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OF THE
PHILADELPHIA
ACADEMY
OF
SURGERY

VOL. XI.

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PHILADELPHIA

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VOLUME XI

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1909

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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.

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., 322 S. Fifteenth 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.

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 Hospital, St. Mary's Hospital, and to St. Christopher's Hospital for Children.

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.

1898. Frazier, Charles Harrison, M.D., 1724 Spruce Street. Professor of Clinical Surgery, University of Pennsylvania; Surgeon to the University 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. 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., 1702 Locust 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, Children's, and Bryn Mawr 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., 251 S. Seventeenth Street. Surgeon to the Germantown Hospital; Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Surgeon to the Eastern State Penitentiary.

1906. MÜLLER, GEORGE P., M.D., 324 S. Fifteenth Street. Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital, Philadelphia General Hospital, and the Home for Crippled Children; Assistant Pathologist to the German 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; Professor of Surgery, Woman's Medical College of Pennsylvania; Surgeon to the Medico-Chirurgical Hospital, Woman's College Hospital, Presbyterian, Jewish, and the Philadelphia General Hospitals.

1900. Ross, George G., M.D., 1721 Spruce Street. Surgeon Germantown Hospital; Assistant Surgeon, German Hospital.

1894. Shoemaker, George Erety, A.M., M.D., 1831 Chestnut Street. Gynæcologist to the Presbyterian 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 Dispensary of the University Hospital; Instructor in Genito-Urinary Diseases, University of Pennsylvania; Surgeon to the British Consulate.

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; Assistant Surgeon, Jefferson Hospital; Professor of Surgery, Philadelphia Polyclinic; Surgeon to the Out-Patient Department of the Pennsylvania Hospital.

1908. Sweet, J. Edwin, A.M., M.D., 4315 Walnut Street. Assistant Professor of Experimental Surgery, University of Pennsylvania.

1890. Taylor, William J., M.D., 1825 Pine Street. Surgeon to St. Agnes' and to 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; Assistant Surgeon to 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 Hospital.

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. Clinical Professor of Orthopædic Surgery, University of Pennsylvania; Surgeon to the Presbyterian Hospital; Consulting Surgeon to the Atlantic City Hospital, and Hospital for Chronic Insane, Pennsylvania Hospital, and the Germantown Hospital.

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.

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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.
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1903. R. G. LeConte.
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1898	*Theodore F. Prewitt	St. Louis, Mo.
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1898	Robert F. Weir	New York, N. Y.
1898	Frederick S. Dennis	New York, N. Y.

* Deceased.

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1900 THEODOR KOCHER.....Berne, Switzerland.
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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 B. MUNRO.....Boston, Mass.

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TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

STATED MEETING, HELD JANUARY 6, 1908.

The President, JOHN B. ROBERTS, M.D., in the Chair.

GUNSHOT WOUND OF STOMACH, WITH POSTERIOR DRAINAGE.

DR. EDWARD B. HODGE, JR., presented a man, aged 19 years, who was admitted to the Presbyterian Hospital on November 12, 1907, in the service of Dr. J. H. Jopson. Two hours before he had been accidentally shot with a BB bullet from an air rifle from a distance of 100 feet. The bullet penetrated a wire screen-door, shirt and undershirt, making a small wound 2 inches below the ensiform slightly to left of median line. Patient had taken no food for 5 or 6 hours, had not vomited and was in good condition. Temperature, 98.8°; pulse, 84; respiration, 26.

Immediate operation by Dr. Hodge. Incision through wound showed penetration through left rectus ranging toward left. A perforation in anterior wall of stomach near lesser curvature and nearer cardiac than pyloric end was closed with silk purse-string suture, reinforced by interrupted silk Lemberts. Little soiling of peritoneum. Air and blood were noticed behind gastro-colic omentum. This structure was torn through, and a perforation found on the posterior wall of the stomach toward the cardiac end. This was closed in a similar manner. No other injury could be found, but in view of the wound of the posterior stomach wall and a possible pancreatic lesion, posterior drainage was considered wise. Through a small incision in the left ileo-costal space a long forceps was pushed into the lesser peritoneal cavity and a medium-sized rubber tube withdrawn. The gastro-

colic omentum was closed over this after dry sponging of the peritoneum. A small cigarette drain was inserted to the anterior stomach wound and both incisions closed with interrupted silkworm gut.

For 24–36 hours the patient gave considerable anxiety on account of marked restlessness, rapid pulse, 130–160, and respiration, 30–40, with some distension of the upper abdomen. After the second day convalescence was smooth. On day after operation there were 3 dark tarry stools, and for 10 days 1–3 of similar though lighter color. Tube was gradually shortened on account of moderate purulent discharge. Stitches removed on tenth day and patient discharged in 4 weeks.

Dr. George G. Ross said that, several years ago, at the Germantown Hospital he saw an Italian who had been shot. The ball went in the lower chest wall between the lower ribs, ranged downward and inward. The skiagraph showed the bullet resting against the vertebral column. The man was shot when his stomach was absolutely empty. There was reason to believe from his bowel movements that the bullet had gone through both walls of his stomach. He absolutely refused operation. He developed quite a cough and violent peritonitis, but finally got well without operation or drainage. Dr. Ross believes that there was a reasonable doubt as to perforation of the stomach, although it was thought there was from the clinical facts.

STAB WOUND OF THE DIAPHRAGM.

Dr. Francis T. Stewart reported the case of a man, aged 22 years, colored, who was admitted to the Pennsylvania Hospital December 14, 1907, in the service of Dr. Gibbon. The patient had been stabbed in the left mammillary line with a penknife, which entered the sixth interspace, cut through the seventh costal cartillage obliquely downward and outward and severed the muscles of the seventh interspace, the resulting wound being 3 inches in length. Through this wound protruded a portion of the stomach about the size of an orange. The pulse was 100, the temperature normal, and the respiration quiet. There was considerable pain in the region of the wound, rigidity of the left side of the abdomen, but no vomiting, displacement of the heart, or pneumothorax. Under ether anesthesia an incision was made through the left rectus abdominis. That portion of the stomach which

protruded through the external wound was then pushed into the thorax, and the opening plugged with gauze in order to prevent the entrance of air. The stomach was then drawn upon from the abdominal cavity, but owing to the negative pressure in the thorax, reduction was found to be rather difficult until assisted by pressure from above through the thorax. The stomach was uninjured and there were no other visceral lesions. The hole in the diaphragm was about 2½ inches long and ran in the direction of the muscular fibers, from the pericardium downward and outward. After pushing the diaphragm upward with the hand in the abdomen the wound in the diaphragm, the edges of which were about ¼ of an inch in thickness, was sutured, through the seventh intercostal space, with catgut without resecting a rib. The severed costal cartilage and the intercostal muscles were sutured with catgut, the skin with silkworm gut, no drainage was employed, and the diaphragmatic region was immobilized with adhesive straps. During the operation some air entered the thorax, but later there was no displacement of the heart and only a slightly higher pitch in the percussion note over the thorax. The lung was neither seen nor felt during the operation. The following day there was some pain and slight dyspnœa, both of which subsided in the course of 48 hours. The wounds healed by primary intention, and the patient left the hospital on the sixteenth day.

Dr. John N. Gibbon recalled a case of his own at the Pennsylvania Hospital several years ago, that of an Italian who was stabbed in the back and when he was seen by Dr. Gibbon shortly after the injury there was protruding through a wound at the lower angle of the scapula quite a mass of omentum, as large as three or four fingers. In this case Dr. Gibbon resected a rib, ligated and removed a portion of the omentum, returned the stomach to the abdominal cavity and closed the diaphragmatic opening. The knife the patient was stabbed with was a small one which passed between the ribs, and one rib acting as a fulcrum the knife cut a 2½ inch opening in the diaphragm. Dr. Gibbon opened the abdomen because he was afraid there might be an injury of the stomach but nothing was found and the abdominal wound was therefore closed. The patient did well for 24 hours but then developed a double pneumonia, and the man died 6 or 7 days after the receipt of his injury. An autopsy was per-

formed and the pneumonia on the side where the patient had been injured was found to have practically subsided. His wound had completely healed and the active process was all on the opposite side.

Dr. Harry C. Deaver said that in subdiaphragmatic abscesses complicating appendicitis he had resorted to drainage by resecting the tenth rib posteriorly and making the incision in the diaphragm, stitching it to the muscles of the chest wall. He has found this very successful and also that it gives good drainage. Subdiaphragmatic abscesses are very hard to drain. In the last case upon which he operated, relieving the abscess in the way described, he depressed the liver and ran a large drainage tube between it and the diaphragm. This drained very nicely and there was no unpleasant results from stitching the diaphragm to the muscles of the chest wall.

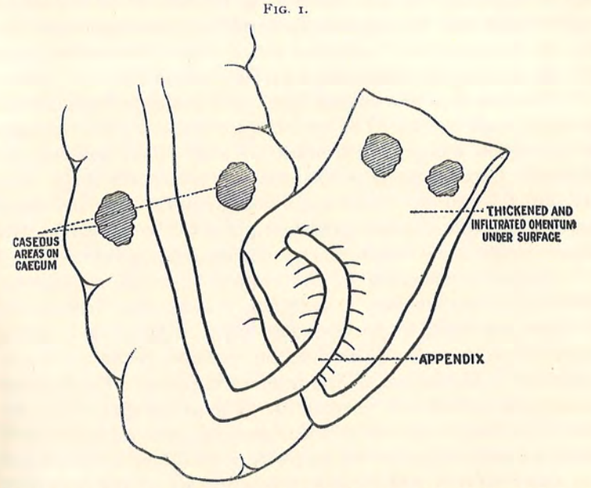
Dr. John B. Roberts said that a good many years ago when he did his first nephrotomy he punctured the diaphragm by accident. He could hear the whistling of the air in the chest. The patient, however, recovered satisfactorily.

PRIMARY TUBERCULOSIS OF THE CÆCUM.

Dr. John H. Jopson reported the case of a man, aged 26 years, who was admitted to the Presbyterian Hospital, October 14, 1907. His family history was negative. Six weeks before admission he had been knocked down by a horse, and a wagon ran over him, the wheel passing over the left thigh just below the hip, and across the right iliac fossa. He had considerable pain in the abdomen and in the left hip, which lasted about three days, when he returned to light work. Pain continued, but of mild degree, until a week later, when he attempted heavier work, and from that time he suffered more severely, until 2½ weeks before admission, when he had to quit his work. He then detected a mass in the abdomen, which he thinks has increased in size, and since then has become the seat of increasing pain. Three weeks before admission he says he passed blood by the bowel for three days. Since then there have been daily bowel movements, sometimes loose, sometimes constipated. He has only vomited once. His appetite has been poor, and his only nourishment of late has been milk. Previous to his injury he had been in good health.

On admission his temperature was 100°, pulse 120, respiration 28. He was in good condition, well nourished, although of rather spare physique; nothing of note in the chest. There was a mass in the right iliac region about the size of a small orange, moderately sensitive, and the seat of pain. Leucocyte count, 18,100. His temperature fell below normal the day after admission, and continued below normal, between 97° and 98°. The pain and tenderness lessened, and the mass decreased apparently in size. On the 21st, one week after admission, the leucocyte

Fig. 1.



Primary tuberculosis of cæcum. In this sketch the diseased portion of omentum has been separated and turned over, showing the relationship of the appendix.

count was 14,000, and three days later 9,700. Operation October 25, 1907. Incision over the tumor showed it to be intra-peritoneal. The mass was formed of a portion of the end of the large omentum, overlying and adherent to the anterior wall of the cæcum, and the entire mass was fastened to the peritoneum over the inner wall of the false pelvis. The cæcum and adherent omentum were peeled off, which disclosed a few caseous areas on the underlying peritoneum. The omentum was stripped from the cæcum to the anterior surface of which it was adherent. Examination of the under section of the portion of omentum so liberated

showed the appendix adherent to it, small, short, and stripped of its peritoneal coat. Two caseous areas, about ⅓ inch in diameter, marked points on the cæcum adhesion (Fig. 1). The rest of the peritoneal coat of the cæcum was inflamed and thickened. There was no gross enlargement of the cæcum, however, and the neighboring intestines were normal in appearance. The adherent omentum was much thickened and altered in appearance, for a distance of 2½ inches by 1½ inches, and was ¾ of an inch in thickness. It was ligated from the rest of the omentum, and removed with the appendix fastened to it after ligation of the base of the appendix. Iodoform gauze strips were packed over the raw surfaces, and the wound partially closed.

Convalescence was uninterrupted, and the wound was healed in about three weeks. The temperature remained normal, and no induration was present beneath the scar. Pain was entirely relieved. Careful physical examination before discharge was practically negative. There was a slightly duller note and some increase in tactile fremitus over the right apex, but no râles. He gained weight and strength, and was discharged in good condition.

Careful examination of the excised omentum showed on microscopic examination a caseating, tuberculous infiltration. This was confirmed by microscopic study. Serial sections of the appendix were made, which from its position in the mass was suspected to be the seat of the primary infection. These failed to show the presence of tuberculosis. The pathological diagnosis was, therefore, a primary tuberculosis of the cæcum, which would be included under the entero-peritoneal type of Hartmann and other writers, and secondary tuberculosis of the omentum. The omentum had well fulfilled its function of "abdominal policeman" in covering over the primary focus and assisting in the prevention of more extensive peritoneal infection.

Dr. JOPSON added that Henry Hartmann, in an address on the "Surgical Forms of Ileo-Cæcal Tuberculosis," before the Medical Society of London, December, 1906 (Brit. Med. Jour., 4–13–1907), gives a clear and concise review of the subject and an analysis of cases operated upon. Charles Greene Cumston has recently covered the subject very thoroughly in connection with a report of two cases (ANNALS OF SURGERY, Nov., 1907). Hartmann points out that the cæcum is the commonest seat of tuberculosis in the entire intestine, and that when the only

portion of intestine involved it is usually a primary infection. Tuberculosis of the cæcum attacks by preference adults between 20 and 40 years of age. The cases admitting of surgical treatment are divided into the entero-peritoneal and hyperplastic types. In the first the cæcum, and with it frequently the ileum, is the seat of ulcers, and around it develop secondary peritoneal inflammation, adhesions, abscesses, and oftentimes fistulous tracts opening externally. The hyperplastic type, on the other hand, which is the most important surgically, is generally limited to the cæcum, beginning near the valve, and when it spreads, does so toward the colon; it is marked by an increase in size of the cæcum with great thickening of its walls, and oftentimes the formation of a fibro-adipose enveloping mass. It is commonly non-adherent; its cavity is greatly decreased in size, frequently the site of stricture, and the mucous membrane is usually ulcerated. The appendix is often involved in the inflammatory exudate, but is usually patulous. As Hartmann points out, the infection may simulate one of two commoner conditions; viz., appendicitis and malignant tumor. The first-mentioned is commoner as a symptom-complex in the entero-peritoneal form; the second in the hyperplastic variety. Appendicial symptoms are preceded in the enteroperitoneal form by symptoms of enteritis, diarrhœa, bloody stools, etc., and later the mass, with localizing symptoms of pain, tumor, etc., appears in the right iliac region. Abscesses and fistulæ form, and pulmonary tuberculosis oftentimes develops later. It will be noted how closely the symptoms in the case here reported resemble those of the typical entero-peritoneal class. The diarrhœa, bloody stools, and later developing local symptoms were all present. The history of traumatism helped to mask their importance. How much the traumatism had to do with causation of the condition is a question.

Attacks resembling sub-acute appendicitis may develop in the course of hyperplastic cæcal tuberculosis, but the symptoms in general are those of slowly developing malignant tumors, with incomplete obstruction, alternating constipation and diarrhœa, colic and digestive disturbances. A tumor is usually present, and the course of the disease is toward a fatal issue in from 2½ to 3 years.

Resection is the operation of choice in the hyperplastic form. In the enteroperitoneal form, where the peri-cæcal infiltration is

such a prominent and early lesion, resection is generally inadvisable. Simple laparotomy has resulted in a cure when the peritoneal lesions were few in number and intestinal ulceration absent. In severe cases, or when adhesions are very extensive, the operation of intestinal exclusion, unilateral, or, in the case of fistula, bilateral, performed on the cæcum, is indicated for the enteroperitoneal type.

Hartmann analyzes 229 operations for cæcal tuberculosis, with a death list of 46. Since 1900 the mortality has been but 12 per cent.

DIAGNOSIS OF RENAL DISEASE AND SUFFICIENCY.

BY BENJAMIN A. THOMAS, M.D.,

OF PHILADELPHIA,

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MODERN surgery furnishes no more striking evidence of the keen desire for increased accuracy and advancement in diagnosis and prognosis than that to be found in the laborious and persistent efforts which have been made in order to place before the profession thoroughly trustworthy methods for the estimation of renal disease and sufficiency.

Until recent years, surgeons have been content in their examination of the kidneys of patients to note the mobility, sensibility, and size of the organs, and to rely upon this, together with a more or less careful analysis of the urine, for the diagnosis of renal disease or an estimation of the renal function. Such information as may be based upon these factors alone must be somewhat variable, and in many instances positively unreliable.

It is my object within the limited scope of this article, to direct attention to the value of the routine employment of the cystoscope supplemented when indicated by ureteral catheterization for purposes of diagnosis in the symptomatology of genito-urinary diseases. Naturally, it is not only superfluous but impossible to enter into a detailed description, in a paper of this length, of the asepsis and technique demanded by cystoscopy.

It is extremely interesting to note the progress made by the indefatigable efforts to perfect renal diagnosis. The earliest attempts to catheterize the ureters were made by Axel Iversen,[1] Guyon,[2] Albarran,[3] and Harrison,[4] resorting to operative procedures of the nature of laparotomy and perineal section. Emmet[5] and Bozeman[6] accomplished the same end

by colpocystotomy. About the same time it was recommended (Hegar,[7] Sänger,[8] Warkalla,[9] Czerny[10]) to place a temporary ligature around one of the ureters from the vaginal route, while in the male sex the diseased kidney was exposed and a renal pelvic fistula established. These practices were soon condemned because too radical and serious, and led to the introduction of the clamp and compression methods of Tuchmann[11] and his contemporaries. Noteworthy advances were made by Fenwick[12] and Kelly[13] in the employment of suction, air distention and direct inspection. Of the segregators or separators the Luys[14] instrument deserves first choice and has proven itself of great value where ureteral catheterization was impossible; unfortunately in the presence of certain vesical conditions, as a medianly located ulcer or area of suppuration, any separator is manifestly useless. Although to Simon[15] and Pawlick[16] is due the honor of priority in catheterizing without intravesical illumination the ureters per urethram in women, it remained for Nitze[17] in the year 1879 to place cystoscopy, in the true sense of the word, upon a practical basis. Since that time, rapid strides have been made in this special method of technical examination, until now in many of the foremost hospitals and urological clinics of the world, it has become a routine procedure. The diagnostic advantages attending the routine use of the cystoscope are so evident, so numerous and so important that further emphasis of the merits of this most important aid in the diagnosis of urinary disorders would seem almost unnecessary.

The cystoscopes commonly employed are the direct vision cystoscope using air distention and the direct and indirect lens cystoscopes, using a transparent fluid medium. Of these methods the first has been almost entirely discarded because of the greater liability to burns, increased pain on account of heat, small size of visual field, inability to measure constantly the amount of inflation, greater danger of infection and limitation of usefulness to the female bladder. In the lens instruments direct and indirect, using always a known definite amount of sterile solution, the degree of distention of the

bladder is constant and the anatomical landmarks of the interior are invariable, the visual fields are large, clear, and distinct, there is less pain and burns are unknown. Unfortunately for the direct method the entire bladder cannot be explored, an act readily performed using the indirect illumination. Naturally, any operator will have the greatest success with that form of instrument with which he has had the greatest experience. The extensive use of the indirect lens cystoscope over other forms speaks more than words for the superiority of this instrument.

Many surgeons are inclined to regard the cystoscope as an electrical toy, possessing no distinct advantage. The routine use of this instrument in difficult renal and vesical differential diagnoses cannot be too strongly urged, and indeed in many genito-urinary clinics, cystoscopy is routinely employed. By adopting such a practice, frequently with the simple cystoscope it will be possible not only to make the differential diagnosis between diseases of the bladder and kidneys, but also by noting the conditions and certain abnormalities in and about the ureteral orifices, decide which kidney is diseased, rendering ureteral catheterization unnecessary. Illustrative of this statement, allow me to cite two cases, in the service of Dr. Chas. H. Frazier, to whom I am indebted for the privilege of these reports.

Case I.—A. L., female, aged 30, was admitted to the University Hospital, May 29, 1907, complaining of a growth in her right abdomen. The social, family and previous medical histories are entirely negative, patient being throughout her life always strong and well. Five months prior to admission she noticed some discomfort when lying on her right side, and consulted a physician who informed her that she had a "tumor." On admission patient felt well, slept well and had a good appetite, but stated that she had lost weight slightly. On the right side in the region of the kidney a large, very freely movable mass was palpable. It was not painful upon pressure and motion, not connected with the liver, and seemed to be located behind and above the colon. Urinalysis demonstrated the presence of a trace of albumen, an

occasional hyaline cast, few erythrocytes and a number of leucocytes. The count of the white blood corpuscles numbered 12,300. There was no response to the tuberculin test. Temperature fluctuated between 98° and 100°. Opinion as to diagnosis was divided between a malignant growth and pyonephrosis.

On June 10, I made a cystoscopic examination and observed a cylindrical plug of inspissated pus protruding into the bladder from the ureteral orifice of the right side, rendering the diagnosis of pyonephrosis indisputable. In Fig. 1 are seen colored drawings depicting the cystoscopic findings.

On the same day Dr. George P. Müller, exposed the kidney by Israel's incision, and found it to be about 40 cm. in length and adherent to surrounding structures. These adhesions were so firm and dense that it was impossible to deliver the kidney and nephrotomy followed by the evacuation of much thick pus and drainage was performed.

Case II.—A. C., female, aged 31, was admitted to the University Hospital, November 6, 1907, complaining of pain in left side of abdomen. Aside from the facts that she had had diphtheria, and one sister had undergone operation for tuberculous cervical lymphadenitis, the previous family and medical histories were negative. Two and one-half weeks prior to her admission patient was awakened during the night by pain in the left side of the abdomen and lumbar region which was persistent, and severe enough to "double her up," on the fourth day radiating down groin to genitalia. This was accompanied by tenderness anteriorly and posteriorly and followed by vomiting, continuing for a week, of a greenish material. No urinary symptoms were present at any time. On admission the complaint was merely a dull ache and tenderness in the left lumbar region. The abdomen was soft, and flabby, and on the left side a palpable slightly tender mass, movable with respiration, extended to within one inch of the median line. The urinalysis was essentially negative, the absence of leucocytes being especially noteworthy. Blood count showed the white blood cells to number only 11,200, and the temperature was never over 98.3–5°.

