiration there is a stream of blood ejected from the wound, which is large enough to admit the tip of the index finger. Examination of the left lung shows all the signs of collapse, with the presence of fluid at the base. As patient's condition was becoming progressively worse an exploratory thoracotomy was decided upon to control the hemorrhage.

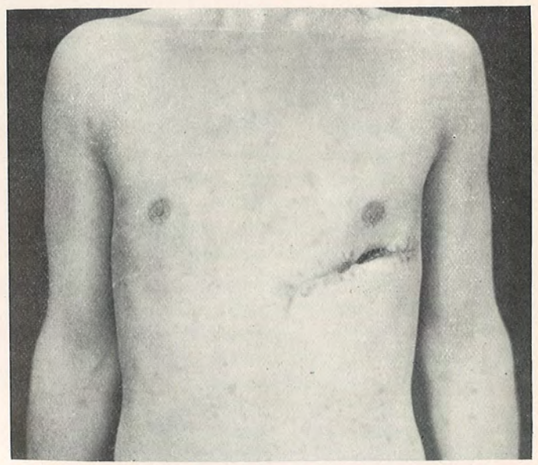
Operation: Chloroform anæsthesia, one and a half hours after injury. Exploration of the wound with the finger showed it to be continuous with the pleural cavity. A transverse incision was then made from the costochondral junction over the sixth rib to anterior axillary line, and the sixth rib resected for a distance of about 5 to 6 inches, and the pleural cavity opened. Exploration of the pleural cavity showed the presence of a large amount of fluid blood, a collapsed lung, and two wounds of the latter—one of the lower lobe about one inch from the free border, and one of the lower and outer portion of the upper lobe near its lower edge. Wounds of exit were present in both lobes. The wounds were large, measuring about 3 cm. long and 1 cm. in width. Both wounds were bleeding very actively. The blood in the pleural cavity was removed with dry gauze sponges and then each lobe of the lung was seized with a flat wide-bladed forceps, separately drawn into the wound and the bleeding controlled by means of interrupted No. 1 catgut sutures. The track of the bullet in the chest wall was excised, and the wound of the chest wall closed with layered sutures of catgut and silkworm

FIG. 1.



Case II.—Photograph taken on the forty-fifth day after injury, showing wound entirely healed excepting for drainage wound at its posterior end.

FIG. 2.



Case III.—Photograph taken on the thirty-eighth day after injury, showing wound entirely healed except at point of drainage at centre.

gut, excepting at the posterior end where a double rubber-tube was placed for drainage. The patient was returned to the ward in a condition of shock, which lasted for several hours.

Postoperative history: At 12.30 A.M., about six hours after the operation, the temperature rose to $100^{2}/_{5}$ degrees, and at six o'clock the temperature was $99^{3}/_{5}$ degrees. The pulse rate fell from its maximum of 164 to 130 shortly after the operation; six hours after it was 120, and the next morning it was 100. The respirations fell to 24 after the operation, and were 36 next morning. During the first week the temperature varied from $99^{2}/_{5}$ to $102^{4}/_{5}$ degrees. The discharge from the wound was at first bloody, but at the end of the week it had become serofibrinous. During the second week the temperature varied from 99 to $101^{4}/_{5}$ degrees; the pulse rate varied from 102 to 90 in the evenings and from 94 to 78 in the mornings, and the respirations varied from 30 to 18. During the third week the patient sat up in a chair and the temperature reached normal. The discharge from the wound became purulent and rather profuse in amount. Since this time the patient has been progressing very favorably. The wound still discharges a small amount of purulent fluid and there is a small cavity containing about 2 ounces of pus. The lung has expanded well and the patient is gradually becoming much stronger (Fig. 2).

Dr. Kelly remarked that bullet wounds of the chest wall involving the lung may be divided into two classes: (1) those in which there is evidence of a hæmothorax or a pneumothorax, but the symptoms of shock and hemorrhage are not severe or progressive in character, and (2) those in which the symptoms of shock and hemorrhage, and especially the latter, are progressive in character. In the first class immediate operative interference is not indicated, but one should delay, and future operative interference should not be considered unless there is evidence of non-absorption of the blood in the pleural cavity, or the hæmothorax has become an empyema. An operation to recover the bullet is not considered advisable unless it is superficial in position, and then only after the signs of shock have entirely disappeared. In the second class of cases immediate operative interference is considered advisable (1) when the symptoms of shock and hemorrhage are progressive in character, (2) when there is evidence of active hemorrhage combined with a pneumothorax (the pres-

ence of active bleeding from a bullet wound combined with a pneumothorax shows that the collapse of the lung has not controlled the bleeding), (3) when there is evidence of increased bleeding operative interference may control it by the production of a pneumothorax, and if the bleeding is not controlled in this manner, direct suture of the lung tissue may readily be performed.

While the opening of the thoracic cavity under positive or negative pressure would facilitate the localizing of the seat of the hemorrhage and lessen the amount of operative shock, yet at the same time it would in all probability have increased the hemorrhage.

While the last two cases were drained the reporter would be inclined to close up the wound in the chest wall without drainage, provided the wound of entrance could be thoroughly excised and the bullet removed.

Dr. John H. Jopson said that very few cases of control of pulmonary hemorrhage by suture are on record. In 1908 Kuttner was able to collect but 6 cases of suture of the lung for gunshot wounds and nine cases of the lung for stab wound, with 6 recoveries. These cases were all reported from the foreign literature. Several years ago Dr. Jopson reported one case of suture of the lung before the Academy for stab wound, which terminated in recovery. It is undoubtedly true that in a number of cases simply opening the chest and establishing a pneumothorax seems to control hemorrhage, but this does not always suffice. In one case of gunshot wound of the lung on which he operated the exploration was undertaken with the idea that the heart had been wounded; the bullet had entered in the third interspace an inch and a half to the left of the sternum, and the symptoms were those of pericardial distention and interference with the heart action. In that case he turned in a quadrilateral flap and had the same experience as had Dr. Kelly in one of his cases, the production of a pneumothorax sufficient to result in the control of the hemorrhage. A laparotomy pad was inserted into the pleural cavity to control active hemorrhage during the stage when the patient's condition was most alarming, and the withdrawal of the pad was followed by arrest of hemorrhage, and he closed the wound immediately. The patient died of delirium tremens on the fourth day without any return of the hemorrhage. In the case of suture of the lung referred to, the hemorrhage

was not entirely controlled by primary exploration and pneumothorax, and a running stitch of catgut to the wound on the edge of the large lobe of the lung was necessary for its complete control. In every case where drainage has been instituted it has been his experience that there has been some infection of the pleura, and this experience has been borne out by the experimental studies of Nötzel, showing the great susceptibility of the pleura to infection where pneumothorax is present. This is not a contra-indication to drainage, because where good drainage is instituted the infection is usually rapidly thrown off. In cases of doubt drainage should be instituted.

Dr. John H. Gibbon said that one of the difficult questions in the treatment of gunshot wounds of the chest is to decide which case should be operated upon and which should be left alone. In most of the gunshot wounds of the lung from small calibre bullets, although the condition may be alarming at first, the hemorrhage usually ceases and the patient recovers. That is one reason surgeons should be careful in the selection of cases. Another is the point that after an operation drainage is necessary, and that whenever drainage is instituted practically always there is infection. These cases reported by Dr. Kelly are rather good illustrations of those in which operation should be undertaken. He thought, however, that a mistake has been made much more often in operating upon cases of gunshot wound of the lung than in not operating. A great many of these cases which look hopeless for a while get well; some develop an empyema later and have to be operated upon, but his own idea is not to operate unless they show such symptoms as those displayed by Dr. Kelly's second case. Stab wounds are more apt to require operative interference than gunshot wounds with small calibre bullets. Gunshot wounds received on the battlefield do not require operation so frequently as do those in civil life.

Dr. Robert G. Le Conte said that the question of drainage in these cases is not always an easy one to decide. He agreed with Dr. Jopson that drainage is apt to be followed by some infection, but whether the infection is due to the drainage *per se*, or to material which has already been carried into the pleura by the primary injury, is a question. When the wound is clean, as it frequently is in a knife-cut, he would have no more fear of draining the pleura than of draining the peritoneum. It is to be

remembered that there are two sources from which infection can take place besides the drainage track: externally from material carried in at the time of the injury, and internally, by the opening of a bronchus. Should infection take place from either of these sources, drainage of the pleural cavity will certainly limit the extent of the pyothorax. When the pleural cavity is clean at the time of operation, there is small chance of infection taking place through the drainage track when properly safeguarded. In the majority of cases the bleeding from the lung will be controlled by the admission of air to the pleural cavity and collapse of the lung, in both gunshot and stab wounds. In his limited experience he had not yet had to suture the lung to control bleeding.

Dr. Francis T. Stewart said that his own rule in these cases is somewhat as follows: If he feels sure that the lung alone has been injured, either by gunshot or stab wound, he does not operate unless the wound is near the root of the lung. Hemorrhage from the lung itself almost invariably controls itself, particularly if some air is allowed to get into the thoracic cavity. He had seen a good many cases in which he had not operated and which had done well. He had explored a number of cases, however, because he thought the heart was injured or that the diaphragm was penetrated. If there is any question of a wound of the heart or penetration of the diaphragm, or injury of the large vessels, exploration should be carried out and hemorrhage controlled. If the parenchymatous tissue of the lung alone is wounded the bleeding usually ceases of its own accord or as the result of collapse of the lung and pneumothorax. There may be cases of large wounds of the lung which will die from hemorrhage alone, and perhaps in some of these cases suture or packing would be indicated.

Dr. John B. Roberts said that one of the interesting features of these cases was the greater rapidity in the cure of the operative cases than in the cases which were allowed to go on until an empyema occurred. He agreed with several of those who had spoken, that gunshot wounds of the lung are frequently cured without operation,—yet he felt that the cases just reported seem to have recovered more quickly than if they had not been promptly opened. He had found in some of these cases which do badly from acute traumatic pneumonia that a prompt phlebotomy has been of service.

Dr. J. E. Sweet said that certain experimental observations had suggested to him a possible mode of infection after wounds of the chest, which might have some decisive bearing upon the question of drainage. The phagocytes can take up bacteria from the alveoli and possibly the bronchioles of the lung; such phagocytosed organisms are not immediately killed in the body of the leucocyte. These phagocytes normally wander to the spleen or bone marrow, perhaps; but an irritation of the pleura might attract them to the wound and the organisms becoming free, an infection could result.

THE TREATMENT OF GANGRENE OF THE FOOT BY ARTERIOVENOUS ANASTOMOSIS.

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It is not necessary to refer at this time to the brilliant series of experimental observations whereby it has been shown that it is possible to divert the blood from an artery to a vein by an end-to-end anastomosis of the two vessels. The work of the experimental laboratory has been applied to the human being, and in this paper I report the tenth case in which an attempt has been made to stay the advance of gangrene of the leg.

In 1902 San Martin, stimulated by the work of Gluck, reported that he had operated upon two patients suffering from gangrene of the leg. He performed a lateral anastomosis between the femoral artery and vein. In one case amputation was performed at the same time and there was no further spread of the gangrene; the other was a complete failure. In the same year Jaboulay reported a similar operation on a patient suffering from gangrene produced by endarteritis. It was not successful and amputation became necessary later.

Hubbard in October, 1906, recorded the case of a man, aged 80, in whom he established an end-to-end anastomosis, by the invagination method, between the femoral artery and vein in Scarpa's triangle, for senile gangrene of the foot. A double anastomosis was done to effect reversal of the circulation. While no pulsation was observed, the leg did not become swollen or cold, its nourishment apparently being satisfactory. The gangrene spread until the lower half of the foot became blue and a line of demarcation appeared. Amputation was then performed.

Torrance in 1906 made an end-to-end anastomosis of the anterior tibial artery and internal saphenous vein in a case of crush of the foot and leg. The anastomosis sloughed.

Lilienthal in 1907 operated on a case of angiosclerotic gangrene and performed an end-to-end anastomosis in Scarpa's triangle. Eighteen hours later a line of demarcation formed, crossing the upper portion of the dorsum of the foot, thence up the sides of the leg and crossing the calf 7 or 8 inches above the point of the heel. Death occurred 31 hours after operation from shock. An examination of the anastomosis showed a smooth union with an extremely soft clot in the vein, possibly formed just before death, when the circulation was at its lowest ebb.

In 1907 Hubbard reported his second case in which the anastomosis was done by the invagination method, the distal end of the artery and the proximal end of the vein being ligated. The case was a distinct failure as it was necessary 10 days later to amputate above the knee.

In May, 1908, Ballance reported a case of arteriovenous anastomosis for senile gangrene in a woman aged 75. The gangrene began in the toes and three weeks later the skin over the dorsum of the foot began to show discoloration. An end-to-end anastomosis was performed. A few hours after operation the internal saphenous vein could be felt pulsating and visible pulsation was seen in the veins on the dorsum of the foot, but this did not persist, as two days later the pulsation was barely perceptible. "The immediate effects of the operation were striking; arterial blood was transmitted by way of the veins to the foot, the warmth of the foot was increased, the advance of the gangrene (obvious before the operation) was stayed, a definite line of demarcation appeared on the inner three toes, and the skin proximal to the line of demarcation again became sensitive so that light touches were readily located." From this time on the gangrene of the foot was arrested. Four months later the patient was seized with acute abdominal pain and died 24 hours later. Autopsy disclosed a gangrenous condition of the cæcum, ascending and

transverse colon. The anastomosis between the femoral artery and the vein was closed by scar tissue.

In July, 1908, Wieting, of Constantinople discussed the operative treatment of angiosclerotic gangrene and reported a successful case in which he intubated the femoral artery into the femoral vein. The patient, a man 40 years old, had had the right leg amputated a year previous. The foot and ankle were cold, and livid in color, and the seat of tingling pain; the patient stated it was exactly as the other foot had been at one time before the progression of the gangrene warranted amputation. Immediately following the anastomosis the foot became warm, the toes red and the pains and paræsthesia disappeared. No pulsation of the veins was seen or felt. Two months later the foot was warm and all symptoms had disappeared.

In November, 1908, Lund reported that he had operated upon a man, 32 years of age, who suffered from coldness and mottling of the foot, several sluggish ulcers on the dorsum and toes and absence of the posterior tibial and dorsalis pedis pulse. The condition had been caused by frost-bite nine months previous, although even before this he had had pain and a tingling sensation in the left foot. An end-to-end anastomosis of the femoral artery and vein was made with mattress silk sutures, everting the intima. The foot immediately turned from white to a deep pink and the superficial veins filled out. The first toe became gangrenous and was removed 11 days later and as the flaps became gangrenous the leg was amputated, three days later, 4 inches below the knee and the wound healed by first intention.

In the same year, December, 1908, Hubbard reported a third case of a woman, 84 years old, who three months before had had an amputation done of the right leg above the knee for gangrene of the foot. Subsequently a necrotic ulcer appeared on the left heel, and fearing gangrene an arteriovenous anastomosis was done according to Carrell's method. Two weeks later the foot was warm and comfortable and the patient up in a wheel chair. Five weeks after operation "it was

noticed that without any apparent reason the whole leg had become decidedly œdematous. From this time there was no very marked changes in the local condition except that a cool area about 3 inches wide, encircling the middle of the leg, appeared, while the foot and upper leg remained warm. The sloughs on the heel and over the big toe began very gradually to extend and a bed sore which developed over the sacrum showed no improvement. The general condition of the patient became gradually poorer and she gradually failed and died from senility" 9 weeks after operation. Examination of the site of anastomosis after death showed perfect healing but a thrombus at the point of union was found which was undergoing organization. The age of the thrombus could not be decided and the result was, therefore, in doubt.

The next case was reported by Armour and Smith in September, 1909. The patient, a man 69 years old, complained of swelling, cold, and feeling of pins and needles in his right foot. The arteries were tortuous and thickened, the pulse tension not high and the circulation very sluggish. The pulse could be felt in the right femoral artery but not in the popliteal below it. An end-to-end anastomosis was done and the internal saphenous ligated in the upper part of the thigh. Four days later a line of demarcation formed at the level of the upper and middle thirds of the leg on the outer side and of the lower and middle thirds on the inner side. Above this the leg was warm and the superficial veins were actively conveying blood and were somewhat distended but not pulsating. Fourteen days later the leg was amputated above the knee and when the tourniquet was loosened the tied vein was seen actively pulsating just as an artery would. The latter was filled with clot. The popliteal vein was found thrombosed below the highest set of valves.

Three weeks ago, October 7, 1909, Hubbard reported his fourth anastomosis for senile gangrene in a man aged 77 years. An end-to-end anastomosis was done by the Carrell method. At the close of the operation the circulation in the foot re-

turned as quickly as before. The discoloration and mottling of the foot were greatly improved but pain was marked. Later œdema of the leg appeared and pain was so great as to require morphine. About five weeks after the anastomosis, amputation above the knee was necessary owing to the pain. When the tourniquet was loosened red blood was seen to spurt from the femoral vein.

To these cases I wish to add the following:

J. F. M., aged 51 years, was admitted to Dr. Frazier's service in the Philadelphia Hospital, June 29, 1909. Two weeks before admission his left foot began to pain and tingle and to become blue, cold and mottled. When admitted he was found to have a gangrenous fifth toe and gangrenous patches on the remaining toes. He was poorly nourished, tall and gaunt and had marked arteriosclerosis of the radial and temporal arteries. The dorsalis pedis pulsation could not be felt. He was treated along the usual lines until July 19, 1909, when it was feared that the gangrenous process was advancing. On that day, under spinal anæsthesia, end-to-end anastomosis was effected, by the Carrell method, of the femoral artery and vein at the apex of Scarpa's triangle below the origin of the profunda femoris. Complete reversal was not attempted. The artery was moderately sclerosed. When the clamps were removed the vein was seen actively pulsating and continued to do so during the closure of the wound with catgut for the deeper tissues, silkworm gut for the skin. The leg and foot became warm, the leg red and the foot reddish purple in color. No visible pulsation of the veins was observed. In 48 hours the foot was cold to the ankle, the leg warm and on the third day a line of demarcation began to appear at the tibiotarsal joint. This became more marked in a few days and amputation at the middle third of the leg was advised but the patient refused to have it done. From this time until September 3, 1909 (40 days), the patient was absorbing toxin from the gangrenous foot and was gradually getting weaker. About September 1, he became delirious and, permission being obtained from his relatives, the leg was amputated 4 inches below the knee. At this time the posterior tibial and peroneal veins showed feeble but distinct spurts of blood. There were many unusual sharp oozers. The anterior tibials did not bleed. All the arteries and the external saphenous vein were thrombosed. The internal saphenous vein was patent. The flaps were loosely sutured together and drainage provided. There was much suppuration in the flaps and despite energetic systemic stimulation death occurred, apparently from exhaustion, on September 20, 1909, nine weeks after the first operation. An autopsy was refused and we were forbidden to examine the seat of anastomosis.

If we omit the cases reported by San Martin and by Jaboulay where a lateral anastomosis was performed (this method having been shown to lead to failure), and that of Torrance which was done for crush, we have ten cases of arteriovenous anastomosis deliberately made in the hope of staying the progress of gangrene of the lower extremity.

In this series there were 7 males and 3 females. The ages ranged from 32 to 84 years and averaged 63 years. Senile gangrene was the term used for the disease for which the patients required relief with the exception of Wieting's case which was termed angiosclerotic gangrene and Lund's case which was probably obliterating thromboangitis.

The exact pathology of the various forms of gangrene is still rather unsettled, but it does not make any material difference whether the artery is obstructed by an obliterating endarteritis or simply by a sclerosis provided that thrombosis of the veins has not occurred. That thrombophlebitis is not an uncommon occurrence in gangrene has been shown by the excellent papers of Buerger, and if it should exist to any extent the performance of arteriovenous anastomosis would be foredoomed to failure. In my case I practised the method advocated by Buerger for ascertaining the patency of the deep veins and apparently found no impairment of their function.

Of the ten cases, one died apparently from shock (Lilienthal) 31 hours after operation. Three others died at periods varying from 8 to 16 weeks after operation Ballance, Hubbard's third, Müller) from causes mentioned above. Of the remaining six, Wieting claimed a perfect result two months after operation and Hubbard's fourth case was progressing favorably until extreme pain required amputation; these were

the only two cases operated upon early. The remaining four (Hubbard's first and second, Armour and Smith, Lund) required amputation either at the "point of election" or above the knee at varying periods after the anastomosis.

"If we deflect the arterial current from the femoral artery into the femoral vein, below the termination of the long saphenous, we do so with a view to establishing the following conditions: (1) the deep veins are to be transformed into arteries; (2) the blood must find its way into the capillaries where it meets the blood from the profunda and the capillaries; and (3) a new centripetal flow must be established, primarily through a set of interanastomosing deep venules, but in the main finding its way into the vast network of superficial veins that empty in the long saphenous and thus into the femoral." (Buerger.)

There are, of course, two serious objections, theoretically, to the success of the operation: (1) the presence of valves in the popliteal vein and (2) the obstruction in the arteries tending to drive the blood from the deep to the superficial veins before the capillary system is reached. In 1903 Gallois and Pinatelle stated that according to their experiments the valves formed an insuperable obstacle to arteriovenous anastomosis, but Carrell has shown that the living tissues have great power of adaptation and that the valves are forced in a few hours, thus allowing for the reversal of the circulation.

As to the second objection the cases on record show that the blood *does* reach the tissues of the foot, but I am of the opinion that if the tibial arteries are occluded the blood barely reaches the dorsum and simply suffices to insure nourishment to the tissues at the "point of election" for amputation. It has been proposed (Buerger) that the ligation of the external saphenous would enable more arterial blood to reach the leg and foot, but it has not been performed in the cases on record. Armour and Smith ligated the internal saphenous but accomplished nothing, nor is this procedure to be recommended, as the long saphenous is needed as the efferent trunk where complete reversal of the circulation is impossible by reason of the obstructed arteries.

An objection has been raised by Ross that division of the artery and vein destroys the nervi arteriorum and that the loss of tone thus induced must favor thrombosis and that, therefore, the effect of the operation is exactly as in ligation, the collaterals supplying the blood to the tissues below. But I think it is pretty well established by the experimental work that the plexi surrounding the vessels must be to a great extent automatic in action and not dependent entirely upon impulses from the sympathetic and spinal fibres. There is undoubtedly some change in the nutrition of the vein wall and this, together with the changed conditions of pressure, results in an increase in the thickness of the wall of the vein.

Finally I would offer in conclusion:

1. That in the early stages of arterial disease producing ulcers on the toes, erythromelia, extreme pain, tingling, etc., a complete reversal of the circulation *may* relieve the condition if other measures have been tried and failed.

2. That with gangrene of a toe established, one should wait for a line of demarcation. If the process involves several toes or tends to spread to the dorsum of the foot an anastomosis between the femoral artery and vein with ligation of the external saphenous *will almost certainly* induce a line of demarcation in the region of the ankle.

3. That if the superficial and deep veins are also thrombosed the operation is useless and should not be done.

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Dr. J. E. Sweet said the fact of the previous operation in Dr. Müller's first case leaves little opportunity for discussion; the operation chosen was the only surgical possibility. Had it not been for the first operation, the use of formalinized arteries would have come into the discussion. They had been surprised in the laboratory to note the slight reaction caused in the substance of the brain by an artery hardened in formalin. The suggestion to use such material in aneurysms seems practical, but he did not know of its having been tried.

It sometimes seems as if the workers with human material were somewhat slow to adopt the suggestions of the laboratory. Possibly Dr. Müller's second case is an example of the reason why the laboratory suggestions are not more readily adopted, they are not always practical, as in the suggestion of the transposition of the circulation for gangrene which is hardly practicable. If the course of an artery to its capillaries is followed it will be found that the blood gradually becomes venous from the processes of anabolism and katabolism; in other words, the capillaries, upon which the life of the tissue depends, are half venous, half arterial. If the blood will not pass through the arterial half of the capillary, when pursuing its normal course, one fails to see how it can if led to the capillary from the venous side.

Dr. George P. Müller added that it does not seem feasible, physiologically, to effect reversal of the circulation, but Carrell reports having done so in dogs. Of course if the artery is thrombosed it is impossible to effect the reversal, as the blood must leak through the large veins which unite the deep and superficial venous vessels, and therefore fail to reach the foot. It is impossible, if gangrene is once established, to send sufficient blood to the foot to prevent gangrene from spreading beyond the toes, but he believed it to be possible almost always to obtain sufficient circulation to enable the amputation to be done in the leg.

MALIGNANT DEGENERATION OF BENIGN DISEASES OF THE BREAST.

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The advances made in surgery of the mammary gland have been due, to a considerable extent, to the aid furnished by pathologic studies. The subject of benign tumors of the breast was obscured for many years by a lack of uniformity in nomenclature, a confusion which has been dispelled by a suitable classification of these affections. Recent pathologic studies of benign breast diseases have elicited a very important fact, namely, that a fairly high percentage of the benign tumors and diseases of the breast undergoes a secondary malignant degeneration. A study of certain types of benign tumors, with the object of determining the approximate percentage of malignancy and the signs by which it can be recognized, should be of value from the prognostic and surgical standpoint.

In reporting the following cases, Warren's [1] classification has been followed. The cases examined are used as types of the various benign affections, the discussion following is based upon the most important recent communications of the subjects in question.

Fibro-epithelial tumors.—Warren divides these tumors into two divisions—the fibrous type and epithelial type. In the first group are included the periductal fibroma, the periductal myxoma and the periductal sarcoma. The second division comprises a class of tumors which are rather uncommon—the cystadenomata—which are subdivided into the fibrocystadenoma and the papillary cystadenoma.

The periductal fibroma (adenofibroma) occupies an important place from the standpoint of frequency, occurring in 7 per cent., whereas the entire group of fibro-epithelial tumors comprises 11 per cent. of the entire number of breast diseases. Warren has advocated the terms "periductal fibroma" because the chief constituent of the fibro-epithelial tumors of the fibrous type is the peculiar periductal tissue of the breast. This tissue develops at a time when the majority of the fibrous tumors occur, between puberty and lactation; it is part of the structure of the breast, and its close relationship with the epithelial elements makes it impossible for one type of tissue to undergo tumor formation without involvement of the other. The name "adeno" is reserved by Warren for the tumors in which the epithelial elements play a more important part.

The clinical features of periductal fibromata are too well known to warrant any extensive discussion, although certain deviations from the usual type encountered are of interest. The growth occasionally progresses steadily until it reaches enormous size, weighing, in some of the cases, as much as eight or ten pounds. In such instances, as reported by Finsterer,[2] Anger [3] and others, the patients are advanced in years (forty to fifty) and the growth is of many years duration. Cases have been reported in which benign tumors have been present for a period of ten to twenty years before malignancy developed. Ulceration of the skin, cystic degeneration of the tumor, a constant increase in pain and enlargement of the axillary lymphatic nodes may occur. Such symptoms are highly suggestive of malignancy, but microscopic examination of the tumor may not show evidence of carcinomatous formation. Fortunately this type of rapidly growing but benign tumor is becoming rare, because few are permitted to reach such size without operative interference. Therefore, the more common type encountered is the small, well circumscribed, single or multiple tumor. Sufficient histologic evidence is present to prove that this form becomes malignant, although clinical facts pointing to a recognition

of this complication are not numerous, and not infrequently the microscope shows quite accidentally that the tumor removed has undergone carcinomatous degeneration. Anger[3] reports a case in which islands of cancer were present in a fibroadenoma, which in spite of its large size (7 k.) and long duration did not appear malignant. The skin was normal, the tumor freely movable and the axillary lymphatics were uninvolved.

Microscopic studies of the secondary epithelial changes in benign tumors have been more numerous in connection with abnormal involution and with the cystadenomata. While fewer cases are on record of malignancy occurring in periductal fibroma, yet the underlying changes are practically the same as in other conditions. Kuru [4] believes that the carcinoma, in such instances, arises by means of active epithelial growth which is associated with a simultaneous adenomatous proliferation, and he agrees with Müller,[5] that the process begins as a multicentric formation. Some pathologists deny that cancer occurs secondarily to benign tumors, and claim that it takes its origin from misplaced cells,—that the two tumors grow independently and finally become associated by the enlargement and infiltration of the carcinoma.

Sudden enlargement of a previously existing latent tumor should always be regarded as a suspicious symptom. Axillary involvement is not always conclusive, as it may be of inflammatory origin and was found by Finsterer [2] seven times in sixty-four benign conditions of the breast. Rapid growth of a benign tumor may be associated with ulceration, loss of weight and weakness, so that the symptoms of an early cachexia are simulated.

A tumor, previously movable on the underlying structures, which becomes adherent presents one of the most reliable signs of malignancy; but this symptom does not occur until the disease has become well advanced. Dimpling or adherence of the overlying skin should always be regarded as highly suggestive of carcinoma. Pain seems to be a variable symptom in benign lesions of the breast. Its occurrence has been

noted by many writers, but when associated with rapid enlargement of the tumor (and particularly when the severity of the pain constantly increases) a malignant degeneration should be suspected.

Statements as to the cause of malignancy in benign affections are rather scanty although traumatism and pressure are supposed to play an important rôle. Elsasser [6] observed a case in which exposure was said to have caused rapid growth and malignancy of an adenofibroma. An hereditary predisposition was present in both of the cases which this author has recorded. An associated mastitis or lactation may be injurious to benign tumors; the effect of pregnancy is discussed under the second case reported. Several of the cases recorded have occurred in women who have never borne children, nor have suffered from previous diseases of the breast.

We find, therefore, that certain tumors which present symptoms suggestive of malignancy do not show the histologic changes of the same, and, on the other hand, carcinoma occasionally arises in a prëexisting tumor without causing symptoms indicative of such a transformation. We can conclude from these statements that operative interference in all tumors of the fibro-epithelial type is indicated to prevent this complication.

In the Laboratory of Surgical Pathology, University of Pennsylvania, two instances of carcinomatous changes in periductal fibroma have been observed in 17 cases studied pathologically. In both there were one or two symptoms which were only suggestive of cancer. In the first case the skin was not freely movable over the tumor, and in the second an enlarged hard axillary lymph-node was present. Beyond these doubtful symptoms, there was no evidence of carcinoma which was not seriously considered in either case.

The clinical histories and pathologic descriptions of the two cases follow:

Case I.—M. J., aged 45, unmarried, was admitted to Dr. Frazier's service for a growth in the left breast of seven months

duration. The tumor was not painful, had grown slowly until it reached the size of an egg, and seemed to the patient, to be slightly more fixed than formerly. Patient cannot recall any injury to the breast, and she has never had any soreness of the nipple. The tumor was situated to the right and passed beneath the nipple which is normal. The skin was movable over the growth but not freely, and the tumor was entirely movable over the chest wall; it was not painful on palpation, but hard. The axillary lymphatics were uninvolved.

Operation: The tumor was found to be well encapsulated, presenting the characteristics of a benign growth; it was not deemed necessary to perform a more radical operation than removal of the tumor with the surrounding skin and all glandular tissue—a precaution which was made on account of the patient's age. The patient recovered from the operation and when seen 22 months later showed no signs of a recurrence.

Specimen on examination consists of the breast, and surrounding fat. The skin is freely movable and unchanged in appearance, the nipple slightly retracted. A small nodular mass is palpable through the skin but has no relationship with the nipple. On the posterior surface a well circumscribed, round encapsulated tumor the size of an egg is seen embedded in the breast tissue. The mass is not adherent to the surrounding tissue and presents on section a reddish white appearance. The red areas are soft, contain a few small cysts, and are directly continuous with the white indurated portion which cuts with more difficulty than the other part of the tumor. The induration is almost the size of a pea, and represents but a small proportion of the tumor from which it so differs in appearance that the impression is given of tissues of different type. The remaining portion of the breast on careful examination, particularly the nipple region, is free from gross change.

Microscopically, the sections taken from the tumor show a proliferation of the periacinous fibrous connective tissue which is quite cellular and completely surrounds the ducts and acini. The latter are regular in appearance, and are lined for the most part by a single layer of cuboidal epithelium. Many of the ducts are dilated, forming small cysts, the lining cells are low and a few papillary projections are seen within the lumen. The fibrous overgrowth has compressed many of the cystic dilatations so

that they appear as slits, resembling the form of tumor described as pericanalicular fibro-adenoma.

The second portion of the growth retains the appearance of a periductal fibroma, but in addition an epithelial hyperplasia is present. This occurs in many of the acini and ducts which are filled with cells which have no tendency to infiltrate the fibrous stroma. The cells, for the most part, are regular in appearance; in some acini many layers are present and here some irregularity in the shape of the epithelium is seen. In many areas the circumscribed appearance is lost, and the epithelium infiltrates the connective tissue spaces as thin lines or processes. In other places the cells are heaped up and form small collections in the tissues; a glandular reproduction, however, is not present. The tissue in which the malignant degeneration has arisen is to a slight extent invaded by leucocytes, shows considerable dilatation of the blood-vessels and some free blood in the tissues.

Examination of the breast tissue surrounding the tumor and in the neighborhood of the nipple shows changes of involution. Pathological diagnosis: Periductal fibroma, carcinomatous degeneration.

Case II.—The patient, aged 45, had noticed a growth in the upper and outer quadrant of the right breast for six years. It was painless, of slow growth, and did not produce any symptoms. Her last child was born 10 years ago; she has not had any previous breast disease. About four months ago she became pregnant, and shortly afterward noticed that the tumor began to enlarge, but did not become painful. On examination a small, well circumscribed tumor was discovered in the breast and a single enlarged node in the axilla. In view of the rapid enlargement and lymphatic involvement, her family physician advised removal of the tumor, which was done by Dr. A. C. Wood.

Specimen consists of a tumor about the size of a hazel nut, the surface is pale and the cut surface smooth and rather fleshy in appearance. The tissue is arranged in concentric bundles, and has a firm consistency. Attached to the tumor is a mass of fat and muscle tissue in which there is but one small piece of indurated material which shows a firm white focus.

Microscopic sections were taken from the lymph-node removed

from the axilla and the breast tumor. The breast tissue has the typical appearance of a periductal fibroma, the ducts and acini being surrounded by periacinous tissue, and do not show any cystic changes. The epithelium is hyperplastic, as in the previous case and again has the tendency to fill the ducts and acini, and in many areas has broken through its normal limits and has invaded the fibrous stroma in the form of cellular processes somewhat resembling an early form of scirrhus. The lymph-node shows slight hyperplastic changes but no metastatic growth. Pathological diagnosis: Periductal fibroma, beginning carcinoma.

The active state of the breast incident to pregnancy undoubtedly was of great importance in promoting the malignant degeneration in this case. The epithelium of the periductal fibroma, already in a state of instability by reason of proliferative changes aided by the advanced age of the patient, was thus readily transformed into a malignant process. As the tumor was well circumscribed, the lymph-node uninvolved and the carcinoma of an early form, the patient is being carefully observed, a more radical operation not being performed. Without removal of the tumor, and with increasing functional activity of the gland, a form of rapid carcinomatous involvement of the entire breast, such as is frequently seen during pregnancy and lactation, may have developed.

Abnormal Involution.—For the sake of uniformity in following Warren's classification the above term is adopted. The older name, "chronic cystic mastitis," advocated by König, is still used by many writers, and while it suggests to the pathologist the exact condition in the breast, yet by many it has been confounded with acute pyogenic mastitis. König[7] and others believe the disease to be infectious in nature, and by a few it is described as a tumor formation. Recent studies, however, assign the cause to certain abnormalities occurring in the breast during its involution. These changes consist largely in hyperplasia of the epithelium incident to cyst formation, produced in turn by fibrous overgrowth. The tendency toward uniformity in classification of breast disease is gradually being extended to this type in

which heretofore the greatest difference and laxity in nomenclature has existed. Thus we find that Theile [8] in his study concludes that fibro-adenoma, cystosarcoma phyllodes and chronic cystic mastitis form a group of diseases which arise from the same elementary histologic changes, and which are distinguished from one another by a more or less pronounced encapsulation, through the predominating growth of the connective tissue in some and the epithelium in other cases. The original process is to be regarded as neither inflammatory nor as a tumor formation, but as a form of fibro-epithelial degeneration which may manifest itself in one of the tumor formations named. Further evidences of regression are seen in malignant degeneration of the connective tissues into sarcoma, or the epithelial elements into carcinoma. The latter variety is much the more common, although a few instances of sarcomatous transformation have been recorded. Early malignant change as such can probably be recognized by the microscope only, the two varieties producing symptoms which can not be differentiated.

Two varieties of abnormal involution may be distinguished, the cystic and proliferative. The latter class is divided into three subdivisions: (1) Proliferation of the acini, (2) papillary outgrowths of epithelium into cysts, and (3) adenomatous proliferation of epithelium. While the difference of these subgroups is mainly histologic, the degree of epithelial proliferation varies so much that they should be briefly discussed. According to Warren's summary, we find that the first type shows an increase in acini which is accompanied in the majority of instances by a proliferation of the epithelium to such an extent that thickened or even solid columns of cells are produced, retaining, however, the formation of the gland ducts, and presenting no infiltration beyond the basement membrane. While the significance of this form is not determined, it may lead to carcinoma.

In papillary proliferation we find a growth of epithelium in the cyst cavities of such a nature that the cells are heaped up and project into the cavity without a connective tissue

pedicle. The picture suggests that more epithelium is produced in the lining of the cyst walls than can be accommodated on the basement membrane, and is thus thrust into the cyst cavity.

In the third group, adenomatous proliferation is met with, and only in cases in which papillary outgrowths are already present. This form represents a more advanced type of epithelial hyperplasia, and is, therefore, most commonly associated with a carcinomatous degeneration. Nine of Warren's cases were seen in connection with involution changes of the papillary and adenomatous types. Bloodgood [9] has observed more malignant than benign cases of this variety. The five cases of adeno-carcinoma which I have studied showed adenomatous proliferation in each instance. The acinal type of abnormal involution is more likely to degenerate into a scirrhous variety of carcinoma, as occurred in three of Warren's cases, and in one of my series.

Abnormal involution occurs more frequently than any other affection of the breast, with the exception of carcinoma. According to Warren, it constitutes 15 per cent. of all breast diseases, and Bloodgood states that it is seen in 25 per cent. of all benign cases. An analysis which I have made of 180 cases of breast disease shows that it occurred in 18 per cent., and of the 35 cases studied in this laboratory 9 instances of malignancy were encountered (26 per cent.). The following table represents the number of cases of abnormal involution studied by different observers and the number of malignant cases in each series:

	No. of cases	No. carcinoma.
Warren [1]	115	15
Greenough and Hartwell [10]	30	3
Sasse [11]	9	2
Ruloff [12]	11	4
Lichtenbahn [13]	5	0
Theile [8]	19	3
Verga [14]	28	5
Schimmelbusch [15]	43	3
Speese	35	9
Total cases	295	44

Carcinomatous, 15 per cent.

A malignant degeneration in 15 per cent. of the cases represents the general opinion of many observers who have studied this disease. In the cases observed 26 per cent. were found to be malignant, a percentage somewhat higher than other writers. The diagnosis of malignancy depended on the general aspect of the epithelium, the regularity of the acini, penetration of the basement membrane and tendency toward invasion of the stroma. The size of the cells is also to be considered, for irregularities in size and shape is suggestive of carcinoma. The presence of clear, vacuolated cells (*blasse Epithelien*) indicates proliferative changes, as pointed out by Müller and Theile, and when present in abnormal involution, is not diagnostic of carcinoma.

The symptomatology and gross pathologic changes of abnormal involution are so well understood that time will not be taken to describe them. In general, the diagnosis of the condition, especially the diffuse variety, is not difficult. Malignancy is more likely to occur in women past the forty-fifth year of life. In the nine cases reported the youngest patient was 35, the oldest 65, and the average age 47. In many instances the disease had lasted but a few months from the time of observation until operation was performed. In Bloodgood's experience the duration of the disease has been less than four months in cases in which the clinical diagnosis is doubtful. In the adenomatous variety, we find too, that the growth is apt to be more rapid than in the cystic type. In the majority of early cases there are no signs by which a malignant degeneration can be diagnosticated. Enlargement of the axillary lymph-nodes, slight inversion of the nipple, induration of the tumor, pain and tenderness, rapid growth and discharge from the nipple are all symptoms seen in non-malignant cases. The diagnosis of early malignancy will have to be made in the majority of instances at the time of operation, when incision into the suspected area will disclose the carcinomatous tissue.

In doubtful cases exploratory incision is indicated; a careful search throughout the entire part involved is necessary,

for the malignant area is apt to be quite small. Malignancy being detected, a radical operation should be performed. In case of doubt, the entire breast should be amputated, and if the axillary lymph-nodes are enlarged they should be removed. The exploratory incision does not reduce in any way the chance of ultimate cure, whereas exploratory incision followed by the radical operation for malignancy at a later period has been invariably fatal according to Bloodgood. In the majority of cases studied, the carcinomatous area has been small, so that if dependence is placed upon frozen sections made at the time of the operation, great care must be observed to select a suspicious area. As one becomes familiar with the gross changes of this disease, less attention will be paid to frozen sections and the diagnosis will be made from the macroscopic appearance. Malignancy is often so early that careful study of specimens hardened to cut in the usual manner is necessary before the diagnosis can be made. For this reason, I have gradually given up the use of the freezing microtome as a diagnostic aid, and place entire dependance on the naked-eye appearance of the affected tissue.

The bilateral character of the disease is one of its interesting features, and one for which occasionally double amputation has to be performed. Several instances have been observed in which patients have been forced to undergo secondary operations on the opposite breast after having had one amputated for abnormal involution. If indurated areas are present in both breasts, especially in women over forty, a bilateral operation should be performed, and both breasts, or the diseased areas removed. Many of the cases of bilateral carcinoma recorded have in all probability originated in abnormal involution which began as a bilateral affection in both breasts. Case XI of the series supports this view, for in each breast definite carcinomatous nodules were present in association with the changes of abnormal involution.

Certain instances of abnormal involution appear to undergo spontaneous cure, the contents being discharged through the nipple, or the cyst rupturing. More frequently a stationary

stage may be encountered, or the epithelial proliferation advance to malignancy. Cases are encountered which probably represent the initial changes of abnormal involution, definite areas of induration are not palpable, but more or less discomfort is experienced. In this type careful observation may be employed, but in no other form of abnormal involution are temporizing methods to be tolerated, because of the danger of cancer.

Case III.—Mrs. M. S., aged 55, service of Dr. Edward Martin. Mother of several children, no previous breast disease. Two years ago the patient received a severe blow on the left breast which has been painful since the accident. About six weeks ago a small nodule was noticed in the breast. There was slight pain and tenderness, the skin and nipple normal, and on palpation the tumor was hard, not larger than a hazel nut and adherent to the surrounding tissues. The axillary nodes were not palpably enlarged.

Specimen (2497) is a breast with underlying muscles and axillary tissues. On section a hard nodule about 1½ cm. in diameter is found which shows a fine yellow mottling at the centre surrounded by a translucent greyish tissue which sends off fine fibrous processes into the surrounding tissue, and by contracting cause a puckered appearance at this point. Throughout the process there is considerable greyish parenchyma which seems increased and more fibrous than normal, but nevertheless there are no frank characteristics of malignancy except at the one point first noted. The nodes in the axilla are very slightly enlarged, soft, and grossly do not suggest metastasis.

Microscopically the breast tissue near the growth is very fibrous in appearance and contains numerous small cysts. The glandular acini are slightly increased in number and are so compressed by the fibrous tissue that they resemble the cellular processes of a scirrhus. In some areas a moderate hyperplasia of the epithelium has occurred in the acini. While the abnormal involution here seems to be of the cystic type, slight hyperplasia is present. Numerous sections do not reveal a process which can be regarded as predisposing to cancer. That this must have occurred somewhere in the process of abnormal involution is shown in the sections taken from the dense nodule, where the compressed epithelium is seen surrounded by a dense fibrous stroma—the picture being a typical scirrhus.

Diagnosis: Abnormal involution (acinal type). Scirrhous carcinoma.

Case IV.—Mrs. M. M., aged 44, service of Dr. J. W. White. About one year ago the patient noticed that the left breast was somewhat larger than the right. One month ago she received an injury of this breast, and noted then for the first time that several hard nodules were present. Since then she has had pain and the tumors have increased slightly in size. She has had two children, but did not nurse either one. The nipple and skin are both normal, and the nodules do not seem adherent to the surrounding parts.

The specimen (2237) obtained by the operation consists of two portions of breast tissue measuring about 14 x 6 cm. Two distinct processes are seen in the breast, the first a rather diffuse infiltration of dense, glistening, whitish tissue in which a few cysts about the size of a pea are present. This process is not very marked, and extends through a small portion of the breast. The second process consists of a soft pinkish mass of tissue about the size of a hen's egg which shows softening and degeneration in its centre. Section through the latter demonstrates a dense mass which is adherent to the surrounding breast tissue.

Microscopic examination of the first process shows marked increase in the number of acini, in which the epithelium is slightly proliferated. The stroma is dense and contains but few cells. Cyst formation is inconspicuous and proliferative change, beyond that noted, is not present.

The soft tumor mass reveals evidence of extensive leucocytic reaction which in some places obscures the tumor tissue. The latter is seen as collections of large and slightly irregular epithelial cells occurring in masses and showing mitosis. The inflammatory reaction which extends to the surrounding tissues, was probably caused by the injury received.

Diagnosis: Abnormal involution (Acinal type). Carcinoma.

Case V.—Mrs. M. O., aged 46, service of Dr. Edward Martin. Patient received a blow over the left breast 17 years ago. Shortly afterward she noted a lump in the breast which did not enlarge until four months ago when it began to increase

in size and became painful. There was no discharge from the nipple, the tumor was freely movable and the axillary nodes uninvolved. The breast was removed, the pectoral muscles and the axilla were not disturbed.

The specimen (2501) showed a fibrous and cystic process which was diffuse in character. Microscopically the sections taken from different portions of the breast reveal in most places a typical appearance of abnormal involution with great production of fibrous tissue compressing the ducts, in some places giving rise to small cysts. The epithelium of the acini is hyperplastic and the basement membranes often poorly defined. In a few places the proliferation is so great and its appearance so atypical that it is impossible to interpret the processes as simply due to pressure from overgrowth of fibrous tissue. Several large masses of cells which show mitotic figures and of invasive tendency are seen. In addition to these changes in the acini other areas show papillary proliferation in the cysts; the epithelium here is quite different in appearance from that of the tubules and cysts seen elsewhere. The cells are larger, the protoplasm is pale and has a vacuolated appearance. The nuclei are small and are deeply stained. In general the epithelial growth is toward the lumen, and the basement membrane is well defined. Occasionally the arrangement is lost and the appearance is that of an epithelial invasion.

The process is regarded as malignant, and certainly suggests the multicentric origin of carcinoma in this instance, for the cancer although early, is apparently arising in two different ways: (1) secondary to acinal proliferation, and, (2) as the result of papillary proliferation.

Diagnosis: Abnormal involution (acinal and papillary types). Carcinoma.

Case VI.—Mrs. F. M., aged 45, service of Dr. J. W. White. About one year ago noticed a small nodule at upper margin of left breast, and a few weeks later a second one in the axilla. At that time both nodules were freely movable and not painful, but later grew rapidly. About ten months later the nodule in the breast was removed and sent to this surgical laboratory and reported as carcinomatous. A few months later she entered the hospital because of the formation of other tumors in the breast, and in the axilla. At this time the mass in the breast

was firmly adherent to the surrounding tissues, the nipple and skin were retracted.

The specimen (2030) consists of an amputated breast, the elliptical section of skin measuring approximately 12 x 4 cm. in length and breadth. The nipple is not retracted, but at the opposite extremity of this elliptical section of skin there is an old scar about 1 inch long running at right angles with the long axis of the skin section. Palpation over this scar reveals the presence of a mass buried beneath the skin and superficial fascia. Incision through the pectoral muscles and fascia on the inferior aspect of the breast displays a mass about 1½ inches in diameter and of a dirty, grayish brownish coloration surrounded by a mass of white fibrous connective tissue. Incision through the tumor itself displays surfaces of a mottled, reddish and grayish coloration, the red areas being quite friable.

Microscopically the tissue in the involuting portion of the breast is very fibrous, and contains a few small cysts. In these papillæ are seen, and in others the epithelium is atrophic from pressure. The tendency toward adenomatous formation is not marked. The carcinoma appears as a dense collection of cells in which necrosis is present (medullary form) and as atypically developed acini (adenocarcinoma).

Diagnosis: Abnormal involution (proliferative form). Medullary and adenocarcinoma.