Three days after admission I made a cystoscopic examination with the expectation of catheterizing the ureters to determine the functional sufficiency of the supposedly normal kidney, in view of the contemplated nephrectomy of the diseased organ, and

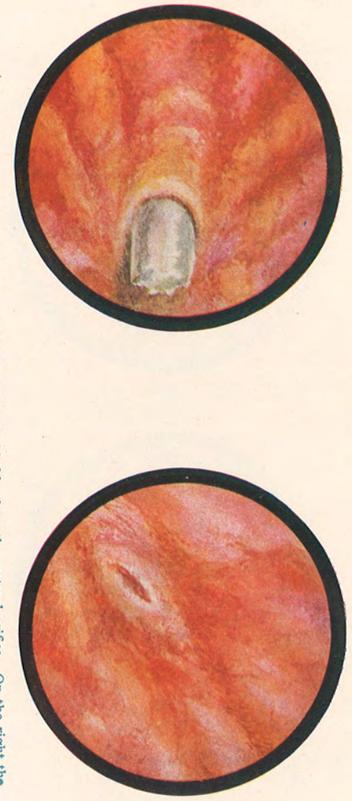
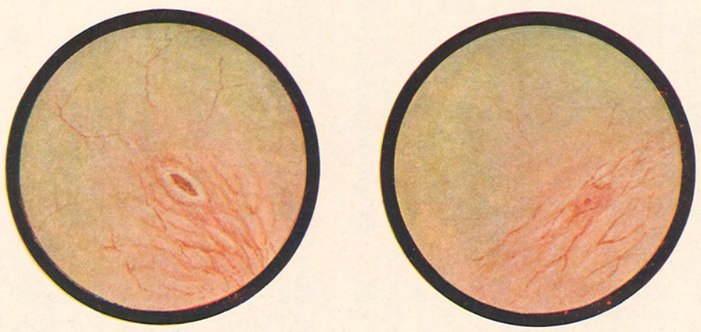


Fig. 1.

On the left is seen a ureteral pus cast, protruding into the bladder from the ureteral orifice. On the right the ureteral orifice appears normal, but as on the other side the mucous membrane is generally in a state of marked inflammation.

FIG. 2.



The picture on the left demonstrates a perfectly normal mucous membrane and ureteral orifice. On the right the ureteral orifice will be observed to be small, round, atrophic and functionless. This was confirmed by catheterization of the affected ureter, when no urine was obtainable.

found the left ureteral orifice to be very small, atrophic and round, instead of presenting the usual spindle-like appearance. The conditions found are well portrayed by the submitted colored drawings in Fig. 2. It was evident that the left ureter was no longer functionating, and this opinion was confirmed when no urine was collectable after catheterization of the affected ureter. In this case the simple cystoscopic findings demonstrated the uselessness of catheterizing the normal ureter to determine the functional capability of the supposedly normal kidney, inasmuch as it had already proved itself competent to care for the entire urinary excretion.

Five days later Dr. Frazier performed a nephrectomy, at which time merely a shell of kidney tissue was found, the entire kidney having been destroyed and supplanted by a suppurating sac filled with a greenish yellow pus. Laboratory examination of the pus and tissue failed to demonstrate any evidence of tuberculosis.

It is of interest to note also in this case that the cystoscope showed no evidence of cystitis, and with the absence of leucocytes in the urine, confirms the point that extensive pyonephrosis may exist in the total absence of pyuria.

In surgical operations, and especially in those connected with the urinary organs, a failure of the renal function is responsible for a certain proportion of the death-rate. Kümmell states that whereas he had six deaths from insufficiency of the second kidney in his earlier work, he has had no deaths from this cause since he has employed the modern methods of diagnosis. The consciousness of this fact is a source of anxiety to the surgeon who proposes to operate where known renal disease is present, and this anxiety is accentuated when the operation concerns some part of the urinary tract; it becomes acute when a nephrectomy is to be performed.

To-day, we are in a position, through the efforts largely of Pawlick,[16] Kelly,[18] Brown,[19] and Nitze,[17] especially the last in 1894, by dependence upon the so-called functional renal diagnosis, based upon bilateral catheterization of the ureters, to estimate the comparative function or sufficiency of one or both kidneys. It may be claimed that such men as Casper,

Kümmell, Rumpel and Zuckerkandl [22] are enthusiasts in this line of work and over-exaggerate the value to be derived from these difficult and technical procedures. However, the results obtained and to be observed in their clinics dispels any thought of doubt. Time forbids a detailed discussion of the technique and indications for the various methods entering into the determination of the functional capability of the kidneys. Suffice it to say that these, in addition to the usual physical, chemical and microscopical examinations, are *cryoscopy,* the *phloridzin test, urea determination,* the *indigo-carmin test, methylene blue test,* and the *electrical conductivity of the urine,* of which the last three are least important and generally superfluous. Many are prone to consider, on first thought, functional kidney diagnosis and cryoscopy as synonymous. Nothing, however, could be more erroneous. Cryoscopy, or the determination of the molecular concentration of the blood and urine, is merely one of the several methods of ascertaining the functional sufficiency of the kidneys. Dependence upon the results of cryoscopy alone has led naturally in many cases to grievous errors in diagnosis.

The following is the preparation and routine method of examination employed in the treatment of a given case for the determination of the renal function:

Previous to the examination, the patient is given a definite diet, namely, a breakfast consisting of 5 oz. of milk, a roll and two soft eggs. This restricted ingestion of fluids is given because of the occasional occurrence of nervous polyuria and diuretic influence of phloridzin. A thorough cystoscopic examination precedes and not infrequently renders a catheterization of the ureters unnecessary; sufficient evidence being demonstrable in the bladder to explain the symptomatology.

After thoroughly irrigating the bladder, always under the most aseptic precautions, both ureters are catheterized employing the double-barreled ureteral cystoscope. The first few drops of urine should not be saved, owing to the fact that the end of the catheter may have taken up pus cells or other matter from the content of the bladder during its passage through the same; or

because of trauma and diapedesis at the time of manipulation, a few red cells may have found their way through the eye of the catheter. After one to three c.c. of urine have been collected in tubes, carefully designated *right* and *left* to avoid confusion, these are replaced by two others. If the urine is now dropping from both catheters, desirably *one centigramme* of phloridzin is injected intramuscularly. At the end of 15 to 20 minutes two more tubes are substituted and a few additional c.c. of urine collected. We now have six tubes containing urine. The first pair serve for the microscopic examination; the second pair for the determination of the freezing point and urea; the third pair for the estimation of the artificially produced sugar.

Cryoscopy of the blood, on which formerly so much stress was laid, is falling into disrepute as a valuable diagnostical aid, although Kümmell and Rumpel still attach no little importance to this procedure in urinary surgery. But even they no longer assert a lowering of the freezing point of the blood to —0.60° to be the limit for nephrectomy. Albarran,[20] Casper,[21] Israel,[25] Senator [23] and Koranyi [24] are all unanimous in the following conclusions:

1. The lowering of the Δ of the blood to —0.60° and beyond may be independent of any renal lesion. Kümmell and Rumpel themselves recognize the possibility of this happening in various circumstances; in lost cardiac compensation, anæmia, diabetes, eclampsia, epileptic attacks and in large intra-abdominal tumors. In all these cases accumulation of carbonic acid in the blood from respiratory insufficiency may determine the lowering of the Δ of the blood.

2. The normal Δ of the blood —0.56° does not indicate that the renal function is insufficient.

3. When the kidney is diseased the Δ of the blood may be —0.60°. Great molecular concentration of the blood has been observed in cases of unilateral hydro- and pyonephrosis, cancer of the kidney and even in renal colic.

4. When the two kidneys are diseased, the Δ of the blood may be normal. A single kidney is sufficient to maintain the normal degree of concentration of the blood, and this work

may, perhaps, be performed by the parts of the parenchyma of each kidney that are still intact. Each of those kidneys considered alone would be insufficient.

Albarran [20] and others believe that the study of the molecular concentration of the blood is only of practical interest in exceptional cases. When the Δ of the blood is below —0.58° or —0.60°, it may raise a suspicion of a bilateral lesion, but in the greater number of cases, we can arrive at a precise diagnosis by other methods, and notably by analysis of the separate, simultaneously collected urines of the two kidneys. When from any reason it is impossible to study separately the urines of the two kidneys, the investigation of the blood has a real interest. Upon the two repeatedly demonstrated hypotheses that, *normally, both kidneys, at a given time, excrete identical urines, and that sugar is normally equally excreted by both kidneys after "phloridzin" injection, are founded the beliefs of the advocates of modern kidney diagnosis.* This naturally necessitates the synchronous bilateral catheterization of the ureters for the collection of urine over a given period of time. According to Casper [21] this is the all-important point, and it is only by a comparative study of the simultaneously catheterized specimens of urine that an indisputable judgment can be formed as to the sufficiency or insufficiency of the corresponding kidneys. On the other hand, there are some, including Israel,[25] Kapsammer [27] and Albarran [20] who deny that the composition of the urines of the two healthy kidneys at a given time is identical. Their objection, however, is vastly overweighed by the positive assertions of Casper,[21] Richter,[26] Zuckerkandl,[22] Friedrich Strauss,[28] Fedorow,[29] Bardier,[30] Frenkel [31] and others. Many errors have arisen because of the attachment of too much importance to very small differences. Again, there has been a tendency just as is so often the case in other conditions, medical and surgical, to seek for some sign or test disregarding all the associated diagnostical aids and procedures, and to make functional renal diagnosis bear the entire brunt of the burden, whereas it is, and only should be, a link in the chain of diagnostic evidence.

In order to illustrate forcibly the great value of modern renal diagnostical methods relative to the estimation of renal sufficiency, allow me to record the following cases:

Case III.—M. H., female, aged 39, was admitted to Dr. Frazier's service at the University Hospital on October 16, 1906, complaining of dysuria with frequency and urgency of urination and some tenderness in hypogastric and appendiceal regions. Although she has never been of robust development, the family and previous medical histories were negative save that one sister died of tuberculosis, and that for the past eight years there has been occasional frequency of urination and an attack of "malarial fever" of three weeks duration during the previous summer. On admission patient had the above subjective complaints, at times associated with a heavy pulling sensation and some tenderness in the right flank, just beneath the costal margin. Recently, leucorrhœa following urination and loss of weight have occurred. In the right flank, extending about two inches below the costal arch, is a firm, smooth, readily palpable mass, very slightly movable and only moderately tender on manipulation. Temperature did not fluctuate and never rose over 98°. Leucocytic count numbered 4,560. Urinalysis of catheterized specimen demonstrated presence of albumen and a large quantity of pus containing the bacillus tuberculosis.

Two days after admission I catheterized the left ureter using the Kelly instrument to determine the functional condition of the left kidney. During this procedure large quantities of pus were observed to flow from the right ureteral orifice. The urine collected from the right side upon analysis proved to be normal and was productive of no lesions upon inoculations into guinea pigs, conducive therefore to a favorable prognosis following nephrectomy.

Shortly afterward Dr. Frazier performed nephrectomy and ureterectomy of the affected side, and a kidney the seat of advanced tuberculosis both macroscopically and microscopically was removed.

Case IV.—Male, 34 years; family history negative; in early life frequently had cervical lymphadenitis; syphilis ten years previously; nephritis two years ago. No pains although almost continuous hematuria; never colic or tenesumus. Patient was

very well nourished; no fever; liver palpable; lungs showed no demonstrable lesions; abdomen not tender. In left hypochondrium an indistinct resistance, not tender to palpation was recognizable. Urine: cloudy, bloody, albumen positive, no sugar, sediment demonstrated blood and pus, no casts, no tubercle bacilli. Urination painless but every three to four hours; more frequently by night.

Cystoscopy showed a bullous œdema of mucous membrane about neck of bladder, and in places the mucous membrane was studded with slightly elevated yellowish nodules. Ureteral orifices presented no especial changes.

Functional Examination by Ureteral Catheterization:—

	Right.	Left.
Appearance	Clear	Cloudy
Amount	13 c.c.	12 c.c.
Sp. g.	1.026	1.010
Δ	1.64	0.43
U	2.0	0.2
Sac.	2.4	0.2
Alb.	0	Moderate
Sed.	—	Pus and red cells

A glance at the comparative determinations of freezing points, urea, sugar, albumen, and characters of sediment, reveals the unmistakable functional sufficiency of the right kidney. Nephrectomy of left kidney demonstrated a *nephrolithiasis* with *pyonephrosis*.

Case V.—Male, aged 60, in childhood had inflammation of the lungs. About a year ago experienced pain in left side following spring over ditch. Four days later had hematuria of short duration without pain. Sometime later, again hematuria, this time with pain in left side. Recently patient had lost weight (28 lbs.). Never fever, colic, or passage of stones. Abdomen soft. Right kidney palpable. Under left costal arch, distinct ballottement of a tumor extending from mammillary line to umbilicus; movable with respiration, smooth and tender on pressure. Lateral position rendered the findings of palpation more distinct. Urine: cloudy, sediment contained pus, no casts, but a few R.B.C., small amount of albumen, no sugar.

Cystoscopy revealed a normal bladder, save a slight trabecular hypertrophy and minute blood coagula.

Functional Examination by Ureteral Catheterization:—

	Right.	Left.
Sp. g.	1.020	1.010
Δ	1.29	0.92
U	1.8	1.1
Sac.	0.6	0.05
Sed.	—	Pus; red cells
Alb.	—	Moderate

Here again the importance in the estimation of the functional integrity of the right kidney is manifest. Nephrectomy revealed a *hypernephroma* of the left side and the patient passed through an uninterrupted convalescence.

Although urological surgery has not attained to the full development of its possibilities, and although few noteworthy advances may have been made during the past decade, as claimed by the opponents of functional renal diagnosis, nevertheless concensus of opinion indicates that important strides have been made and still greater ones are destined to occur along the line of functional kidney diagnosis.

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Dr. John H. Gibbon asked if Dr. Thomas could tell how many cases there have been of infection of the primarily healthy kidney from ureteral catheterization. It was his opinion that there was a certain amount of danger. For instance in the case of a patient with a tuberculous kidney with secondary involvement of the bladder there would be a certain amount of danger in carrying the infection into the well ureter unless the greatest care was exercised in cleansing the bladder thoroughly and in manipulating the catheter. Dr. Gibbon believes that the indiscriminate and careless use of ureteral catheters may result in injury of a perfectly healthy ureter and its corresponding kidney. He considers this a method of diagnosis which is of undoubted value, but it is only one means, and he thinks that if a diagnosis can be arrived at by means of a cystoscopic examination of the ureteral openings, as was done in two of the reported cases, it is better, especially in the presence of a bladder infection.

Dr. Gibbon referred to a case of a physician who had blood and pus in his urine, frequent micturition; he had no abdominal symptoms, no tumor or tenderness over the kidney, but he gave a history of having what he thought was an attack of appendicitis, which passed off. This attracted Dr. Gibbon's attention to the right kidney; he used a cystoscope on his patient with very little

satisfaction, which he thought was due to the presence of blood. He then did a suprapubic cystotomy and found a large ulcerated area involving the right ureteral opening. The other ureteral opening was apparently normal. The bladder wound was healed in less than two weeks, and Dr. Gibbon then exposed the left kidney in order to determine its condition, as has been recommended by Leonard Freeman. This required only about ten minutes, and demonstrated a perfectly normal kidney. The right kidney, which was the seat of an extensive tuberculosis, was then removed. Within 48 hours after the removal of the kidney the patient could hold his urine for quite a little time, much longer than before the operation. He made a prompt recovery and before he left the hospital had to empty his bladder only once at night. At the present time the bladder function is perfectly normal, and the patient has resumed active practice.

Dr. Gibbon also referred to ureteral catheterization in cases of ureteral calculi. He recalled two instances where the ureters had been catheterized by experienced men, and in which no ureteral stone could be definitely located. In one of these cases Dr. Gibbon removed a stone 18 months after catheterization, and in the other 6 months after catheterization. He believes that in these cases the X-rays are of far more value than ureteral exploration. Probably in the hands of an experienced man the use of the wax-tipped catheter might be relied upon in such cases.

Dr. B. A. Thomas replied that personally he had never seen a case of infection that could be ascribed to catheterization of the ureters. A couple of years ago he had an opportunity to visit Zuckerkandl in Vienna, where a great deal of work is being done along this line, and he took the opportunity to ask him whether he had ever seen a case, and much to Dr. Thomas' surprise Zuckerkandl replied in the negative. Dr. Thomas had expected that occasionally some such condition might arise. He thinks the danger can be reduced to such a minimum by thorough irrigation of the bladder with a sterile solution and thorough asepsis in instrumentation, that it is hardly worthy of consideration.

With reference to ureteral calculus Dr. Thomas said he thought that the catheterization of the ureters is probably not of so much value in the determination of this condition as the employment of various so-called chromo-cystoscopies, or the employment of the X-ray.

STATED MEETING, HELD FEBRUARY 3, 1908.

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

EXCISION OF THE CLAVICLE WITH PERFECT FUNCTIONAL RESULT.

Dr. James K. Young presented a girl, 11 years of age, who fell in the school yard on January 30, 1907, injuring the left knee. The following day she had a high temperature and great prostration which continued until four days later when she had a hemiplegia of the left side. The knee continued painful but there was no swelling until the end of six weeks, when it swelled suddenly and to a great degree. A small pustule formed on the anterior surface and was opened and drained by the attending physician, and a drainage-tube was inserted. A slough occurred over the left clavicle which extended until the central third of the bone was fully exposed. The lower part of the neck and face also became enormously swollen and for three or four days she could not move her head. Pieces of bone were discharged from the right side of the inferior maxilla within the mouth.

On July 11, 1907, she was admitted to the Polyclinic Hospital under the care of Dr. Young. The pus discharging from the wounds at this time showed the presence of Staphylococci pyogenes aureus, and a diagnosis of osteomyelitis was made. On September 20th, 1907, the clavicle still being exposed and it being impossible to close the wound, the entire clavicle was removed subperiosteally. The specimen examined in the pathological laboratory of the Polyclinic by Dr. James A. Kelly, Pathologist, showed an acute suppurative condition of the medullary cavity and osseous structure. The proximal extremity of the right clavicle was also removed.

Both wounds healed by granulation, and the X-ray taken January 31, 1908 shows a regeneration of the clavicle. The functional use of the part is remarkable but corresponds with what has been described by other observers where after removal of the clavicle the function of the shoulder has not been materially changed.

MALIGNANT ULCER OF ORBIT.

Dr. Warren Walker presented a woman, thirty-five years of age, who came to the surgical dispensary of the Episcopal Hospital for treatment in the first week of December, 1907, giving the following history: married for nineteen years; has three healthy children; has had two miscarriages during past year; smallpox at four and abscesses of neck following typhoid five years ago.

Present condition began eighteen months ago with a small sore at left inner canthus which gradually increased in size. There was a clear watery discharge; no blood. The growth has within the past three months ulcerated into the nasal cavity and destroyed the muscles on the inner side of the eyeball. She has no pain but suffers from severe headaches. She was put on K. I. and inunctions of mercury, and the wound appeared to be slowly granulating when she developed a nephritis and treatment had to be stopped.

THE NON-ABSORBABLE SUTURE AND LIGATURE.*

BY OSCAR H. ALLIS, M.D.,

OF PHILADELPHIA,

Surgeon to the Presbyterian Hospital.

THERE are few subjects that have occupied the surgical mind more than that of suture material. Animal suture material has the disadvantage that when moist it is difficult to tie, when fine it has little tensile strength, and when coarse it is not suited to fine plastic work. Silk on the contrary is the easier handled when wet, makes all the firmer knots from moisture, possesses adequate strength in its finest sizes for the work for which it may be selected, and when rendered sterile satisfies most of the requisites for suturing material.

In the class of surgery that permits of immediate closure of the initial wound, primary union and return to soundness always gives rise to the question, What becomes of the silk suture or ligature? In amputations bleeding vessels are surrounded by different structures than when operations are performed in serous cavities; yet in both instances the sterile suture or ligature is probably immediately enveloped in exudate which is later organized and becomes a part of the economy. If the suture material is fine, it may never give rise to any irritation; but if large, and of sufficient strength to ligate an ovarian pedicle, the ligature may finally come away.

But in the class of surgery—especially abdominal surgery—in which it is not feasible to close the initial wound, pus cases, or cases where drainage is indicated, the fate of the non-absorbable suture or ligature is not a matter of doubt. The suture about an appendix, the stump of a pedicle, or the peripheral suture in a plastic operation of the intestine, is liable to infection; and healing will be retarded until the suture comes away. It is hard to explain why in so many cases of necrosed appendices the sinus leading to the part will be two, three, four, or more months in closing and

finally without any assignable cause will heal, unless it can be explained by the presence of infected ligature that has finally been ejected.

No part of the operation for the removal of the appendix has given rise to more discussion than the treatment of the stump. The usual way of ligating with silk and dropping the bowel back, while it often answers perfectly well in clean cases, is, it seems to me, open to objection in the gangrenous ones. The earlier surgeons in amputations always brought the ends of the ligatures out of the wound, and such it seems to me would be good routine surgery in ligations in infected areas.

In anastomoses of the intestines, whether the Murphy button be used or suture, it is the practice of many surgeons to put a fine running stitch around the serous border of the approximated structures. If such a case could be insured against infection this peripheral suture would do no harm; but if infection is unavoidable and drainage necessitated, then this peripheral suture may become a permanent annoyance and be the cause of an intractable sinus.

In a case of gangrene of the intestine following a neglected umbilical hernia, after resection of about five inches of intestine and approximation with the Murphy button I employed a fine silk peripheral suture.

On the tenth day I was surprised to see a large accumulation of fecal matter at the opening of the wound. My fears that the button had escaped at its point of insertion into the abdominal cavity led me to probe for it, but as the patient presented no untoward symptoms I concluded that the rent in the bowel had been made as the button became detached and that only a small rent had occurred. The fecal discharge continued for only a few days but a sinus remained for several weeks, which I attributed to the infected peripheral suture. I therefore took a piece of wire upon which I had made a hook like a crochet needle and passed it down to the bottom of the sinus, and had the satisfaction of catching a loop in the suture. This I seized with a pair of forceps and after

dividing it upon one side of the forceps drew out a single piece quite two inches long.

Such an experience would lead one to adopt some other means of suturing the border of an approximated bowel than entirely surrounding it, or suggest the propriety of bringing the ends of the suture out of the initial wound.

REPORT OF SATURDAY SURGICAL CLINICS FOR STUDENTS,

HELD AT THE GERMAN HOSPITAL OF PHILADELPHIA, 1906 AND 1907.