Case VII.—Service of Dr. J. B. Carnett. Patient aged 43 years, single, has had several operations on the right breast, two cysts being removed, the tissue, however, not being examined microscopically. For several months she has suffered with pain in left breast, which on examination contained three distinct cysts, one to the inner side of the nipple, and one each in the upper and lower outer quadrants of the breast. The tumors were freely movable, the lymph-nodes not enlarged, the skin not involved. Operation: plastic resection, all glandular tissue being removed because of the extensive involvement.

The specimen (1589) consists of two masses of tissue, one about the size of an egg, the other the size of the palm of the hand. Both have the same characteristics, and contain many cysts which vary from a pea to a hazel nut in size. The tissue on section is dense in quality, fibrous, and cuts with some difficulty.

Microscopically many small cysts containing papillæ are present, the lumen of some is filled with a homogeneous secretion and desquamated epithelium. The lining cells are cuboidal in shape, the acini are increased in number and many of them are filled with cells some of which are cuboidal and others cylindrical. The epithelial hyperplasia also occurs in the form of rather cellular collections in which a few atypical acini can be distinguished. They are found in the fibrous stroma, unlimited by a basement membrane and infiltrating the tissues.

Diagnosis: Abnormal involution (acinal and papillary proliferation) Adenocarcinoma.

Case VIII.—M. C., aged 65, service of Dr. J. H. Jopson, Presbyterian Hospital. About 10 years ago patient had the right breast amputated for carcinoma. There has been no recurrence of trouble since the operation until four months ago when she noted a lump in the upper and outer quadrant of the left breast. On palpation this was found to be tender, rather diffuse in character and freely movable. In the axilla several enlarged lymph nodes were present which seemed to be adherent to the surrounding structure. A clinical diagnosis was made of carcinoma secondary to abnormal involution, and the breast amputated.

The breast (1963) was found to be the seat of a diffuse fibrous and cystic overgrowth, and in one area a dense mass the size of a walnut was detected. The axillary nodes were hard, and of the same character as the small tumor in the breast.

Microscopically the usual picture of abnormal involution is seen, papillary and adenomatous proliferation of the epithelium is present, the papillæ almost filling some of the cyst cavities In the immediate vicinity of the cyst, the cells have infiltrated the tissues forming carcinomatous masses in which there is an attempt to form acini. The cells in these areas are irregular in size and shape and show many mitotic figures. In the stroma leucocytic infiltration is marked.

This patient developed local recurrence and died three years later. The autopsy showed a single carcinomatous nodule in the liver, pathological fracture of the femur due to metastasis and skin metastases.

Diagnosis: Abnormal involution (papillary and adenomatous type). Adenocarcinoma.

Case IX.—Mrs. J. G., aged 55, service of Dr. Edward Martin. The patient was admitted for removal of a growth in the right breast. This on examination was in the outer quadrant, was dense in character, the skin and nipple were not adherent, the axillary lymphatics were uninvoluted. The breast was amputated, and on careful inspection did not show any gross evidences of cancer. The process present (2434) was diffuse and fibrous in nature, pinkish-white in color, and contained numerous thin-walled cysts whose contents were clear. The cyst walls were smooth and did not reveal any papillary growths.

Microscopic examination shows a marked overgrowth of the connective tissue, the nuclei being abundant showing an active proliferating process. Along with the connective tissue changes there is a considerable hyperplasia of the glandular acini which are present in great numbers. The epithelium is in an active state of proliferation; fills many of the acini, some of which are dilated. Small papillæ project into the cysts which are quite small. In the adenomatous parts some of the acini are quite irregular in shape and are closely packed together; toward the periphery of the areas the acini have no regular basement membrane. The cells are without definite arrangement in the connective tissues in some places, in others the form of acini is assumed. The epithelial cells do not show marked deviation from the normal type, although some irregularity in their size is present. About the adenomatous areas the tissues are invaded by leucocytes, and the stroma here is more cellular than elsewhere.

Diagnosis: Abnormal involution (adenomatous type). Adenocarcinoma.

Case X.—Mrs. J., aged 40, service of Dr. A. C. Wood. One year ago she had a small tumor removed from the right breast which on examination proved to be carcinomatous in nature. Immediate amputation of the breast was advised but refused. In a short time the growth reappeared, and X-ray treatment was begun. This was continued for a year, 80 treatments being given; the tumor, however, increased, so that surgical interference was again sought.

The breast was amputated, and on opening the axilla enlarged lymph-nodes were not found.

The specimen consists of a breast with some axillary lymphoid tissue. To the breast is attached the pectoral muscle and a

large amount of fat. The skin with nipple attached does not shown any abnormal changes or retraction. Cross section through the breast shows a rather diffuse whitish infiltration which resembles the fibrous tissue changes following involution. A few small cysts are present which contain a clear secretion. At one corner of the breast directly above the pectoral muscle but not attached to it, is a nodule not larger than a pea, which is hard, indurating in character and infiltrates the breast tissue. This is the only macroscopical evidence of malignant disease which is present. The fatty tissue removed from the axilla is perfectly normal in appearance.

The sections were taken from the tumor and the fibrous tissue. In the latter the process is benign and consists of a marked fibrous overgrowth in which a few cysts appear. The acini are increased in number and in a few as well as in some of the ducts, the epithelium is proliferating, and appears as minute papillæ. The cells of these papillæ are slightly irregular in shape, and in many of them the protoplasm is quite clear. The nuclei are deeply stained and regular in size. There is no attempt in these areas for the cells to break through the basement membrane of the glands. In the stroma a round cell reaction is present.

The sections taken from the tumor show a well-advanced carcinoma which is embedded in a dense fibrous stroma. The tumor cells form rather dense masses and have undergone necrosis in many places, probably the result of the X-ray treatment. A connection between the benign disease and the carcinoma is not seen microscopically. The lymphatic tissue is normal.

Diagnosis: Abnormal involution (acinal type). Carcinoma.

Case XI.—B. W., aged 35, service of Dr. C. H. Frazier. Has had three children but no previous breast disease. About two years ago she noticed small lumps in each breast, the growth of which have been gradual, have caused pain and have given the patient considerable anxiety. On examination, the nodules are about the size of a hazel nut and freely movable. The axillary lymphatics are uninvolved. As an abdominal operation had to be performed, it was thought advisable to remove the breasts.

On examination both breasts show practically the same characteristics, being the seat of a diffuse fibrous overgrowth in

which numerous small shot-like cysts appear. This tissue while firm is not dense in quality and contains embedded in it several small pinkish white nodules which are adherent to the fibrous stroma. These nodules are hard and dense when compared with the other process and cut with great difficulty. In the left breast, one of the nodules slightly infiltrates the pectoral muscle which is attached to the breast.

Microscopic examination of the stroma shows a slight fibrous overgrowth of the periacinal tissues, which is quite cellular. Numerous dilatations of the ducts and acini are present and in these the epithelium is heaped up in masses and in the form of papillæ. There is no evidence of malignancy until the sections taken from the small nodules are examined, when a marked cellular hyperplasia is encountered. The stroma is relatively slight in amount—the acini and ducts filled with cells and papillary formations. In the stroma, the acini are arranged in an irregular manner and much epithelium is present in small ill-defined masses. The carcinoma in the left breast is more advanced in type than that of the right.

In this case a malignant degeneration had arisen without causing any marked symptoms.

Diagnosis: Bilateral abnormal involution (adenomatous proliferation). Bilateral adenocarcinoma.

Cystadenoma.—The epithelial type of the fibro-epithelial group of tumors is less important than the fibrous variety from the standpoint of frequency, occurring in only 2 per cent. of the cases. Warren subdivides this group into fibro-cystadenoma, and papillary cystadenoma.

The fibrocystadenomas are regarded as an exaggeration of the periductal fibroma from which they differ by the secondary proliferation of the epithelium. The tumors occur in young single women, are of slow growth, of long duration and are generally painless. While the prognosis is favorable in this class, the degree of epithelial hyperplasia makes a carcinomatous degeneration likely, so that removal of the tumor should always be practised.

In the papillary cystadenoma we have a more common and at the same time more dangerous affection. Clinically

we have to deal with a tumor formation seen in advanced life and especially in women who have borne children. As in the first variety, the tumor is slow in growth, of long duration, and is usually situated near the nipple, from which a bloody discharge occurs in the majority of cases. While they rarely attain large size, and are almost always slow in growth, such complications may arise and make the diagnosis of a malignant degeneration most difficult. The following case occurring in Dr. Frazier's service illustrates this fact.

CASE XII.—Surgical pathology (2562). The patient is single, 22 years of age, and has always been perfectly well with the exception of her breast condition. This began eight years ago when she noted a small lump in the right breast, which followed a blow received a short time previously. The tumor was painless and showed no tendency to grow until 18 months ago, when enlargement and pain began. This has continued until the growth is as large as a child's head and causes discomfort from its weight. The mass involves the entire breast, is not adherent to the underlying structures, and the skin is freely movable except at one point near the nipple. Several soft cystic spaces which are surrounded by dense tumor tissue are noted. There has been no discharge from the nipple, several axillary nodes are palpable. The case was regarded as malignant from the history and the entire breast and axillary lymphatics removed.

The specimen on examination shows an encapsulated mass which is neither adherent to the skin or the pectoral fascia beneath. Near the nipple a round reddish encapsulated tumor about the size of an egg is present. From the base of the fibrous capsule many fine papillæ project and almost fill the cavity. This tumor is distinct from the mass which occupies the remaining portion of the breast, which presents a dense white appearance, and is divided by numerous septa into small nodular masses. The tissue is unyielding and fibrous and in a few places only shows a tendency toward papillary formation, as in the smaller growth first described.

Microscopically two distinct processes appear to be present in the breast. Sections from the dense tissue show a process resembling periductal fibroma. Here the stroma is very cellular, indicating an active proliferative process, and surrounds the

ducts and acini. In the latter the epithelium is in a state of hyperplasia, forms a lining composed of several layers, has filled the lumen in a few acini and in others lines delicate papillæ. The cells are cuboidal in shape, regular in outline and some have the pale translucent appearance seen in proliferating epithelium. In the small tumor a similar fibro-epithelial hyperplasia is apparent, but in this case the epithelium is even more active, and papillary formation marked. The cystic spaces here are in places almost filled with papillary overgrowth, but careful examination of many slides does not show any malignant tendency in spite of the general proliferative change. The axillary nodes were not involved in a metastatic growth, but were hyperplastic.

The process is a cystadenoma in which the papillary character is seen in the small growth, the fibrous form predominates in the remaining portion of the breast.

From the very rapid growth of this tumor, its size, long duration and pain, a malignant degeneration was suspected. The degree of hyperplasia of both epithelial and connective tissues proves that such a process was imminent, and that the tumor was probably removed prior to such a transformation.

When malignancy is about to develop in such tumors, they apparently undergo a variety of changes and degeneration. Gassert [19] reports a case of cystadenoma and carcinoma in which he found areas resembling the lactating breast, simple cystic dilatation, adenomatous formation with cystic degeneration, papillary proliferation and finally carcinoma. He believes that the adenomatous proliferation and the cysts were independent.

The difficulty in differentiating malignancy in early cases of this disease is emphasized by a comparison of the rapidly growing benign tumor just reported with the following instance of malignancy, in which the size, clinical history and pathologic findings of the case differ materially.

CASE XIII.—Surgical pathology (1425), service of Dr. Edward Martin. Mrs. S., aged 35, married, mother of several children. No previous breast disease. A few weeks ago she noted a small tumor in the right breast which was painless,

originated without any cause so far as could be ascertained, and was freely movable. The tumor was not adherent to the skin, there was no discharge from the nipple which was slightly inverted.

On opening the cyst which was about the size of a walnut, a bloody fluid escaped. The lining was smooth except at one point where a small papillomatous nodule, red in color projected.

Sections for microscopic examination were taken from the small papilloma and the portion of the cyst wall from which it grew. The epithelium lining the papillary projection is very irregular, appearing in one or more layers of cells which are very irregular in their shape. In other areas the papillæ have fused so that a dense collection of cells appears. In the stroma irregular acini are seen, the cells here present irregularities and do not completely surround the lumen, occasionally all attempt toward glandular formation is lost and cellular masses lie in the tissues without a limitating membrane. Some of these cellular collections containing atypical acini are found in the fatty tissue of the breast directly outside the cyst wall, and indicate that the process is extending to the surrounding parts.

Diagnosis: Papillary cystadenoma; adenocarcinoma.

A radical operation was refused in this case. Eighteen months later the patient was found to be free from any breast disorder.

The cystadenoma have been studied carefully by many pathologists and especially with the object of determining the probability of a malignant degeneration. Greenough and Simmons [20] found adenocarcinoma associated in 15 per cent. of twenty cases. The cancer appeared to be associated with the existence of the papillary tumor, and the type was the same in all three instances. Reliable symptoms of early malignant degeneration are wanting, for we find that the malignant papillarycystadenoma occasionally is of long duration, and may be seen at a fairly early age. The diagnosis must therefore be made at the operation, when inspection of the cyst and the surrounding tissues will reveal any infiltration. In certain cases of malignant papillomatous cysts which Bloodgood has observed, the diagnosis could be made clinically from the

history of long duration of the tumor, discharge of blood from the nipple with retraction of the same and skin involvement. Such breasts revealed a pathologic picture entirely different from benign cysts; instead of a papilloma in the wall there was a soft fungus growth resembling a medullary carcinoma. In diagnosing these cases much emphasis should be laid upon the character of the cyst contents as well as in cancer cysts to be considered later.

Cancer Cysts.—By this term is meant a malignant transformation in the wall of a benign cyst, a class of cases distinct from the cystadenomata, and the cystic changes seen in abnormal involution. While the origin of the cancerous degeneration is not quite clear, the retrogressive changes which the epithelium undergoes can be regarded as responsible. The lining cells of the cyst become compressed or atrophied, and in addition retrograde changes in the fibrous wall may occur, these factors playing a more or less important rôle in the degeneration which may follow. The origin of the cancer is not so important when once the disease is well established, for then a radical operation is indicated. The diagnosis in early cases, from the purely clinical stand-point, presents the same difficulty as is encountered in other instances of malignancy secondary to benign affections—reliable evidences of the metamorphosis are wanting. Here again the exploratory incision and examination of the cyst must be our method of diagnosis. Bloodgood [21] states that this depends upon the contents of the cyst, if bloody and a benign papilloma is not present, a cancer should be suspected. Granular or grumous material in the cyst should lead to the diagnosis of cancer of the cyst wall. Palpation will also be of great value in detecting the presence of small carcinomatous nodules, or diffuse infiltration of the wall. In certain instances the wall becomes rough or reticulated, which in the presence of hæmorrhagic contents, as in a case I have recorded elsewhere,[22] should lead to the diagnosis of cancer. In the cancer cysts in particular, Bloodgood emphasizes the greater certainty in diagnosis from the gross appearance than from rapidly frozen sections.

Mastitis.—The relationship between inflammatory affections of the breast and the development of carcinoma at a later period has been recognized for many years. Two types of mastitis are important in connection with carcinoma; in the first the inflammation is associated with a very rapid and malignant growth of the tumor, so that the entire breast becomes involved. This form is uncommon, is most frequently seen during pregnancy or lactation, which states seem to hasten the process. Volkmann has given the name "carcinomatous mastitis" to this disease; by others it has been termed "acute carcinoma."

By far the more important group of infections coming under the scope of this paper are encountered in the inflammations which occur as complications of lactation, the tissue changes resulting act as the predisposing factor in the development of cancer. A similar effect is seen in the granulation tissue caused by the healing of wounds, or hæmatomata following traumatism. The scar thus formed does not possess the resistive power of normal tissue, and constitutes a locus minoris resistentiæ. Chronic irritation then occurring in an individual whose vitality is diminished by old age may cause proliferative changes in the epithelium, which growing deeper and deeper into the breast finally become malignant and appears as a carcinoma. Guleke [16] believes that the epithelium which undergoes such proliferation arises from ducts and acini which are cut off by the contracting scar tissue.

The presence of points of induration or distinct nodules as after effects of inflammation or traumatism, and the many clinical reports of carcinomatous formation in direct relationship with such areas, indicate clearly that we have to deal with a condition which may be more common than suspected. While statistics cannot be relied upon to furnish us with absolute proof of the occurrence of mastitis previous to the development of cancer, yet the reports published indicate that such inflammation has existed in 10 to 20 per cent. of the cases. The time elapsing from the inflammation until malignant metamorphosis ensues varies from several weeks to many

years, in advanced cases 20 to 30 years may elapse before severe pain and rapid enlargement indicate that carcinoma may be developing. Such symptoms, on the other hand, are not always present, for Steinthal [17] records an instance in which a small carcinoma was accidentally found in a mass of chronic inflammatory tissue. Many cases of carcinoma are seen in which a previous mastitis has not caused changes in the breast recognizable by palpation. Whether the malignant degeneration here is independent of the previous inflammation or not, is difficult to determine. Scheurer [18] believes that although an apparent restoration to the normal state has occurred, yet certain minute changes are present, which remaining latent for years, finally through some unknown irritation, manifest themselves as a malignant tumor.

From a practical stand-point, the question can be raised whether we are justified in permitting areas of induration to remain, especially if the patient is near the menopause. Certainly in view of the possibility of cancer, such cases should receive as careful attention as other forms of benign disease, early removal of which may prevent cancer and its greater danger.

The author wishes to express his thanks to Dr. J. W. White, Dr. Edward Martin, Dr. C. H. Frazier, Dr. A. C. Wood, Dr. J. H. Jopson, and Dr. J. B. Carnett for permission to use the clinical data of the cases reported.

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DR. WILLIAM L. RODMAN said that it is beginning to be appreciated that all benign tumors in every part of the body are liable to malignant degeneration, and that this is more likely to occur in the breast than elsewhere, on account of the fact that the soil of the mammary gland is fertile to cancer. He did not, however, think it to be appreciated as sufficiently as it ought to be that the danger of any benign tumor undergoing malignant change sooner or later, is as great as it is; as Dr. Speese had said. there are certain varieties of neoplasms more prone to undergo carcinomatous change than others. The papillary cyst adenoma he should consider the most likely to undergo malignant change. In the first place it is with difficulty differentiated from malignant disease; so is involution mastitis. Papillary cyst adenoma is, however, more likely to involve the central part of the gland and to be just behind the areola; whereas involution mastitis particularly is more likely to involve the periphery of the gland. There would be more difficulty in differentiating between papillary cyst adenoma and involution mastitis than between papillary cyst adenoma and carcinoma. The age of the patient is also a help. Papillary cyst adenoma is usually more apt to occur about 50, and there is very little pain, whereas there is much pain in involution mastitis. There is, however, such a similarity regarding age in these various conditions, that the only safe way of making a diagnosis is by an exploratory incision, which should only be done after the consent of the patient has been obtained for a complete operation should one be deemed necessary. He had always believed a great deal in the value of macroscopic appearances, still he would take issue with Dr. Speese, in that he did not think the macroscopic appearance can possibly be of as great value as

the frozen section. He would not depend entirely upon a frozen section, but he did think them practically safe and reliable and never operates a suspicious case without the presence of a competent pathologist and his freezing microtome. This plan he had followed for 17 years and had known but two mistakes made in diagnosis by depending upon frozen sections. Very recently some of the most prominent members of the Philadelphia Pathological Society materially differed concerning the nature of a breast he removed at the Presbyterian Hospital. Some thought it sarcoma, others carcinoma, and others still that parts were carcinomatous and parts sarcomatous. These examinations were not made quickly and after frozen sections but weeks and months after the breast was removed. It was referred to a committee for final report. If such differences occur after the better and more accurate way of interpreting the microscope, of course it can, and will occasionally occur when frozen sections are relied upon.

DR. GEORGE G. ROSS said that he would not belittle frozen sections, but they are usually made with great haste, the selection of the portion is not always a careful one, and there is great possibility for error. If a portion of the most suspicious part of the tumor were always selected, and if the section were always well stained, these reports would be of much greater value. He believed, however, that the macroscopic appearance, particularly to a man who has had experience, is a better guide in deciding at the operating table. The ideal time for operating on carcinoma is before it really exists.

DR. GEORGE P. MÜLLER said that he did not believe malignancy as a rule occurs in fibroma; in those cases where it does develop he believed it to be accidental or else to be one of the fibrous forms of cystic adenoma, because the tissues are so compressed that the epithelium is practically atrophic and incapable of malignant reversion. With regard to enlargement of breast tumors in pregnancy one should be careful not to attach too much importance to rapid growth during this period. As to the age of the patient, he would take exception to the common statement that 45 is the age at which cancer appears, or that 40 is the age at which the diffused cystic hyperplasia is most apt to be seen. Every one has seen cases of cancer under thirty, and age should have nothing to do with the diagnosis in the individual case.

As to the use of the frozen section he agreed with Dr. Speese; he had used it for many years and had come to distrust his own judgment in the matter. He believed with Speese and Bloodgood that the frozen section had not the value that many surgeons attach to it and that more attention should be paid to the naked eye appearance of the growth.

The plastic operation of Warren should be adopted with great caution, and only used in cases of abnormal involution of the cystic type.

LEUKÆMIA RESEMBLING PYONEPHROSIS.

Dr. Francis T. Stewart reported the case of a man aged 47 years, who was admitted to the Jefferson Hospital July 23, 1909, for pyonephrosis which had ruptured into the bowel.

The trouble began 16 years ago after an attack of typhoid fever, when he began to complain of dull pain in the left loin. The pain was associated with a swelling in this region which disappeared with the cessation of the pain. The pain and tumor have come and gone a number of times, sometimes suddenly but more often gradually. They have occurred as often as once a month and have sometimes remained absent for as long as four months. The pain is usually dull and aching in character but occasionally severe and lancinating and sometimes referred to the left testicle. The last severe attack occurred in May, 1909. There was intense and agonizing pain, with fever, sweating, vomiting, and headache. The urinary output was lessened during the attack but towards its end became whitish, profuse, and finally red and fetid. About four days after the onset of this paroxysm he was suddenly relieved of his pain and shortly afterwards passed a large quantity of sanguineous pus by the bowel. Since this time the bowel movements have always contained some pus and blood.

The patient is tall and thin and has lost much weight. The skin is pale and dry and the mucous membrane anæmic. There are many enlarged lymphatic glands in the posterior cervical triangles, both axillæ, and both groins, the largest measuring about 2.5 cm. in diameter. They are painless and freely movable. The thoracic organs are normal.

The abdomen is symmetrical in contour, soft, and not painful. There is an indefinite resistance in the left flank but no rigidity

or demonstrable mass. The liver and spleen are apparently normal.

Blood examination: Hæmoglobin 80 per cent., red cells 6,000,000, color index .6, leucocytes 9200. The feces showed blood and pus but no free fat. Rosenberger's test for tubercle bacilli negative. On cystoscopic examination the bladder and ureteral orifices showed no pathological change. A catheter was passed up each ureter to the kidney without meeting with any obstructions. The left kidney secreted 8 c.c. while the right secreted 75 c.c. of urine. The urine from each side was practically identical and showed no abnormality except a few red blood cells; no tubercle bacilli could be found. Methylene blue appeared in the urine from the right kidney in one hour and in the left in one hour and fifteen minutes after being swallowed. No methylene blue appeared in the stools although some of the drug was injected directly into the pelvis of the left kidney. An X-ray examination of both kidneys and ureters showed no stone.

Having improved somewhat while in the hospital the patient decided to leave and to return if the improvement did not continue. In September he was readmitted to the hospital; he had lost more weight and the pain had returned. Upon reinvestigation the spleen could be palpated, and extended from the seventh rib to within two fingerbreadths of the iliac crest. The urine was normal except for a slight trace of albumin. The blood showed: hæmoglobin 65 per cent., red cells 4,300,000, white cells 56,000, color index .7. A differential count of the leucocytes showed polymorphonuclears 6 per cent., lymphocytes 81 per cent., hyaline 7 per cent., degenerated 6 per cent. Later the lymphocytes ascended to 89 per cent. Proctoscopic examination revealed a few small ulcers and numerous polypi, the largest of which was one and a quarter inches in diameter; they were pale, firm and slightly tender. On the 28th of September the temperature rose to 101 and the pain in the loin was severe; during the night the temperature fell to normal, the pain almost wholly subsided, and there was a profuse discharge of pus and blood from the bowel. The following day the spleen could not be palpated.

In this case, in the opinion of Dr. Stewart, the pain and swelling in the left loin are due to engorgement of the spleen, which shrinks as the result of a free hemorrhage into the bowel, a not uncommon complication in leukæmia. The pus in the feces

comes from the ulcers and polyps in the rectum and colon; perhaps the latter are leukæmic tumors.