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

DURING the 26 clinics there were 193 patients operated upon with a total of 261 operations. Upon 113 of these patients 181 operations were performed.

There were 55 cases of appendicitis, of which 25 were acute. Of the patients with acute appendicitis, there were 18 males and 7 females. The appendix was found acutely diseased and removed in 2 patients operated for other conditions: one a male with inguinal hernia; the other a female with prolapse of the uterus.

Of these 25 cases, 12 had abscess. The average duration of the attack in the non-abscess was 5 days, and in the abscess cases 3.6 days. Six of the non-abscess cases were operated in their first attack, and in 9 of the abscess cases the history of a previous attack was not elicited.

The incision varied according to the pre-operative findings. Of these acute cases, in 9 the McBurney or gridiron incision was made; in 3 the incision was made through, and in 9 at the outer border of the right rectus muscle.

In 4 cases the incision was made above and parallel with the outer third of Poupart's ligament and carried well up into the loin space, making the operation in greater part extraperitoneal. When I can do this operation I much prefer it, as the less intraperitoneal interference, particularly when infection is present, the better for the patient.

The appendix was subcæcal in 4 cases, to the outer side of the cæcum in 1 case, to the inner side in 4, and in 4 cases in the pelvis. In 2 cases the pathological conditions were so severe as not to warrant searching for the appendix. (In the

remaining 10 cases the position of the appendix was not noted.) The appendix was gangrenous and perforated in 4 cases, gangrenous in 4, and in 2 of these had ulcerated off near the base, while in the remaining 17 the appendix was either adherent, congested, swollen, or covered with inflammatory exudate.

The technic in removing the appendix varied with the pathological condition of the organ. In 12 of the acute cases, ligation with catgut and cauterization of the stump was done. In 5 cases the stump of the appendix was invaginated, and held in this position by a purse-string suture of linen thread: in 3 cases simple ligation with linen thread covering the stump with the adjacent serous coat of the cæcum. In 4 cases the appendix was ligated with silk, and the stump cauterized; in one the appendix was amputated flush with the cæcum, and the opening in the cæcum closed by two interrupted Lembert sutures of linen thread.

Drainage was introduced in 16 of the 25 acute cases and consisted of gauze, with or without a rubber or glass drainage-tube. In 8 cases a glass tube was placed in the pelvis. In abscess cavities, one or more pieces of gauze were used, multiple wicks frequently being required to drain the ramifications of the cavities. Rubber tubes were used when there was much to drain; cigarette wicks in a few cases in which there was little to drain. In the 9 undrained cases the wound was closed with tier sutures of chromicized catgut.

Leucocyte counts were made in all these acute cases except six. Of the non-abscess cases, a count of 8000 prevailed in 2 cases, of 9000 in 1, of 11,000 in 2, of 15,000 in 1, and of 16,000 in 1. Of the cases with abscess, there were 7000 in 1, 10,000 in 2, 11,000 in 2, 14,000 in 1, 15,000 in 1, 17,000 in 1, 18,000 in 1, 20,000 in 1, and 22,000 in 2. Thus of the non-abscess cases in which counts were made, in 5 the count was below 15,000, whilst in 2 only, the count was 15,000 or more.

But of the 12 cases with abscess, in 6 the count was below 15,000, and in 6, 15,000 or more. There were two patients, both of whom had been sick equally long before operation (10 days), and in whom the leucocyte count was equal (15,000). One, who had a previous attack one month before, showed an acute ulcerative appendicitis, with adhesions between the cæcum and appendix, and the posterior parietal peritoneum; the other

revealed foul greenish pus at operation. Thus, while in the majority of cases a high leucocyte count is strongly suggestive of pus, yet, as we have just illustrated, cases can be selected which exhibit an equal count, but in which the findings at operation are entirely different. It is this very fallibility which compels the operator to give more weight to the clinical examination, and less to that of the laboratory. We found that differential leucocyte counts were of no more significance in determining the presence of pus than the leucocyte counts alone. The differential count is of moment in judging of the patient's resistance.

Microscopic examination in 18 of the appendices showed that the disease was interstitial in 5, ulcerative in 7, and chronic, with acute exacerbations in 6. Of this last group, namely, those six in which the microscope revealed chronic appendicitis with acute exacerbations, one gave a history of a previous attack, and exhibited adhesions at the operation; one gave no history of previous attacks, but exhibited adhesions at the operation; whilst the remaining 4 gave no history of previous attacks, and had no adhesions.

The fact that in four of these six cases the clinical history,—provided, of course, that it is correct and the patient's memory was not faulty,—and the operative findings did not support the laboratory diagnosis of chronic appendicitis with acute exacerbations, shows either that the microscopical diagnosis, as in cancer, is subject to error, or else that, as occurs in the gall-bladder, there may be latent or masked infections of the appendix which, while causing the patient little or no discomfort,—or at least not enough to impress his memory,—yet leave their marks in the organ, to be revealed only by the microscope.

The Bacillus coli was recovered in cultures taken from the appendix or the abscess in 5 cases.

I desire to call attention to the immediate or remote effects of appendiceal pus. Last year in reporting my Saturday Clinics I referred to the frequency of toxic nephritis in cases of acute appendicitis with abscess, as revealed by examination of the urine previous to operation, and I mentioned its subsidence, usually within a few days after operation. Now I shall speak of some of the post-operative effects of pus. Individually I might refer to one of the cases whose peritoneal cavity harbored much pus. The patient was 55 years of age, and had been sick

eight days. Operation, by lateral incision, carried above and parallel with upper third of Poupart's ligament and into the loin, revealed the peritoneum acutely hypertrophied, the appendix lying mesial to the cæcum, pointing towards the umbilicus, and partly gangrenous and perforated. Pus was found near the liver,—presumably on its way to form a subdiaphragmatic abscess; running over towards the umbilicus, along the appendix; and in the appendix in large quantity. A gauze strip was placed in each of these directions, and a glass tube in the pelvis. While I do not sanction drainage by multiple wicks in acute diffuse peritonitis, yet when the pus is present in definite multiple collections, the latter should be reached, if at all possible, and freely drained, so as to avoid the disastrous and so-called secondary collections, by evacuating them when they are primary collections. Six days after operation, a fecal fistula, at the site of the gangrenous area around the base of the appendix, occurred. After another month, the fistula not having closed, a second operation showed numerous adhesions between the visceral peritoneum of the cæcum and omentum and the parietal peritoneum. These adhesions proved that the drainage had been effectual, and that the omentum had prevented dangerous peritonitis, by exercising its function of throwing out large quantities of exudate about the site of infection. The adhesions were divided, and the fistulous tract obliterated by inverting with a broad base the offending stump of the appendix.

One patient developed, one month after operation, an abscess low down in the pelvis about the rectum. At the first operation no pus was found, but there were adhesions between the visceral peritoneum of the cæcum and the appendix, and the parietal peritoneum of the posterior abdominal wall. There was no note made in this case as to whether or not the pelvis was explored at the time of the first operation, therefore, I cannot say definitely if there was at that time a small collection which had been overlooked, or whether subsequent abscess formation was consequent upon the extension of infection.

Another patient, from whom four ounces of thick, foul pus had been evacuated, developed, shortly after operation, suppurative parotitis, and tonsillitis.

One patient had infection by contiguity of the right Fallopian tube, necessitating removal of the tube.

Pelvic appendicitis in the female I believe to be a not uncommon cause of sterility, therefore one of the many arguments in favor of early operation,—operation if possible before the infection has travelled beyond the confines of this organ.

Three deaths occurred in this series, one in a patient who, one week after operation, developed acute intestinal obstruction. Operation for the relief of the obstruction revealed two areas of gangrene in the lower part of the ileum, which formed part of the abscess wall. One area was three inches long and involved half the circumference of the bowel; the other area situated four inches higher, was still more extensive. Resection of the bowel was necessitated.

The second death occurred in a patient 53 years old who had been sick five days before admission and operation. The abdomen was greatly distended and universally tender, showing diffuse infection of the peritoneum. Operation revealed quantities of thick, foul, yellowish pus, and the appendix free in an abscess, it having separated at its base by ulceration. This was an example of the fulminating type of this disease.

The third death occurred in a patient who had been sick for forty-eight hours before admission and operation. Examination revealed general board-like rigidity, with tenderness. Incision gave exit to a large amount of free pus from the general peritoneal cavity as well as from the pelvis. The appendix, subcæcal, was perforated at the base close to the cæcum,—a second example of the fulminating type. Two subsequent operations were performed to establish free drainage, in the attempt to drain the peritoneal cavity. Postmortem revealed diffuse purulent peritonitis; a large collection of pus between the right lobe of the liver and the abdominal wall; another about the spleen; and perforation of the right cupola of the diaphragm, with bilateral bronchopneumonia.

Of the 30 cases of chronic appendicitis, 17 were in males and 13 in females. The longest appendiceal history was 18 years; the shortest two weeks.

Of the 20 cases in which the number of attacks was definitely stated: 10 had one, 6 had two, 3 had three, and one had six attacks. In these cases the time that elapsed since the last attack varied from two to five months. The patient (a cornice-

worker) who had the greatest number of attacks, had his first one year before operation. He had suffered from constipation during the entire time of his appendiceal history. This latter patient was operated upon six months previously and an appendiceal abscess was evacuated. For sixteen days following this operation the patient was very ill. Two months after discharge from the hospital a fecal fistula developed, which discharged for a period of two months and then closed. Since then the fistula has opened and closed several times.

Two days before re-admission for operation for the correction of the fistula, the fistula re-opened. Operation revealed numerous adhesions, in addition to a hole on the outer and back part of the cæcum, which was surrounded by necrotic, inflammatory material. The fistulous tract, and the diseased appendiceal stump were excised, and the rent in the cæcum closed.

The symptoms complained of were, in 6 cases, sudden, diffuse abdominal cramp, followed by nausea and vomiting, and localizing within a few hours to the right iliac fossa. In 16 cases the symptoms varied. In 10 the pain began in the right iliac fossa, and was variously described as severe or violent, sharp, shooting, cutting or stabbing, or dull, heavy or aching; in some of these the pain spread throughout the abdomen, like that of cholera morbus. Six patients complained of constant or intermittent, dull, aching soreness in the right iliac fossa. In the remaining 3 the symptoms were not noted. In 11 cases constipation was a marked feature.

In 22 of the cases, tenderness over McBurney's point was a constant objective sign. Rigidity, but only moderate, was present. The McBurney incision was used in 18 cases, and the short rectus incision in seven. The purse-string suture was employed in 14 cases, after clamping and removal of the appendix, and invagination of the appendiceal stump.

In 4 cases the appendix was ligated with silk or linen thread, the mucous membrane excised from the stump, the latter cauterized chemically, and covered by the adjoining serosa of the cæcum; in 7 cases the organ was simply ligated with silk. The abdominal layers were approximated with tier sutures of chromicized catgut.

Cholelithiasis.—There were 10 cases of cholelithiasis, 3 in

males and 7 in females. The youngest patient was 29, and the oldest 46 years of age.*

A history of a definite infection, preceding the onset of gall-bladder disease was obtained in 5 cases, in all of which the infection was enteric fever. This disease preceded manifestations of gall-bladder symptoms by a few months, one year, six years, 25 years and 26 years respectively.

The lowest number of attacks was three, those in the remaining cases being designated as numerous. All of the cases had pain and this symptom was described in 4 cases as colic or cramp in the region of the gall-bladder: in 2 cases the pain was noted as severe only, and in the remaining 4, the character of the pain was not mentioned. In all the cases the pain was in the gall-bladder area, in 4 it was referred, in addition, to the epigastrium, and in 4 to the inferior angle of the right scapula. The pain was followed by nausea and vomiting in all of the cases except one, and of these cases a history of chills was elicited in 3.

Various digestive disorders, such as loss of appetite, gastric tympanites, indigestion, catarrhal gastritis, hyperchlorhydria in the shape of heartburn, eructations of sour fluid and constipation were complained of. Jaundice was present at some or other times in 5 cases.

Physical examination revealed tenderness at the site of the gall-bladder in all of the cases; rigidity of the supraumbilical portion of the right rectus muscle in 4, and palpable liver margin in 3.

Calculi were present in the gall-bladder alone in 3 cases, in the gall-bladder and cystic duct in 2, in the gall-bladder, hepatic, cystic and common ducts in 1, in the gall-bladder and common duct in 1, and in the common duct alone, in 1. The walls of the gall-bladder were thickened in 4 cases, the gall-bladder en-

* The analysis of these, as well as of the cases to follow, is presented with the understanding that an undeterminable amount of error is apt to be present, owing to the unavoidability of having to accept the diagnosis of previous illnesses, and description of symptoms entirely from the patient's memory. It is well known that the lay diagnosis is often incorrect, and also that the human memory is very untrustworthy, and apt to respond too quickly at the expense of truth, to the stimulus of the prodding questions of the enthusiastic examiner.

larged in 3, contracted in one, and impacted with calculi in another. Bile was absent in the contracted gall-bladder, profuse in one of the enlarged organs, tarry in another bladder, and darker than usual in 2. Adhesions present in 5 cases, were described as pericystic in 2, between the omentum and gall-bladder in 2, and between the omentum, transverse colon, duodenum and gall-bladder in one. The bile was examined bacteriologically in 6 cases, of which in 3 it was sterile, in 2 the Bacillus coli, and in one the Bacillus typhosus was present.

In 3 cases the gall-bladder was so badly diseased as to necessitate removal. Drainage in these 3 cases of cholecystectomy consisted in one of a piece of gauze to the fossa of the gall-bladder, in one of a piece of gauze in the sub-hepatic space, and a cigarette drain, cleft, with one end above the lesser omentum and the other in the foramen of Winslow, and, in one of a rubber tube in the hepatic duct supplemented by a cigarette drain. In the remaining cases a rubber tube was placed in the gall-bladder in one; in the gall-bladder and the cystic duct in 2 cases; and in the gall-bladder and common duct in 2 cases. A small counter-opening for the emergence of the drainage, was made in 5 cases, in order to allow the laparotomy wound to heal *per primam,* and thus minimize the risks of incisional hernia.

It is my practice when removing the gall-bladder in the presence of infection to drain the stump of the cystic duct when this is feasible, and if not the stump of the cystic, the common duct.

In one case, the appendix, the seat of chronic inflammation was removed at the same sitting.

The most interesting and instructive case was that of a woman, aged 31, who had had enteric fever seven years previous to operation and from whose gall-bladder the Bacillus typhosus was cultivated. She recalled having pain in the gall-bladder during her attack of fever (probably typhoid cholecystitis). Nine months previous to operation, that is, over six years after the attack of enteric fever, her gall-bladder disease from being latent, became active, and at this time she had her first attack. In addition to three attacks, each of which was characterized by severe colicky pain in the right hypochondrium, which radiated to the right scapula, and which was followed by nausea and

vomiting, she had, as other salient features of the disease, loss of appetite, constipation, and profuse sweats on exertion. The latest, or third attack, preceded the operation by two weeks. That these clinical symptoms are explained by the pathological findings, is quite true. There were numerous adhesions between the omentum, transverse colon and duodenum on the one hand, and the gall-bladder on the other. The gall-bladder was contracted, empty and thickened. The bile-ducts were thickened and surrounded by adhesions, and the hepatic and common ducts were greatly dilated. There was a calculus at the distal end of the common duct.

The death occurred in a female aged 29, who succumbed to shock twenty-two hours after the operation. This patient had an endocarditis which was undoubtedly caused by the toxæmia of the gall-stone disease.

Cholecystitis.—In addition to the cases of chronic cholecystitis associated with the 8 cases of cholelithiasis, there were 2 instances of cholecystitis, one of which was subacute and the other chronic, both in females.

The subacute cholecystitis was present in a woman aged 46, who four years previously suffered an attack of pneumonia. The duration of the previous gall-bladder history was not mentioned, if, indeed there was any. However, while in the hospital, the attack occurred, upon which the diagnosis was based. The pain started in the gall-bladder region, radiated to the umbilicus, and back to the gall-bladder. Coincident with the pain were regional tenderness, and rigidity of the supra-umbilical portion of the right rectus muscle. Furthermore, there was distinct, though slight, jaundice. The duration of the attack was three and a half hours.

Abdominal section revealed a gall-bladder the size of a hen's egg, the serous covering of which was opaque, the musculature friable and thick, and the mucosa swollen, and granular. Two ounces of dark reddish-brown bile were removed. Adhesions were present: several, soft and recent between the omentum and colon, and the gall-bladder; one dense and old, between the inferior margin of the liver, near the gall-bladder, and the parietal peritoneum; another, likewise dense and old, between the duodenum and the gall-bladder. The head of the pancreas was hard and

enlarged. The gall-bladder was drained by a rubber tube, reinforced by a cigarette drain.

The laboratory reported the presence of occult blood in the feces, and the colon bacillus in the culture from the gall-bladder.

The case of chronic cholecystitis did not present anything of special moment.

Carcinoma of the Gall-Bladder.—Cancer of the gall-bladder occurred in a man aged 26. There was no family history of carcinoma.

Six months previous to operation, after the evening meal the patient experienced sudden cramp in the gall-bladder region, which was soon relieved by vomiting. Such attacks have occurred frequently since then. Jaundice attended each attack after the third, but was absent in the intervals.

Two months before operation, patient stated that he passed gall-stones per rectum. Five weeks before operation the latest attack occurred, and lasted several weeks. Since the first attack the patient estimated his loss in weight at 27 pounds. At the time of operation the patient was anæmic and slightly jaundiced.

Abdominal section exposed an enlarged, tense gall-bladder, whose fundus and body exhibited nodules. Adhesions existed between the omentum and gall-bladder. After cholecystectomy, drainage, consisting of one rubber tube in the stump of the cystic duct, surrounded by a cigarette drain, and one piece of gauze in the fossa of the gall-bladder, all of which were brought out through a counter opening. Culture from the contents of the gall-bladder proved sterile, but microscopical section of the gall-bladder showed the nodules to be cancerous.

Hepatic Abscess.—This case of abscess should, I think, on *a priori* grounds, be classified under chronic cholecystitis instead of under the heading "hepatic abscess."

The patient, a laborer, aged 49, gave no history of previous infection. Two months before operation he had a chill, which lasted half an hour. The following morning he noticed soreness throughout the epigastrium, with much fulness here. His appetite became poor. A month later the soreness localized in the right hypochondriac region, and now, for the first time, he thought he could feel a mass, which was moderately tender. He had no more chills. The epigastric soreness changed into a gnawing pain,

which appeared, together with epigastric distention, immediately after eating.

The pain in the gall-bladder was occasionally referred to the inferior angle of the right scapula.

The patient stated that he had lost thirty pounds in flesh since the illness began, although it must be borne in mind that his diet was restricted during that time.

Physical examination revealed moderate rigidity of the muscles in the upper right half of the abdomen, some tenderness about the umbilicus and the presence of a palpable swelling. The liver dulness extended nearly to the umbilicus. The stomach was dilated, holding a quart of water.

Abdominal section revealed the gall-bladder thickened, atrophied, and bound down firmly by strong fibrous adhesions; from it fluid bile escaped. There were numerous firm adhesions between the stomach and duodenum and the liver.

An abscess, the size of a small orange, was located one inch beneath the inferior surface of the liver, in close proximity to the fossa of the gall-bladder. Its walls were a quarter of an inch thick and its contents, creamy pus.

Drainage consisted in three pieces of gauze, one in the gall-bladder, one in the abscess cavity, and one in the subhepatic space.

Culture from the gall-bladder proved sterile.

Cirrhosis of the Liver.—There were two cases of cirrhosis of the liver operated upon, of which one was biliary, and the other was an example of Henoch's disease. The latter patient was cholæmic at operation, and died the next day.

Gastric Ulcer.—There was one case of gastric ulcer, in a woman 32 years old. She had had enteric fever eleven years previous to admission.

Her illness began three months before admission with sharp cutting pains in the epigastrium, radiating low in the abdomen: duration, three weeks.

Five weeks before operation there was a second attack, similar to the first, the pain lasting up to within a few days before operation.

Physical examination showed the greater curvature of the stomach four centimetres above the navel.

Abdominal section and gastrotomy revealed the gastric

mucosa congested. It bled readily when touched, and rubbed off easily. Several small areas were especially hemorrhagic. After posterior gastrojejunostomy, recovery was apparently complete.

The appendix, chronically inflamed, was removed at the same time through a McBurney incision.

Duodenal Ulcer.—There was one case of duodenal ulcer, in a man 60 years of age. His illness began nine months previous to operation, with severe dull aching pain in the epigastrium, coming on from one to two and a half hours after eating, and radiating to the shoulders. The pain lasted several hours.

Four months before operation ten teeth were extracted,—an event which naturally increased the severity of the morbidity. Shortly afterwards, the epigastric pain returned, and was followed two hours after eating by vomiting, which relieved the pain.

Three months before operation, after unusually severe pain in the right side of the epigastric region, the patient became jaundiced. From this time on the intervals between attacks were three to five days, and occasionally two weeks: during these intervals the patient was fairly comfortable. The bowels were loose, occult blood was present. The patient stated that during these nine months he had lost twenty pounds in weight.

Physical examination showed the stomach dilated, its greater curvature extending down as far as the navel. There was resistance in the epigastric region, more marked on the right.

Abdominal section revealed an ulcer in the anterior and upper walls of the first part of the duodenum which extended to the pylorus. There was no obstruction at the latter site.

Posterior gastrojejunostomy, no loop, resulted in cure. In this connection I beg to say that in my experience the operation of gastro-enterostomy (no-loop operation) in the presence of an open pylorus has not been followed by the disagreeable symptoms described by some operators. While I was doing the loop operation I did see vomiting, etc., which from my more recent experience, I must attribute in part at least to the former faulty technic.

Carcinoma of the Stomach.—There were 3 cases of carcinoma of the stomach, all in males, aged 34, 37 and 45. There was a family history of carcinoma in all these cases: one patient's father died of carcinoma of the stomach; another patient's father died of carcinoma of the jejunum, whilst the third patient had a sister suffering from epithelioma of the face. Common symptoms were pain, dyspepsia, vomiting, loss of weight, and in two, constipation. In 2 patients, both of whom had pyloric obstruction, the vomiting was that of retention: in all, the vomitus contained either streaks, or considerable amounts of blood. The loss of weight amounted to 20, 50 and 52 pounds.

The site of the carcinoma was, in one patient, the anterior wall; in another, the pylorus and duodenum; in the third, the pylorus and anterior and posterior walls. In all partial gastrectomy with posterior gastrojejunostomy was done. In all three cases clinical diagnosis was confirmed by microscopical examination. Subsequent history of the patient favorable, with one exception; this man died nine months after operation from what was thought to be recurrence, yet a postmortem was not made.

Carcinoma of the Jejunum.—There was one case of carcinoma of the jejunum, in a female aged 45, whose illness began five months previous to operation, with daily vomiting. There was dull aching pain, boulemia, and loss of twenty-five pounds in weight. Occult blood was found before the operation.

Abdominal section revealed a hard, annular growth three inches beyond the duodenojejunal flexure, of hour-glass shape which caused an almost total stricture, nearly three inches long. Adhesions were present between the pylorus, the inferior surface of the liver, and the lesser omentum. Resection of the jejunum, with end to end anastomosis, and posterior gastrojejunostomy were performed.

Carcinoma of the Intestines.—There were three cases of intestinal carcinoma, one in a male and two in females.

Carcinoma of the colon was present in a male aged 39. A sister had been operated upon for carcinoma of the breast. Six years previous to admission the patient had had an attack of dysentery. Six months before admission there appeared abdominal colic, with obstinate constipation. Three months before admission the patient was operated upon for bilateral inguinal hernia, and during his stay of three weeks in the hospital, he lost 27 pounds in weight, and since then has lost eight pounds, making a total loss of thirty-five pounds in three months. Five weeks before admission the patient noticed for the first time, blood-clots in the stool,

rectal tenesmus and borborygmi. After the operation for the herniæ, the constipation was relieved, but the colic and tenesmus continued. One month before admission the stools became loose and watery.

Physical examination revealed, in addition to emaciation and cachexia, rigidity of the muscles in the left half of the abdomen. There was dulness to the left of the navel, over an area of a little over an inch, and this dulness corresponded to a tender mass.

Abdominal section disclosed a large movable mass, the size of a large orange. Involved in this mass were the small gut and the mesentery. No surgical procedure was employed in this case.

Carcinoma of the cæcum was present in a woman aged 32, whose family history was negative. Five months previous to admission this patient complained of tearing, dragging pain in the right iliac region, followed by soreness over the whole of the abdomen. Six weeks before admission she noticed for the first time a lump in the right iliac fossa, just below the site of the previous pain. The abdomen at this time was swollen, and this swelling increased and decreased alternately.

Physical examination of the abdomen revealed considerable distention but no rigidity. There was general tenderness. A mass, indefinite in shape, hard and nodular to be felt in the right iliac fossa, by combined abdominal and pelvic palpation. There was free fluid in the abdomen.

Abdominal section permitted the escape of dark, thick, serous fluid and disclosed a malignant growth in the right iliac fossa to which the intestines were adherent. The growth was extensive, but sprang, apparently, from the ileocæcal junction. There were metastatic nodules on the uterus and adnexæ, floor of pelvis and anterior abdominal wall. The case proved to be inoperable.

There were 2 cases of carcinoma of the rectum. One, a woman aged 54, whose father's sister had an epithelioma on the forehead.

She had been constipated ten months before admission. Since three months before admission, she had movements the size of sheep-stools, and, at times, passed a little blood. There was rectal tenesmus. Lately, there had been much rectal bleeding.

The patient lost weight. At times there was considerable pain in the sacral region.

Digital examination discovered a large, hard, nodular mass, fixed in the lower half of the posterior wall of the sacrum. The finger was streaked with blood when withdrawn. The operation consisted in left inguinal colostomy.

The second case was similar to the above and too far advanced to allow of other than a left inguinal colostomy, which was done.

Hernia.—There were 12 operations for the radical cure of inguinal hernia, 10 were in males, and 2 in females. Seven of these were on the right side and 4 on the left: in one case the site of the hernia was not recorded. There were two cases of congenital hernia: the father of one of these patients also had a hernia. Trusses were worn in 8 cases. The duration varied from one to thirty years. Four were ruptured by heavy lifting. Concomitant pathological conditions consisted in varicocele in two cases, chronic appendicitis in two, acute appendicitis in one, and in another case, part of the cæcum with the appendix was in the sac. Incisional hernia was present in addition to inguinal hernia and chronic appendicitis in a woman who had had an abdominal section four years previously. There was one ventral hernia.

There were 2 cases of strangulated femoral hernia, both of which recovered.

There were 2 cases of umbilical hernia, both in females. One patient had the rupture for three years, and could assign no cause to it, but notes in the history show that she was very stout, and had borne five children. The other woman acquired the hernia when fourteen years old, or 28 years before operation, by heavy lifting. The hernia protruded two and a half inches beyond the navel, and was seven inches in diameter. Its contents were omentum and gut, and, as is usual in long standing cases, many adhesions. The appendix, the seat of chronic obliterative inflammation, was removed at the same time.

There were two cases of incisional hernia, both in females. One case had in addition an inguinal hernia and a chronic appendicitis. The other patient had been operated fifteen months previously and an appendiceal abscess evacuated through a three inch incision. She then returned to her work in a hosiery mill,

where considerable standing was required. She wore an abdominal belt for a period of eleven months after the operation, and then dispensed with it. One month later the scar relaxed. At operation, numerous adhesions were broken up, and a chronically inflamed appendix removed.

Wandering Kidney.—There were 6 cases of wandering kidney, four in males and two in females, and all on the right side. Analysis of the case histories shows that symptoms, aside from pain, were few. In all cases, the pain was in the right lumbar and hypochondriac regions and varied in character from numbness, or dull and aching, to severe and stabbing, like renal colic. In one case pain was aggravated by standing in one position and in another by motion. In one case it radiated to the glans penis, and, in another, to the right testicle. Pain in wandering kidney so frequently resembles that in renal calculus as often to make the diagnosis very doubtful. Associated with the pain was nausea in one case, and vomiting, which relieved the pain, in another. Urinary symptoms, though usually frequent, are mentioned but once, and here consisted in difficulty in starting the stream. Two patients complained of constipation. One patient had a chronically inflamed appendix removed at the same time. Another had diastasis of the recti with visera optosis, and a split celery-stalk laceration of the cervix. In this instance, conservative treatment, by means of abdominal binder, would probably have fulfilled the indications better than operation. Anchorage, in five cases, consisted in separation of a triangular flap of the true capsule, twisting of this flap, and suturing of it into the anterior layer of the lumbar fascia, and quadratus lumborum muscle. In the sixth case the kidney was anchored by means of polar gauze. The presence of hæmaturia in a percentage of cases of very movable kidney has been my experience, also jaundice in a few.

Pyonephrosis.—There were 4 cases of pyonephrosis, three in males and one in a female. Two were on the right side and two on the left. The etiology of this condition was, in two cases renal calculus; in another tuberculosis. The fourth case, while the cause is not mentioned, I believe was consecutive upon wandering kidney.

Both of the cases which were due to long-standing calculous disease, were in males, and both died. The ideal time to operate would have been of course in the pre-suppurative stage. In all

suppurative states, the surgeon is more or less subservient to the caprices of infection. In one of these patients, the calculous history had existed since the patient was fourteen years of age, or for twenty-seven years. Infection began five months previous to operation, when he noticed for the first time, pus in the urine. In addition to the attacks of renal colic, in which the pain was referred down the right ureter and also to the right testicle, there was dysuria, and profuse sweats at frequent intervals.

Physical examination showed that the patient was anæmic and decidedly septic. There was a tender mass in the right hypochondrium. Nephrotomy revealed a kidney enlarged and disintegrated, from which a basinful of greenish-yellow pus was removed. Near the vesical end of the ureter a softened calculus was removed. The kidney was extirpated. Drainage was established by three pieces of gauze. The laboratory reported chronic suppurative nephritis and ureteritis.

The other patient had had a calculus removed from the left kidney eight months previous to operation, and a month later the calculous history on the right side was inaugurated. The time of inception of infection was not definitely stated. There was progressive loss of weight and strength, increased frequency of urination in the day, and headaches towards evening. Functional activity of the left kidney was established by ureteral catheterization.

Nephrotomy gave vent to a large amount of thick, foul, yellowish pus. The ureter was much thickened, and dilated, and near its vesical end contained a small calculus.

The patient with tuberculous pyonephrosis had had her condition for six years. Seven weeks previous to the present operation an abscess of the left kidney, which had ruptured, was evacuated. However, in spite of this, the same dull aching pain persisted, together with a sinus, which repeatedly opened and closed. Nephrectomy.

Pyelonephritis.—There was one case of pyelonephritis, in a woman aged 31, who gave a definite history of previous infection Two weeks before the operation she noticed for the first time, the urinary symptoms of pain after micturition, frequency and urgency, and consequent passage of small amounts of urine. Ten days before admission, she experienced violent, sharp, shooting pains in the right iliac region, and aggravated by motion. The

next morning and for two days after there were chills, fever, sweats, and vomiting, and up to time of operation constant high fever persisted.

Physical examination revealed marked tenderness in the right lower hypochondriac region anteriorly, and lumbar region posteriorly. Palpation caused exquisite pain.

Nephrotomy showed an enlarged, inflamed kidney that contained a large amount of pus.

Renal Calculus.—There was one case of renal calculus, which occurred in a man aged 52. For twelve years preceding operation this patient had suffered from periodic—*i.e.* every four months—attacks of sharp, cutting pain at a localized point in the left lumbar region, and without radiation. Later on, the attacks were more frequent and severe, and the pain radiated along the left ureter to the testicle. These attacks lasted from one to two hours, were accompanied by chill, and occasionally by vomiting. Nephrotomy, with removal of a calculus from the pelvis of the ureter.

On the eighth day after operation, there was a severe attack of renal colic, followed by increased frequency of urination, and the passage of a shower of calculi, which varied in size from a millet to a mustard seed.

In all my kidney cases it is my practice, with few exceptions, to have cystoscopic and ureteral catheterization; this is done by one of two members of our staff, Dr. Alexander Uhle or Dr. William McKinney. I cannot lay too much stress upon this practice, the importance of which I need not dwell upon, as I am sure all of the Fellows will agree with me in this.

Hypertrophy of the Prostate Gland.—This patient, 65 years old, suffered, more than twelve years before operation, from pain before, during, and after urination; from increased frequency, and, at times, from sudden blockage of the stream, with dribbling. For twelve years he has led a catheter life.

Ten years ago pus and blood appeared in the urine at intervals of three months. On admission, the patient had pain, referred to the end of the penis, occasional priapism, vesical tenesmus, and often difficulty at stool. At operation there was removed by the suprapubic route, a calculus, the size of a peach-stone, and a much enlarged prostate.

Sarcoma of the Prostate.—There was one case of sarcoma of the prostate, which occurred in a patient 69 years of age. Nine months previous to operation he began to suffer from frequency of urination, with dysuria and hæmaturia. On admission, the frequency amounted to one to two hours by day, and five to six times by night. Complains of severe pain in sacrum. Rectal examination revealed the prostate soft, tender, and uniformly enlarged to the size of a large orange.

Suprapubic operation confirmed rectal palpation, and showed, further, that the growth was very vascular, and so soft that it ruptured during manipulation,—an event that necessitated removal piecemeal. The resulting cavity was as large as a fist, and bled freely. Drainage consisted of one Freyer tube in the bladder. Six hours after the operation profuse bleeding, which required gauze packing to control it, occurred. Saline intravenous infusion two quarts, was administered. Microscopical examination confirmed the clinical diagnosis of sarcoma.

Cystoscopic examination in enlargement of the prostate is equally as important as is cystoscopy and ureteral catheterization in kidney conditions.

Carcinoma of the Breast.—There were six cases of carcinoma of the breast, all in women, although last year I reported an instance of this in a male. The ages were from 32 to 45, with the somewhat low average of 37 years. The right breast was involved in five and the left breast in one. One patient gave a family history of cancer, and one a history of traumatism.

The duration was three months in one case, six months in three, and nine months in one. Pain in the breast was described as sharp and shooting in two cases, and stabbing in another. Involvement of the axillary nodes was present in two cases. Radical operation was performed in four cases. In all drainage of the axilla was carried out by means of a rubber tube.

Tuberculosis of the Breast.—There was one case of tuberculosis of the left breast in a woman aged 44. Three years previous to operation, the patient experienced for the first time, pain in the left breast. Five months before operation, she noticed, for the first time, a tumor, which has grown rapidly. Small areas became tender, inflamed and swollen, and then broke down and discharged foul pus. Examination of the breast revealed a round, red, slightly elevated area, the size of a silver quarter,

in the centre of which was a sinus discharging non-odorous pus: this area was situated above, and slightly to the outer side of the nipple. Above this there was another similar area, not so red, and without a sinus. Beneath these spots there was an ill-defined, irregular, fairly hard, moderately tender growth. Radical operation was performed, and the axilla drained by a rubber tube. Microscopical study showed tuberculosis.

Fibroid of Uterus.—There were 8 cases of fibroid tumor of the uterus, of which one was complicated by carcinoma, under which caption it will be considered. The duration of the disease was six weeks in one case, one year in two, two and a half years in two. The pain was dragging or bearing down, lumbar or sacral, radiating down the thigh in one, and aggravated by the menses in another. Metrorrhagia was present in four cases, and in two was profuse and clotted. Four complained of leucorrhœa. In two cases there was increased frequency and urgency of urination. At operation, which was supravaginal, amputation of the body of the uterus and adnexæ in three cases; uterus with the left tube and ovary in two cases; uterus with both tubes and right ovary in one case. The appendix was the seat of disease, and for this reason was removed in five cases. One patient who had a fibroid removed fifteen years previously through the vagina, showed at operation a right intraligamentary cyst; chronic appendicitis, and adhesions between the ileum and the vagina.*

Carcinoma of Uterus.—There were 4 cases of carcinoma of the uterus, all in married women, whose ages were 42, 46, 47 and 49. There was no family history of carcinoma, nor any history of trauma apart from that ordinarily attending childbirth. The duration was three months in one, four months in another, and indefinite in the other two.

Metrorrhagia was present in two cases: in the case complicated by fibroid it contained clots; in the other case it was profuse, and before admission, foul. In all these cases the cervix was the seat of the malignancy.

Operation was performed by the abdominal route in 3 cases, and by the vaginal in one. One case was complicated by fibroid

*In addition to the above cases of fibroid uterus, an example of subserous fibroid removed by myomectomy will be referred to under "Diseases of the Tubes and Ovaries."

and showed, in addition, chronic appendicitis; the uterus with the adnexæ, the uterine third of the vagina, and the appendix were removed.

Another case was complicated by polyp, and showed chronic appendicitis; complete abdominal hysterectomy and appendectomy were performed. Upon the third patient it was intended to perform trachelorrhaphy and perineorrhaphy, which had existed since childbirth, four and a half years. The cervix showed a stellate laceration, and was unduly hard, thus creating the suspicion of carcinoma. Therefore, the uterus was removed by the vaginal route, and the perineum repaired. The diagnosis of malignancy was confirmed by microscopical examination. Here, then, was a very early carcinoma, springing from the site of a lacerated cervix—and the conclusion may properly be drawn, that trauma was the cause of malignancy in this patient.

Prolapse of the Uterus.—There were four cases of prolapse of the uterus. Operation consisted in vaginal hysterectomy in two; ventrofixation, perineorrhaphy, anterior colporrhaphy, and, incidentally, appendectomy for chronic appendicitis in one, and in the remaining case, Dudleys' operation, together with amputaton of a redundant cervix, and repair of a lacerated perineum. One of these patients had decidedly weak abdomino-pelvic musculature, having been operated upon four years previously, for femoral and inguinal hernia, and lacerated cervix and perineum. There was one death in this series.

Chronic Metritis and Endometritis.—There were 4 cases of chronic metritis and endometritis in multiparæ, of whom two had borne eight children each, and one two children. Operation in two cases consisted in hysterectomy by the vaginal route; in one of these the uterus was, in addition, retroverted. Two cases were cured by complete abdominal hysterectomy, in one, at the same sitting, appendectomy for chronic appendicitis, and perineorrhaphy, for rectocele.

In all these cases the microscopical examination showed arterio-sclerosis and hyperplastic endometritis. It is my belief after a considerable experience in dealing with this class of cases that this is the only rational treatment. I have had the opportunity of observing cases a long time after operation, and in-

variably the immediate as well as the remote results have been most satisfactory to patient as well as surgeon.

This may be thought to be too radical treatment, but in being so radical it is conservative in the true sense of the word in that it is the best possible safeguard against the development of carcinoma which will take place in some of these cases if left alone and more likely to if subjected to traumatism by the ill-advised use of the curette.

Diseases of the Tubes and Ovaries.—There were 12 cases of tubo-ovarian disease. Miscarriages had occurred in five of these patients, one of whom had eight. Of these patients who had had miscarriages, the character of the pain in four betrayed a some-time pelvic peritonitis. The pain was usually in the pelvis, and was sharp, or sharp and shooting, or cutting in seven patients, four of whom had had a miscarriage: this pain was accompanied by chills and fever in two, and was followed by nausea and vomiting in two more. There was bearing down pain in two patients. The pain was referred down both lower limbs in one and up to the inferior angle of the left scapula, and down to the left knee in another, who suffered from left-sided salpingo-oöphoritis. In two cases there was frequency and urgency of urination. The menses were irregular in five patients, of whom four had menorrhagia: they were scanty in another. Dysmenorrhœa was present in five patients; leucorrhœa in five, and constipation in six. Associated conditions consisted of chronic appendicitis in all the twelve cases; retroversion in two, endometritis in two, and bilateral hydrosalpinx in one. The operations consisted of appendectomy in all cases; of bilateral salpingo-oöphorectomy in five, in two of which the uterus being adherent, was freed; of left salpingo-oöphorectomy, with resection of the right ovary, and right salpingectomy in four cases, in one of which a myomectomy was performed; of right salpingo-oöphorectomy in two; and of complete abdominal hysterectomy in another patient, who had a severe fundal endometritis.

In addition to the operations described above, fifty-two others of less interest were also performed in the Clinics.

FRACTURE OF THE PROXIMAL END OF THE FIFTH METATARSAL BONE.

Dr. Henry R. Wharton reported the following cases:

Case I.—W. A. G., aged 45 years, in jumping from a wagon in a runaway landed upon his right foot and found he had pain and difficulty in walking. On the third day after the accident, and as the foot was still painful and interferred with walking, he consulted Dr. Wharton, who found on examination that there was marked swelling over the proximal end of the fifth metatarsal bone, and great tenderness upon pressure of this portion of the bone. An X-ray examination showed that there was a fracture through the proximal end of the bone. A plaster-of-Paris bandage was applied for two weeks, and upon its removal, as the tenderness had disappeared, strapping and a bandage were applied, and he was able to walk comfortably with the aid of a cane. Two weeks later he was able to discard all dressing and walk without difficulty.

Case II.—E. B., aged 10 years, while skating upon roller skates ran into the curbing and fell, twisting her foot. She immediately experienced pain in the outer portion of left foot and walked with great discomfort. Dr. Wharton saw her within an hour of the accident, and found a distinct swelling over the proximal end of the fifth metatarsal bone; this region was also extremely tender upon pressure. An X-ray examination on the following day showed a fracture passing through the proximal extremity of the bone. A plaster-of-Paris bandage was applied for two weeks, and upon its removal strapping and a bandage were applied, and the patient walked without difficulty.

Case III.—J. C., aged 10 years, received a wrench of the foot while playing foot ball. He applied to the Dispensary of the Children's Hospital on the following day, complaining of pain in right foot, and difficulty in walking. Upon examination there appeared swelling of the tissues, and tenderness on pressure over the proximal end of the fifth metatarsal bone of the right foot. From the symptoms presented, which were exactly similar to the two cases reported above, Dr.Wharton thinks he had the same variety of fracture. Dr. Wharton further remarked that fracture of the shaft of the metatarsal bone is not an uncommon accident,

and is said to be most common in the first and fifth metatarsal bones. The special variety of fracture reported in the above cases, the accurate diagnosis of which is impossible without the aid of an X-ray examination, does not seem to have been described by surgical writers. Hamilton speaks of fracture of the first and fifth metatarsal bones as most common, but makes no mention of fracture of the proximal end of the bone. Scudder mentions the greater susceptibility to fracture in the first and fifth metatarsal bones, and shows a skiagraph of a transverse fracture of the fifth metatarsal bone near its proximal extremity. Von Bergmann mentions a condition formerly described as tumor of the foot which was not uncommon in soldiers who made long marches carrying heavy weights. Bruthaupyt, Schentze, Kocher and others, with the aid of X-ray examinations, have shown that this condition is usually due to a fracture of the second or third metatarsal bone. It is probable that the systematic X-ray examination which is now so generally employed in fractures, will show that it is a comparatively frequent injury.

Fracture of this portion of the bone is probably of the nature of a sprain fracture, the fragments being separated by the ligamentous slips from the dorsal or plantar ligaments which attach it to the cuboid. Displacement of the fragments seems slight.

The treatment which seems most satisfactory is the application of a plaster-of-Paris dressing for a few weeks, or firm strapping and a bandage, which is followed by good use of the foot in from three to four weeks.

Dr. James K. Young wished to place on record a case in which union did not occur. This was verified by X-ray examination. In this case the distal end of the fifth metatarsal bone was first removed. This did not relieve the metatarsalgia, and therefore the distal end of the fourth metatarsal bone was removed. This gave some relief to the patient, and no other operative treatment was undertaken. Dr. Young simply wanted to show that the treatment advocated by Dr. Wharton is not always satisfactory in producing union in fracture of the fifth metatarsal bone.

Fig. 1.

X-ray showing fracture of proximal end of fifth metatarsal.

FIG. 2

X-ray showing fracture of proximal end of fifth metatarsal.

MULTIPLE FRACTURE OF THE LOWER JAW TREATED WITH AN INTERDENTAL SPLINT.

DR. HENRY R. WHARTON reported the case of a man, aged 24 years, who received an injury of the lower jaw probably by a blow from a blackjack. He came under the operator's observation upon the following day, when it was found that there was a small lacerated wound of the left cheek which did not communicate with the mouth, and there were also two fractures of the body of the lower jaw, one on the left side just in front of the wisdom tooth, the other on the right side near the mental foramen. The bone between these two lines of fracture was displaced downward, several teeth were loosend, and one had been knocked out near the fracture on the right side of the jaw. It was found by manipulation that the fragment could be replaced, but even with a compress and Barton's bandage it could not be kept in position so that the teeth could be made to articulate.

An X-ray examination made with the compress and Barton's bandage applied showed that distinct deformity still existed, and it seemed that satisfactory correction of the deformity could only be obtained by wiring the fragments or employing an interdental splint, and Dr. Gritman, of the Dental Department of the University of Pennsylvania, made casts of both jaws, and from these casts metal moulds were made upon which the splint was shaped. The most difficulty in fitting the splint was due to the fact that the only retaining point posterior to the fracture on the left side of the jaw was a partially erupted wisdom tooth.