SARCOMA OF THE PSOAS MUSCLE TREATED BY EXCISION, X-RAY AND COLEY'S FLUID.

Dr. Stewart also reported the history of a man, R. G., 27 years of age, who was admitted to the Jefferson Hospital September 12, 1908. In December, 1907, while lifting a heavy stone he felt a sharp pain in the right iliac region, but this subsided after a time and left a dull ache. About four months later he noticed a swelling in the lower right abdomen; this increased in size and finally filled the iliac fossa, almost reaching the median line. It was very firm on palpation but could not be demonstrated with X-ray. It was smooth, and moderately tender, and was intimately attached to the iliac bone. When the thigh was extended there was an audible click in the hip-joint. On September 15, 1908, an incision was made along the iliac crest and Poupart's ligament, severing the muscles of the abdominal wall. The peritoneum was then displaced inwards, the iliac vessels, which skirted the inner side of the growth, retracted towards the median line, and the tumor, together with the iliopsoas muscle, from which it sprang, excised. It was necessary to sever Poupart's ligament in order to cut the muscle close to the femur. The growth had infiltrated the inner table of the ilium over an area about 3 inches in diameter. The bone in this region was removed with a curette and the bleeding checked with Horsley's wax. The wound was sutured except at its upper end, which was left open for the exit of a gauze drain. On microscopic examination the tumor proved to be a round-celled sarcoma. About a month after operation a diffuse swelling could be felt beneath the scar and this was thought to be a recurrence. A sinus still existed at the point where the drain had been placed but there were no evidences of retention of pus or of inflammation. The patient was given X-ray treatment every second day. Two months after operation the skin in the region of the wound became red and tender and the patient was forced to his bed because of fever and weakness. This area of inflammation, probably erysipelas, extended down over the gluteal region and upper third of the thigh. The sinus was still open. The fever lasted about 10 days and disappeared with the subsidence of the inflammation. The swelling in the

right abdomen slowly increased in size until the advent of the erysipelatous inflammation, after which it seemed to remain stationary. On February 25, 1909, the subcutaneous administration of Coley's fluid was begun, but no reaction could be obtained, although the dose was run up to 7 drops. On March 3 a new fluid was obtained, 3 drops of which gave a decided reaction. These injections were continued up until March 25, the maximum dose being 8 drops. A second febrile reaction was not obtained. During the administration of Coley's fluid the growth began to shrink, finally disappearing sometime in May, 1909. The X-ray treatment was continued throughout the treatment, and is still given at intervals to guard against recurrence. The patient has gained 40 pounds in weight.

Dr. George P. Müller said with regard to the first case, that he saw one of a similar nature some 8 or 9 years ago when a resident in the German Hospital. A woman of about 35 was admitted to Dr. Deaver's service with a history of having been delivered of a child; six weeks previously she had fever and chills and was thought to have an infected uterus. A blood count made as a matter of routine showed 100,000 leucocytes, and a diagnosis of acute lymphatic leukæmia was easily made.

With regard to Dr. Stewart's second case, he recalled a patient, 28 years old, admitted to Dr. Frazier's wards in the University Hospital, upon whom he operated for a large lymphosarcoma of the neck; this was dissected out and in a month there was a recurrence along the trapezius which was also removed. The patient was then treated with Coley's toxin and is well at the present time and free from recurrence, one year after operation. He had had other cases treated with Coley's toxin with entire failure

Dr. John H. Gibbon said that he saw both the cases reported by Dr. Stewart. In the first without the blood count one might easily have made the mistake of operating.

The second case reported is the second case he had seen with an apparent cure after the use of Coley's toxin. He had used Coley's toxins religiously in inoperable sarcoma, and even in cases where he thought he had removed the growth. The other case is that of a young girl 16 or 17 years of age upon whom he operated at the Jefferson Hospital in February, 1908, removing an osteosarcoma of the humerus. He wanted to do a shoulder-joint amputation, and explained the situation to the family, but

they would not consent, although the girl herself was anxious to have it done. He then started her out on Coley's toxins and also gave her X-ray treatment which Dr. Manges carried out persistently. He did not remember just how long it has been since the operation, but about 18 months, and she is now apparently perfectly well. These are the only two cases in which the combination of the X-rays and Coley's toxins have in his experience worked an apparent cure, although he had combined this treatment in practically all of his cases. This case reported by Dr Stewart was 27 years of age, Dr. Müller's patient 28, and his own case under twenty, so there are three cases under thirty and he thought we should therefore continue to use these two remedies in even what appear to be hopeless cases.

Dr. John B. Shober added one case of sarcoma occurring in a young married woman, cured by means of operation and treatment by the X-ray without Coley's toxin. The patient was 27 years of age. Upon operation upon a growth in the forearm he found a cystic spindle-celled sarcoma developing from the interosseous tissue. By an extensive operation he thought he had removed the entire growth, including the cyst wall, but after a few months there was recurrence of the tumor. He then urged operation which she declined. She subsequently fell into the hands of Dr. Pfahler, who treated her with the X-rays and he sent her to see him some years later entirely cured.

His limited experience with Coley's serum in these cases has been disappointing. He would prefer in the future to rely upon first operation and then the use of strong radium bromide, the X-rays, or both.

Dr. William L. Rodman said there is one point in connection with this case, and that is if it does prove to be a radical cure it will be most interesting, insomuch as it was a round-celled sarcoma, which is the least favorable variety for the toxin, as pointed out by Coley himself. Personally he had been using Coley's toxin since 1894 and had seen a decided improvement in many cases but was sorry to say he had not seen a cure in any cases. He had seen several cases cured by the X-rays alone. He had no faith in the treatment of carcinoma by the X-rays as he thought on the whole, more harm than good had resulted from such treatment. Only superficial epitheliomata are cured by X-ray treatment. It is very different with sarcoma. In all inoperable sarcomata Coley's toxins and the X-rays should be used conjointly as both are often helpful and sometimes curative. He had seen several of Coley's cured cases and a colleague in Louisville, Dr. M. F. Corrum, at his suggestion, used the toxins successfully 13 years ago in a very advanced sarcoma of the throat.

Dr. Francis T. Stewart (in closing) said he had used Coley's toxin in all inoperable cases of sarcoma and in most, if not all, cases of sarcoma after operation, but this was the first time he had had any encouragement. Whether this improvement is due to the Coley's toxin, the X-ray, or the erysipelatous infection, or whether it is due to some other condition of an obscure nature, he did not know.

STATED MEETING, HELD DECEMBER 6, 1909.

The President, Dr. William J. Taylor, in the Chair.

OPERATION FOR WRY-NECK.

Dr. James K. Young presented a boy, 11 years of age, upon whom he had operated, July 7, 1909, at the University Hospital, for torticollis of a severe type, due to injury in birth. There was a marked contraction of the sternocleido mastoid muscle with contraction of the platysma. An open operation was performed on account of the extensive amount of tissue involved in the contracted tissues. Two vertical straight incisions were used, one over the sternal and one over the clavicular portions instead of the transverse or flap method. The sternal and clavicular portions of both were divided by careful dissection. The deep jugular vein was exposed during the division of the clavicular portion. The deformity was corrected as fully as possible and fixed in plaster dressing for four weeks. Subsequently a special wry-neck dressing was applied.

SACRO-ILIAC DISPLACEMENT.

Dr. Young presented a man, aged 23 years, who entered the University Hospital, October 26, 1908. He had been injured in the sacrolumbar region two years before by being thrown upon a railroad track. He suffered from severe pains in the sacro-iliac region for two years and at the time of the first examination he had severe spasms of the rectospinal muscles; there was pain over the sacral region extending down toward the anus. An X-ray examination was negative for displacement, but the test which was applied indicated that there had been a displacement of the sacrum on both sides. A special spring fixation brace was designed and applied and he has been given the high frequency current by Dr. Pancoast in the X-ray department of the University Hospital. His improvement has been marked. The apparatus which he wears has some advantages over the spring appli-

ance used by French surgeons and by Dr. Goldthwaite, in that it extends around the sides of the pelvis and holds the pad more securely in an even position; the pressure can be increased in the upper and lower parts by the lateral straps which are attached to a stockinette abdominal belt.

Dr. John B. Shober said that sacro-iliac displacement was a much more frequent condition than was commonly supposed. The fact that these cases are very often reduced spontaneously is one of the reasons they are not more frequently recognized. The cause is almost invariably traumatism and the diagnosis not difficult in recent cases if one is familiar with the possibility. He had seen but two cases of sacro-iliac displacement. In one patient reduction was accomplished easily, a few hours after the accident. The other case was one which ran a longer course. He had never had to deal with a double displacement. As a rule, after the reduction the lameness disappears in a week or ten days. While the displacement is present the lameness is very marked.

Dr. Young, replying to inquiry in regard to the diagnosis and reduction in difficult cases of sacro-iliac displacement, said that the diagnosis had been very carefully given by Goldthwaite. The test consists in placing the patient for the anterior test on the back with, say, the right limb fixed on the bed; then the left leg is lifted from the bed without flexing the knee. If it does not go as high, if the extension or flexion of the limb when the knee is extended is not equal to the other side, and if the pain is acute, we suspect an anterior displacement of the sacrum. The posterior test can also be made by extending the limb upward with the patient lying on the face. The reduction of these displacements is generally difficult. There is a method of reducing these displacements varying in every case. In those patients who periodically have the displacement reduced there is frequently associated curvature or some other condition. He recalled one such case with a lateral curvature of the spine which he was able to correct by complete reduction and proper bandaging.

The pain is very acute in all cases, and many cases formerly considered lumbago and sciatica are really instances of sacro-iliac displacement.

ACUTE POTT'S DISEASE.

Dr. Young presented a girl, aged 13 years, who was seen by him July 10, 1909, at the Polyclinic Hospital. She was then suffering from an acute inflammation of the cervical vertebræ. The history was that on April 7, 1909, she laid all night on a lounge with her head hanging over the end. In the morning it was found that the head was drawn to one side and she experienced great pain which increased greatly and was not improved by medical treatment, especially massage and electricity, and she was referred to Dr. Young by Dr. Victor Loeb. For the correction of the torticollis she was placed in bed for ten days with head extension. The pain at this time and preceding the first examination was of a most acute character and the patient was prostrated. The X-ray revealed an inflammatory lesion of the third cervical vertebra. A special extension head brace designed by the reporter was applied, and subsequently she was sent to the seashore. The deformity has disappeared and her recovery is now complete.

PERINEPHRIC ABSCESS.

A CLINICAL CONTRIBUTION BASED ON THIRTY-SIX CASES.

BY MORRIS BOOTH MILLER, M.D.,
OF PHILADELPHIA.
Professor of Surgery, Philadelphia Polyclinic.

It is the purpose of this paper to report a series of thirty-six cases of perinephric abscess previously unreported, to call attention to certain factors in the etiology and diagnosis of this condition, and to emphasize the importance of clinically differentiating between two types of suppuration about the kidney,—that arising secondary to demonstrable renal infection and that having its origin elsewhere, or at least giving rise to no urinary phenomena.

As is well known the subject has received contributions from many writers and several collections have been made for the purpose of studying these abscesses from various standpoints. Compared to some of these, notably the two hundred and thirty cases of Küster, my series is a meagre one but it has the value of including a fair proportion of observations in the urine, blood and pus which may be of interest. However, before taking up practical considerations I want to call your attention to some anatomical factors which seem to have clinical significance and particularly to refer to certain conclusions which may be drawn from the observations of Zuckerkandl and Gerota on the renal fascia and of Stahr and Cunéo on the lymphatic distribution.

The parenchyma of the kidney is completely and closely covered by the fibrous capsule, a thin, translucent but comparatively strong membrane. From it pass into the cortex delicate connective tissue fibres which are easily torn in the normal state. When the fibrous capsule reaches the hilum it passes over the outer wall of the papillæ and the calices of

the pelvis and provides a thin layer to cover the renal blood-vessels to their respective sources. Posteriorly the extension of the fibrous capsule is much stronger and constitutes the so-called suspensory ligament of Englisch. Part of it merges with the sheath of the aorta and part is continuous with the fascia covering the lumbar origin of the diaphragm.

The subperitoneal tissue in the region of the kidney forms a distinct fascia, the fascia renalis, which divides at the convexity into an anterior and posterior layer. The anterior passes in front of the kidney, the renal vessels, and the ureter to the other side of the body in front of the great vessels. It is better developed over the left kidney. Above the upper pole it fuses with the posterior layer and the united fascia is lost over the diaphragm. The posterior layer passes behind the kidney and over the fascia covering the transversalis, quadratus lumborum, and psoas muscles to the vertebral fascia. At the inner margin of each of these muscles the attachments are quite strong, and this also serves as an important element in the support of the kidney. At all points the renal fascia is separated from the fibrous capsule by the fatty capsule, but scattered connective tissue bands pass through the fat from one to the other. Inferiorly, while the anterior and posterior layers of the renal fascia approach each other, they do not join but separately disappear in the loose areolar tissue of the iliac region.

The fatty capsule is an envelope of adipose tissue found between the renal fascia and the intimate fibrous capsule of the kidney. Its distribution is not even, since the fat is relatively thin about the upper half of the kidney, accumulates at the hilum, is fairly abundant about the lower end, and is thickest over the posterior aspect of the lower pole at a point nearest the surface of the body. As its purpose is presumably protective the reason for this arrangement is obvious. The fatty capsule is not found at birth and is more or less deficient until puberty; it varies somewhat in amount in different persons and largely disappears during emaciation. The blood-supply is derived from two arteries given off from

the renal artery just before or just after it divides, and from a branch of the first lumbar artery. All three are very small and surgeons are familiar with the slight bleeding encountered in the fatty capsule in operative procedures.

The lymphatic circulation is made up of three networks,—one in the cortical portion, one situated immediately beneath the fibrous capsule, and one beneath the peritoneum in the superficial portion of the adipose capsule. The efferents from the cortical network pass through the medullary substance and emerge at the hilum in several vessels which pass along the renal vein to the upper nodes of the lateral lumbar group. The network beneath the fibrous capsule communicates both with the cortical and subserous networks and drainage is probably by the two routes in equal degree. A few vessels also pass around the kidney beneath the capsule to the cortical terminals. The subserous network drains into the upper lateral lumbar nodes independently of the cortical efferents; it lies in the pathway of, and is a part of, the lateral lymph drainage system. The lumbar lymphatic nodes are from twenty to thirty in number and form three irregular longitudinal rows along the abdominal aorta. They extend from the second lumbar vertebra to the bifurcation of the aorta and with the communicating vessels form the lumbar plexus. Without describing in detail the arrangement and precise location of these nodes it is important to note two points. First, that the median row drains, either directly or through the mesocolic nodes, the entire lymphatic flow of the large intestine except the cæcum and appendix, which sends efferents to the mesenteric nodes. Second, that the lateral rows receive drainage from the kidneys, suprarenals and posterior abdominal walls,—from the iliac and through them the inguinal nodes,—from the bladder,—from the testicles, penis, and prostate gland in the male,—from the clitoris, and portions of the vagina and uterus in the female,—and from the adjacent subserous tissues.

From the foregoing hasty compilation of the known anatomy of the perinephrium, certain deductions may be

drawn. At once the fact presents itself that we are dealing with an area of fat which is bounded on all sides by connective tissue layers of relative imperviousness, viscerally by the fibrous capsule, externally by the renal fascia. The only lapse is below where the two layers of the renal fascia are lost separately in the iliac fascia. Adipose tissue generally throughout the body is indifferently nourished compared to other structures. Here this is particularly true since the circulation is dependent upon three tiny arteries, the largest of which is scarcely the size of a knitting-needle. And, furthermore, it is evident that the connective tissue coverings are not such as to readily permit of an emergency increase in blood-supply to combat infection. On the other hand, the lymphatic arrangement in this neighborhood is highly suggestive in offering explanations of perinephric suppuration. The cortical network probably does not concern the immediate subject, but the network beneath the fibrous capsule and the subserous group of lymph vessels undoubtedly provide channels through which infection passes to the perinephrium, and with these the relation of the lateral lumbar nodes and collateral vessels to the adipose capsule should be taken into consideration. Were it not for the fact that the communication between the subcapsular and subserous networks is free and abundant, it is likely that perinephric suppuration would never get its infective impetus from the kidney except in the rare instance of a calculus penetrating the parenchyma, or pelvic wall. As it is, the renal origin of perinephric abscess is well recognized, and pyelitis, pyelonephritis, pyonephrosis, and acute hematogenous infection of the kidney are all assigned important places in the causation of this disease. Undoubtedly the route taken by infection may be through the intercommunicating vessels between the two networks, but the phase of a quicker access to the adipose capsule through sudden small tears or rupture should be considered. To the writer the latter solution seems quite reasonable, at least in the chronic forms of renal infection, since the effect of inflammation upon the fibrous capsule is much the same as it is on

the peritoneal covering, namely, to cause thickening with hardening and thereby tending to block the lymph channels. Many pus kidneys are seen which never have given rise to extraneous suppuration and the contrary is the exception rather than the rule.

Admitting that some perinephric abscesses start from an adjacent diseased kidney, I want to call attention to what seems to me a far more frequent cause. The usual history in these cases is that a patient of about thirty years of age is taken ill with pain in the lumbar region, associated with some fever, with stiffness of the back, and occasionally with a tendency to flex the corresponding thigh. In a short time evidences of abscess appear in the deep structures about the kidney. On prompt evacuation of the pus the patient quickly gets well and returns to work none the worse for the experience. The urine is usually normal, or, at the most, only shows the changes incidental to fever from any cause, and the kidney at operation appears to be unaffected. What is there in this picture to make us assume that the responsible infection came through the kidney? Why ignore the recognized tendency of all infections to travel by the lymph channels, and to overlook the vast area below the kidney for portals of entry? Already attention has been directed to the anatomical reasons for an area of lessened resistance in the fatty capsule, and the intimate relation of the subserous network to the lateral lumbar nodes and to the contributing lymph channels has been mentioned. It seems fair to assume that any infection which affects the lateral nodes has potentially the power of creating perinephric abscess. Etiologically the bacterial invasion may occur at any point along the lymphatic drainage of certain defined areas. Of these probably the most important is the lower genito-urinary tract. A number of instances have been reported where there was an antecedent infection of the urethra or prostate, or where infections of the testes or the cord have been followed by perinephric suppuration. In women portions of the vagina and uterus may transmit bacteria to the adipose tissue through

the lymphatics. Horsley recently has reported in detail three cases occurring in women after parturition, and Hirst noted a case following infection after abortion. Furthermore, it should be borne in mind that bladder infections may be responsible without an ascending infection through the kidney. The posterior abdominal wall can be another direct source of infection, and, finally, any of the lymphatic vessels draining into the iliac nodes may serve to carry micro-organisms within the perinephric zone.

With this extensive drainage area there are opportunities for infection without recognition of the exact avenue through which it came, and a brief reference to the literature will show that many cases are assigned to unknown causes. When the difficulty of determining the source of infection in adenitis of the groin, axilla, neck, or elsewhere, is considered, and when it is realized that with these the point of invasion is often inconspicuous or not found, it seems reasonable to apply the analogy to the deeper lymphatics and to conclude that many perinephric abscesses of unrecognized source must have their origin from the lymphatic system below the kidney. That more of these abscesses are not observed is doubtless due to the well-known fact that the lymph nodes, generally speaking, destroy the micro-organisms in transit and it is only in the exceptional case that infective agents get near the perinephrium.

While it is unwise to state that any infection of the abdomino-pelvic cavity may not give rise to perinephric suppuration, yet there are a number of conditions which have been held responsible for which there is insufficient anatomical basis. I refer to such diseases as appendicitis, cholecystitis, abscess of the liver, spleen, or pancreas, and ulcerative colitis. Each and all of these may cause subphrenic or subdiaphragmatic abscess but hardly perinephric abscess. The reason is clear since the drainage from these tracts is into the median row of the lumbar nodes and hence traverses a route relatively remote from the adipose capsule. Of course an exception must be made where any of these diseases cause a suppuration

involving the posterior subperitoneal tissues, and possibly a special exception should be made to cover those portions of the colon which are in direct contact with the kidney, where the law of continuity would prevail. It has also been stated that abscess of the lung and empyema may occasion perinephric abscess. Nearly forty years ago Bowditch called attention to the rather decided tendency to secondary pulmonary involvement and his observations have been confirmed by other writers (this complication is well illustrated in the present series). The solution lies in the situation of the upper lateral lumbar nodes upon the crus of the diaphragm which is penetrated by their efferents passing to the thoracic duct. That pleurisy, pneumonia, and empyema may readily follow perinephric abscess is true, but the upward flow of drainage would render the reverse extremely questionable. Doubtless some perinephric cases are not recognized until there is an associated pleurisy or empyema and the result has been assumed to be the cause.

There is still a class of cases which do not fit in with those of renal origin or those having a more remote source through the drainage system. I refer to the few cases which are apparently due to hematogenous infection, such as those following typhoid, measles, influenza, or peripheral suppurations. We are familiar with the pathological proposition that the blood can carry micro-organisms under certain conditions, but the details of this proposition and the relation it may bear to perinephric abscess are still beyond our knowledge. The hypothesis has been advanced that by reason of the large amount of blood passing through the kidney and its peculiar structures, there is a tendency toward lodgment of bacteria and their escape into the perinephrium without renal lesion. I have not been greatly impressed by this theory since it would seem that the same doctrine might apply with equal force to the spleen or liver. Furthermore, it is of interest to recall that in conditions where we know the blood contains bacteria, such as tuberculosis, perinephric suppuration does not occur without prior involvement of the kidney; or again

in septicopyemia where often both blood and urine are loaded with bacteria perinephric abscess is unknown. There are as good or even better reasons why infection should pass directly to the adipose capsule by its own vessels, and therefore it is well to conclude that while a small percentage of cases apparently are hematogenous, yet the exact route the infection takes is unknown.

Cold, over-exertion, and trauma were considered prominently by the older writers among the causes. In the light of modern pathology we can afford to ignore the first two, but trauma would certainly seem to occupy a place as an important contributing factor. In many cases there is a clear history of injury to the back and inferentially the same conclusion may be reached in other ways. The greater proportion of men over women with the greater likelihood of injury to the former, the common occurrence during the years of greatest physical activity, the predominance of right-sided abscess over left-sided, due to the lower position of the right kidney, and the frequent early localization of the pus in the fat covering the lower pole posteriorly, all strongly suggest that external violence plays a contributing part. The rarity of the disease in children, who naturally are exposed to injuries, is doubtless explained by the absence or scanty development of the perinephric fat. Cumston thinks that children pay a severe penalty for the exemption in their greater predisposition to neoplasms. The relation of injury as well as the hematogenous source of the infection was shown experimentally many years ago by Albarran, who injected pyogenic bacteria into the ear of a rabbit, then bruised the perirenal tissues, and caused artificially an abscess.

The relative proportion of cases due to renal disease to those having an infectious source elsewhere is an interesting question and one which possesses practical importance. Of late there seems to be a tendency to emphasize the renal origin. Ransohoff in a recent admirable article on the surgery of the kidney, in speaking of perinephric abscess, says that "suppurations within the perirenal fat are for the most part

due to suppurative disease within the kidney resulting from calculous pyelitis, tuberculosis, or metastatic abscess," and later quotes Israel's series of forty-three cases, in twenty-one of which the disease was consequent upon stone, pyelitis, or tuberculosis, and in thirty-four of which the kidney was involved. Guiteras believes that nearly all cases are due to disease of the kidney and has reported fifteen cases, fourteen of which he assigns to renal causes. Upon these were done eight nephrotomies, four nephrectomies, and one partial nephrectomy with three deaths. I may say in passing that a critical analysis of his reports discloses six cases in which a reasonable doubt may be raised as to the source of infection. On the other hand the collections made by other writers and the general text-book teaching would tend to show that the cases of renal origin comprise not over a third of the total number. In Küster's comprehensive series of two hundred and thirty cases, fifty-nine, or about 26 per cent., were due to suppuration in the kidney. Among the cases herewith reported I have been able to include only four cases of renal origin, two of which are certain and two are probable. In making up this series I have collected from a majority of the largest hospitals in Philadelphia all the cases I could find (except two or three where the records were very inadequate) over a period of four or five years. It may be that a few cases were classified under the more dominant kidney lesion and hence overlooked in the search, but certain it is that from this collection there is no ground to conclude the proportion of cases due to renal infection to be greater than 20 per cent., if that high.