The interdental splint was applied on the fifth day after the injury, and the jaws were firmly held in contact with the splint by means of a Barton's bandage. An X-ray examination at the end of a week showed that the displacement of the fragment had been corrected and the articulation of the teeth was perfect. The splint was removed at the end of five weeks, and the articulation of the teeth was found perfect, but as the union at the seat of the fracture was not quite firm, it was re-applied for two weeks longer, making seven weeks in all that it was worn. Even at this time it did not seem safe to remove all retentive apparatus, so the patient wore through the day a light Barton's bandage, and was not allowed to use the jaw in mastication, and at night he re-applied the splint, to guard against any violent involuntary movement of the jaw during sleep. The patient during

the whole course of treatment was kept on liquid nourishment.

The result obtained was an excellent one, there being absolutely no deformity and the articulation of the teeth being perfect.

Dr. George M. Dorrance (by invitation) said he had had during the past year 77 cases of fracture of the jaw, 23 of which he had treated with intermaxillary splints or interdental splints. Some were treated by the so-called Angle method, which really does not belong to Dr. Angle; others with the Matas splint, which he modified somewhat; and others with the Barton bandage. Reviewing all these cases he thinks the Barton bandage should be discarded absolutely. In cases where it is impossible to obtain the interdental or intermaxillary splints the Angle or Dorrance modification of Matas' method give most satisfactory results. In speaking of results one takes the articulation of the teeth, not their alignment. If a fracture is within the line of the teeth all that is needed is an interdental splint which covers over the lower teeth. The patient can open his mouth, talk, and eat semi-liquid food. In every one of the 23 cases in which Dr. Dorrance used the intermaxillary or interdental splint he has perfect articulation. In those in which the Angle method was used he had some failures because the application was not correct, or because of the slipping of the two bands which go around the teeth. The Angle method consists of a band around the upper teeth and a band around the lower teeth; between these two there is a rod which is held in place by a clamp around the band on the upper teeth, and again by a clamp on the lower teeth. This holds the lower jaw against the upper. It is easily applied by a surgeon; but an interdental splint should be applied by a dentist. Dr. Dorrance has treated 3 cases of fracture of the upper jaw with the interdental splint. The jaw is immediately reduced and a cast taken; this will undoubtedly show some deformity; then another cast is made and a die is made of that, and finally a German silver die is wedged over the copper one. This silver splint is placed on the teeth by cement and fracture is in perfect position, and the patient can eat food he does not have to chew. The results from the intermaxillary and interdental splints have proven most satisfactory in every respect.

CASES OF FRACTURE OF THE PATELLA TREATED BY OPEN OPERATION AND SUTURE OF THE FRAGMENTS.

Dr. Henry R. Wharton reported the following cases:

Case I.—W. R., aged 23 years, in December, 1907, while fox-hunting, fell with his horse and received an injury of the left knee. A temporary dressing was applied and the patient was removed to the Presbyterian Hospital.

Upon the third day after the injury the patella was exposed by a transverse incision over the knee-joint, and a very large amount of blood-clot was removed. Examination of the fracture showed that there were three fragments, the upper fragment consisting of two pieces, the smaller one to the left side was held by a periosteal hinge. The upper and lower fragments were drilled and were brought into apposition by several strands of chromicized catgut passed through the drill holes and secured by tying. After securing the fragments two additional layers of chromicized catgut sutures were employed to approximate the periosteum and capsular structures, and a third layer of silkworm gut sutures were employed to approximate the connective tissue and skin. A small cigarette drain was introduced at the angle of each wound before the capsular structures were closed by sutures. The wound was covered by a gauze dressing, and a plaster-of-Paris dressing was applied to the limb from the toes to the groin, with provision for strapping when dressing of the wound became necessary. The small drains were removed on the third day, and the sutures were removed on the tenth day, and the wound was found healed.

The plaster-of-Paris bandage was removed at the end of a month, and gentle passive motion of the joint and massage of the limb were practised. The patient was allowed to walk on crutches at the end of six weeks. Motion of the joint gradually improved, and at the end of ten weeks he walked with a cane. The function of the joint gradually returned, and six months after the injury he apparently had full extension and flexion of the joint. An X-ray taken eleven months after the injury shows the condition of the patella.

Case II.—Mrs. M. R., aged 60 years, tripped upon a rug and fell, fracturing the right patella.

She was removed to the Presbyterian Hospital, and upon the third day after the injury the patella was exposed by in-

cision, and the fragments and capsular structures were approximated, as in the case previously described. The dressing applied and the after-treatment were similar to that described above. The result obtained was very satisfactory, and at the end of six months motion of the knee-joint was almost perfect.

CASE III.—Mrs. R., aged 45 years, in August, 1906, fell downstairs, doubling her right knee under her, sustaining a fracture of the right patella. She was sent to the Presbyterian Hospital and was under the care of Dr. Hodge, who exposed the fragments by incision and approximated them by suture of the capsular structures. The patient did well and was discharged with good union of the fragments. She states that she regained normal use of the limb.

On February 12, 1907, she stepped upon a piece of ice and fell, fracturing the same patella. She was admitted to the Presbyterian Hospital on February 18th, and the fragments were exposed by a longitudinal incision. It was found that union of the fragments had occurred by isolated bony areas, five or six in number, the intervening union being fibrous. The edges of the fragments were freshened, drilled and approximated by a few strands of chromicized catgut. The periosteum and capsular structures were next approximated with chromicized catgut sutures, and the skin and connective tissues with silkworm gut sutures. The limb was put up in plaster, and the case made a good recovery, and was discharged from the hospital on March 3, 1907.

An examination of this patient within a few weeks, shows that she walks without a limp, and has regained full function of the knee-joint.

OSTEOPLASTIC RESECTION OF THE SKULL,

WITH DESCRIPTION OF A MODIFICATION OF STELLWAGEN'S INSTRUMENT FOR PERFORMING THIS OPERATION.

BY ALFRED C. WOOD, M.D.,

OF PHILADELPHIA,

Assistant Professor of Surgery in the University of Pennsylvania; Surgeon to the University Philadelphia and St. Timothy's Hospitals.

AMONG the notable advances in surgery in recent years, intracranial operations occupy a prominent place. This fact is due largely to the development of the osteoplastic method of exposing the brain and its membranes. Wagner, who has the credit of first performing this operation in 1889 employed the chisel and mallet to cut through the skull. The value of this method of exposing the brain was at once recognized by surgeons, and almost immediately suggestions of new instruments to replace the chisel and mallet in effecting the bone section began to appear, and have continued, at frequent intervals, up to the present time. Without reviewing the discussion as to the relative merits of the original method, and the numerous substitutes that have been recommended, which is now an old story, it may be confidently stated that the chisel and mallet are employed less frequently each year in the operation now under consideration.

At the present time, the rivalry is chiefly between bone-cutting instruments and saws driven by power,—usually electricity,—and certain cutting forceps and instruments manipulated entirely by the hands.

It is not the purpose of this report to open a controversy on the relative merits of these two general methods of procedure. It will be admitted at the outset that each has its well-defined field of usefulness, as have also a number of the different instruments that have been described. Nothing can be more trite than the statement that an instrument that one surgeon will use with facility and satisfaction will be

considered wholly inappropriate under identical circumstances by another operator. I have, therefore, no arguments to advance against any of the methods that have been successful in other hands. I desire, merely, to describe an instrument that has been eminently satisfactory to me, and one, I believe, that deserves a trial from those who have not felt satisfied with the methods they have heretofore employed.

In 1903 Dr. Thomas C. Stellwagen, Jr., of this city, devised an instrument for cutting an osteoplastic flap of the scalp and skull. Shortly thereafter I had the opportunity of assisting Professor J. William White in some cases of osteoplastic resection of the skull in which he used this instrument, and subsequently employed it in two or three cases in my own service. I was surprised at the ease with which the bone flap was cut, and although the instrument accomplished the object for which it was intended it seemed to me susceptible of improvement in certain minor features. The first objection encountered in this limited experience was the severe tax on the pronator and supinator muscles of the forearm, which, being unaccustomed to prolonged efforts of this kind, became very tired, so that it was necessary to rest from time to time. The second objection from my standpoint, was the lack of security of the plate upon which the shaft of the instrument revolved. In spite of every effort I could make it would soon become loose * and had to be held by the fingers of the left hand, or by an assistant, whose hand in the vicinity of the wound, was usually more or less in the way and impeded the progress of the operation. A third objection was the free hemorrhage from the vessels of the scalp while the bone was being cut through. While hemorrhage from a scalp incision is always copious, and requires the application of a large number of hæmostatic forceps, the sweep of this instrument made the use of the forceps impossible and the well-

*Dr. Stellwagen informs me that he has since adopted the use of wood screws which overcome this difficulty. However, I prefer the modification here described as this instrument has a fewer number of parts and less time is consumed in establishing the central point or base.

known difficulty of tying the scalp vessels results in a great loss of time. This last objection was overcome to some extent, theoretically, by some operators, by cutting a short segment of the flap at a time, and sawing through the subjacent bone, then enlarging the scalp incision and the bone section, part by part, until the necessary flap was formed. My own observation leads me to say that the total amount of bleeding which occurred when this method was employed was just as great as when the whole flap was cut at once and in addition the time required to change from the knife to the saw and back again, and the extra time required in forming the flap, prolong the operation unnecessarily.

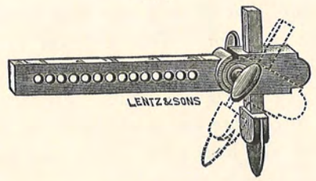
To overcome the first difficulty mentioned, it occurred to me that by attaching a handle to the end of the arm carrying the saw, the force required in cutting the bone could be applied more comfortably, that is, in a way that would be much less tiresome to the operator. This addition to the instrument required the shaft to turn freely upon the handle instead of being fixed as in the original model. Further, as both hands were required to operate the instrument, an effort was made to do away with the base plate which had been a source of inconvenience as already stated.

In my first model all of the features of the Stellwagen instrument were retained. To these were added the handle at the end of the arm, the rotating shaft armed with a spear-pointed pin at the end opposite the handle, which bored a hole in the skull as the shaft rotated, and thus became fixed. A shoulder at the junction of the shaft with the pin prevented the latter from penetrating too deeply and injuring the membranes of the brain. Motion was provided at the joint between the arm and the shaft, otherwise it would be necessary to incline the shaft at various angles, as the saw swept over the irregular surface of the skull, and as it penetrated the bone. In order to combine both ideas in one instrument it was necessary to have means: first, to fix the shaft rigidly to handle; and second, to fix the arm firmly to the shaft,—when used

in the original way. To meet the requirements in the other case, both of these points must be freely movable.

Subsequently, the idea of retaining all of the original features was abandoned, as the instrument was thus unnecessarily complicated and further experience with the modified form led me to feel that in the latter, all of the requirements were fully met. An effort was made at first to cut the skull obliquely rather than perpendicularly, in order that, when the operation was completed and the skull flap returned, it would be supported by the bevelled edge of the section and would thus be prevented from becoming displaced inward. With this object in view, in the first model, the clamp at the outer end of the arm in which the saw was secured was arranged so that the latter could be adjusted at any angle

FIG. 1.



desired (see Fig. 1.). After a little experience this feature was omitted, as the perpendicular section is, I believe, in every way satisfactory. The theoretical preference for the formation of a support for the bone flap must be admitted, but I have never observed any tendency of the fragment of bone to become displaced inward, nor do I recall having heard of such a complication.

The drill-pointed pin at the end of the shaft which did not give satisfaction was substituted by a blunt pin, and a separate drill was provided.

The various parts of the instrument are shown in Fig. 2, and are as follows:

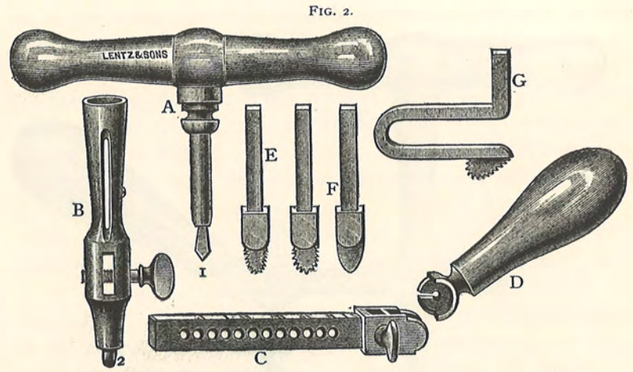
1. A T-handle (A), armed with a bone drill (1).
2. A shaft (B), to which the handle is adjusted, provided

with a fenestra to accommodate the radial arm, and a blunt centre-pin at the end (2). The handle is held to the shaft by a spring, but is instantly released by slight traction.

3. A radial arm (C) which is received in the fenestra in the shaft, and is secured by a thumb screw. The knife and saw are carried at the outer end of this arm and are held by a set screw.

4. A radial arm handle (D), to be adjusted to the extremity of the arm, and used to give the circular motion to the knife and saw. The arm is graduated in inches and centi-

FIG. 2.



metres so that it may be instantly adjusted to cut an opening of the desired size.

5. Knife and saws (E, F, G).

The saw (G) is designed to cut the base of the bone flap by carefully raising the pericranium and scalp along the proposed saw line. The sawing must be done very deliberately in order not to detach the scalp from the body of the bone flap.

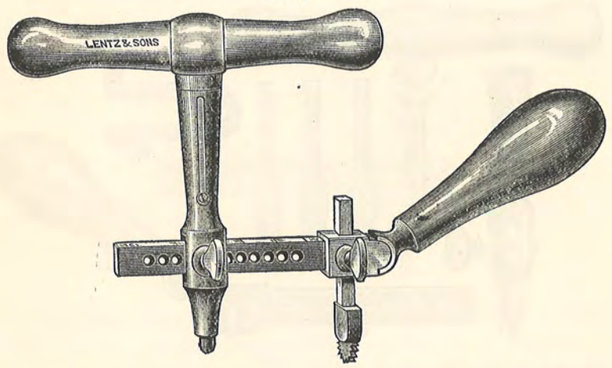
Fig. 3 shows the instrument assembled ready for use.

The operation with this instrument is carried out as follows:

The head is prepared in the usual way. The fissure of Rolando, the fissure of Sylvius, or any intracranial landmark

desired as a guide at the operation should be marked upon the scalp. After the patient is anæsthetized, important points may be scratched with the point of a scalpel and the entire scalp may again be cleansed with alcohol and bichloride solution. The size of the circle required to expose the area of brain which it is desired to inspect, is determined and the central point marked by scratching an " X " on the scalp with the point of a knife. The radial arm should now be adjusted by the scale to cut a circle of the desired size. When all is ready, a half-inch incision is made in the scalp at the central

FIG. 3.



point (X), the handle, carrying the drill, is then removed from the shaft by slight traction, and a hole bored in the skull at the centre of this incision. The drill is prevented from going through and injuring the membranes by a shoulder. The handle is then replaced in the shaft and the knife inserted in the outer end of the arm where it is secured by the set screw. The T-handle is held in the left hand, the arm handle is applied to the end of the arm and held in the right hand, while the pin at the end of the shaft is introduced into the hole bored in the skull. The scalp flap is now cut, down to the bone, usually by a single sweep of the knife, which should

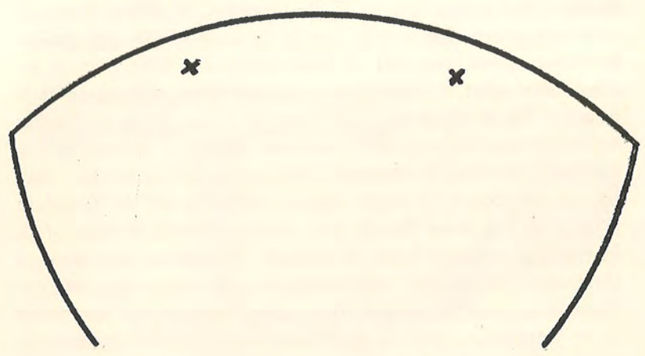
be introduced at the point at which it is desired to begin the incision, and carried around to the point at which it should end, forming two-thirds or three-fourths of a circle. During this manœuvre, as the scalp is freely movable on the skull, an assistant should steady the former and make traction against the pull of the knife, so that the flap shall not be distorted. The knife is then replaced by the saw and the bone cut by moving the saw forward and backward by means of the handle held in the right hand. The saw may be made to traverse the entire length of the incision in either direction with one sweep, but it will usually be found more convenient to cover about one-half of this distance. The saw is so constructed that it cuts equally well in either direction; it is guarded by a shoulder, the blade is scant 3/16 inch long so that it may be used freely without danger of wounding the dura. If the skull is unusually thick at any point the saw may fail to cut entirely through, but no difficulty will be found in prying up the bone flap if two narrow chisels be employed. If the bone has not been cut entirely through at any point, a little edge will be left, which may be cut away with rongeur forceps, or may be allowed to remain to support the flap when it is returned. This support may always be obtained, if desired, by leaving one or more points where the inner table is not entirely sawed through. After the bone section is complete, the base may be sawed through (under the dura) or the bone may be pried up by two chisels, thus breaking the base of the bone flap. No special comment is needed as to the incision in the dura, which is made according to the usual rules.

Two points in connection with the use of the instrument require special mention. First, in placing the radial arm in the shaft, be particular to see that the proper face is uppermost, otherwise the arm handle cannot be adjusted. Second, when sawing the bone, the shaft should be kept perpendicular to the skull, for, if inclined, the saw will be carried in the same direction. After a groove has been cut in the skull, if the saw does not tend to follow this track it will be because the

position of the handle has changed. A very little manipulation will again bring the saw in its proper position.

If a larger exposure of the brain is desired than is afforded by the circular flap a somewhat rectangular flap may be made by cutting the segments of three circles of the required size. Fig. 4 illustrates this idea. The " X's " indicate the three centre points used to form this flap. Many variations in size and shape are possible.

FIG. 4.



I have employed this instrument in a number of cases with very great satisfaction. Its use does not tire the muscles at all, it is easily manipulated by any one, it is absolutely safe, and it cuts rapidly. The whole time required to expose the brain has not been observed, but in a number of instances the time has been taken from the moment I began to saw the bone until the flap of scalp and bone was turned up and the dura exposed. The longest period required was eight minutes, and the shortest, one minute and fifty seconds. The latter was in a man about 35 years of age, the flap being three and one-half inches in diameter. With a little practice this part

of the operation should be done easily in from three to four minutes, the hole for the centre pin may be made in from one-half to one minute and the scalp should be cut in a minute. Thus in the absence of complications the whole operation of opening the skull need not consume more than from five to six minutes. The very short time consumed in the operation results in a marked decrease in the amount of blood lost, and as soon as the flap is raised forceps may be applied or other measures adopted to prevent further hemorrhage from the scalp wound.

Among those for whom I have operated, and who have witnessed the use of this instrument are: Drs. Charles K. Mills, William G. Spiller, M. Howard Fussell, Charles S. Potts, T. H. Weisenberg, J. H. W. Rhein and S. Ross Crothers.

I believe the following claims may be made for this instrument.

1. It enables one to cut an osteoplastic flap of the skull quickly and safely.

2. No injury can possibly be done. The careless or clumsy use of the instrument can do no harm.

3. Every part may be sterilized by boiling.

4. It is always ready for use as there are no complicated parts to get out of order.

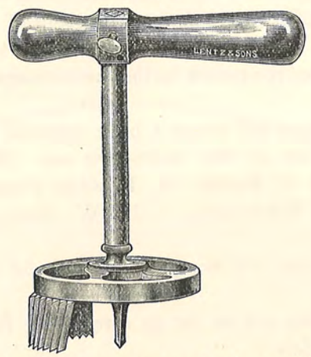
5. It is complete in itself and does not depend upon electric currents, motors, assistants, or anything but the hands of the operator.

DR. JOHN B. ROBERTS said he was very much interested in trephining instruments and had employed Stellwagen's and others. He showed last September at the State Medical Society a device of his own which he thinks is good; the instrument is simply the segment trephine, a modification of the old-fashioned trephine. He has never made use of the Cryer instrument, run by a surgical engine, although he believes it to be one of the best instruments obtained if the power is run by a practised and competent man. It is, however, very much more expensive than most individuals can afford. The price of his modification of the old-fashioned trephine he believes to be only a few dollars.

Dr. Roberts thinks Fetterolf's nasal septum rasp an exceedingly good tool to cut the hinge of the flap made by the segment trephine in osteoplastic resection of the skull.

Dr. Thomas C. Stellwagen (by invitation) said that Dr. Wood had overcome most of the difficulties that the surgeons had

Fig. 1.



in the use of his instrument through his modifications. When this instrument was first used the great trouble was that the pressure was put on the saw; they did not let the saw act with its own weight, and this pried the centrepiece away. Afterwards a plate was made to screw into the bone,

Fig. 2.

which largely overcame the difficulty. This however required extra time and so necessitated a little longer time in the operation. Dr. Stellwagen does not recall in some fourteen cases trephined in which he assisted, any case where there was an injury to the dura. He does not think the dura will be injured if ordinary care is taken in terphining. It may be scratched but he has never seen a case where the dura was cut through. Another advantage of the plate is that it controls hemorrhage from the central portion of the flap and keeps it from being torn from its attachments. In one case which Dr. Stellwagen attempted to

trephine for Dr. Deaver at the German Hospital the hemorrhage was so great that it was necessary to stop.

Dr. Stellwagen said he thought there was one suggestion which might be made regarding Dr. Wood's instrument to make it practical for the average surgeon. Instead of having an ordinary smooth tip to let into the bone, have it screw in, and then it will be held more firmly and will overcome entirely the danger of the point being pulled out. He thought Dr. Wood's objection to the instrument in that it tired the wrist, was a proper one.

Dr. Stellwagen referred to a case in which it took about twenty-eight minutes to get the osteoplastic flap up. He afterwards helped in the autopsy on this case and it took him about one hour to remove the calvarium.

Dr. Stellwagen has seen a good many men try to use the surgical engine, and he thinks unless they are especially trained in its use it is a very dangerous instrument. He does not think the general surgeon has either the time or the inclination to become proficient with such a complicated instrument; it further runs so rapidly that it dulls the sense of touch.

Dr. Stelwagen's own instrument was devised in 1903.

Dr. Charles F. Nassau referred to a demonstration given upon the cadaver before the Academy some years ago by Dr. Hopkins, who used an instrument which in principle was exactly like the one presented by Dr. Wood, except that it was very much larger, and Dr. Hopkins employed a fixation apparatus of different character.

Dr. A. C. Wood, in closing, said in regard to cutting the base of the bone flap, referred to by Dr. Roberts, that he had a model of a saw to fit his instrument for that purpose. Dr. Wood does not employ this method as a rule, but simply fractures the base.