This question cannot be lightly dismissed on account of its bearing on treatment and prognosis. If we are to assume that perinephric suppuration spells renal disease in the great majority of cases, it naturally leads to a thorough search for the underlying renal cause. This is not warranted if these abscesses are, in the main, simple affairs requiring only early recognition, free evacuation, and drainage. It is beyond question that the type of abscess which occurs secondarily to

renal infection is a serious malady and has a high mortality, probably in the neighborhood of 40 per cent. Nephrotomy or nephrectomy is usually indicated, either at once or, if possible, at a later afebrile period with material lessening of the risk to life. My contention is that this form is not the ordinary one and does not comprise more than a fourth to a fifth of the total number. In the commoner type where the infection comes from the drainage area below the kidney, or from hematogenous sources, the mortality is comparatively low under modern surgical treatment, apparently approximating 10 per cent., and even this mortality is largely due to the pulmonary complications to which the disease is so prone.

It should be possible in most cases to differentiate between the two forms. The history of prior attacks of renal colic, or frequent alterations in the quantity or quality of the urine, or the detailing of symptoms indicative of chronic cystitis should arouse suspicion of the renal source of infection in any case of perinephric abscess. Some attention should be paid to the greater average age of patients suffering from this type of abscess. Further valuable data may be obtained by careful examinations of the whole urine and of separated specimens obtained by ureteral catheterization, even carrying the investigation to the point of learning the bacterial contents of the urine from each kidney. The skiagraph can be generally relied on to show stone, and the recent reactive tests for tuberculosis might be applied in any suspected case, guarding of course against an existing tubercular focus elsewhere in the body. Finally, if the case reaches the operating table without a definite diagnosis beyond that of perinephric abscess, the presence of a causative and material lesion in the kidney may be shown by the admixture of urine with the pus, the existence of sinuses leading into the cortex or pelvis, the occurrence of a free or partly free calculus in the abscess cavity, or the gross alteration in size and shape of the kidney.

It is not my intention to discuss the general symptomatology, since the important clinical phenomena associated with perinephric abscess are too well known to warrant repetition.

However, as it sometimes happens that the correct and prompt diagnosis is difficult, or perhaps not made until too obvious for error, I want to call your attention to two observations which may throw light upon the doubtful case. That such difficult cases occur is well shown in the present series where one case was treated as typhoid fever for nearly a month despite a rising leucocytosis before correctly interpreted; another was operated on for acute appendicitis and the mistake not rectified until the continuance and augmentation of the symptoms caused the surgeon to operate again; and in four cases the abdomen was opened transperitoneally in an evident hazy state of mind of the operator as to the true condition. And these cases occurred in the services of skilled and experienced surgeons whose examinations were doubtless checked by alert hospital internes.

The first observation which I wish to emphasize is the existence of a fixed point of greatest tenderness in cases of perinephric abscess over the fascial triangle of Grynfelt and Lesshaft, or as I prefer to call it the kidney triangle, bounded by the erector spinæ, the twelfth rib, and the internal oblique. Just as there is more or less muscle stiffness and referred pain in appendicitis but with a constant area of maximum tenderness at or near McBurney's point, so I believe we have in perinephric abscess the same phenomena with reference to the kidney triangle. This is the place where the kidney is nearest to the surface of the body and it makes no difference whether the abscess lies in its usual primary location, over the lower pole posteriorly, or whether it is affected indirectly through the substance of the kidney, the response to pressure at this point is instantaneous and characteristic. By reason of the relations to the lumbar plexus of nerves the reference of pain is exceedingly common in these cases, and as muscular rigidity may cover so wide an area it may be well to bear in mind this triangle in routine examinations. I do not wish to urge the phenomena as pathognomonic since a limited experience has taught me to regard it as of value in all inflammatory diseases of the kidney, but not to the same extent

as in perinephric abscess. Brewer speaks of tenderness in the costovertebral angle as a pathognomonic sign in acute hematogenous infection of the kidney, and doubtless some surgeons have noted it in relation to other surgical diseases of the kidney but the fact remains that its significance has not been generally recognized.

The second diagnostic point is one apparently of great interest and importance, but at this time I offer it more or less tentatively as to definite conclusions. I refer to the exceptionally high leucocytosis found in perinephric suppuration. In twenty-three cases of this series the blood count is recorded more or less completely, and at once it will be seen that without exception the number of white blood corpuscles is high—in the lowest 11,700, in the highest 48,800, with a general average of 24,700. It is generally known that the chronic infections of the kidney give a low leucocytosis, and I am under the impression that in the acute suppurations of the kidney proper the increase of white cells does not approach such a high average, but whether this factor is constant enough to be of positive value in differential diagnosis requires further investigation. The only reference so far found is that given by Emerson, who noted in five cases of perirenal abscess the leucocytes to range from 19,000 to 36,000, in four cases of pyelitis from 10,000 to 19,500, in two cases of pyelonephrosis from 18,000 to 28,500, and in two cases of hydronephrosis from 6,400 to 9,000.

CASE REPORTS.

Case I. Pennsylvania Hospital, 140 ('08).—G. L., aged 24, stone mason, native of Italy. Admitted March 6, 1908; discharged July 9, 1908. Family and previous history uninteresting, except that he had pneumonia on the left side two years before admission.

Present illness began 25 days ago with a hard cough and 15 days later he noticed a tumor in the abdomen which has not increased in size since he first found it. He has slight pain in the mass when he coughs. Bowel movements normal and not painful; urine seems normal in amount and no pain on micturition. No loss of weight or strength; no pain in walking; no pain in back except when he turns in bed.

In the lower left quadrant is a moderately large, tense, and smooth tumor. It is fixed and immovable, not influenced by respiration, not

connected with the spleen. Urine 1024, trace of albumin, a few hyaline casts, epithelial cells and debris. Leucocytes 16,600, hæmoglobin 77 per cent., no malarial organisms. March 17, 1908, leucocytes 11,150; repeated urine examinations show no change. March 20, 1908, cystoscopic examination was done and a ureteral catheter introduced into the pelvis of the left kidney. Urine secreted in 3.35 hours was 2½ ounces. Examination of this urine gave sp. gr. 1025, trace of albumin, no casts, no pus.

Operation, March 24, 1908, by abdominal incision and a large, fluctuating round tumor was found back of the peritoneum on the left side. It was not connected with the spleen or kidney. Abdominal contents were normal and the wound closed. By posterior incision the abscess was opened and about two pints of greenish-yellow pus were evacuated. The laboratory report shows no organisms of any kind by smears or cultures.

Practically the temperature was slightly subnormal throughout. Convalescence was prolonged by depth of sinus and slowness of healing, but he was discharged as well July 9, 1908.

Comment.—No urinary symptoms, no pain in walking; cough showed slight pulmonary involvement; temperature subnormal throughout; diagnosis not clear until operation which was first by anterior incision, then posterior for drainage.

Case II. Pennsylvania Hospital, 133 ('08).—S. A., aged 22, negress, domestic. Admitted March 25, 1908; discharged May 6, 1908. The history shows smallpox six years before admission, also syphilis three years ago. With present illness she has been sick two months and in bed two weeks, complaining of pain in both iliac regions, of fever but no chills, of pain and burning with urination, and of pain with bowel movements. Has had slight cough and expectoration. No history of injury and no evidence of pelvic infection except that suggested by a profuse vaginal discharge. Notes do not show results of physical examination except the presence of a secondary skin eruption.

April 6, 1908. Complained of pain in the right side about the lower chest and upper part of the lumbar region. Two days later a large, smooth swelling was slightly perceptible in the right lumbar region. This side of the abdomen was rigid, tender, and an indefinite mass could be made out. Leucocytes 44,550. Urine, sp. gr. 1030, faint trace of albumin, many white blood corpuscles, and a few granular and hyaline casts.

April 9, 1908. By lumbar incision a large quantity of foul smelling, dark colored pus, with gas bubbles in it, was drained. No bacteriological report; recovery uneventful. Temperature range was irregular but not above 101 degrees. The leucocyte counts subsequent to operation were as follows: April 10, 46,700. April 13, 15,000. April 17, 7650.

Comment.—Source here may have been through the skin eruption, or from the pelvic organs; urine showed trace of albumin and a few casts but nothing to suggest infected kidney; high leucocytosis; irregular fever up to 101 degrees.

Case III. Pennsylvania Hospital, 239 ('08).—J. D. M., aged 11,

native of Italy. Admitted April 13, 1908; discharged July 18, 1908. Past history negative; ill 55 days with pain over left kidney and later swelling; no chills or sweating; voids urine normally; no œdema of lower limbs. Small, thin, anæmic boy; temperature 100 4/5 degrees, pulse 140, respiration 32; distinct tenderness over left lumbar region; soft fluctuating tumor; local redness and some œdema. Urine: Acid, sp. gr. 1025, trace of albumin, no casts, few epithelial cells and leucocytes, a morphous urates, phosphates, and debris. Hæmoglobin 50 per cent., white blood corpuscles 38,500.

April 15, 1908. Incision in left flank and considerable quantity of greenish-yellow rather thick pus evacuated. Cavity extended toward spine but there was no caries. Bacteriologically the cultures showed pure staphylococci.

July 18, 1908. Discharged but sinus still running.

August 8, 1908. Returned from Atlantic City, examined and found well. Temperature range was irregular, running from normal to 101 degrees.

Comment.—A staphylococcus infection of unknown source in a lad of 11 years; urine practically normal; temperature range irregular up to 101 degrees; high leucocytosis.

Case IV. Pennsylvania Hospital, 1546 ('07).—E. F., aged 23, negro, laborer. Admitted August 28, 1907; discharged October 30, 1907. He gave a history of having fallen off a trolley car three weeks before and having had since then severe pain in the left side with difficulty in the commencement of the act of micturition. After his fall he stopped work for two days, then worked five days, but by that time the pain had become so severe that he could not lace his shoes or walk erect. The muscles in the left lumbar region were very painful and this pain radiated through the left side of the abdomen to the umbilicus. He has had slight cough with yellowish sputum which sometimes has been tinged with blood. Has had fever but no chills.

Somewhat thin, rather anæmic man; bodily movements affecting the trunk apparently painful. Temperature 102 3/5 degrees, pulse 90, respiration 24. Chest expansion equal but over the lower left lung the breath sounds suppressed and note impaired. Heart, liver and spleen normal. Abdomen showed no distention but it is tender over the left side, from the costal margin to the iliac crest. No tumor made out. Urine, clear, faintly acid, 1030, trace of albumin, one or two faintly granular casts. Leucocytes 30,350, hemoglobin 92 per cent. Urine from ureteral catheterization of the left kidney showed normal amount and only 3 or 4 red cells. Sputum gave no tubercle bacilli. Operation on August 30, 1907, by incision parallel to the spine which opened a large perinephric abscess. Temperature was normal two days later and no fever appeared subsequently. The sinus continued to discharge for a long time and he was not discharged until October 30, 1907. Even at that time he continued to complain of a little pain in the left lumbar region.

Comment.—Trauma may have been a factor in this case but on the other hand it may have served only to call his attention to his malady; cough and pulmonary involvement on same side as the abscess; temperature about 102 degrees, but promptly fell to normal when abscess was opened.

Case V. Polyclinic Hospital, 17632.—F. D., aged 18, negro, concrete worker. Admitted August 17, 1909; discharged September 6, 1909. family and previous histories were negative. Two months before admission had a punctured wound of left index finger which became infected and was opened; later necrosis of distal phalanx developed and it was removed. Two weeks prior to admission he commenced to have pain in the right flank which was worse on walking or when he would try to lie on that side.

Lightly muscled but generally well developed young negro. Lips dry, tongue coated, index finger of left hand suppurating. Pain was localized on the right side below the rib edges and outside the erector spinæ. Temperature 101 2/5 degrees. Heart and lungs normal; no cough. Chest movements were equal but the abdominal muscles moved more on the left side. No tenderness over the stomach, liver, appendix, or pelvis; no rigidity of the recti. Outside of the semilunar line and above the umbilical level there was decided muscle stiffness and a quick response to pressure. Tenderness marked from the crest of the ilium to the rib edges and its acme was at the kidney triangle. Indistinctly a mass could be felt. Blood showed leucocytes 18,200, erythrocytes 3,800,000, hemoglobin 60 per cent. Urine was normal in all respects.

On August 21, 1909, under ether anæsthesia an oblique incision was made over the right kidney and about an ounce of creamy pus was evacuated. The abscess was in the fatty capsule and was posterior to the lower pole of the kidney. The pus showed staphylococci. Recovery was uneventful. Temperature range was about 101 degrees but it dropped to normal six days after operation.

Comment.—Source of infection probably hematogenous from felon of left index finger; urine normal; temperature range was about 101 degrees.

Case VI. Polyclinic Hospital.—J. P. F., aged 35, native of Russia. Admitted April 27, 1903; died May 7, 1903. Married 16 years with 7 children; now pregnant in third month; seven years ago after childbirth had "inward trouble but has been well some time." Present trouble began six months ago with pain in right side below costal line and posterior to mid-axillary line which gradually grew worse; went to bed three weeks ago; a swelling in this location developed eight days ago. History was defective as patient could talk English very indifferently.

Heart and lungs normal. Abdomen very tender on right side between costal margin and crest of ilium in axillary line, where a hard mass was palpable which extended apparently backward. Temperature 99 degrees, pulse 80, respiration 20. Urine, weakly acid, 1022, albumin present, red and white blood cells, no casts. Leucocytes, 28,000.

April 29, 1903. Incision over right kidney and a large quantity of pus was evacuated; abscess cavity seemed to point in the direction of

the appendix; kidney apparently uninvolved. Gauze and tube drainage. Bacteriological examination showed the only organism was a typical growth of streptococcus pyogenes.

April 30, 1903. Without chill developed within 24 hours of operation pleural friction sounds over anterior surface of right lung with fine râles in the lung; progressed into typical pleuro-pneumonia of entire lung. Died May 7, 1903; no autopsy. No local developments in the kidney area beyond some foul smelling discharge.

Comment.—A streptococcus infection of unknown origin, possibly pelvic; urine showed nothing significant; within 24 hours of operation patient developed pleuro-pneumonia of corresponding side and died 8 days later.

Case VII. Presbyterian Hospital, 37731.—P. L., aged 39, native of Ireland, fireman. Admitted October 26, 1906; discharge January 31, 1907. Illness began a week before admission with symptoms suggesting typhoid fever but he also had severe pain in the right side posteriorly and laterally below the costal margin. There was no tenderness to pressure, no rigidity, no mass. His condition was diagnosed as typhoid fever. He continued to complain of pain in the region of the right kidney and a month later it was noted that this area was prominent; there was tenderness and rigidity and a mass could be felt at the lower margin of the ribs. In a day or two fluctuation could be felt and it was noted that he lay with his right thigh flexed and efforts to extend it caused increased pain. Temperature range was between 101 degrees and 102 degrees. Blood count showed a leucocytosis as follows: October 28, 8,800; November 12, 13,600; November 26, 15,200. Urine was normal throughout except once a few hyaline casts were seen. On November 28, 1906 an incision was made into the abscess and over twenty ounces of pus liberated. The abscess cavity ran down to the kidney and another part ran upward and backward. The kidney was palpated and found not enlarged. Three days after operation temperature had reached normal and subsequently there was no fever. Convalescence was slow and he was not well until January 31, 1907.

Comment.—A case diagnosed and treated as typhoid fever for a month despite a rising leucocytosis; no urinary changes and kidney found unaffected at operation.

Case VIII. Presbyterian Hospital, 37344.—T. E., aged 49, native of Italy. Admitted September 27, 1906; discharged October 3, 1906. Family history was negative; married and father of 3 children; chancre 23 years ago; also had malaria with jaundice, tender liver and enlarged spleen. Present illness began September 4, 1906 with fever, chill, and sweat. Had severe pain in the lower right side of back which was later felt down the thigh and leg like a sciatica. On admission complained of severe pain in the right renal region and down the leg in the course of the sciatic nerve. He was found to have pronounced rigidity and exquisite tenderness in right lumbar space, from costal margin to pelvic crest. Attempts to flex the thigh were resisted and apparently caused great pain. There was lateral curvature of the spine with concavity toward

the affected side. No kyphosis or spinal tenderness. Urine was normal; leucocytes, 29,600. Refused operation and was discharged unimproved.

Comment.—A case of undoubted perinephric abscess which declined operation; urine normal; high leucocytosis; pain was mainly referred to the sciatic area and efforts to flex the thigh were resisted.

Case IX. Presbyterian Hospital, 39146.—K. M., aged 52, female, native of Pennsylvania. Admitted July 22, 1907; discharged October 5, 1907. Married and mother of 7 children. Two weeks before admission she had an attack of indigestion with severe pain under the heart; indigestion persisted but she worked until the evening before she applied to the hospital, when she was taken ill with pain under the right breast, getting worse and gradually involving the entire right side. The pain was continuous and uniform in character; it commenced high but on admission patient referred it to a point to the right of the umbilicus. Full inspiration caused increase of pain at the lower margin of the thorax, and she described the pain as being "like a boil."

Examination: Abdomen distended, large and flat; patient on right side and in that position a tumor on the right side could be felt, its border extending two inches to the left of the umbilicus. No jaundice, no œdema. Vaginal and rectal examinations negative.

August 4, 1907. The pain was generally located in the right hypochondrium and slightly below the umbilical line. The tumor was cystic and thought to be gall bladder. Temperature range from 100 degrees to 102 degrees. Patient tended to turn in bed toward the right side.

Operation on August 5, 1907 when a vertical incision was made through the right rectus exposing a large perinephric abscess. This was opened through greatly thickened peritoneum and about two quarts of pultaceous material in sero-sanguineous pus was evacuated. The color was dark like decomposed blood. The cavity extended to right kidney which was of normal size. The temperature dropped in 48 hours from 103 degrees to 98 degrees.

August 24, 1907. Patient developed congestion of base of right lung with pleurisy which cleared up by September 2, 1907. Convalescence was delayed by an attack of cystitis which appeared September 8, 1907, and she was not discharged until October 5, 1907, and at that time she was entirely well.

Repeated urine examinations were negative until August 22, 1907, when some epithelial cells and numerous leucocytes were noted and on the development of cystitis the usual urinary findings were noted, but at no time were there any casts. No blood examination and no report on the pus.

Comment.—Transperitoneal opening of a large abscess; diagnosis difficult; kidney not affected and urine normal; convalescence delayed by pulmonary congestion and a late attack of cystitis.

Case X. Presbyterian Hospital, 26433.—A. S., laborer, aged 39, native of Italy. Admitted November 8, 1901; discharged January 11, 1902. His previous history showed that three years before his admission he had been treated in the dispensary for an injury to the left side as

the result of being struck by an engine. Further than this he has been strong and healthy.

Present illness began twelve days ago with pain in the abdomen, especially in the epigastrium; no gastro-intestinal phenomena; no chill or fever. He felt somewhat better after the first attack of pain, but three days before admission he "chinned" himself three or four times on a door. This markedly increased his pain and it became definitely located on the left side about the base of the chest. With this he has had dyspnœa and a slight cough. Bowels have been constipated.

Examination showed on the left side from the midaxillary line to the vertebral column and to the lower margin of the ribs, an area of dullness the size of the palm. This area was tender on pressure but no œdema was present and no fluctuation made out. There was some congestion of the base of the left lung. Leucocytes, 16,800. Urine showed very few leucocytes, no red corpuscles, trace of albumin, and a few hyaline and granular casts were found with the centrifuge only.

November 18, 1901. Leucocytes, 15,800. Apparent deep seated fluctuation in the lumbar region of the left side; complained of some pain.

November 21, 1901. Dr. Willard made an oblique lumbar incision over the involved area. Nothing abnormal was found until the perinephric fat was reached, when a large abscess was opened and considerable quantity of "laudable" pus was drained; no involvement of the kidney. Bacteriological examination of the pus gave abundant staphylococci and an unidentified bacillus. Temperature chart showed slight fever, 99 degrees to 100 degrees, until two days after operation, when it dropped to normal. Discharged, well January 11, 1902.

Comment.—Urine practically normal; pulmonary phenomena; pus showed staphylococci and an unidentified bacillus.

Case XI. German Hospital.—P. W., male, aged 25 railroader. Admitted July 14, 1909; discharged August 17, 1908. Nothing of note in his previous health except five years before he had had an attack of rheumatism. A month prior to admission was taken ill with severe pain in the right lumbar region; the pain was dull and burning, never cutting, and it did not radiate; constantly present but varied in intensity; had no vomiting and no urinary disturbances. The only physical sign was excessive tenderness in the right lumbar region; no mass felt. On July 18, under ether, a quantity of foul smelling pus was evacuated from an abscess about the lower pole of the kidney. Temperature range was about 100 degrees, quickly falling to normal after the operation. Urine was normal in amount and specific gravity; no pus was found, and, aside from a very few hyaline casts, it was normal in all respects. Ureteral catheterization showed no difference in the urine from the right and left kidney. Leucocytes, 14,520. Pus showed bacillus coli commune as the principal organism.

Comment.—B. coli commune infection of unknown origin.

Case XII. German Hospital.—A. E., male, aged 26, knitter. Admitted September 8, 1908; discharged October 1, 1908. For three weeks prior to applying to the hospital he had had constant dull pain in the left

lumbar region, gradually getting worse and preventing sleep. No radiation of the pain. Examination showed in the left kidney region distinct bulging with marked tenderness but no definite mass could be felt. Three days after admission a large pocket of pus was opened by vertical incision over the left kidney. The abscess lay posterior to the kidney which was not involved. There were numerous careful urine examinations in this case but aside from a very faint trace of albumin, a few hyaline casts on one occasion, and a few pus cells seen four days after operation, there was nothing abnormal. The temperature range was between 99 degrees and 100 degrees until the abscess was opened. The leucocytes were 34,600. Pus showed staphylococcus albus.

Comment.—High leucocytosis; infective agent was the staphylococcus albus; urine practically normal.

Case XIII. German Hospital.—T. L., aged 40, groceryman. Admitted December 31, 1907; discharged January 18, 1908. There was nothing of interest in his family, previous or personal history. Three weeks before admission he was seized with sharp, sticking pain in the left lumbar region; this was aggravated on motion or deep inspiration and radiated across the belly and to the spine; it was tender to pressure. There was marked tenderness over an area 10 cm. in diameter, situated posterior to the posterior axillary line from the rib margins to the crest of the ilium, with some rigidity of the muscles; much tenderness was present on deep palpation below the ribs and a sense of resistance was encountered at a point corresponding to the left kidney. Two days later under ether anæsthesia an abscess cavity surrounding the kidney was opened and 300 c.c. of reddish, foul smelling pus was liberated. This contained bacillus coli commune. Temperature ranged from normal to 101 degrees until the operation, when it became normal. Urine on four examinations showed a very faint trace of albumin, two granular casts, a very few leucocytes, no pus, and was acid in reaction. Leucocytes, 11,700; polynuclears, 89.5 per cent. Convalescence uneventful.

Comment.—Urinary findings unimportant; no ascertainable cause; infective organism bacillus coli commune; temperature from normal to 101 degrees.

Case XIV. Presbyterian Hospital, 36 ('09).—A. D., aged 50, housewife. Admitted June 18, 1909; died July 17, 1909. This patient was first treated at the hospital from May 7, 1908 to June 11, 1908 for hemorrhoids and cystitis and underwent the clamp and cautery operation. She returned and was under treatment from January 25, 1909 to February 11, 1909 for carbuncle and cystitis; again she was operated on, the carbuncle was excised and a ureteral stricture was dilated. Her third admission was on June 18, 1909, when she was found to have a large mass in the region of the right kidney with a reddened and œdematous area in the flank. The following day an incision opened a large abscess containing about two quarts of foul pus. It is unfortunate that the notes in this case are not full. On July 9, 1909 a sinus was opened down to the kidney and a secondary incision was made above Poupart's ligament but efforts failed and she died July 17, 1909. The temperature was

practically subnormal throughout. Urine on six examinations was alkaline, with large quantity of sediment, albumin always present, large amount of pus, large number of red and white blood corpuscles; later there were fewer whites and an increase of reds.

The autopsy showed a hypertrophied kidney with a suppurating ureter the size of the little finger; perinephric suppuration; pyonephrosis and calculus; bladder seat of chronic cystitis and contracted.

Comment.—Perinephric abscess of renal source with clear history of urogenous infection; urinary reports characteristic of this form of perinephric suppuration; death followed an afebrile illness.