In regard to the instruments run by power, such as the Cryer instrument, Dr. Wood admits that they are very satisfactory when they work well but they have one great disadvantage which must always be borne in mind—they have great power for harm. He believes a great many operators can report a long series of cases without a serious accident, but such accidents do occur. In the circular-saw type, he has heard of the saw breaking loose from the handle and being thrown with great force. If the power instrument while in operation catches a fibre of gauze or other material it may be at once jerked from the hands of the operator who is powerless to control it.

STATED MEETING, HELD MARCH 2, 1908.

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

CARIES SICCA.

Dr. Morris B. Miller presented a woman, aged 22 years, whose personal history was without interest until five years ago when she suffered from a prolonged and severe attack of typhoid fever complicated with pneumonia. Approximately two months after she got perfectly well her arm became weak at the shoulder and remained that way until something over a year ago when within a few weeks she lost entirely the power to raise it at the shoulder and it commenced to pain. The muscles became shrunken and the fixation grew pronounced over a period of three or four months. From the first she has had severe pains resembling neuralgia but not responding to any form of treatment. These are mainly of the area immediately surrounding the joint, but some pain is referred down the arm. Any effort to move the firmly ankylosed shoulder-joint causes considerable suffering. The clinical phenomena are clearly those of caries sicca. There is no pulmonary lesion perceptible.

Dr. Miller said he believed this condition must occur more frequently than one would gather from the literature, and he thinks it may possibly be that this condition is frequently diagnosed as arthritis. He would like to have raised the question whether, in the light of the disability his patient presented, and particularly the neuralgic pain of which she complained, an excision would be warranted and whether it would result in an improved condition.

RESECTION OF SPINAL ACCESSORY NERVE FOR TORTICOLLIS.

Dr. Robert G. Le Conte exhibited a boy of eleven upon whom he had operated six months previously for congenital torticollis. The patient's head, from birth, had been drawn to the right side, with the chin towards the right shoulder, and it was

impossible for him to bring his face to the front. The right sternocleidomastoid muscle appeared to be twice as thick and strong as the left. With an anterior incision at the upper portion of the sternocleidomastoid the spinal accessory nerve was exposed before it entered the sternomastoid muscle. It was resected for a distance of half an inch.

The patient made an uneventful recovery, and now has perfect control and freedom of the motions of the head in all directions.

SUBCUTANEOUS RUPTURE OF THE SPLEEN.

REPORT OF CASES WITH REMARKS.

BY GEORGE G. ROSS, M.D.,

OF PHILADELPHIA,

Assistant Surgeon German Hospital; Surgeon Germantown Hospital.

CASE I.—Robert S. Age 8. History of having fallen 8 feet down a cellar way, striking on left side of abdomen in left hypochondriac region. Accident November 3, 1907.

The first urination after the accident showed evidence of blood. He did not vomit; no marked evidence of shock; bowels moved normally. The next two succeeding days he was not so well and when I saw him two days later he presented the following symptoms:

Expression anxious, indicating some severe abdominal lesion. Some meteorism, but no vomiting. Temperature 102; pulse 20; respiration rapid and shallow. Lips and mucous membrane pale. Rigidity of left rectus muscle; tenderness most marked over splenic area. Complained of pain in left upper abdomen. The kidneys and bowels had acted normally and showed no evidence of blood. The degree of traumatism and its application to the splenic area, followed by the evidence above related, makes the diagnosis of contusion of the spleen, slow hemorrhage and a low grade, more or less localized, peritonitis, most reasonable. He also had a contusion of the left kidney as evidenced by the one hemorrhage. The boy had a slow but satisfactory recovery without operation.

CASE II.—Jacob H. Age 21. Painter. Was admitted to the German Hospital on the afternoon of September 28, 1907, having been referred by Dr. Klemm.

Patient's previous history of no importance or bearing on present condition.

Dr. Klemm kindly furnished the notes of the accident and the condition immediately following:

"Jacob H. came to my office stating that two hours before he had fallen from bay window on a fence, striking on his upper abdomen. He soon recovered sufficiently to walk to his home, a distance of ten squares, then to my office another six squares

and back to his home. He was pale, not able to stand fully erect; his pulse was 96; temperature normal; he referred his pain to the epigastrium, radiating toward the left side and the back. I advised him to go to the German Hospital for observation, to which his mother objected, then I ordered him to bed and to let me know if he got worse. The next day I found him, with abdomen distended, pulse 136, temperature 100, more pale and willing to go to the hospital at once."

On admission he was very pale, expression anxious. Temperature 100; pulse 148; respiration 26. Abdomen showed no ecchymosis, bruise, cut or evidence of traumatism. Lungs clear. Heart action rapid. No murmurs. Pulse rapid, weak and running. Abdomen moderately distended; general rigidity and marked tenderness. Complained of severe abdominal pain, most intense in the left hypochondrium. Hæmoglobin 48 per cent., leucocytes 20,000.

Operation on admission, 24 hours after the injury. Abdomen was opened through right rectus muscle with line of umbilicus as central point. A large amount of very dark unclotted blood escaped. A rapid survey of small and large intestine and their mesenteries, also of the liver, proved them to be intact. As the examination approached the spleen it was noticed that the blood was clotted and an examination discovered a rent in the spleen. The patient by this time was practically pulseless. Intravenous salt solution was started—a total of 2000 c.c. being given. Another incision through the abdominal wall over the spleen and three pieces of gauze were packed around the organ. A stab wound over the pubis was made for the insertion of a glass drainage-tube; the original wound was closed, excepting at the lower angle, where one piece of gauze was placed for drainage. The abdomen was not washed out. The patient made a slow recovery. On the twentieth day the temperature shot up to 104 and the pulse to 138 without a known cause, and stayed up until the thirty-fifth day, when it again reached normal. The leucocyte count at this time was 9700. Widal negative.

Subcutaneous injuries of the spleen vary from simple contusion to complete pulpification, the extent of the injury being governed by the amount and direction of the applied force and the condition of the organ. An abnormal spleen either enlarged or unduly friable will be more readily and more severely

injured by minor degrees of traumatism. That the normal spleen is liable to severe injury is proven by the number of cases on record. At the height of its functional activity, the spleen is engorged with blood and is at this time more liable to injury. This condition occurs some hours after digestion. The two cases herewith reported illustrate rupture in two degrees of severity, in normal or presumably normal organs. Both were in males.

In Berger's collection, 300 cases were in men and 60 in women.

Subcutaneous injuries are more common than through open wounds. Edler's 160 cases show 51.8 per cent. as subcutaneous to 48 per cent. from gun shot and stab wounds.

Berger, Archiv für Klin. Chirurgie, 1902, vol. 68, pp. 768–817, gives a review of all cases up to 1902, from which the following facts have been deduced:

Frequency of rupture of the spleen compared with same injury to the other solid viscera due to traumatism he gives as follows: rupture of spleen, 20 per cent.; rupture of kidney, 22 per cent.; rupture of liver, 37.5 per cent.

Contusion of the spleen regarded as an authentic diagnosis, is in many cases hard to diagnose from rupture. The symptoms are pain and tenderness in region of the spleen, enlargement of the organ, fever, shock without evidence of hemorrhage.

Age of Cases.—Report of German cases: age from 0 to 10, 38 cases; 11 to 20, 33 cases; 21 to 30, 42 cases; 31 to 40, 32 cases; 41 to 50, 15 cases; 51 to 60, 15 cases; over 60, 9 cases. Report of English cases: age from 1 to 10, 11 cases; 11 to 20, 18 cases; 21 to 30, 15 cases; 31 to 40, 15 cases; 41 to 50, 6 cases; 51 to 60, 11 cases; over 60, 11 cases.

NOTE.—One case in a new-born infant, which was dropped on floor in precipitate labor.

Pathology.—Somewhat less than half of the ruptures affected a diseased spleen, in most cases malarial. It was especially common also during acute infections with splenic enlargement.

Of 132 pathological ruptured spleens: 93 were malarial, 15 only enlarged, no cause stated, 5 in typhoid, 1 in typhus, 1 in pneumonia, 3 in leukæmia, 1 in hereditary syphilis and alcoholism with liver cirrhosis, 9 in pregnancy, 1 in tuberculosis, 1 in other diseases.

Spontaneous Rupture.—Referred to by Berger. He gives over 30 examples, some with slight trauma, as bending or in labor. He reports one case in a man lying absolutely still.

Prognosis of Ruptured Spleen.—Unoperated: of 220 cases, 17 recovered—mortality, 92.3 per cent. *Operative results:* splenectomy, 67 cases, 38 recovered, 29 died—mortality, 56.7 per cent.; splenorrhaphy, 2 cases, 1 recovered, 1 died—mortality, 50 per cent.; tamponade, 6 cases, 5 recovered 1 died—mortality, 83.3 per cent.

In the above splenectomies 13 had complicating injuries, of which 9 died. In two of the recovered ones the complications were very slight.

LATER REPORTS OF RUPTURE OF SPLEEN.

1. BEAUMONT. Trans. Clin. Soc. London, 1902–3, xxvi, 261. Reports case of man hit by wagon tongue; spleen was ruptured. Operated. Splenectomy. Developed a left pleurisy and empyema. Had enlarged lymphatics one month after operation. No pathology of spleen.

2. FREUND. St. Louis Med. Cour., 1906, xxiv, 135–137. Reports one case of splenectomy for rupture with recovery. Operation within 24 hours. Noted leucocytosis of 9000 on admission, 18,000 on third day.

3. KIRCHNER. Ibid. Mentions 5 or 6 cases with 3 or 4 recoveries. No exact data.

4. BREWSTER. Boston M. and S. Journ., 1904, cl, 211. Reports a case of rupture of the spleen on a female of 6. Operated evening of the second day, with diagnosis of probable rupture of intestines. Wound in spleen packed, a drain was brought out by counter opening in flank.

5. SIMPSON. Lancet London, 1906, ll, 364. Case of splenectomy for ruptured spleen. Operated in 5¾ hours.

6. NOETZEL. W. Beitr. z. klin. Chirurgie, 1906, xlviii, 309. Reports five cases of splenectomy for rupture. Two recovered. One operated in 24 hours. One on third day. Of the three that died (no pathological report), 1 died apparently of shock, 1 of rupture of liver and heart complicating splenic condition, 1 of rupture of intestine (not found at operation). He calls attention to need of examination for associated lesions of viscera when doubtful.

7. FRANK. Munch. med. Wchnschr., 1906, liii, 189. Reports two cases of splenectomy for rupture. One operated within 24 hours and one

on second day. The latter worked 2 days after accident—had subcapsular hemorrhage which broke second day and necessitated operation. Complicated by pneumonia and pleuritis. No pathological report.

8. FONTOYNONT. Bull. et Mem. Soc. de Chir. de Paris, 1905, us. xxxi. Reports a case of splenectomy for rupture in a woman of Madagascar, who had malaria and syphilis. Operated in 2 hours. Spleen removed as was also an injured portion of tail of pancreas. Clamps left on vessels. Spleen free of blood weighed 500 grams. It was hypertrophied and malarial.

9. SCHLUETHER. R. E. J. Missouri Med. Ass., 1905-6, 11, 23-26. Reports splenectomy in boy of 14, for rupture. Spleen entirely broken in half. Operated in 18 hours. Bleeding had spontaneously ceased. He notes hypertrophy of lymphatics in second week after operation.

10. ANORAY. Bull. et Mem. Soc. de Chir. de Paris, 1904, xxx, 900-911. Reports two cases of splenectomy for rupture, with recovery. He advises resection of ribs to expose the field of operation. He refers to several other cases and to 3 cases of spontaneous cure.

11. SHERWOOD. Brooklyn Med. Journ., 1906, xx, 62. Reports case of rupture of spleen. Operation in 3 or 4 hours. Hemorrhage all back of peritoneum and no free blood in peritoneal cavity. Spleen and clot left undisturbed and wound closed. Patient recovered.

12. DAVYS. Indian Med. Mag. Calcutta, 1904, xxxlx, 219. Reports spontaneous rupture of spleen in native while lying down. No accident. Died in ½ hour. Postmortem: Spleen has rent in anterior angle; is soft and enlarged to double its size. No pathological report.

13. THURSTON. Ibid. p. 379. Reports operation for peritonitis. Ruptured spleen. Spleen not enlarged. The blood had become encysted, the breaking of which caused the peritonitis. No free blood in abdominal cavity.

The evidence upon which a diagnosis can be established is the history of traumatism to the upper abdomen and especially when applied to the left side; shock, pain, tenderness over the spleen, rigidity of the recti muscles, more marked of the left; later signs of hemorrhage and meteorism. The abdominal wall rarely shows the evidence of force, although it be sufficient to rupture any one or several of the abdominal organs. The absence of ecchymosis or bruising should not mislead one.

As we see these cases in the hospital the impression one receives is that the patient has a serious hurt and urgently requires operation, and it is my opinion that the time spent in making a fine differential diagnosis would be better spent in opening the abdomen on the evidence of a ruptured viscus and repairing the condition or conditions found.

If the diagnosis of injury to the spleen can be established an incision through the left rectus muscle offers the best route for handling the conditions. Unfortunately the signs of hemorrhage into the peritoneal cavity and the meteorism so often obscure the symptoms that we must make a compromise incision, that through the right rectus muscle being the best. The umbilicus should be on a line with the middle of the incision. One can readily and rapidly enlarge upward and downward. Injuries to other organs will be more readily seen and recognized by this route.

DR. JOHN H. GIBBON referred to a case of rupture of the spleen which he had reported before the Academy some years previous. He believed that localized tenderness and rigidity were the most valuable symptoms we have for locating the injured viscus. In nearly all of the cases of rupture of the spleen which have been reported there has been marked localized tenderness and rigidity. Dr. Gibbon believed that if the spleen were not so easily removed fewer splenectomies for rupture would be reported, since in the majority of these cases hemorrhage can be controlled by judicious packing. In order to control bleeding from large wounds of the spleen it may be necessary to crowd the spleen firmly up against the diaphragm. Dr. Gibbon believed that any case that lived for four or five days after the rupture had occurred could be saved without splenectomy.

END-TO-END ANASTOMOSIS OF THE BRACHIAL ARTERY.

DR. FRANCIS T. STEWART reported the following cases:

CASE 1.—A. L., aged 42 years, was admitted to the Pennsylvania Hospital June 14, 1905, in the service of Dr. Le Conte, to whom the author is indebted for the privilege of operating upon and reporting this case. The patient had been struck on the inner side of the arm just above the elbow with a piece of flying steel. The profuse bleeding which followed was readily controlled by pressure. Subsequently the arm became greatly swollen, the skin tense, and a number of large blisters appeared over the forearm. The radial pulse was absent. The X-ray showed the piece of steel, ⅜ x ⅛ inch in size, just beneath the skin. Two days after the injury a 5 inch incision was made along the inner side of the biceps, and the brachial artery exposed at the upper angle of the

wound and compressed between the fingers of an assistant. The vessel was then traced downwards until the wound in its walls was found. The piece of steel was removed with the mass of clots which surrounded the artery. The wound in the artery was transverse and involved half of its circumference. One of the brachial veins had been severed, but was closed by agglutination of its walls the result of compression. After ligating the vein the arterial wound was sutured with through and through sutures of fine silk, which controlled the bleeding but also dangerously narrowed the lumen of the artery. The injured segment of the artery was therefore resected and an end-to-end anastomosis performed by the Murphy method. This necessitated flexion of the elbow, in which position the arm was dressed on an internal angular splint. The radial pulse had disappeared by the time the dressing was completed, but reappeared the following day, although very feeble. The wound was not drained, and primary union occurred. Two months after operation the forearm could be almost completely extended, the radial pulse was as strong as on the sound side, and there was some neuralgic pain along the course of the median nerve.

CASE 2.—J. M., aged 32 years, was admitted to the Germantown Hospital, May 22, 1906, with a bullet wound on the inner side of the right arm just below the axilla. The following day the arm was greatly swollen and the radial pulse absent. The artery was exposed and compressed as in the preceding case, and a lacerated wound involving three-fourths of the circumference of the vessel found. As approximation of this wound obliterated the lumen of the vessel, the injured portion was resected, and the ends united with silk sutures passing through all the coats. After turning on the circulation a few additional sutures were applied to control the oozing. The wound was closed without drainage and healed by first intention. A feeble radial pulse could be felt immediately after the operation and this increased in strength from day to day. The bullet could not be found at the operation nor could it be shown by an X-ray plate.

Dr. Stewart said further that in addition to the above cases 8 others had been reported in which circular arteriorrhaphy had been performed for accidental wounds (1897, Murphy, Djemil Pacha, two cases; 1899, Kümmel, Krause; 1902, Fergusson; 1904, Delanglade; 1906, Brougham), not including cases of

aneurysm. Of these 10 cases the axillary artery was involved in 3, the brachial in 2, the radial and ulnar (same patient) in 1, the femoral in 3, and the popliteal in 1. In 3 the wound was caused by a bullet, in 1 by a piece of steel, in 1 by a stab wound, and in 5 the vessel was accidentally opened during a surgical operation. The largest amount of vessel resected was 2 inches (femoral). In 7 cases the vessel was united with silk; in 3 the suture material was not mentioned. The Murphy method was employed in 8 cases and simple approximation in 2. In 5 cases the peripheral pulse could be felt at the close of the operation and in 5 it was absent immediately after the operation. Infection occurred in at least 3 cases and gangrene in 2 (femoral and popliteal). In no case was secondary hemorrhage or aneurysm reported.

At the present day ligation is contraindicated for a clean wound of a large artery. Unfortunately in the very cases in which arteriorrhaphy for wounds is most strongly indicated, *i.e.*, in those with chronic arteritis, in whom the danger of gangrene after ligation is much increased, the sutures are apt to tear out during the operation or thrombosis is likely to occur subsequently. Even in these cases, however, he believed arteriorrhaphy should be tried, since when one considers the probability of section of the vessel by a ligature, the dangers of suture are at least no greater than ligation, and in the event of thrombosis the patient is no worse off than after the application of a ligature; indeed if the thrombus forms slowly the collateral vessels may sufficiently dilate to prevent gangrene in the affected part.

DR. JOHN H. GIBBON thought that in Dr. Stewart's first case a prompt clot had formed at the site of anastomosis. This is indicated by the disappearance of the radial pulse before the patient left the operating table, and its gradual reappearance would indicate the establishment of collateral circulation. In this case the invagination method was employed which is now recognized as being faulty, because there is not a close contact between the intima of the two portions of the divided vessel. In Dr. Stewart's second case he did an end-to-end anastomosis with a close approximation of intima, and there was evidently no obstruction after the operation. Dr. Gibbon believes with Dr. Stewart that arteriorrhaphy is to be preferred to ligation wherever possible.

DR. STEWART thought Dr. Gibbon's criticism was correct, and that thrombosis must have occurred in the first case. In his

report he simply classed the cases according to whether the pulse was or was not present immediately after operation. Although his report shows that 8 of the 10 cases were done by the Murphy method, Dr. Stewart thinks there can be no doubt that the simple approximation, or the Carrel circular arteriorrhaphy is to be chosen by all means. He was at first going to say that he did his second case by the Carrel method, but was afraid Carrel might object as the edges were slightly inverted instead of everted, and he did not use the guide sutures of that surgeon.

Dr. Stewart thinks that the Murphy method is little used at the present day, although it was the pioneer one and paved the way for the progress which has been made along this line.

GUNSHOT INJURY OF THE LEFT HYPOGLOSSAL NERVE.

Dr. John B. Roberts reported this case, as follows:

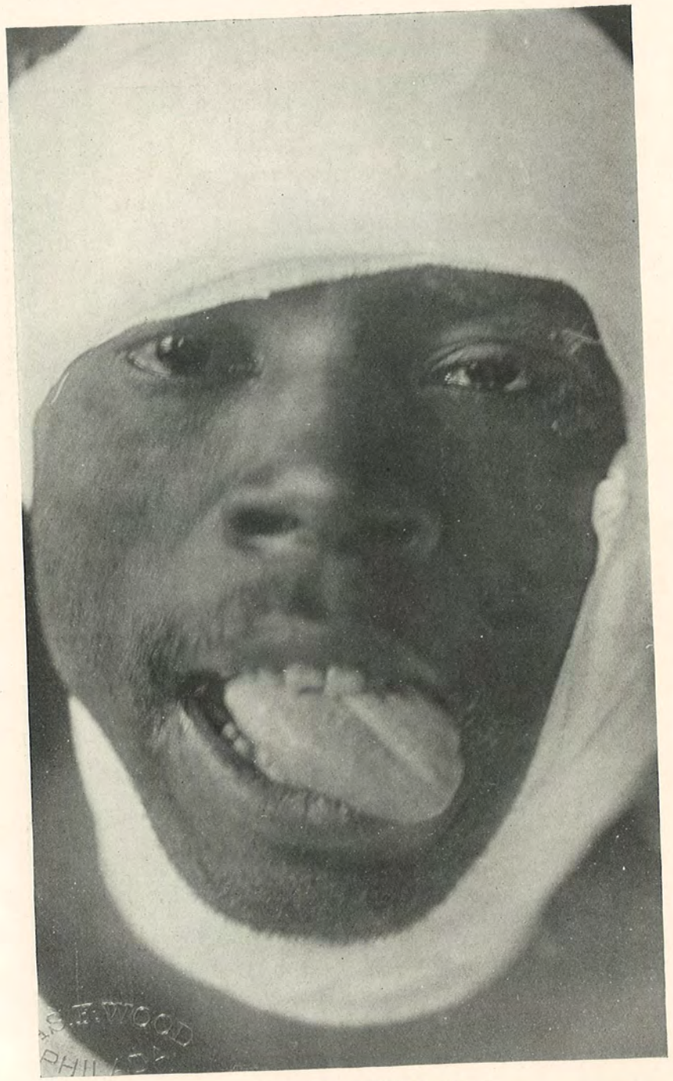
A man was admitted to the Polyclinic Hospital on the 28th of March, 1907, with a gunshot wound of the left cheek over the ramus of the lower jaw. The point of entrance was about three-quarters of an inch below and about three-quarters of an inch in front of the lower edge of the lobe of the ear. The tongue when protruded pointed very much to the left (Fig. 1), showing that the hypoglossal nerve was paralyzed. The left side of the man's face was covered with sweat, and the left pupil slightly dilated suggesting irritation of the sympathetic nerve.

Dr. William G. Spiller examined the patient two days after his admission and supplied the following notes:

The left facial nerve is very paretic but not completely paralyzed. The upper branch of the nerve has probably escaped injury. The man can nearly close the lids of the left eye. The left side of the tongue is completely paralyzed. The organ while in the mouth deviates to the right, but is greatly deviated to the left when protruded. He is unable to move the tongue to the left, except a very little beyond the median line, unless it is protruded. This shows injury to the hypoglossal nerve. The soft palate is moved well on both sides when he says "Ah!" and is not paralyzed. He swallows fluids without difficulty when he is sitting up. The pneumogastric and glossopharyngeal nerves have probably escaped injury. The sympathetic has been injured.

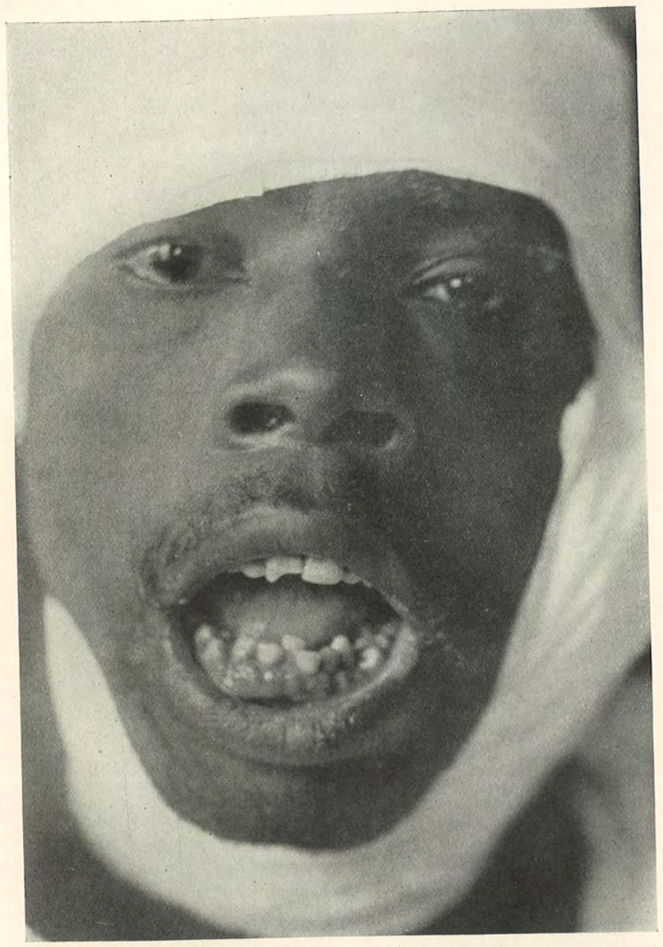
He sweats profusely on the left side of the face. The sweating also extends down to the upper part of the shoulder and upper

FIG. 1.



Gunshot section of left hypoglossal nerve.

FIG. 2.



Gunshot injury of left hypoglossal nerve.

part of the left arm. The right side of the face is dry. The jaw is not deviated when his mouth is open (Fig. 2). The masseter muscles contract well on both sides. Sensations of touch and pain are normal on both sides of the face. Salt and sugar are both well tasted on the left side of the tongue. The grasp of the hands and the power of the legs are normal. There are no symptoms of involvement of the brain.

The left pupil is slightly dilated but seems to react to light.

On April 3d, after locating the bullet by means of two X-ray pictures, Dr. Roberts operated for extraction of the missile. The wound in the cheek was suppurating, though it had been packed with iodoform gauze. The probe showed that the bullet had gone through the ramus of the mandible a short distance below the sigmoid notch. An incision was made around the angle of the jaw and the parotid gland pushed forward. By burrowing with a finger he was able to get behind the pharynx and explore the region in front of the first and second cervical vertebræ. He could feel distinctly the transverse portion of the first vertebra and with some manipulation was able to discover what seemed to be a foreign body, which was slightly movable, to the inner side of the mastoid process in front of the second cervical vertebra. A porcelain tipped probe being introduced proved this to be lead. With forceps such as are used for cleft palate operations he was able to extract the ball. He then found that it had lain in a depression in front of the spinal column and that there were some small fragments of bone there. It is possible that these were pieces carried in from the perforation of the mandible. The space in which the ball lay was either the normal space between the first and second transverse processes or was a depression made by the bullet in the body of the second vertebra. The depth of the wound made it impossible to definitely determine whether the hypoglossal nerve at this point was actually divided, though it probably was cut close to the base of the skull. No attempt was made to suture it because of the danger of operating in such a region. The patient's favorable condition and the known rather unimportant results of hypoglossal injury were not such as to warrant interference.

When the man was admitted there was a good deal of difficulty in swallowing from want of control of the saliva; but at the time the operation was done he had gained fair control of

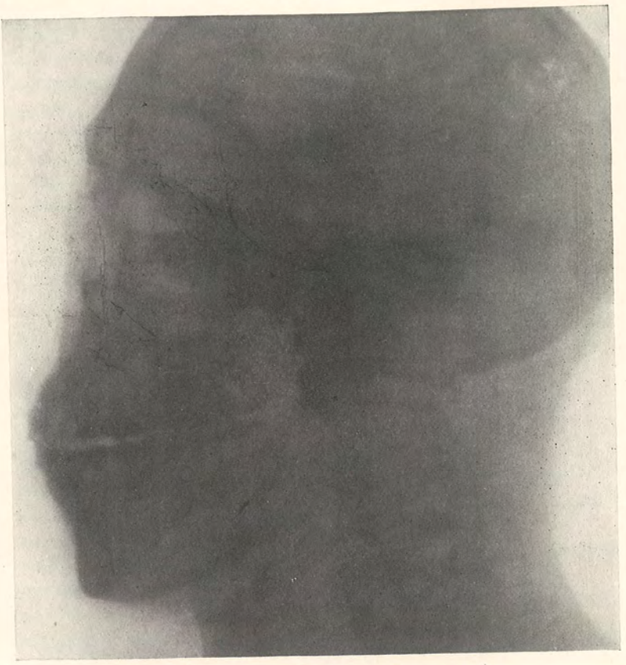
these functions and the removal of the bullet seemed to be all that was indicated. The wound was treated by inserting a drainage-tube and packing.

The patient did well for a number of days. He had practically a normal temperature after a slight rise immediately subsequent to operation. On April 6th his temperature went up a little. On the 8th some moist râles in the upper part of the left lung could be heard. He complained of cough which had bothered him for about a day. The drainage-tube was withdrawn and the wound dilated, which evacuated a little fluid, and orders were given to wash the wound out with sterile salt solution twice a day. The drainage-tube was not returned, but the packing was continued. The next day his respiration was practically normal and the lung condition seemed to be better. His cough had been controlled apparently by occasional doses of five grains of ammonium carbonate and a sixteenth of a grain of codeine sulphate. The patient had been allowed for several days to sit up in bed and was advised to lie particularly on his left side to facilitate drainage.

Later sonorous râles were heard in the posterior part of the right chest. There was some tenderness on percussion of the left chest near the posterior edge of the left scapula, and a loss of resonance at the upper part of the right chest posteriorly. The gums were spongy, though no mercury had been taken to cause it. It was thought that possibly the bloody tinge of the expectoration might have come from this gingival condition. Bacteriological examination of the sputum showed the presence of pneumococcus, staphylococcus pyogenes aureus and bacillus proteus vulgaris. Urinary examination showed nothing abnormal. The temperature for a few days previous to this time and also at this time varied from 100° to 102°; the respirations from 24 to 28; the pulse from 90 to 100.

An examination of the chest made later by Dr. David Riesman showed that there was impaired resonance on the right side at the fourth and fifth interspaces over a limited area reaching to the axilla. Here crackling râles were heard with feeble breath-sounds and diminished fremitus. There was some pain in this region. The patient had had no chill and no night sweats, but was rapidly losing flesh. No tubercle bacilli were found in the sputum. His red blood cells were 2,150,000; white blood cells

FIG. 3.



Case of gunshot wound of the left hypoglossal nerve.

26,200; hæmoglobin 85 per cent. The man was emaciated and weak, had a troublesome cough, and his throat seemed a good deal filled up with mucus. There was very little discharge from the original wound or the incision made for the extraction of the bullet. At the end of the month further operation was suggested to explore the wound and to facilitate drainage, but the man declined to submit. By the 7th of May he was very much better and walking around the ward. On the 12th of May he left the hospital without permission, considering himself well enough to go.

In July Dr. Roberts heard that the patient had been admitted to the tuberculosis wards of the Philadelphia General Hospital under the care of Dr. Ward Brinton. Dr. Brinton stated that tubercle bacilli had been found in the feces, but not in the sputum. There was, however, extensive pulmonary involvement. A few days later the patient died. The wounds in the neck and face had become healed. The Resident Physician, Dr. William Shields, had informed him the case was first thought to be one of gangrene of the lungs on account of the odor of the sputum. Tubercle bacilli were not found in the sputum nor was the streptothrix. At the autopsy six slides were taken from a cavity in the right lung and stained for tubercle bacilli but none were found.

The pathological diagnosis made was tuberculous broncho-pneumonia. The pathologist was of the opinion that the gunshot wound of the neck involving the hypoglossal nerve had nothing to do with the lung condition.

The further notes of the autopsy, furnished by Dr. Shields, are as follows:

Right pleura firmly adherent from apex to base in midaxillary line. Slight adhesions of the left pleura in the region of the first and second ribs. The pericardium contained 60 c.c. of straw-colored fluid, and extended 7 cm. to right of midsternum. In the right pleural sac there were 300 c.c. of straw-colored fluid. Heart smaller than normal, but otherwise negative. Left lung slightly emphysematous and contained some œdematous fluid. Right lung was covered with thick pleura, both layers of which were firmly attached. Both lobes were firmly attached and showed tuberculous bronchopneumonia. The lower lobe contained three good-sized cavities in which was cheesy material. The two lower cavities communicate with a bronchus. The other organs show

nothing of importance. The diagnosis was tuberculous brochopneumonia with chronic adhesive pleurisy.

Little doubt exists that in this case the hypoglossal nerve was divided. The dilated pupil and the unilateral sweating lead to the supposition that the sympathetic nerve was the seat of irritation. It is perhaps possible that the lids of the left eye suggested paresis of the facial nerve, when the real cause of their apparent loss of power was a slight protrusion of the eyeball due to sympathetic irritation. Division of the sympathetic would be expected to cause contraction of the pupil and sinking of the eyeball.

The location of the bullet in front of the second cervical vertebra near its transverse process on the left side corresponds with the upper part of the superior cervical ganglion of the sympathetic nerve. It is opposite this vertebra too that the hypoglossal nerve receives communicating branches from this sympathetic ganglion.

A missile dividing or destroying the hypoglossal nerve by pressure would be very likely to cause coincident irritation of the sympathetic ganglion in the same region. Had the patient lived, part of the spinal accessory nerve or the lingual branch of the trifacial nerve might have been transplanted into the distal part of the hypoglossal in order to restore motion to the left side of the tongue.

Dr. John H. Jopson referred to a case of injury of the median nerve of a peculiar type which he had recently encountered. The man had been struck on the inner side of the arm by a piece of steel scale while driving a bolt through a piece of sheet steel. An X-ray photograph showed a very small piece of steel located in the neighborhood of the brachial artery. The patient complained at this time of tingling or electrical sensations in the ring and little finger, on the palmar surface, or in other words, in the distribution of the ulnar nerve. Dr. Jopson saw him several days later and had a second X-ray plate made, and localized this very small foreign body in its relation to the wound of entrance, which was the only localizing point that could be utilized, being situated at about the middle of the arm. By this time the sensory disturbances had disappeared to some extent, although the patient complained of them at times when he attempted to use the arm, and still in the distribution of the ulnar

nerve. There was slight tenderness over the site of the wound. On exposing the region where the foreign body had been localized a large nerve presented itself, and on examining it closely it seemed at one point to be a little swollen and injected. By probing with a pair of fine forceps Dr. Jopson found an opening in the nerve, and was able to remove the foreign body, which was deeply embedded and completely concealed in what proved to be the median nerve and not the ulnar. It was a thin scale, measuring 4 mm. in diameter. After the operation the patient had the same tingling sensations for 24 hours, but now in the distribution of the median nerve, that is, in the thumb, index and middle fingers, and not in the distribution of the ulnar nerve as formerly.

The reference of the pain to the distribution of the ulnar nerve, rather than to that of the median, was difficult to explain. The foreign body could not possibly have injured it, as the wound of entrance lay between the nerves.

Dr. George M. Dorrance said that he saw the case reported at the Polyclinic Hospital, and that he followed the patient from there to the Philadelphia Hospital, but lost track of him when his body was sent to the University. The report from the man who macerated the body was that the first cervical vertebra and part of the occipital bone was injured, and from his description of it one would imagine that the nerve was injured just as it came out from the anterior condyloid foramen. Therefore an operation would not have been of value, as it would have been impossible to reach the upper end of the nerve.

STATED MEETING, HELD APRIL 6, 1908.

INFANTILE PARALYSIS TREATED BY TENDON TRANSPLANTATION AND NERVE ANASTOMOSIS.

DR. ASTLEY P. C. ASHHURST presented several patients from the Orthopædic Hospital, from the services of Dr. G. G. Davis and Dr. R. H. Harte, to whom he was indebted for permission to operate and to report the operations.

CASE I.—*Paralytic Varus; Transplantation of Tibialis Anticus into the base of the fifth metatarsal bone.*

Alfred C. came to Dr. Harte's clinic, April 20, 1905, when 11 years of age. In December, 1901, when 7 years old, he had had a disease in which both legs and arms were paralyzed, and which confined him to bed for five months. The boy was unable to walk alone for a year afterwards. His family physician has informed Dr. Ashhurst that the diagnosis of cerebrospinal meningitis was confirmed by the board of health. When seen at the Orthopædic Hospital the chief complaint was that the left ankle turned very easily, and that the boy was constantly falling; there was quite a noticeable limp. The peroneal muscles were paralyzed, and there was a mild degree of varus, the foot turning easily until the sole was parallel with inner surface of the tibia. He had been wearing a brace for several years. A new brace was ordered which held the foot in perfect position. The patient wore this brace for nearly two years longer; and it was then decided, as no further improvement had occurred, to resort to operation. As a preliminary the foot was stretched manually, and put up in plaster in an over corrected (valgus) position, on February 18, 1907. On April 4, 1907, Dr. Ashhurst transplanted the tendon of the tibialis anticus to the base of the fifth metatarsal bone. The cast was changed at the end of three weeks, and a new one applied for five weeks longer. At this time, eight weeks after the operation, the transplanted tendon was firmly attached at its new insertion, and by its contraction flexed the foot into a very slight valgus position. A shoe was ordered, with its sole raised on the outer side, so as to maintain over-correction for some time longer. Two months later it was noted that all the

motions of the foot were normal, the transplanted tibialis anticus everting and flexing the foot well, while the power of inversion was retained by the tibialis posticus. The boy now walks without any limp, never falls from turning of the ankle, and except for the scars of operation, it is difficult to tell which was the paralyzed foot.

CASE 2.—*Paralytic Valgus, ankle-drop, and knee-drop. Transplantation of peroneus brevis to the base of the first metatarsal bone; and transplantation of the gracilis and semi-tendinosus to the upper border of the patella.*

Frank W., entered the service of Dr. G. G. Davis, February 26, 1907, when 11½ years of age. He had had infantile palsy at the age of 10 months, and had been under the care of Dr. T. G. Morton, who ordered a brace and had the patient treated with electricity. Later at the University Hospital, an operation (arthrodesis?) was done on the ankle, and a brace was ordered. When the patient came to the Orthopædic Hospital he could hardly walk at all without his brace, having to put his hand on his left knee at every step to keep it from collapsing like the blade of a pocket knife into the handle, as there was absolutely no power of holding the knee extended. Besides the paralysis of the quadriceps extensor femoris, the following muscles of the foot were paralyzed: tibialis anticus, extensor longus hallucis, extensor longus digitorum, tibialis posticus, and flexor longus hallucis; the calf muscles were weak, but contracted feebly. The only muscles which contracted well were the peronei, and the flexor longus digitorum. On April 17, 1907, Dr. Ashhurst transplanted the peroneus brevis to the base of the first metatarsal bone, to replace as far as possible the paralyzed tibialis anticus; at the same time the gracilis and the semitendinosus were transplanted into the upper margin of the patella. The plaster cast was removed eight weeks later, and, after the patient's old brace had been fitted, another cast was applied while alterations were being made in the brace. It was found possible to dispense with the apparatus above the knee, as the transplanted hamstring muscles effectually prevented the collapse of the knee in walking, although voluntary extension is not yet possible. He never falls down now, and the transplanted peroneus muscle can slightly invert the foot and correct the extreme valgus deformity present before the operation. The boy, however, still wears the old

brace to keep his foot in good position, and it seems probable that arthrodesis will have to be resorted to before the brace can be entirely discarded. There is also paralysis of the erector spinæ group of muscles, and the limp, due partly to the shortening of the whole lower extremity, is aggravated by the extreme lordosis.*

CASE 3.—*Paralytic calcaneus, with varus and foot-drop. Transplantation of the anterior tibial nerve into the musculocutaneous; and of the peroneus longus muscle into the insertion of the tendo Achillis.*

Fred J. S.. entered Dr. Davis's service February 26, 1907, when 7 years of age. He had had infantile palsy at the age of 2 years, affecting both legs. The left leg largely recovered its functions, only a slight cavus deformity remaining. The right foot showed moderate calcaneus, with varus and foot-drop. The peroneal muscles contracted well, but there was paralysis of the following muscles: tibialis anticus, extensor longus hallucis, extensor longus digitorum, flexor longus digitorum, flexor longus hallucis, and the muscles of the calf. The condition of the tibialis posticus was doubtful, but it was certainly very weak. The only voluntary motion possible was a very feeble extension (plantar flexion) and abduction of the foot by contraction of the peroneal group. There was no power of raising the heel, and if there had not also been foot-drop, the boy would doubtless have walked on his heel with his toes in the air, as in pure paralytic calcaneus. As the entire distribution of the anterior tibial nerve, embracing the tibialis anticus, the extensor longus hallucis, and the extensor longus digitorum, was paralyzed, while the entire distribution of the musculocutaneous nerve was intact, the case seemed a suitable one in which to attempt to divert some of the nerve impulses from the latter into the anterior tibial nerve. It was determined at the same time to transplant the peroneus longus into the calcaneum, so as to overcome as much as possible the calcaneus, which was the most disabling deformity. On June 1, 1907, Dr. Ashhurst isolated the musculocutaneous nerve by dissecting through the peroneus longus muscle, just below the head of the fibula. After finding the musculocutaneous nerve on the surface of the fibula, the anterior

* On June 3, 1908, Dr. Ashhurst did arthrodesis of the ankle-joint and of the subastragalar joint in this patient.

tibial nerve was easily located just to its mesial side, before it had perforated the septum between the peroneus longus and the extensor longus digitorum. Two sutures of very fine silk, threaded in ophthalmic needles, were then passed through the sheath of the anterior tibial nerve, one on either side, and after this had been done, the nerve was divided with a tenotome above this point, just below its recurrent articular branch. Then a longitudinal slit was made with a tenotome in the musculocutaneous nerve, and by means of the sutures previously placed in the musculocutaneous nerve the latter was drawn into the slit in the anterior tibial nerve, and sutured to the sheath of the anterior tibial nerve. Two other sutures were placed above and below the first two, through the sheaths only, to act as guys, and relieve any possible tension on those first placed. The deep fascia was closed with interrupted silk sutures, and the skin with chromic gut sutures. Then the peroneus longus tendon was divided at the base of the fifth metatarsal bone, and transplanted into the periosteum at the insertion of the tendo Achillis. The time of the operation was 40 minutes. A plaster cast was applied, extending to the middle of the thigh. After six weeks a new cast, extending only to below the knee, was applied, and worn for several weeks longer. At no time was there any evidence of injury to the musculocutaneous nerve, into which the paralyzed nerve had been transplanted. Since August, 1907, the patient has been wearing his old brace. There has been absolutely no result from the nerve anastomosis, the muscles supplied by the anterior tibial nerve having no more power than before the operation. The transplanted peroneus longus muscle has restored a slight degree of power of raising the heel, and has at all events prevented a recurrence of the calcaneus deformity. Subastragalar arthrodesis will probably be required later, as the foot is still rather flail-like.

CASE 4.—*Paralytic valgus; transplantation of peroneus longus and brevis into base of first metatarsal bone.*

This case was reported at the last meeting of the Academy by Dr. G. G. Davis, in connection with his operation of transplantation of the tensor fasciæ femoris for outward rotation of the lower extremity from infantile palsy. The operations were done October 22, 1907. The transplanted peroneal muscles act well, and overcome almost entirely the previous valgus. An

ordinary shoe is worn, and the slight limp is due chiefly to the shortness of the paralyzed leg.

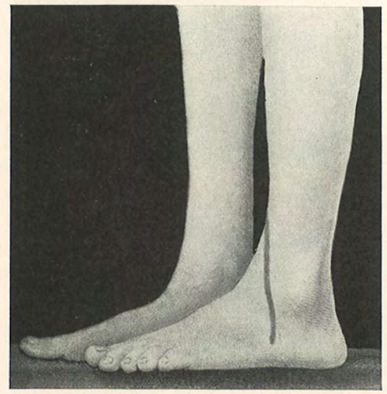
CASE 5.—*Paralytic valgus; transplantation of peroneus brevis and extensor longus hallucis into base of first metatarsal bone.*

Pasquelino R., aged 7 years, had infantile palsy when four years old, and had never received any treatment for the resulting deformity. He entered Dr. Harte's service at the Orthopædic Hospital October, 1907, with marked valgus of the right foot. The tibialis anticus was paralyzed, but the extensor longus hallucis and extensor longus digitorum contracted well, and the peroneal muscles also appeared to be normal. The boy walked on the inner surface of his foot, with a very marked limp. On December 10, 1907, Dr. Ashhurst transplanted the peroneus brevis into the base of the first metatarsal bone, and as it did not appear to be as strong when seen at operation as it had been thought to be before, the tendon of the extensor longus hallucis was divided on the dorsum of the foot, and after suturing its distal end to the neighboring tendon of the extensor longus digitorum, its proximal end was also sutured into the base of the first metatarsal bone, at the point of insertion of the tibialis anticus, thus supplementing the paralyzed tibialis anticus by both the peroneus brevis and the extensor longus hallucis. The plaster cast was removed two months later. The transplanted muscles now contract satisfactorily, and while there is no over-correction, the valgus deformity has been overcome, and the arch of the foot restored. The patient wears a shoe with its sole raised on the inner side, and is able to walk very well without any kind of apparatus, and with a scarcely noticeable limp.