Case XV. Philadelphia General Hospital.—M. R., male, aged 19, iron worker, native of Norway. Admitted March 8, 1906; discharged June 30, 1906. Complained of pain which was constant though in varying degrees and sometimes stabbing in character in region of the right kidney. It had affected him for about three months but getting slowly worse. Specific urethritis four months ago. Examination showed no chest abnormality; abdomen was slightly rigid in the right flank but no mass could be distinguished. Skiagraph showed no calculus or other distinguishable pathological condition. On March 31, 1906, under ether, about an ounce of yellowish white pus was evacuated from an area about the lower pole of the kidney. No defect of the renal surface of the pelvis could be made out. Leucocytes on March 28, 1906 were 16,200. Urine showed several granular casts, few red blood cells, few leucocytes, and urates. The pus contained streptococcus pyogenes. The wound granulated nicely and healed promptly.

About a month later he developed a prostatic abscess. The late notes are defective but apparently he still later developed laryngeal tuberculosis.

Comment.—An abscess due to streptococci from a mixed infection of the urethra; no evidence of kidney involvement.

Case XVI. Philadelphia General Hospital.—T. S., male, aged 34, laborer. Admitted December 24, 1904; discharged February 13, 1905. Complained of throbbing pain in left lumbar region extending downward along the crest of the ilium to Poupart's ligament. Patient was well up to two weeks ago when the pain started in the groin, and it has since been severe enough to disable him. Nothing of note was found on general examination except a hard mass could be felt in the upper abdomen on the left side. Three examinations of the urine gave normal results.

On January 16, 1905, under ether, an abdominal incision was made through the right rectus, when the tumor was found to be retroperitoneal and behind the left kidney. This wound was closed and by a lumbar incision about a pint of pus was liberated. There was nothing abnormal about the kidney. The pus showed staphylococcus pyogenes aureus in pure culture. The temperature was remittent in type up to about 102 degrees, but it fell to normal the day after operation. The wound healed well and he was discharged February 13, 1905.

Comment.—An average case due to staphylococcus aureus infection of unknown source; urine normal.

Case XVII. Philadelphia General Hospital.—T. M., male, aged 59. Admitted June 20, 1909; died July 14, 1909. Entered the hospital complaining of pain in the right loin and gave a history of gonorrhœa some months before, followed by stricture. He stated that three weeks prior to admission he fell as a result of dizziness, striking his back; the next day he hurt his back again but applied a plaster and thought nothing more of it. However, the pain persisted and got worse, so he came to the hospital.

Examination showed marked arterio-sclerosis, weak and irregular heart action but no murmurs. There was marked rigidity and some redness and swelling of the right loin; the right knee was drawn up and the patient seemed unable to straighten it. The day after admission he had a bad attack of syncope with almost imperceptible pulse. The heart was found acutely dilated and the sounds were almost absent. The lungs showed fine râles in front and behind. Leucocytes were 13,500. Urine: specific gravity, 1010, albumin, few red blood cells, many pus cells, granular casts, amorphous urates and triple phosphates.

On June 22, 1909, under local anæsthesia, an abscess containing about two pints of pus was opened. This pus showed streptococci and pneumococci. His temperature dropped from 101–102 to normal but his pulse and respiratory rates remained up, urine secretion kept below 40 ounces, and he died on July 14, 1909 of myocarditis and cardiac dilatation.

Comment.—The pus in the urine would indicate that the abscess had a renal source; death was due to myocarditis but it was likely accelerated by the infection; the pneumococci and streptococci gave rise to no special phenomena; corresponding thigh was flexed.

Case XVIII. University Hospital.—E. L. W., female, aged 58. Admitted December 1, 1904; discharged January 27, 1905. Twelve years ago she began to have attacks of renal colic and suffered eighteen months; she then recovered and has been well until the present illness. Four weeks prior to admission she began to have pain which was then indefinitely located in the abdomen. Within 24 hours pain and tenderness became located in the left loin and left hypochondrium; it was dull, constant, worse on jarring, and with no radiation. She was worse and better for ten days. Then a fever of about 102 degree abated and for a week she was fairly comfortable with a temperature of about 100 degrees. During the last three days her fever has increased and the pain is worse. The urine has been persistently loaded with pus and a few red cells.

On admission the left loin tissues showed œdema, with tenderness too great to permit of deep palpation. Urine: Acid, 1022, trace of albumin, loaded with pus, and some columnar epithelium. An abscess containing about a quart of greenish pus was opened and found to extend toward the median line to the aorta and above and below the kidney about two inches. The kidney showed at the middle of its convex surface a sinus the size of a dime and at the lower pole there was another sinus. Probes passed through these entered the pelvis and

touched. The upper pole was nearly normal and still showed some fat about it. After operation the urine contained much blood which soon disappeared; hyaline, granular, and pus casts, with many pus cells were observed. Urine drained through the back in free amount for a long time and the sinus was not closed on discharge. There was persistent cystitis during most of her stay at the hospital. Temperature was normal except during the first four days.

Comment.—A case of abscess having renal origin; two sinuses found in the kidney; persistent cystitis.

Case XIX. University Hospital.—S. S., male, aged 60, insurance agent. Admitted July 28, 1905; discharged August 16, 1905. Patient has had rheumatic attacks and thinks for about 25 years he has had "kidney trouble," characterized by pain in the back and frequent micturition. He dates his present trouble to an attack of grippe five months ago, but states the present trouble started two months ago when he noticed a small swelling on the back at the upper border of the ilium, on the right side. A week before admission a small swelling was also noted in the right groin. Has had pain in back and right hip and leg when he walks.

On examination a swelling about the crest of the ilium and upper sacrum was noted. It seems to have deep attachments but not to the spine or ilium. It was the centre of an area of induration about 4 by 6 inches. Urine, clear, 1020, no albumin, no sugar, few hyaline and granular casts. On July 29, 1905, incision along upper border of ilium showed many sinuses dissecting the muscle layers and apparently having perirenal origin. Another opening was made internal to the anterior iliac spine.

Patient was discharged on August 16, 1905, but re-admitted on September 14, 1905, with the observation that the sinuses had continued to discharge and two weeks before swelling was noted about the upper abdomen. Again he was operated on and this time the kidney area was thoroughly explored. Two quarts of flaky pus were evacuated from an area posterior to the kidney, which was found unaffected. Subsequently he developed cough and expectoration and chest examination showed still later that there was obliteration of the pleura from the sixth rib downward on the right side. Convalescence was slow. Pus showed staphylococcus aureus and albus.

Comment.—A case which might suggest renal origin; defective drainage caused a second operation; pulmonary complications; micro-organisms were s. aureus and albus.

Case XX. University Hospital.—R. L., female, aged 45. Admitted October 26, 1903; discharged December 2, 1903. Gave an excellent previous and family history. Present illness began 12 days before admission with abdominal cramp, which she ascribed to the onset of the menstrual period; on the following day she went to bed with chills and fever; pain radiated from the right lumbar region to the left side of the body and hip; no jaundice but some vomiting. About a week later her physician noted a prominent mass in the right loin which was

oval in shape and well defined. She could not straighten her right thigh or take a deep breath without excruciating pain. She was not aware of any alteration in the quantity or quality of the urine.

On admission the temperature was 103, pulse 104, respiration 26. Urine: Specific gravity 1032, cloudy, trace of albumin, granular casts, numerous white blood cells, no reds. Leucocytes, 26,940. Abdomen was distended but not tender; on right side extending from the rib borders to the pelvic brim, posteriorly to axillary line and anteriorly to an inch beyond the umbilicus, there could be felt on deep palpation a firm swelling which was not very tender. It was evidently covered by the intestines, and the size and position of the mass was unaffected by inflation of the colon. Pelvic examination showed a perineal and cervical tear, cystocele and prolapse.

Operation on October 31, 1903, and a large perinephric abscess drained; convalescence was uneventful. Pus contained the bacillus coli commune.

Comment.—The origin of the infection may have been pelvic; the infective agent was b. coli commune.

Case XXI. University Hospital.—H. A. G., male, aged 28, bookbinder. Admitted October 20, 1903; discharged November 1, 1903. Nothing of interest in previous, personal or family history. Present illness began about a month before admission, with dull pain in left upper lumbar region, principally under lower two or three ribs; two days later pain was markedly increased by a jolting ride and he went to bed; six days later a swelling in the upper lumbar region was noted; temperature was continuously elevated between 100 degrees and 101 degrees. On admission pain and tenderness were somewhat less than they were. No pleuritic symptoms, no gastro-intestinal disturbances, no alteration in urinary function.

Patient lay with thighs slightly flexed, spine bent a little both antero-posteriorly and laterally. Respirations hurried but no dyspnœa. Urine was normal in all respects. Left loin and lumbar region were the site of a resistant mass, extending from the pelvic brim up to and under the rib edges; whole area very sensitive, hot, and red; dullness from the nipple line to the spine; some bulging in the loin and swelling was very tense. Operated on immediately; quantity of pus not noted but it contained bacillus coli commune. Patient did well and wound was nearly healed when discharged. Temperature range was between 99 degrees and 100 degrees until three days after operation.

Comment.—No cause can be suggested; b. coli commune infection.

Case XXII. German Hospital.—J. W., male, aged 21, bookkeeper. Admitted February 15, 1907; discharged March 30, 1907. Was taken suddenly sick four days before admission with cramp-like pains about the umbilicus, was nauseated and vomited. Admitted to hospital with symptoms of acute appendicitis but also had rigidity of muscles in the right loin. At operation the next day the incision was made in the flank not opening the peritoneum. A large quantity of thin, malodorous, yellowish pus was evacuated from an abscess which extended upward

above the kidney. Pus was found burrowing over toward the left side, the vena cava and ureter were exposed, and many pockets opened. No notes on the kidney condition. Urine examination showed very few changes from the normal. Pus gave the colon bacillus. On February 15, 1907 blood examination showed leucocytes, 16,500, polynuclears, 83.6 per cent., and on February 25, 1907 leucocytes were 13,400 and hæmaglobin 72 per cent. The temperature chart shows an even temperature of about 102 degrees until the sixth day, then a drop to 100 degrees and not reaching normal until March 8, 1907.

Comment.—Symptoms suggesting appendicitis with rapid onset and relatively high fever; urinary changes unimportant.

Case XXIII. German Hospital.—J. C. B., male, aged 32, lineman. Admitted May 17, 1907; discharged June 15, 1907. Gave history of specific urethritis ten years ago and chancroid two years ago. Present illness began one month before admission, with dull pain in right side, which continued and increased in severity. Later he had symptoms suggesting renal colic which were relieved by ice-bags.

No report of physical examination. Operation May 18, 1907, when an abscess was opened. Pus showed staphylococcus aureus. Temperature was practically normal. Urine showed a trace of albumin, a few casts, and a few leucocytes.

Comment.—Probably urethral infection by staphylococcus aureus.

Case XXIV. German Hospital.—S. L., female, aged 60. Admitted May 31, 1907; discharge July 3, 1907. She began to have cutting pain in left hypochondrium one month before admission, which was severe and increased on deep inspiration; it has been associated with irregular vomiting and constipation. Has had chills and fever and has lost about 15 pounds in weight, but has had no cough.

On examination an indurated, tender, slightly movable mass the size of a child's head was felt in the left hypochondrium and extending almost to the navel; it did not move with respiration. Operation June 10, 1907. Lumbar incision opened a small abscess containing thick, dirty yellow pus. Anterior to the kidney was an indurated and immovable mass which was not opened. A definite diagnosis was not made. The urine showed a constant trace of albumin with occasional granular casts and pus. Blood: On June 1, 1907, hæmaglobin 55 per cent., white blood corpuscles 19,200, red blood corpuscles 3,270,000, polynuclears 83 per cent. On June 5, 1907 the leucocytes were 23,300. The pus gave in culture the bacillus coli commune.

Comment.—It is probable that this case was one of pyonephrosis since she continued to have a slightly septic temperature until her discharge.

Case XXV. German Hospital.—J. McG., female, aged 18. Admitted June 12, 1907; discharge July 24, 1907. During three months prior to admission had dysmenorrhœa and for several months a yellowish vaginal discharge. Operated on by Dr. Deaver on day of admission for acute appendicitis, through an incision in the right loin; appendix found pointing upward and backward, deeply congested and covered by plastic exudate. After operation her temperature which was 103 degrees, dropped

to 100 degrees, but almost at once it commenced to oscillate between 99 degrees and 103 degrees, gradually getting higher. It was found that there was great rigidity of the lumbar muscles and the right half of the abdomen. On account of the marked tenderness no mass could be felt. On June 29, 1907 Dr. Deaver again operated and through a lumbar incision opened and drained a perinephric abscess. Eight days later her temperature was normal and convalescence was uneventful. The leucocyte report was as follows: On June 12, 13,600; on June 24, 24,000; on June 29, 22,400. The urine showed a trace of albumin but other changes were unimportant. The laboratory report on the appendix showed only inconspicuous lesions. The pus from the abscess contained staphylococcus aureus.

Comment.—Diagnosed as acute appendicitis and appendix removed with no improvement in symptoms; seventeen days later a perinephric abscess was opened and patient promptly recovered; probable source of infection was pelvic; no material urinary phenomena.

Case XXVI. German Hospital.—A. G., male, aged 18, musician. Admitted November 18, 1906; discharged December 8, 1906. Three weeks before admission noticed pain in region of left kidney, at first intermittent but later constant. Does not micturate frequently. Has had chills and fever. Chest examination was negative; abdomen showed rigidity in left upper quadrant and posteriorly a swelling was noted below the costal margin and back of the posterior axillary line which fluctuated slightly. On November 19, 1906 a large abscess was opened and drained. It lay over the lower pole of the kidney and communicated with another smaller pocket toward the median line.

The urine showed a trace of albumin with some granular and hyaline casts. Leucocytes were 29,500. Temperature which was about 102 degrees, dropped at once to normal. No bacteriological report.

Comment.—No source of infection could be assigned.

Case XXVII. German Hospital.—T. K., male, aged 29, brewer. Admitted February 26, 1906; discharged March 31, 1906. Taken suddenly ill ten weeks before admission with acute pain at the right costal margin posteriorly. With this he had a chill and slight cough. Has had fever and has lost about 40 pounds. Five weeks ago had an attack of aphonia which lasted three days.

He was emaciated; lungs were normal, heart showed an aortic murmur; no distension of abdomen but slight rigidity was present. There was a fullness of the right lumbar region and he was very tender on palpation. By lumbar incision about a pint of pus was evacuated; no report bacteriologically. Temperature was irregularly between normal and 101 degrees for eight days, when it reached normal. Urine showed faint trace of albumin and casts occasionally. Leucocytes were 17,100 on admission, hæmoglobin 42 per cent.; a month later leucocytes were 9,700, hæmoglobin 54 per cent.

Comment.—Symptoms had existed ten weeks before operation with decided emaciation; no recognized source of infection.

Case XXVIII. Mt. Sinai Hospital.—J. T., male, aged 20, laborer.

Admitted November 21, 1908; discharged January 18, 1909. Illness began three weeks before admission with pain in his shoulders and right side of the back; no known cause; family and personal accounts were uninteresting. In the right loin from the last rib to the iliac crest there was a distinct mass which was very tender, painful, and it seemed to fluctuate. On November 23, 1908 a large quantity of pus was evacuated by lumbar incision. The abscess extended downward toward the pelvis, under the kidney, and toward the diaphragm. The urine at this time was practically normal. His temperature, which had ranged from 102 to 103, fell to normal in 24 hours. On December 3, 1908 his temperature suddenly shot up above 103 degrees, and in a day or two it was found that the left lung was entirely consolidated with pneumonia; there was also pleural effusion. He was extremely ill with pulse at times of 140 and respirations of 56. Recovery was slow, consolidation of the left base persisted for some time and it was fully three weeks before his temperature fell to normal. During this time he developed a purulent discharge from the right ear. The wound in his back healed slowly but without difficulty. His urine mainly showed febrile changes but no pus. Blood: Leucocytes 15, 360; polynuclears, 82 per cent. The pus contained staphylococcus aureus.

Comment.—This case is interesting in showing a pleuro-pneumonia of decided severity, involving the opposite lung from the abscess; urine normal and no source of infection recognized.

Case XXIX. University Hospital.—A. R. G., aged 27, native of Russia, salesman. Admitted May 17, 1909; discharged June 6, 1909. Chief complaints on admission were pain in back, cough with expectoration, vomiting and constipation. Six weeks ago had grippe which put him in bed one day; he then worked two weeks but had a cough so severe that he vomited. From the first he had pain in the right lumbar region extending forward and radiating down the inner side of the thigh to the knee; it is dull and aching except when he moves, when it is very sharp. The thigh was flexed and he was unable to straighten it without pain. Previous and family history unimportant; no venereal disease.

Abdomen was tender over the whole right side, becoming less at the middle line; an indefinite elastic mass was felt on deep palpation in the right hypochondrium; posteriorly some bulging was noted between the last rib and the iliac crest, and at this point there was acute tenderness with a feeling of fluctuation. The right abdomen measured 18 and the left 17 inches. There was some curvature of the spine with convexity toward the left; right thigh flexed to 45 degrees. Urine: Amber, normal odor, flocculent sediment, specific gravity 1030, acid, no albumin, no sugar, a few cylindroids and an excess of mucus. Hæmoglobin 82 per cent, leucocytes 16,900. Temperature ranged from 99 degrees to 100 degrees. Skiagraph was negative for stone or spinal caries.

On May 20, 1909 Dr. A. C. Wood evacuated a large perinephric abscess containing thick, greenish, and odorless pus. The cavity extended

upward and inward for about 4 inches but there was no communication with the spine or kidney. On May 22 temperature, pulse and respiration were normal and the patient convalesced quickly and satisfactorily.

Comment.—It is probable that the so-called grippe attack was merely the pulmonary irritation associated with the abscess formation; urine unaffected.

Case XXX. Episcopal Hospital.—E. W., aged 19, female, spinner. Admitted September 8, 1908; discharged November 7, 1908. Five weeks prior to admission patient was caught in a door and sustained a severe contusion over the right kidney. She stated that she voided some blood and had some incontinence of urine. The pain from the contusion became less but she had some tenderness continuously. Two weeks ago the pain and tenderness became greater and she commenced to walk lame, as though the right leg was shorter than the left.

Examination: Great tenderness in the right flank, between the rib edges and the iliac crest; also considerable tenderness over McBurney's point on deep pressure. No limitation of motion or pain about the right hip joint. On September 26, 1908 she was operated on and a large perinephric abscess was opened. No notes on the kidney, but she made an uninterrupted recovery. The pus contained staphylococci. Blood: Reds, 5,290,000; whites, 27,680; hæmoglobin 63 per cent. Urine in five reports showed the average daily amount to be about 40 ounces. There was a trace of albumin but no pus; a few hyaline, pale epithelial and granular casts were observed. Fever was rather high but showed strong remissions (100 degrees to 103 degrees); it touched normal the day following operation but showed slight evening rise until September 30.

Comment.—A case apparently associated with trauma more directly than is usual; no evidence of renal source of infection.

Case XXXI. Jefferson Hospital.—K. J. B., aged 19, school boy. Admitted September 13, 1909. During the summer months he suffered from furunculosis, five boils having appeared on his left thigh. Two weeks before admission he was suddenly taken with intense, knife-like pains in the left loin which were referred to the hip and down the thigh. He soon became lame with stiffness of the left limb and extension was particularly painful. Has had fever of about 102 degrees; no bowel or urinary symptoms; has lost 15 pounds.

Pale, poorly nourished, though fairly developed lad; temperature 100 2/5, pulse 90, respirations 24; no tenderness or rigidity about the abdomen; right kidney not palpable; the lower pole of the left kidney was questionably palpable and there was tenderness anteriorly; on deep pressure under the ribs exquisite tenderness was elicited. There was a marked limp to the left leg and extension of the thigh was impossible. No œdema or redness anywhere. Examinations of the urine on September 13, 14, 16, and 18, gave normal results in all respects. Blood: Erythrocytes 4,200,000, leucocytes 24,000, hæmoglobin 69 per cent., color index .82, polynuclears 83 per cent. The X-ray showed an area of light shading about the left kidney, with poor definition of the organ.

On September 18, 1909, Dr. Schwartz evacuated about 6 ounces of thick yellow pus and found the kidney firm and of normal size. The pus gave pure cultures of staphylococci. The temperature was normal on September 21.

Comment.—A typical case having its source in furuncles of the corresponding thigh; normal urine.

CASE XXXII. German Hospital.—L. O., aged 24, domestic. Admitted March 5, 1905; discharged April 12, 1905; re-admitted April 24, 1905; died June 17, 1905.

Healthy girl of good family and personal history. Eighteen months before admission she had an attack of sudden pain in right lumbar region which lasted about two weeks; six months later she had a more severe attack and for a year past she has had at irregular intervals pain which was aggravated by bending or stooping. Has lost about ten pounds in weight.

Examination showed floating right kidney, also a bulging above the crest of the ilium anterior to and just below the kidney area; it was resistant and doughy in feeling. At operation about a pint of pus was evacuated; the kidney was found to be loose and was apparently unaffected by the suppurative process. By the use of iodoform gauze it was replaced nearly in normal position. Urine showed a faint trace of albumin, leucocytes and phosphates. Temperature changes were slight, substantially not over 100 degrees. On discharge she had a granulating wound in the back, but was doing well; ten days later was taken ill with evidences of infection of some sort and was re-admitted on April 24, 1905. While nothing very definite showed about the lumbar area, she was again opened on April 29, 1905, and thoroughly explored. No disease of the kidney, spine or muscle was found. Her temperature remained septic but she was thought to have influenza; temperature was about 99 degrees in the morning, 102–103 in the evening. On May 27 an empyema was made out in the right chest posteriorly and a half pint of pus was evacuated. On June 3 another abscess in the pleura was opened nearer the spine. On June 12, 1905, it was noted that she had a left septic pneumonia and from this she died five days later.

Comment.—In this case the perinephrium of a movable kidney was affected but no disease of the kidney was shown; later the patient developed empyema of the same side and died of septic pneumonia of opposite side.

CASE XXXIII. German Hospital.—H. G., 36, tobacconist. Admitted July 15, 1905; discharged August 16, 1905. Nothing in history of importance. Present illness began six weeks ago with pain in left side and back, which was sharp, shooting and continuous; no chills, no vomiting. Abdomen showed a mass in the left ileocostal space, extending anteriorly to nipple line, which seemed movable and caused pain on palpation. An oblique lumbar incision opened a large abscess filled with yellow, flaky pus. Four days later he developed a femoral phlebitis of the left leg. Fourteen examinations of the urine gave normal

results. Leucocytes were 20,600; hæmoglobin 76 per cent. Slight fever (99–100) for the first ten days.

Comment.—A case complicated by femoral phlebitis; urinary changes absent and course practically afebrile.

CASE XXXIV. Children's Hospital.—B. C., aged 10. Admitted June 7, 1903; died June 21, 1903. Had measles, rubella, pertussis, and chicken-pox, but not scarlet fever, diphtheria or typhoid. Two weeks before admission was struck on right side of abdomen with blow of fist. The following day he vomited and had severe cutting pain just below right costal margin; the pain remained continuously but varying in severity. Has had no cough and no change in the urine or micturition. The right shoulder was lower than the left. Temperature for a week before admission average 103 degrees. Blood: Hæmoglobin 73 per cent., reds 4,700,000, whites 42,960.

On operation the following day the kidney was exposed and nothing found until a point in front of the upper pole of the kidney was reached, where a small abscess containing thick foul pus was opened and drained. On June 11, 1903, his temperature was normal and on June 14 he was sent to the country branch of the hospital. A few days later a second operation was necessitated apparently by reason of extension of infection. The old wound was re-opened without finding any collection of pus. However, sinuses were found running upward and inward and downward to iliac region. A counter opening in the iliac region opened the peritoneal cavity; the pelvis contained a large quantity of pus and was drained.

The child died on June 21, 1903. Autopsy showed all the cavities along the posterior abdominal wall to be bathed in pus and the pelvis was half full. Both the diaphragmatic and hepatic serosa were covered with fibrinous exudate and pus. The appendix was bound down in a greatly thickened mass of lymph surrounding the cæcum but when dissected out was found to be normal. The mass of lymph was tightly adherent to the posterior abdominal wall and in pushing this aside a pus cavity was found having the kidney for the floor. No notes on the kidney.

Comment.—An interesting case showing the effects of trauma. Death due to extension of inflammatory process to abdominal cavity, a condition liable to result from the anterior position of the original infection.

CASE XXXV. University Hospital.—A. McL., aged 16. Admitted May 31, 1909; discharged October 17, 1909. This boy had scarlet fever at the age of seven but otherwise was apparently healthy until present illness. It began seven weeks before admission with swelling under eyes and in the feet and legs, evidently due to nephritis. A month later he had a sharp pain in the left side, intermittent in character, which has continued. On the day before admission he noted a mass in the left iliac region which caused him to flex his left thigh; has had diarrhœa and vomiting since the onset of the pain in his side.

Physical examination showed many general signs of nephritis. Also tenderness in left loin posteriorly running down to left iliac fossa, where

there is a distinct induration and mass. Urine: 1012, acid, cloud of albumin, no casts, many red and white blood corpuscles, triple phosphates. Blood: Reds, 3,130,000; whites, 48,800; hæmoglobin 48 per cent. On operation (June 2, 1909) by incision well above Poupart's ligament in the groin, about a pint of pus was evacuated. Counter openings were made posteriorly and abscess drained with rubber tubes. Pus was examined and found sterile. Temperature averaged 99 degrees to 100 degrees.

Later the evidences of nephritis continuing and ascites developing, he was again operated on (July 17, 1909) and a decapsulation of both kidneys done. The kidneys were large and white, with the left kidney slightly congested. On September 10, 1909, blood count was as follows: White, 14,600; reds, 3,530,000; hæmoglobin, 60 per cent. Abscess cavity healed uneventfully.

Comment.—In this interesting case the infection was of unknown origin; the leucocytosis was very high; there was pre-existing parenchymatous nephritis and a double decapsulation was done after the perinephric suppuration subsided.

Case XXXVI. German Hospital.—U. R., female, 22. Admitted October 28, 1909, complaining of pain in right lumbar region which had existed for three weeks. It commenced as a dull ache and she found she could not fasten her corsets. It was characterized by pain in back and soreness over abdomen in front, no nausea, no jaundice, but she had a cough at first. Has had indigestion for several years.

Rather anæmic and poorly nourished girl. Abdomen distended and somewhat tympanitic. Slight rigidity throughout, but more marked about the upper right quadrant, where there is distinct tenderness extending back to lumbar region; most tender point is on a line from the ninth cartilage to the umbilicus. Liver not enlarged or tender. Mass felt where right kidney would be, which comes down with deep inspiration, but examination was masked by distention.

Under ether on October 30, 1909, abdomen was opened by right rectus incision and a slight amount of cloudy fluid was found in pelvis. Appendix slightly thickened but not acutely inflamed. Gall-bladder, stomach, and pelvic contents were normal. Abdomen closed and a loin incision exposed a kidney with a distended capsule which was opened and considerable pus escaped.

Blood: Leucocytes, 30,300; erythrocytes, 3,980,000; hæmoglobin, 68 per cent.; polynuclears, 88.5 per cent. Pus showed staphylococcus albus; pelvic fluid was sterile. Temperature range was 100 degrees to 101 degrees. Urine was normal prior to operation, but later showed some pus cells and epithelium.

Comment.—The diagnosis was difficult and the first incision was transperitoneal; the abscess was within the fibrous capsule which has not been noted before in this series.

ANALYTIC SUMMARY OF CASES COLLECTED.

Of the 36 cases submitted 25 were males and 11 were females. The age of the oldest patient was 60 and the youngest was 10, with a general average of 31 years, or omitting the cases of pre-existing renal infection, the average age was 28 years, showing clearly that the disease is one of early adult life. The right side was affected in 23 cases, the left in 13. The source of infection was unknown in 20 cases, in 2 there was pyonephrosis, 2 others were probably of renal origin, there was urethral infection in 2, influenza preceded 2, 3 were possibly derived from pelvic disease, peripheral suppurations probably caused 2, and trauma was prominent in 3 instances. Postural changes were noted in 10 cases, in the main being a tendency to flex the corresponding thigh, though in several cases there was some spinal curving and in one with sciatic pain flexion of the thigh was resented. Pulmonary phenomena were seen in 13 cases, varying in intensity from a simple cough to a fatal septic pneumonia; in 3 cases cystitis was present; 1 case developed subsequently a prostatic abscess; 1 had otitis media; 1 had femoral phlebitis; in 1 there was a fatal cardiac dilatation, due to myocarditis; and in 1 the perinephric suppuration occurred in the course of parenchymatous nephritis. The urine was normal in 15 cases, practically normal in 5, having a trace of albumin with casts, etc., in 12, and showing pus in 4. The bacteriological examination of the pus from the abscess was made in 23 cases and gave sterile results in 2 cases, colon bacillus in 6, staphylococci in 5, staphylococcus aureus in 4, staphylococcus albus in 2, staphylococcus aureus and albus in 1, streptococci in 2, and streptococci and pneumococci in 1. 35 abscesses were evacuated and 1 declined operation and was discharged; 30 cases recovered and 5 died. This gives a total mortality of 14.3 per cent., or omitting the cases of recognized renal origin, two of the four dying, there is a mortality of 9.7 per cent. The cause of death in the two renal cases was exhaustion in one and cardiac dilatation in the other, but both were

TABULATED SYNOPSIS OF CASES COLLECTED.

	Sex	Age	Side	Source of infection	Complication	Postural change	Leucocytosis	Pus	Urine	Fever	Days ill	Days in hospital	Result.
1	M	24	L	Unknown	Hard cough		16,600	Sterile	Tr. alb., no pus	Subnormal	25	123	R.
2	F	22	R	Probably pelvic	Cough, expectoration		44,550	No report	Tr. alb., few casts.	Irregular, abt. 101	60	42	R.
3	M	11	L	Source unknown	None		38,500	Staphylococci	Tr. alb., no casts.	Irregular, abt. 101	55	95	R.
4	M	23	L	History of trauma	Congestion, left lung		30,350	No report	Tr. alb., no pus	About 102	21	62	R.
5	M	18	R	Necrosis of phalanx	None		18,200	Staphylococci	Normal	About 101	14	20	R.
6	F	35	R	Possibly pelvic	Pleuropneumonia		28,000	Strept. pyogenes	Tr. alb., no casts.	About 99	180(?)	11	D.
7	M	39	R	Unknown	None	Thigh flexed.	15,200	No report	Normal	Bet. 101 and 102	35	95	R.
8	M	49	R	Unknown	None	Curvature of spine	29,600	No report	Normal		23		
9	F	52	R	Unknown	Cystitis, pleurisy, congestion of right lung			No report	Normal	Bet. 100 and 102	14	74	R.
10	M	39	L	Unknown	Cong. of left lung		16,800	Staph. and a bac.	Tr. alb., few casts.	99–100	12	63	R.
11	M	25	R	Unknown	None		14,520	Colon bacillus	Normal	About 100	30	33	R.
12	M	26	L	Unknown	None		34,600	Staph. albus	Normal	99–100	21	24	R.
13	M	40	L	Unknown	None		11,700	Colon bacillus	Tr. alb., no pus	Normal to 101	21	18	R.
14	F	50	R	Pyonephrosis, etc.	Chronic cystitis			No report	Alb. quan. pus, etc.	Subnormal		29	D.
15	M	19	R	Mixed urethral infection	Prostatic abscess		16,200	Strept. pyogenes	Few gran. casts		90	112	R.
16	M	34	L	Unknown	None			S. aureus	Normal	Irreg. to 102	14	50	R.
17	M	59	R	Probably renal	Pul. congestion	Thigh flexed.	13,500	Strep. and pneumococci	Alb, pus, casts	101–102	21	24	D.
18	F	58	L	Pyonephrosis	Cystitis			No report	Alb, pus, casts		28	58	R.
19	M	60	R	Possibly influenza	Cough	Right-sided lameness		S. aureus and albus	Few casts, no pus		60	90	R.
20	F	45	R	Possibly pelvic	None	Thigh flexed.	26,940	Colon bac	Tr. alb., few casts.	103	12	37	R.
21	M	28	L	Unknown	None	Both thighs flexed		Colon bac	Normal	99–100	30	12	R.
22	M	21	R	Unknown	None		16,500	Colon bac	Normal	About 102	4(?)	43	R.
23	M	32	R	Probably urethral	None			S. aureus	Tr. alb., few casts.	Normal	30	29	R.
24	F	60	L	Probably pyonephrosis	None		23,300	Colon bac	Tr. alb., casts, pus		30	33	R.
25	F	18	R	Unknown	None		24,000	S. aureus	Tr. alb., no casts.	99–103	..	42	R.
26	M	18	L	Unknown	None		29,500	No report	Tr. alb., casts	About 102	21	20	R.
27	M	29	R	Unknown	Slight cough		17,100	No report	Tr. alb., occas. casts	99–101	70	35	R.
28	M	20	R	Unknown	Pneumonia; otitis		15,360	S. aureus	Normal	102–103	21	58	R.
29	M	27	R	Possibly influenza	Severe cough	Thigh flexed; spinal curvature	16,900	No report	Normal	99–100	42	20	R.

	Sex	Age	Side	Source of infection	Complication?	Postural change	Leucocytosis	Pus	Urine	Fever	Days ill?	Days in hospital	Result
30	F	19	R	Hist. of trauma	None	Right-sided lameness	27,680	Staphylococci	Alb. few casts.	100–103	35	61	R.
31	M	19	L	Furunculosis, left hip.	None	Thigh flexed	24,000	Staphylococci	Normal	About 100	14	..	R.
32	F	24	R	Unknown	Empyema, septic pneumonia			No report	Tr. alb., no casts	99–103	..	107	D.
33	M	36	L	Unknown	Femoral phlebitis		20,600	No report	Normal	99–100	42	32	R.
34	M	10	R	History of trauma	Suppurative peritonitis		42,960	No report	Normal	About 103	14	14	D.
35	M	16	R	Unknown	None	Thigh flexed.	48,800	Sterile	Alb. casts, no pus	99–100	30	..	R.
36	F	22	R	Unknown	Early cough		30,300	Staph. albus	Normal	100–101	21	..	R.

NOTES

Case No.

1. Primary incision was transperitoneal.
6. Died 9 days after operation, of pneumonia.
7. Diagnosed as typhoid fever.
8. Had sciatic pain and resisted efforts to flex thigh. Declined operation.
9. Diagnosed as cholecystitis; opened abscess and drained through transperitoneal incision.
14. Autopsy showed pyonephrosis, nephrolithiasis, etc.
15. Probably later developed laryngeal tuberculosis.
16. Primary incision was transperitoneal.
17. Died from cardiac dilation due to myocarditis.
18. Two sinuses into pelvis of kidney were found at operation.
19. Obliterative pleurisy from 6th rib downward, right side.
24. An indurated mass in front of left kidney was not opened.
27. Diagnosed and operated on for appendicitis; seventeen days later a perinephric abscess was opened.
28. Severe pleuropneumonia on opposite side from the abscess.
32. Abscess involved the perinephrium of a floating kidney; later developed an empyema of right side and a septic pneumonia of left side, and died.
34. Secondary infection of abdominal cavity; autopsy showed extensive suppurative peritonitis.
35. Abscess occurred in the course of parenchymatous nephritis.
36. Suppuration was not in adipose capsule but beneath fibrous capsule; transperitoneal incision primarily.

probably uremic. In the other cases one died of pleuro-pneumonia, another of peritoneal extension of the suppurative process, and the third of septic pneumonia. The death rate is lower than in any previously reported series and compares most favorably with the 34 per cent. mortality of Küster's tables; this is doubtless due to the early recognition of the disease and the adequate drainage without unwise interference with the kidney.

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Dr. John B. Deaver said that in the etiology of perinephric abscesses traumatism without question plays a part. There are, of course, a certain percentage of these cases which are hæmatogenous and a certain number which are tubercular. In one of his cases, in which Dr. Miller had witnessed the operation, he could not differentiate the condition between a high appendiceal and a kidney condition. There were no symptoms referable to the kidney either in the shape of subjective symptoms, or from X-ray, or cystoscopic examination, ureteral catheterization, or chemical examination of the urine. She had circumscribed tenderness anteriorly but not posteriorly. He opened her abdomen believing it to be a tubercular case with abscess, and that if he did not succeed in reaching the abscess cavity that he could at least locate it. When the incision was made serous exudate immediately escaped; there were enlarged mesenteric glands and

exudate around the duodenum and hepatic flexure of the colon; the post-peritoneum was densely infiltrated and adherent at the latter point,—all these conditions pointing to the kidney. The incision was closed and a posterior one made; the perinephric fat and capsule were normal, but an abscess upon the anterior surface of the kidney beneath the true capsule was found. He firmly believed the case to have been tubercular, although no tubercular reaction was obtained on administration of tuberculin, and the patient made an uninterrupted recovery. In a more recent case of localized abscess of the upper pole of the left kidney in which the colon bacillus was found, he questioned if it was not also tubercular and the presence of the colon bacillus due to a mixed infection. More frequent than perinephric collections are collections within the kidney. His experience with this condition tallies with Dr. Miller's conclusions, that in perinephric conditions where the kidney is healthy practically all get well.

Dr. John B. Roberts said that Dr. Miller's paper gave some light as to diagnosis by speaking of the kidney triangle where pressure located at this point, earlier than other symptoms, may lead to a diagnosis of perinephric lesion. If he is correct in thinking that pus around the kidney gives a higher leucocyte count than similar abdominal lesions, this should be a very valuable aid in diagnosis. He is right in saying that a good many cases of perinephric abscess are primary and not secondary to the kidney lesion. He recalled two cases seen some years ago, one a case of perinephric abscess the result of an internal urethrotomy for an old stricture, and in the other case a perinephric abscess the result of a gonorrhœa causing general sepsis, there being abscesses in other parts of the body also.

Dr. John H. Gibbon said, in reference to perinephric abscess not having its origin in the kidney, he thought many conditions were called perinephric abscesses which were not. Many are tuberculous, having their origin in the muscle sheaths. Surgeons are apt to call an abscess opened posteriorly a perinephric abscess. Those which are truly tuberculous, he thought, keep up discharging for months and months, many afterwards developing some change in the lumbar spine, showing an origin in Pott's disease. Tuberculous muscular abscesses are often called perinephric; they are not perinephric, they are in the abdominal wall and the surgeon has not gone through the muscular wall before

he has opened the abscess. This explains the absence of any symptoms relative to the kidney in many so-called perinephric abscesses.

Dr. Morris Booth Miller (in closing), in answer to the suggestion that some of the cases reported were tuberculous, said that he had attempted to exclude all doubtful cases. The bacteriological examinations show no tubercle bacilli but the ordinary pyogenic micro-organisms were present in all the cases noted save two, where it was stated that the pus was sterile.

Dr. Roberts did not mention that 26 years ago he read before this Academy a masterly paper on the subject of perinephric abscess with particular relation to the referred pain, based upon careful anatomical studies. This work, which was published in the *American Journal of the Medical Sciences,* April, 1883, stands to-day as an authority upon this phase of the subject and as such has been frequently quoted.

The case mentioned by Dr. Deaver was an unusual one. In it the pus was entirely confined beneath the fibrous capsule and none was found in the adipose capsule. It was a staphylococcus albus infection. It was a difficult case to diagnose as the symptoms were vague though pointing to some upper abdominal trouble on the right side. Fever was moderate and the urine was normal. However, the leucocytosis was as high as 30,000 and there was a history of cough early in the attack.

He called attention to the apparent greater frequency of this disease in this country in contrast to European statistics. Socin found 4 cases out of 16,661 and Sutter noted 1 in 4437 cases. At the Presbyterian Hospital he had found 5 cases out of a total of 10,429, and at the German Hospital—where about 3500 cases are treated a year—the average number of perinephric abscesses is 2.

PUS IN THE ABDOMINAL CAVITY.

BY JOHN B. DEAVER, M.D.,

OF PHILADELPHIA,

Surgeon-in-Chief to the German Hospital.

The last three decades have cleared up the rôle of bacteria in pus production, and pathologic physiology has taught us much concerning its meaning. Surgery has turned a flood of light upon the avenues of intraperitoneal infection, and, armed with a knowledge of its principles, has been making an increasingly successful fight against it. Still, infection and its sequel, pus formation within the abdominal cavity, constitutes one of the chief dangers to life and consequently one of the chief problems of surgery.

Pus in the abdominal cavity may be either free or circumscribed. That it may become confined is due to the adhesive powers of inflamed peritoneal surfaces. In general, circumscribed collections of pus are less dangerous to life than an unconfined suppurative process. Collections in the lower part of the abdomen are less serious than those in the upper portion. Abscesses situated at the margins of the cavity afford a better prognosis than those located centrally, and those which abut upon the wall through which discharge may be effected, than those which lie between loops of bowel, folds of mesentery, or in recesses behind the viscera.

Wherever it be, however, a definite collection of pus within the abdomen requires surgical aid, except in the rarest instances. "Ubi pus ibi evacuo" is as true to-day as it was when it was coined in the days before the pathogenesis of pus was understood. The practical problems, therefore, resolve themselves into two, namely, the time of attack, and the method of approach.

The chief sites of circumscribed pus are: in the lower abdomen, the right iliac fossa and the pelvis; in the upper abdomen, between the diaphragm and the subjacent viscera, below the right lobe of the liver, in the so-called subhepatic space, and in the peripyloric region, both anteriorly, in the general peritoneal cavity and posteriorly, in the lesser sac. These sites correspond in general to the great sources of intraperitoneal infection, the appendix, the internal genitalia of the female, the gall-bladder, and the pyloric region of the alimentary tract. Usually, therefore, the location of an abscess points to its origin.

There is, however, considerable variability from the type of abscess derived from each of these sources; secondary collections may form elsewhere, and less frequent conditions, such as diverticulitis, perforation of benign or malignant ulcers of the intestine, suppurating mesenteric glands, acute pancreatitis, and a host of other conditions may on occasion give rise to abscess formation, so that no region of the abdomen is entirely immune.

An appendiceal abscess should be attacked as soon as its presence is determined, providing the patient's condition warrants any operative risk. The form which is most amenable to treatment is that which lies external to the cæcum in the flank. A simple incision into the abscess will evacuate the pus and provide free drainage. The cavity should not be irrigated, nor should the wall be roughly wiped free of pus. Nature has already thrown about the cavity a protective wall of embryonic connective tissue which will do its own work of cleansing, and will secrete antibacterial serum for the extermination of the micro-organisms, while granulation will start at once when pressure is relieved. Let the delicate granulations alone. A cautious search for the appendix may be made, and if it be found in the wall of the abscess cavity it is proper to remove it. In my opinion it is inadvisable to insist upon finding the appendix, if, thereby, it is necessary to do extensive damage to the confining adhesions or to open the looser post-peritoneal tissues. Recurrence will occasionally happen when the appendix is not removed, but in my opinion the immediate indication is the urgent one,—and that indication assuredly is to get the patient well from his present attack, accepting no unnecessary chances. Nature has already excluded the appendix and it is no time to do preventive surgery in the presence of infection and toxæmia. Loose gauze packing is advantageous, not as drainage but to keep the cavity and incision open so that drainage may occur. Care should be taken not to obstruct the free drainage with tightly packed and sodden gauze, misnamed drainage. This is the course which has given me the best results, where the incision may be made through the parietes directly into the abscess.

Where the abscess does not abut in this manner upon the accessible abdominal wall, as in collections beneath the mesentery, between coils of intestine, below the liver, or retrocæcal, it is necessary to open freely into the abdominal cavity. Then, cautiously exploring the limits of the abscess, gauze pads should be packed about it to push the unaffected bowel away and to protect it from soiling. The abscess may then be opened and the pus aspirated or gently mopped away.

In such a case I make a special effort to locate and remove the source of infection. Nature had excluded it from the general cavity, but we have annulled her work and placed it once more in communication. We must therefore, if possible, provide against a recrudescence under conditions once more favorable to generalization. Having accomplished this much we must provide a tract for the discharge of necrotic and infectious material from the site of the abscess and the isolation of that tract from the general cavity. This we do by tubular drainage of rubber or glass, or other material, if the abscess cavity be distant from the surface where discharge is to take place, as in pelvic abscess or abscess located below the liver, or in the enteronic area. It may be advisable to bring such drains out through a stab in the loin or suprapubic portion. Isolation of the tract we effect by making use of the power of gauze to excite adhesions. Some soiling of clean peritoneal surface must occur in such manœuvers. But the

peritoneum is no longer regarded as it once was, as the most vulnerable structure of the body. It is the good friend of both surgeon and patient, and with the aid of the immune forces of the body already rallied against the infection, it can take care of itself, providing the original focus is not able to direct an attack against it. We do not presume, however, on this defensive power of the peritoneum, but aim to soil as little clean surface as possible.

Like loin abscesses, collections of pus in the pelvis, may at times be advantageously opened extraperitoneally by way of the vagina. These abscesses arise usually from tubal disease. When acute or subacute if we have reason to believe that the pus contained is still infective, this is a safer procedure than to attack the collection from above. This is distinctly a palliative operation and will usually require abdominal section at a later date. Therefore, when the process is of considerable duration and we have reason to believe that the pus is sterile or of low virulence, it is best to make a laparotomy in order to attend at the same time to such organs as are diseased beyond hope of repair.

Subdiaphragmatic abscess affords special difficulties both of recognition and treatment. In view of Dr. Jopson's more extended paper upon this subject to-night it is unnecessary for me to do more than mention it.

Abscesses in the pyloric region, if in the greater sac, must be attacked anteriorly and our drainage arranged so as to give the most efficient and direct outlet, at the same time disturbing normal relations as little as possible. In the disposal of all drainage we must give consideration to the position of the intestines, avoiding such tortuous paths as will conduce to kinks and secondary obstruction. We should also, whenever possible, make use of the force of gravity to carry off the secretions,—in other words, secure dependent drainage. This is often impossible, and we must be content with relieving tension and providing a free outlet, by far the most important indications.

Owing to the difficulty of localization before incision, it

will sometimes happen that after opening the abdomen we will find our collection within the lesser sac. In such cases it is usually wise to close the anterior wound and make our avenue of discharge through the flank. This holds true also for peripancreatic suppuration due to suppurative or gangrenous pancreatitis.

In these cases the pus is really post-peritoneal, though it may simulate, by its forward bulging, an intraperitoneal tumor or abscess. I have several times encountered the condition, and have had no cause to regret my choice of posterior drainage, though it involved another incision. In one remarkable case, about a year ago, the entire body and tail of the pancreas, completely gangrenous, was spontaneously discharged twelve days after operation, and the patient made a good recovery.

By slight appropriate variations of these principles any abscess in the abdominal cavity may be attacked with good hope of success. In certain cases one will find more or less reparative surgery indicated. A perforating ulcer must be closed, or perchance resected. Malignant masses may require removal. These possibilities are too numerous to be foretold or here discussed. The largest measure of interest attaches to those cases in which the pus is not confined, but exists free within the abdominal cavity. At the outset of infection there is practically always some free pus formation in the immediate vicinity. This is a defensive process of Nature. To fulfil its purpose in an ideal manner, it must speedily accomplish the destruction of invading micro-organisms and again undergo absorption. This frequently occurs. How often we are met with a thin turbid fluid, seropus, when we open the peritoneum in search of an inflammatory condition! A culture may, or may not, be positive for micro-organisms. If not, it was formerly explained on the grounds of a chemical peritonitis, but we now know that failure to find organisms indicates that they have been destroyed, absorbed, or entangled in the fibrinous mesh upon the surface of the intestines.

If the infecting organisms be of high virulence, or in too

great dosage, whether by sudden escape of large quantities of infective material or by reason of a slower but continuous outpouring of renewed infection, or if the bodily resistance be inadequate, the defense is overpowered, exudation continues, the slain and useless phagocytes accumulate, the fluid-deprived of its antitoxic and antibacterial properties, becomes at once a culture medium for their multiplication and a means for their transference to fresh fields. The powerful toxic emanations of the bacteria held in solution in the liquor puris make it a poisonous foreign material, locally injurious and, by absorption, dangerous to the delicate parenchyma of the essential organs. Thus we are "hoist with our own petard."

Of all single factors which influence the outcome of such a case that of time is the most important. It is true that there are cases of infection of the peritoneum which at the present time seem to be uninfluenced by surgical treatment at any stage. These are usually due to the streptococcus and cause little pus formation but an intense inflammation and paralysis of the intestines with rapid fatal toxæmia. No known surgical measures seem to change materially the course of such an infection. Thus Barker in the last Address in Surgery before the British Medical Association was led to remark: "When we speak now of peritonitis we are conscious that we are using a term which includes conditions as widely apart as an ordinary attack of eczema and a desperate cutaneous, streptococcal erysipelas." In these cases I doubt whether the mechanical aids of surgery will ever be sufficient to avert a fatality, and I look for help rather to some method of inducing active or passive immunity to the micro-organism.

Fortunately these extreme cases are comparatively rare. The vast majority will yield promptly to operative treatment provided it be done sufficiently early. In my experience the prognosis of peritonitis depends not so much upon the type of infection as upon the duration of the disease before treatment is instituted. Late peritonitis is quite a different disease from early peritonitis. I may illustrate this from my own experience by a series of cases which I have had compiled recently.

In 70 consecutive cases of diffuse peritonitis secondary to perforative or gangrenous appendicitis, or ruptured gastric or duodenal ulcer, which were operated upon within forty hours after onset, there was but one death, a mortality of 1.4 per cent. Of 99 cases operated within the first fifty hours, three died, a mortality of 3 per cent. This gives an idea of the rapidity with which the mortality mounts as a result of delay in this class of cases. As a further illustration I may say that in the last consecutive 55 cases which I have found suffering with generalizing or generalized peritonitis, there have been 11 deaths, a mortality of 20 per cent. A number of these cases were in extremis when admitted, and I confess that I know of no way to save the neglected cases. I resent the fact that these deaths are charged to surgery when the blame really rests upon the cause of delay, whether that be due to circumstances, to the patient himself or, as in too many instances, to bad advice.

While we are busied with improvements in technic, therefore, let us not forget to sound the note against delay, the most important single cause of mortality.

As a corollary to the importance of early operation is the fact that the most important single object of operative intervention is the treatment of the focus of infection itself. Appropriate treatment of this source will often be sufficient in itself to allow nature to complete the cure. There are, however, many subordinate aids in treatment which are of great value, among which I would mention the importance of quiet, the Fowler position, light careful anæsthesia, quick, skilful operation, saline infusion hypodermically, intravenously and particularly by way of the rectum as introduced by Murphy, and careful after treatment, usually consisting in a "masterly inactivity." The scope of this paper, however, precludes more than passing mention of all these and necessitates close adherence to the subject.

What is to be our attitude towards the pus already present within the abdominal cavity? It is but a few years since the peritoneum was considered one of the most vulnerable tissues

of the body. Surgeons were horrified at the discovery of pus within the abdomen, and with little faith in nature they devised methods of treatment consonant with their belief that the recovery of the patient was possible only through their ingenuity in getting rid of the pus. So we find that patients had their bellies washed out with antiseptic solutions, the intestines vigorously scrubbed with gauze, and some surgeons, more ingenious than clear sighted, devised means for constant irrigation of the abdominal cavity. These measures were supplemented by cumbrous methods of drainage both with gauze and tubes. These attempts at plumbing not only failed signally to perform the function for which they were devised, but gave rise to complications due to their presence. On the other hand it was observed that the peritoneum of itself possessed wonderful resisting and recuperative powers. More and more was entrusted to nature and even to-day we have not found the limit. I am certain that I drain less and less every year. Where I once said, "When in doubt, drain," I am now likely to say, "When in doubt, don't drain." I do not hesitate to close up any case which shows only a small amount of seropurulent fluid within the abdomen. Often the culture from such an exudate will be sterile, indicating that the infection is already overpowered. But even when micro-organisms are demonstrated it makes no apparent difference in the ease of recovery.

Thick, vicious-looking pus in considerable amount, especially if it be foul smelling, is in my mind still an indication for drainage. I waver somewhat even in certain of these cases, and I have closed a few of them without ill effect. I believe that we will find it unnecessary to drain many of these cases if the source of infection can be rendered innocuous. I believe this to be true both because of the clinical evidence of having seen such cases get well without drainage and because I am skeptical of the degree of general drainage of the abdominal cavity that may be obtained by practical methods. I have pointed out that the earlier attempts at extensive sewage systems resulted in failure. Now when we limit the amount

of drainage we get hardly more than a local effect. It is a fatuous hope to drain the abdominal cavity by introducing a tube into the pelvis, or indeed into any other region of the abdomen. In my opinion we are still much misled by the idea of drainage as applied to the abdominal cavity. Any foreign body within the peritoneum speedily excites adhesions which cut it off from the general cavity. Especially is this true when the peritoneal surfaces are already inflamed. The function of any sort of drainage placed among the intestines rapidly becomes purely local. For a few hours it may serve to a limited extent as a general avenue of discharge, but this soon ceases and the discharge becomes usually thin and watery, being nothing more than an exudation from the walls of the drainage tract. I have not infrequently seen such drainage from a tube when there was a large amount of unconfined pus in other areas of the abdomen. This fact also has a bearing upon the ideas in regard to the relief of tension, almost a cant phrase nowadays. In desperate cases it is not so uncommon to find a high degree of tension with accumulation of pus in spite of tubes introduced within the abdomen. Thus, when the surgeon is cajoling himself with such ideas of scientific assistance he may be doing very little to affect the result. These facts confirm me in my belief in little drainage, skilfully placed and quickly removed, as its effect becomes local rather than general.

Another misleading term is drainage as applied to gauze, the true use of which is to isolate necrotic areas or dangerous foci of infection from the general cavity and establish a tract opening upon the outer world. When used as drainage it more often defeats its purpose than it accomplishes it. Sodden, pus-soaked gauze is an obstacle to the flow of secretion instead of a conductor. As I remarked long ago, a cigarette drain is an excellent thing when there is nothing to drain.

In the treatment of free pus within the abdominal cavity, then, we are obliged to rely very largely upon the powers of the peritoneum to care for itself. We may aid by the evacuation of an excess of pus at the time of operation, and by means

of drainage we may secure a sustained effect for some hours. This is undoubtedly very important for many cases and should be done, but in many others it is not essential, and in those which are benefited we often aid nature but little in the disposal of pus and infection already present.

The advisability of washing away the exudate at the time of operation is, of course, another point to be considered here.

I am aware that free general irrigation, local irrigation, wet sponging, dry sponging, and no irrigation, all have their strong adherents well fortified with opinions and statistics. I feel, however, that any strenuous measures directed towards removal of exudate already present are but an expression of the old tendency to do too much and rely too little on nature. While Blake and some others have reported excellent statistics obtained under the irrigation treatment I am convinced in looking over the statistics reported by many workers that those who do not irrigate get the best results. I have been better satisfied since I abandoned it some years ago. My objections to irrigation in brief are that:

1. It consumes time that we cannot afford to lose.

2. It diffuses infectious material, a serious matter in generalizing peritonitis where there may be extensive areas of peritoneum as yet unaffected.

3. By causing us to manipulate the bowels it has a tendency to promote paresis.

4. My own experience, and I believe the combined experience of operators all over the world, show a higher percentage of cures without irrigation.

I do believe it to be good practice to aspirate any collection of fluid in the pelvis, or elsewhere, that is accessible, or to absorb gently with gauze any highly foul or purulent exudates about the source of infection, but to wash extensively or to go on any extended tour of the abdomen seeking for exudate to clear away, I believe is wrong.

One other suggestion. I have observed in certain desperate cases with large amounts of vicious pus in the cavity that a long incision partially approximated and overlain with gauze

to retain the intestines permits a marked escape of exudate and seems to relieve abdominal tension in a far more satisfactory way than a single tube or multiple tubes brought out through an angle of the incision.

Dr. Walter G. Elmer inquired as to the value of abdominal irrigation especially in connection with stab wounds or gun-shot wounds of the abdomen in which the intestines have been completely severed. In such cases the surgeon has to deal with a very low grade of infection—the colon bacillus—which in its normal state is not virulent.

In regard to operating for appendiceal abscess and not removing the appendix he related the case of a trained nurse who undoubtedly had an appendiceal abscess but persistently objected to operation on the plea that her appendix had been removed. When, after much persuasion, the abscess cavity was opened the appendix was found inflamed and gangrenous, although the patient had been under the impression that it had previously been removed. He thought it would therefore always be better to tell patients when after such operations the appendix is left undisturbed, in order to prepare them if necessary for future developments.

Dr. John B. Deaver remarked, relative to the question of subdiaphragmatic abscess, that he had seen a large number of such cases. He had never seen a case of subdiaphragmatic abscess without some effusion in the pleura of corresponding side. The best way is to early resect the ninth rib; do not wait until the case is far advanced.

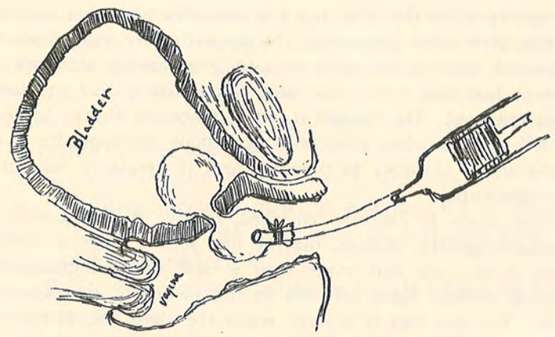
In the 70 cases of peritonitis he reported a bacteriological examination was made and a pyogenic organism found. Many were sick more than 40 hours. He maintained that if every case of peritonitis in the lower abdomen, particularly of the appendix, the gall-bladder and the pelvis, was operated upon within 40 hours of its onset, the mortality would be very small, probably 1 per cent. When the peritonitis has lasted for 50 hours the mortality begins to crawl up.

He had learned that a circumscribed appendiceal abscess where the appendix is not accessible is better treated without the removal of the appendix. There was a time when he did what Murphy had recommended, open the peritoneum, pack with gauze

above the abscess and take out the appendix. He did this before Murphy recommended it and stopped doing it long before. In the majority of cases, say 45 out of 50, one will be able to remove the appendix, but there will be one case every now and then where the appendix had better not be removed.

As to drainage in stab wounds of the peritoneum, he had operated upon very few such cases. He had one case not long since of rupture of the intestines where suture was required. He no longer washed such cases out, but wiped them. He was not as much afraid of fæces in the peritoneal cavity as he was of pus. He was not afraid of the colon bacillus in the peritoneal cavity unless associated with pus.

FIG. 1.



Temporary closure of vesicovaginal fistula by distended rubber finger-cot, for cystoscopy

PLUGGING A VESICOVAGINAL FISTULA.

DR. GEORGE ERETY SHOEMAKER reported the history of a woman in whom a large tumor of the kidney was bleeding so freely as to choke the bladder. It was decided not to attempt removal of the offensive decomposing clots with an evacuator, with the probable necessity of repeating the operation as hemorrhage continued. The hæmoglobin was already 25 per cent. and infection of the kidney imminent. A vaginal opening was therefore made into the bladder and the clots removed, after which frequent irrigation easily made the field clean. It was now

necessary to prove the sufficiency of the opposite kidney. Any one who has tried to cystoscope the collapsed bladder with a fistula in it will appreciate the problem. The following procedure was adopted with entire success.

With the assistance of Dr. Laws the end of a piece of rubber tubing was lashed tightly into the open end of a thin rubber finger-cot. The collapsed rubber bag thus made was pushed part way through the fistula so that one-half was in the bladder, the other half in the vagina. On distending the rubber bag with water the two ends dilated while an isthmus formed at the site of the fistula, holding the appliance in place. The valve-like action made a tight closure. Water was now injected into the woman's bladder and the cystoscope used as usual. By watching the spouting of blued urine from the two ureters it was determined that one kidney was doing nearly all the work. Nephrectomy was successfuly done. The fistula was afterward closed under local anæsthesia, using eucaine and adrenalin.

It was found experimentally that it was not difficult to keep this patient dry with this apparatus for some hours by clamping the tube. However, when her bladder contracted after normal urination there was a tendency to drive the fluid out of the inner sac and thus displace the appliance. Of course a longer and larger bag can be used for a larger fistula.

SUBPHRENIC ABSCESS FOLLOWING APPENDICITIS.

DR. JOHN H. JOPSON reported three cases of subphrenic abscess secondary to appendicitis, as follows:

CASE I.—M. M., male, aged 40, was operated upon at the Presbyterian Hospital in August, 1906, for an acute gangrenous appendicitis and diffuse peritonitis. Removal of the appendix, drainage, Fowler position, enteroclysis. The abdominal symptoms were promptly relieved. The temperature, however, continued elevated between 100–102°, without marked increase in pulse or respiration, while the general condition was excellent.

Failing to find evidences of accumulation in the lower abdomen, and flatness being present over the lower lobe of the right lung, posteriorly, puncture of the pleura was practised on the seventeenth day, with negative results. Dulness persisted, but characteristic physical signs were absent. Patient's condition

continued good and diagnosis by exclusion pointed to subphrenic collection, which diagnosis was confirmed by Dr. W. E. Hughes four weeks after operation. On the following day, before operation could be performed, the abscess discharged through a bronchus, much pus was expectorated, and the patient experienced characteristic shock with high fever, accelerated pulse and anxious expression. Aspiration in the ninth inner space gave pus from beneath the diaphragm, and operation under local anæsthesia, twelve hours later, showed the pleural cavity the sight of much recent effusion, and a subphrenic abscess, which was drained by transpleural route. Recovery followed.

No pleural or pulmonary infection or irritation were present until rupture occurred, and the prolonged elevation of temperature and the modest physical signs at the base of the right lung were the only danger signals present before rupture and pulmonary shock developed.

Case II.—Catherine T., aged 8, white, was operated upon at the Presbyterian Hospital, September 9, 1909, for acute appendicitis of two days' duration. The appendix lay well above the crest of the ilium, in the posterior position. It was perforated, gangrenous, lay in a moderate sized abscess, and was removed. Counter opening made in the loin, drainage by tube and gauze instituted. Pleural friction rub developed on the right side the following day, and twelve hours later there were fine râles over the same area posteriorly.

For three days the temperature continued elevated, pulse rapid and irregular (140–160), respirations from 40–48, and she was delirious. There were râles and harsh breathing over the right base posteriorly. Her condition then improved somewhat, but the temperature remained at about 100, pulse and respiration still rapid. There was dulness as high as the scapula on the right side, fine râles, and a loose cough. A small fecal fistula was observed in the posterior wound; otherwise the abdominal condition was satisfactory. The diagnosis was bronchopneumonia. On the fourteenth day her condition was noted as not so good. She had lost much flesh, took her nourishment poorly, temperature ranged from 99–101, physical signs in the chest remained the same, diarrhœa was present. Tuberculosis was suggested by a medical colleague. On the eighteenth day the subphrenic space

was aspirated, in the ninth inner space posteriorly, and foul, thick pus was evacuated. Operation refused, but consented to on the following day.

Operation was performed on the nineteenth day after primary operation. Posterior transpleural drainage by resection of ninth rib behind postaxillary line. Pleural cavity contained no effusion, but wall was gray and œdematous. Suture of parietal and visceral layers of pleura, and further protection of pleural cavity by packing. Large abscess found beneath the diaphragm extending as far toward the median line as the vertebral column. Operation well borne. Death from exhaustion the following day.

In this case there were symptoms of pleural inflammation, and later of consolidation in the right lung. Moderate, persistent elevation of temperature, rapid pulse and respiration, and later rapid emaciation.

Counter opening at the first operation was made by reason of the high location of the appendix, with the deliberate intention of avoiding a subphrenic infection. This it failed to do, or, more probably, such infection was already present. The symptoms closely simulated those of septic pneumonia. The prolongation of the process and the rapid emaciation indicated the subphrenic location of the infection. Had aspiration been practised earlier, it is possible that recovery might have resulted. No postmortem was obtained and we cannot say, therefore, whether a pneumonia had been present or whether the symptoms were only those of subphrenic abscess and secondary pleurisy.

Case III.—Mrs. Ada V., aged 25, was operated upon at the Presbyterian Hospital, June 29, 1909, for acute appendicitis of three days' duration. The appendix was perforated and gangrenous, pointed upward beneath the liver, almost touching it, and extending deeply into the right subcostal region. There was an abscess at this point, a large collection of pus in the pelvis and free pus all through the right side of the abdomen. Tube and gauze drainage from right subhepatic space to pelvis. Murphy-Fowler after treatment. Right-sided pleurisy developed promptly after operation with slight increased dulness over lower chest posteriorly. Temperature remained elevated with brief remissions, ranging from 100–102. There was profuse purulent discharge from the wound; pus was washed out in large quantities,

especially from the upper tube. Secondary posterior drainage was considered, but gradual diminution of discharge, occasional remissions of the temperature, and the fact that the general condition remained fairly good decided against it. The temperature fell to normal after three weeks, but rose again, and on July 31 patient expectorated small amounts of pus of decided odor. There was flatness to the ninth rib posteriorly and forward to the postaxillary line. No alteration of area of dulness on change of position, diminished fremitus over the area. Discharge of pus was much diminished. There was evidently a subphrenic collection, and operation was deferred for a day or two on account of moderate shock. There was rapid improvement, however, and the abscess finally drained itself; small amounts of pus being expectorated, the greater portion being washed out through the tubes. Aspiration of the pleura on one occasion gave only serum. The patient made a tedious recovery, with final complete return to robust health.

A study of this case shows that following appendiceal perforation and abscess in the subhepatic region there were prompt development of pleural inflammation, as shown by the usual symptoms: friction rub, pain, etc., a prolonged period of moderate fever, the development of a subphrenic collection which was evacuated partly through the lung, but mainly through the drainage tract. Aside from some loss of flesh, constitutional depression was mainly conspicuous by its absence, except on two or three occasions when shock and pulmonary irritation were marked, notably when pus was evacuated through the bronchi.

Some criticism might justly be made, because secondary drainage of the subphrenic space was not instituted. Temporary improvement, however, occurring on each occasion when operation had been decided upon, resulted in postponement, and the patient was finally fortunate enough to escape without a transpleural thoracotomy, which while a comparatively simple and easy operation in itself, is attended by certain manifest risks. Nor could this case fairly be classified as recovery of an unoperated case. Drainage vicarious but finally successful through the long tract between the abdominal wound, the posthepatic and subphrenic regions was present from the first, and comparatively a small amount of pus perforated the diaphragm and bronchus and was expectorated.

Dr. Jopson remarked further that subphrenic abscess is a rather infrequent complication of appendicitis. Elsberg collected 73 cases and Eisendrath added 33, a total of 106 cases reported up to 1908. Weber noted it in 9 cases out of 350 cases of appendicitis, and Moschowitz found it 8 times in 2000 cases in the Mt. Sinai Hospital. Appendicitis ranks according to most authors after gastric and duodenal ulcer, as the most frequent cause of subphrenic abscess, one-third of the cases being due to perforated ulcers around the pylorus, and one-sixth to appendicitis. Of the seven cases of subphrenic abscess which he had seen, in three it followed peritonitis from perforation of the appendix. The splendid paper by Barnard in the *British Med. Journal* in 1908, was a noteworthy contribution to the anatomy of these and other types of subphrenic abscess. The majority of subphrenic abscesses from appendicitis are intraperitoneal, the pus finding its way upward behind the cæcum and colon, and the position of the appendix has much to do with favoring such a course. The posterior position of the appendix, and especially a high location, places the abscess in the most favorable site for invasion around the liver to the subphrenic space. An extraperitoneal collection on the right side may form between the layers of the coronary ligament, which it separates, being continuous with the retroperitoneal tissue below, as Barnard emphasizes; an appendiceal collection which takes an upward course may reach it and become subphrenic without perforating into the peritoneal cavity. In the early stages, in cases of intraperitoneal infection, the process is diffuse, later the collection is walled off, forming a localized abscess. Hence, the advantage of postponing operation by the transpleural method in the early stages. The abscess at this time is small in size, deeply situated under the dome of the diaphragm and consequently difficult of access by this route. In the early stages the lumbar route is to be preferred. Occasionally the abscess will point in the epigastrium, and is conveniently opened there. In the majority of cases of any standing the abscess grows in size, pushes the lung up, the costophrenic sinus of the pleura is obliterated and posterior thoracotomy with drainage through or below the pleura is to be preferred.

Posture is an important factor in the development of subphrenic infections. Lymphatic drainage in the abdomen is upward

through the diaphragm. In addition to this the subphrenic space is a natural anatomical pocket when the patient is in a recumbent position; hence, the influence of gravity in spreading infection to this neighborhood, and hence, also the advantage of the Fowler position in overcoming it. Unfortunately, infection has oftentimes reached this point before the case comes to the operating table, especially when the appendix is in the position already described.

As is well known the *symptoms* of such collections may be acute or chronic. In the very acute cases the temperature is often markedly elevated, the pulse may be very rapid, and severe pain, nausea, vomiting, with chills and sweats and the acute constitutional symptoms of sepsis may be conspicuous features. The points he would emphasize, however, are, that a moderate continuous elevation of the temperature, a pulse little if any above the normal, an entire absence of abdominal symptoms, and a physical expression of comparative comfort and well-being are to be recognized as not inconsistent with the presence of a subphrenic abscess. Owing to adhesions of the liver to the diaphragm the liver is not often displaced downward, at least anteriorly. Most of the physical signs are to be looked for in the chest, except in those cases where the abscess bulges forward in the right hypochondrium, forming a swelling in that region which occurs when the subhepatic space is involved. Otherwise, compression and inflammation of the lung, due to an upward projection of the abscess, are produced.

In regard to the *diagnosis* of subphrenic abscess from pleural effusions and pulmonary consolidations, it has been his experience that reliance on text-book descriptions, and the attempt to elicit the finer shades of distinction as to the exact shape and definition of areas of dulness, may be fallacious and lead to error, even on the part of the most skilful clinicians. It is not to be wondered at, therefore, that one's faith in physical signs is sometimes shaken.

Dulness over the base of the right lung posteriorly is a valuable sign. If it occurs in connection with diminished tactile fremitus, and a continuous elevation of the temperature, without adequate explanations in the abdomen, following an appendiceal operation, one may suspect that a subphrenic collection is present. The most frequent association of physical

signs in these cases is said to be dulness with limitation or absence of breath sounds, vocal resonance and tactile vocal fremitus. The area of dulness is convex upward, unless gas be present. In the latter case tympany overlies dulness, and amphoric and coin sounds are presumably present. Immobilization of the thorax on the same side is sometimes noted, with cough and expectoration. Of course, the expectoration of pus is confirmative, but it is much to be desired that the diagnosis be made before this stage is reached; not only because sepsis may be much advanced, but because, as it has been his experience to see several times, the rupture of pus into a bronchus either from empyema or subphrenic abscess is attended by a degree of shock which makes operation at that time highly unfavorable.

Barnard did not find either friction sounds or râles present with any great frequency in his series, but the occurrence in two cases under Jopson's observation, of pleurisy and evidences of pulmonary involvement almost immediately after operation, and both in cases where infection was present in the subhepatic region from the time of rupture of the appendix, makes him inclined to believe that these symptoms are of some diagnostic value.

In cases of doubtful diagnosis the use of the exploring needle is of paramount importance; and its use at an earlier time than usually practised would undoubtedly result in saving a larger percentage of cases. If pus is found on aspiration of the subphrenic region below the ninth rib, operation must be at once proceeded with, as leakage and infection of the pleura through the needle puncture will almost certainly ensue if the costophrenic sinus has not been obliterated by inflammation. This occurred in Case I. Fortunately such obliteration often takes place early, and the drainage of the abscess can then be accomplished without risk of infection of the general pleural cavity. In a case of subphrenic abscess in a child reported some years ago by Dr. Jopson, the abscess had pointed through the diaphragm, both layers of the pleura and the chest wall, forming a collection outside the lateral wall of the thorax without infection of the general pleural cavity.

With few exceptions posterior thoracotomy is the route to be chosen in draining these abscesses. Many cases can only be reached by a transpleural operation, and if care be used in suturing the visceral pleura and the diaphragm to the intercostal

muscles and further protecting the pleura by gauze before going through the diaphragm, serious infection of the pleura will usually be avoided. In this connection the subpleural methods of Elsberg and Eisendrath may be mentioned. The operation itself is a simple and easy one. It is the condition for which operation is done that makes the prognosis so serious and which furnishes the 25 per cent. mortality. High as this mortality is, it is lower than that of subphrenic abscess in general, which is estimated at from 35 to 42 per cent. in operated cases.

It is interesting to note that in children the mortality from subphrenic abscess is less than it is in adults. In 1903 Jopson collected 23 cases in patients under fifteen years of age. The mortality in 15 cases in whom operation was performed was 13.3 per cent. The explanation of this is probably to be found in the fact that appendicitis is the most frequent cause of subphrenic abscess in children, in whom perforation of gastric and duodenal ulcers with their excessive mortality is rare. In seven cases of this series, appendicitis was the cause of the infection. Most of the other causes active in adult life were present occasionally.

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