CASE 6.—*Paralytic valgus; transplantation of peroneus longus into base of first metatarsal bone, and transplantation of distal end of tibialis anticus into extensor communis digitorum.*

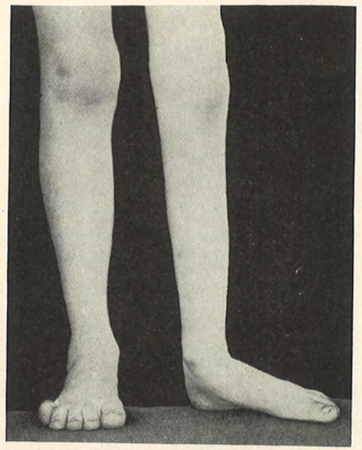
William M., entered Dr. Harte's service at the Orthopædic Hospital, May 4, 1905, at the age of 7 years. He had had infantile palsy at the age of 2 years, which had left him with valgus and slight ankle-drop of the right foot. The tibialis anticus, tibialis posticus, and extensor longus hallucis were paralyzed; the extensor longus digitorum contracted well, and the peroneal muscles appeared to be normal. A brace was ordered, but the patient did not return to the Orthopædic Hospital for nearly two years, when it was found that an operation

FIG. 1.



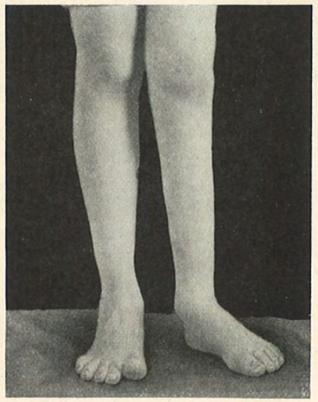
Case I. Position of transplanted tibialis anticus outlined on the skin.

FIG. 2.



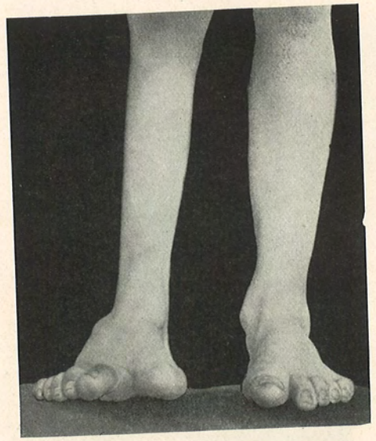
Case II. Paralytic valgus before operation.

FIG. 3.



Case II. Paralytic valgus after operation.

FIG. 4.



Case III. Paralytic calcaneus with varus and foot-drop. Before operation.

FIG. 5.

Case III. After operation. The incisions for the nerve-anastomosis and for the tendon transplantation have been outlined on the skin.

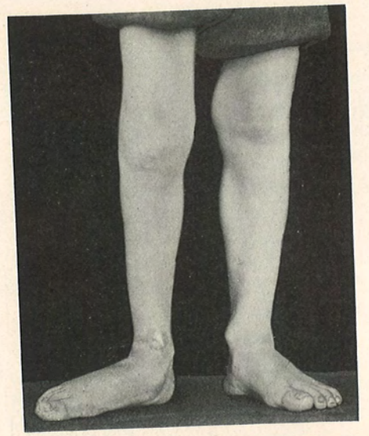
FIG. 6

Case V. Paralytic valgus. Before operation.

FIG 7.

Case V. After operation.

FIG. 8



Case VI. Paralytic valgus. Before operation.

FIG. 9.

Case VI. Paralytic valgus. After operation

of some kind (apparently shortening of the tibialis anticus) had been done by a homœopathic doctor. The boy was now wearing a brace, and his foot was if possible in a more deformed condition than at his first visit. Without the brace there was marked toe-drop, and he walked on the inner side of his foot, his sole turning outwards. He was admitted to the ward of the Orthopædic Hospital in October, 1907, and his foot was forcibly stretched under an anæsthetic on October 24, November 7, and November 30. The deformity having now been entirely overcome, Dr. Ashhurst operated December 31, 1907. The peroneus longus was transplanted into the base of the first metatarsal bone, and as it did not appear to be very strong, and as the extensor longus hallucis was entirely paralyzed, the tendon of the tibialis anticus was divided above the annular ligament, and its distal end was sutured under tension to the tendon of the extensor longus digitorum, which was normal, thus pulling the foot into the varus position. The plaster cast was removed two months later, and the result was found to be more satisfactory than had been anticipated: by flexion of the ankle through the extensor longus digitorum the distal end of the tibialis anticus is also pulled upon, so that the foot is no longer everted, but can be somewhat inverted also. The patient wears a shoe with its sole raised on the inner side, to maintain the over-corrected position.

Dr. John H. Jopson discussed the result in the second case shown by Dr. Ashhurst, in which he transplanted the gracilis and semitendinosus into the upper border of the patella. The patient is greatly improved, there being additional strength given to the knee. But the lack of power of voluntary extension would seem to support the views of Lange, who advises that in transplanting the ham-string tendons the entire group be transplanted rather than a couple of muscles, as in this way there is a much greater chance of achieving early alteration of function of the muscle from a flexor to an extensor.

Dr. G. G. Davis referred to the question raised by Dr. Jopson as to the utility of transplanting certain parts of a group of muscles. Dr. Davis said that in practically all of the cases, even where there was a transplantation of but a single muscle, the result was satisfactory; that he has had cases in which the transplantation of the semitendinosus has been sufficient, and

although it might not give the power of extension which would be derived from the transplantation of the entire group of flexor muscles, it was nevertheless sufficient to steady the knee, rendering it possible to dispense with the use of any apparatus. The main object of the operation is to give sufficient power of extension to prevent the knee from suddenly flexing as the patient walks and he believes that this result can be obtained in some cases by the transplantation of a single muscle.

Dr. John H. Jopson said that he had not meant to criticise the operation which had been done in the case discussed, as the result was an excellent one, but thought the case referred to was a good example of the contention raised by Lange. When tendon transplantation was first brought forward it was claimed that one could alter at will the function of the muscle as easily as we could change its insertion. This claim has been found somewhat exaggerated, and as a result there had been for a time a revulsion of feeling in regard to the operation.

Dr. William L. Rodman said that three weeks ago he had anastomosed the musculospiral for wrist-drop, doing practically the same operation as Dr. Ashhurst, bringing the distal end of the nerve over to the median, by transfixing the brachialis anticus muscle and anastomosing it with the median and musculocutaneous. At the present time there seems already return of sensation in the skin over the hand and fingers.

Dr. Ashhurst, in closing, said, in reply to inquiry, that he did not know how long one should expect to wait for a nerve to regenerate; ten months had elapsed in the present case. He said that he had seen statements that even one or two years should be allowed to elapse before hope of a good result should be abandoned; and said that if in that length of time his patient should be fortunate enough to obtain return of power, he would take pleasure in showing the boy again.

TWENTY-FIVE HUNDRED CASES OF GAS-ETHER ANÆSTHESIA WITHOUT COMPLICATION.

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The recent inroads of surgery into the domain of medicine have not only largely increased the number of operations, but have introduced so many extensive proceedings requiring prolonged anæsthesia that the problem of the administration of anæsthetics has been raised from a comparatively trivial to an important position. The surgeon fully realizes that to a large degree his success depends upon his anæsthetist, that many a skilfully performed operation has been rendered useless by clumsily administered ether and that many a convalescence has been unduly prolonged by over-anæsthetizations. Still the progress of this art has not been commensurate with surgery's advance. We still see, too often, patients profoundly shocked and deeply cyanosed in the hands of inexperienced men—perhaps in those of an obliging practitioner, entirely incompetent to take this important duty upon his shoulders. To a certain extent the text-books are responsible for over-etherization. It is usual to find the statement that surgical anæsthesia requires the absence of all reflexes. This is obviously erroneous teaching and leads to gross over-use of the drug.

A glance at the records and statistics of spinal anæsthesia suffices to show that at this stage it has not approached the usefulness of general narcosis. The mortality is variously estimated at from $^1/_{10}$ to ½ per cent. Failure to produce anæsthesia occurs in 4 per cent. of cases according to Bier, 14 per cent. according to Moynihan, 10 per cent. according to Doderlein, etc. The after-effects are likewise more severe, 10 per cent. suffering from severe persistent headache; many

have paralysis; nausea and vomiting is not infrequent. Rigidity of the muscles of the neck has been observed many times as well as untold more unusual complications.

An attempt to collect statistics as to postoperative complications and mortality from ether anæsthesia, showed a lamentable absence of records, both in the literature and hospital reports. In three of our leading hospitals no statistics whatever could be collected—in a fourth a list of 1800 cases was traced, with 18 cases of pneumonia, thirteen of which were fatal, giving a percentage of 1 per cent. of pneumonia and of .7 per cent. mortality. This is unusually high; which fact can be partly explained by the type of cases brought to this institution. As in many others, anæsthetization in *this* hospital is the duty of the junior resident, who is usually inexperienced. It is therefore a more or less fair example of statistics of etherization and its mortality in the hands of unskilled men, especially as these records do not show deaths from any of the other complications of ether anæsthesia, such as renal failure, acute cardiac dilatation, apoplexy and shock.

The present series of twenty-five hundred cases without serious complications and absolutely without pneumonia or bronchitis forms therefore a marked contrast.

A word as to what should constitute a complete surgical anæsthesia. It is that degree of sensory and motor depression required to enable the surgeon to complete his operation unhampered by movement or rigidity of the patient's muscles, and not one whit more. From this definition it obviously follows that the degree of anæsthesia varies with each operation and each individual, which fact the competent anæsthetist keeps constantly in mind. The signs and symptoms of sufficient narcosis vary likewise.

In a general way it may be said that complete surgical anæsthesia is indicated by a pupil reacting sluggishly to light, a regular noiseless breathing, a good color, muscular relaxation and absence of cutaneous reflexes. The best guide is the pupil, but unfortunately in from 85 to 90 per cent. of cases it is not reliable during the whole time of narcosis. We find

irregularity, inequality, absolute fixation of one or both pupils, etc., etc., in the above percentage of cases. This sign failing the respiration furnishes the best gauge. Close observation of the rhythm, the depth and the sound of breathing will almost invariably indicate the return of reflexes. The irritating vapor causes reflex contractions and consequently a more noisy, more hurried or more spasmodic breathing. Often the alteration is ushered in by one deep inspiration.

It is rarely necessary to carry the anæsthesia beyond a point where slight reflex inhibition of respiration is occasioned by administration of fresh ether.

To keep the patient on the borderland between consciousness and unconsciousness requires the absolute concentration of the anæsthetist. The subject's degree of narcosis varies from minute to minute. It is impossible to watch the details of the operation, or do anything but observe the changes in the patient's condition. It is much easier for the etherizer to carry the anæsthesia into the deep third stage with absolutely fixed dilated pupil, shallow respiration, cyanosis and increasing pulse rate. He then may follow the operation for minutes at a time or otherwise amuse himself, but he does so at the expense of the individual temporarily in his care. Ether is an irritant depressing poison, and each drop needlessly administered increases the danger to the patient's life, and decreases his power of resistance, so sorely needed in his period of convalescence.

In my hands the best results have been obtained by the use of nitrous oxide as a preliminary, followed by the gauze drop method. This has the following undisputed advantages: Nitrous oxide is by all means the safest anæsthetic we have, a series of 300,000 cases without a single death having been recently reported. It is not irritating and therefore greatly enhances the patient's comfort. All the choking, gagging and struggling so often seen where ether alone is used is eliminated. It greatly reduces the length of time required to produce surgical anæsthesia, the average being from seven to eight minutes, and likewise greatly reduces the amount of

ether required. This is especially true, as it is a well-known fact that it often requires as much, or more ether to anæsthetize a patient as it does to keep him under its influence for a considerable length of time. Its disadvantages are: nitrous oxide requires a more or less bulky apparatus, it is expensive, and in about 50 per cent. of cases, principally males and children, leads to an increased secretion from the respiratory mucous membrane. This last disadvantage would be an objection indeed had we no way to prevent, or at least to limit it. The most efficient preventative is the administration of a hypodermic injection of a full dose of morphine and atropine twenty minutes before the anæsthesia is commenced. This has many uses. The morphine quiets the patient, and to some extent depresses the nervous system so as to limit the amount of ether required. The atropine controls mucus secretion. Preliminary sprays of adrenalin and cocaine solution are also of some use. A thorough spraying of the mucous membrane of the nose and throat furthermore eliminates the rare danger of reflex cardiac inhibition occasionally observed as the result of the first administration of ether. If mucus is secreted in excess, notwithstanding these preliminary precautions, great care is necessary. Under no circumstances should such a patient be deeply anæsthetized—never to the point where inhaled mucus ceases to cause a reflex cough. The common practice of swabbing out the mouth and throat by gauze or other sponges is worse than useless; mucus reappears in less than two minutes and the friction of the sponges increases the flow. Raising the patient's shoulders allowing the head to extend fully while placed on its side allowing the mucus to flow into the cavity of the cheek thence leak out at the angle of the mouth, is the best treatment for this condition. Occasionally repeated sprayings and another dose of atropine helps to control the ceaseless flow.

As to the administration of ether itself the open method, and the most open one, namely, gauze, was invariably used. Pads about four by five inches and about eight layers in thickness form the most convenient method of administering the

drug. The concentration of the vapor may be regulated by the number of layers of gauze employed. Sixteen is about the average number, children requiring less, women less than men, the latter frequently calling for twenty-four layers. If great concentration is required the ether may be dropped upon the under gauze and then covered by an overlaying pad, which will practically exclude the air. More ether is required by the gauze than by any other method, the average amount for men being seven to eight ounces for the first hour, five or six for women. After this time the amount is greatly reduced, especially if a morphine preliminary has been employed, it not being an unusual occurrence to have thirty minutes elapse without the necessity for more vapor. Average amounts of ether required per hour are of no value statistically inasmuch as they vary so greatly with the individual.

If the anæsthetist observes the precautions cited above he will be enabled to carry on his narcosis without endangering the patient's life from over-etherization, which may lead to shock, inhalation pneumonia, kidney complications and great physical depression, reducing vital resistance and healing powers during convalescence.

The management of a so-called difficult case often taxes the ingenuity of the most experienced. Every one knows that notwithstanding the greatest care and knowledge it is sometimes impossible to completely relax some individuals. The type occasioning these difficulties is usually the fat, flabby, plethoric, short-necked male, addicted to the use of alcohol, whose mucous membranes are in a constant state of congestion, and whose arteries are sclerotic. This class of patients run great danger from complete ether narcosis. Their resistance is low, hence pneumonia is more likely to follow inhalation of infected mucus, almost always profuse in these cases. Their arteries are brittle, hence subject to apoplectic rupture, caused by the cyanosis so often the result of the early administration of ether. Their kidneys are, as a rule, impaired and therefore likely to suffer from the anæsthetic, best results in these cases were attained from the following precautions:

Twenty minutes before the anæsthesia a very full dose of morphine and atropine is injected hypodermically, the chest is covered by a cotton pneumonia jacket. Immediately before administration of ether, the mouth, nose and throat is thoroughly sprayed with a 2 per cent. eucaine solution. Then a mouth-gag of the Whitehead type is inserted and the preliminary nitrous oxide commenced. When the patient is unconscious, ether is substituted in moderate concentration,—about sixteen layers of gauze moistened with ether being sufficient. At this stage frequently the patient spasmodically and reflexly fixes the jaws defying all attempts to open them, respiration ceases leading to profound cyanosis and the increased blood pressure dependent thereupon, which in turn may cause the rupture of sclerotic vessels. Atropine and morphine will decrease this tendency, but not eliminate it. The presence of the previously inserted mouth-gag saves the situation inasmuch as it is easy to open the jaws, pull the tongue forward, open the larynx and relieve the cyanosis.

If after ten minutes of administration of ether the patient shows no sign of relaxation I change off to chloroform through an Esmarch inhaler, unless contraindicated by the cardiac condition. By observing these precautions it is usually possible to handle these cases in the safest and most satisfactory manner.

A word as to the after-effects of ether anæsthesia: Nausea and vomiting are perhaps the most constant. This annoying, and at times dangerous complication, is greatly reduced by the gas-ether method. In a recent series of one hundred cases anæsthetized by this method by students under my instruction the following results were obtained; persistent vomiting (48 hours) in one case, a gall-bladder operation, the condition being ascribed to a low degree of acute gastric dilatation, 81 per cent. did not vomit at all after regaining consciousness, the remaining 19 per cent. had varying amounts of gastric distress during the first twelve hours, in a few continuing during the first twenty-four hours. The use of oxygen and inhalation of vaporized vinegar have been given

up after a thorough trial. If the patient be not over-anæsthetized oxygen is not needed, because there is no cyanosis, and the patient will regain consciousness within ten minutes after the last suture is placed, often moving and talking at random immediately after completion of the operation. The administration of oxygen did not seem to improve upon the statistics given above. A similar conclusion was reached after the use of vinegar.

Ether burns of the face never occur when the gauze drop method is adhered to. If the ether be spread over a sufficiently large evaporating surface and not allowed to drop in one place it will be found that the under surface of the gauze pad is entirely dry. In no case has an ether burn resulted in this series, nor in any of the cases anæsthetized by students.

The advantages of this method are: Its relative safety, comfort to the patient, the time and ether saved in anæsthetization, freedom from complications, such as bronchitis, pneumonia, annoying nausea and vomiting, shock and reduced vital resistance.

In conclusion I would make a plea for less profound anæsthesia in all cases, for rules preventing the junior resident from giving anæsthesia, unaided, and for the more extensive instruction of this art in our medical schools, in the light of its daily increasing importance.

Dr. John B. Roberts thought the reader had brought out a point not always insisted upon, namely, that very little ether is needed after the patient once becomes etherized. Dr. Roberts said that it would seem from his experience with the Resident Physicians who administer ether for him that they had never been taught the importance of this fact. They get the patient etherized for the surgeon and then continue to pour on as much ether as they did at the start. He thinks Dr. Van Kaathoven has properly emphasized the need of plenty of ether to start with but very little afterwards, and the desirability of having the patient in such condition that he comes out of ether as soon as the operation is over. He is inclined to believe that what is called the "drop method" has been so talked of recently that

many men are claiming to give ether by what they call the "drop method" when they are really pouring more ether on the inhaling apparatus than is done by those who know what is scientific administration of the anæsthetic. After all, it is not the "method" that is to give safety to the patient, but the experience and brains and attention of the administrator.

Dr. G. G. Ross said that there were two things about serious operations which gave him an undue amount of alarm. The first is the junior resident who gives the ether and the other is the unsophisticated female who handles the gauze. He thinks that the danger does not lie so much in the ether as in the man who is giving it. In hospitals where they do not have teaching in connection with the other hospital work and therefore no teacher for that particular art, he thinks it would be wise to have an official anæsthetizer on the senior staff who would be responsible for the instruction of students or residents until they are fully qualified to give ether properly and safely.

Dr. G. G. Davis said that the use of nitrous oxide preceding ether anæsthesia is an old one although it seems to be coming into favor only now in this progressive country; it was commonly used in London over twenty-five years ago, and he thinks a method which has taken so long to establish itself on an acceptable basis argues either that the public is very slow in recognizing the utility of good things or else it is not worthy of recognition. The objections to the method are in the first place, that it requires more experienced anæsthetizers and it gives rise to very considerably more mucus, and the transition from nitrous oxide to ether is liable to be unsatisfactory, especially, Dr. Davis believes, when the so-called "drop method" is used. We hear of eight to sixteen layers of gauze but personally Dr. Davis has never liked gauze, thinking it inferior to a close meshed towel in efficiency. Time and time again he has had the anæsthetizer fail to anæsthetize the patient rapidly, simply on account of the amount of air which is inhaled. He believes in deliberately excluding air when it is desired to rapidly anæsthetize the patient.

As regards the advantages of nitrous oxide, Dr. Davis was not prepared to admit with Dr. Van Kaathoven, that it leaves the patient in better shape than a simple anæsthesia with ether. If ether is used alone and time is taken in its administration, he believes it is the safest anæsthetic agent, and if it is preceded by

the morphia and atropine injections its results would be as good, as far as the after-effects go, as if preceded by nitrous oxide.

Dr. William L. Rodman said that he thought it had long ago been conceded that ether is best preceded by nitrous oxide. He also believes that chloroform can be preceded by nitrous oxide in the majority of instances. He was particularly glad to hear that one hundred students at the University had been allowed to administer the anæsthetic. He does not think it a broad position to say that a paid anæsthetist should be in every hospital; certainly not in teaching hospitals, for if the students are to be sent out without practical experience, how can they be expected to give an anæsthetic. Dr. Rodman thinks that it is perfectly safe for students to give ether under competent instructors inasmuch as the danger signals are thrown out promptly and are easily recognized and met. During the past term every senior student at both the Woman's Medical College and the Medico-Chirurgical College has given an anæsthetic. He thinks that the giving of anæsthetics is one of the most important things to be taught students. Dr. Rodman agrees with Dr. Van Kaathoven that the drop method is the best. Also that if ether is not to be preceded by gas a most valuable adjuvant is talking to the patient, for he has literally seen patients almost talked to sleep. He is impressed with the fact that ether is not as safe an anæsthetic as is generally thought; there is a great deal of pneumonia following it. He does not consider it safer than chloroform. He has given chloroform as often if not more frequently than ether and has never seen a death from it in his own practice, but he has had three deaths from ether. When a patient goes off the table after chloroform one can be easy about him, whereas it is the reverse with ether; they are apt to have suppression of urine, develop pneumonia or bronchitis. For these reasons Dr. Rodman prefers giving chloroform in nephritis rather than ether. He thinks that in hospitals where it is practicable, ether should always be preceded by nitrous oxide, as he believes this will reduce the mortality rate from the administration of ether very materially.

Dr. Charles H. Frazier does not believe surgeons connected with non-teaching hospitals realize how much they are handicapped in educational institutions where a greater part of the routine surgical work is carried on with students as etherizers

and assistants. It is not fair to criticise a junior resident at the hospital because he is not at the time he enters upon his work a skilled anæsthetist. The fault lies with the organization of the clinic and the administrative officers of the hospital. To assign to a junior resident the responsible post of anæsthetizer is a practice worthy only of condemnation and fortunately long since abandoned by many hospitals.

Dr. Oscar H. Allis said that the discussion on this subject had helped him to understand why it was so hard to teach the young men who came to the Presbyterian Hospital the way in which to administer an anæsthetic, as they had administered it two or three times somewhere else and thought they knew it all. It seemed to make no difference to them that Dr. Allis had had thirty-five or forty years of experience. Dr. Allis said that operators often become impatient and hurry the anæsthetizer; for his part he never hurried the anæsthetizer, and always considered his duty as important as was his own as operator. He has sometimes seen the patient almost dead from an overdose of ether, and the anæsthetizer still pouring it on, wholly oblivious to the patient's critical condition. He thinks that anæsthetizers are as a general rule too much interested in the work of the surgeon and not enough interested in their own important duties.

Dr. Allis said that any one who knew anything about ether felt that he knew nothing, as the dangers and responsibilities change with each individual case. He thinks it would be a wise arrangement if each hospital had a well paid expert anæsthetizer.

Dr. John H. Gibbon emphasized one improvement which has been made in general anæsthesia, namely, reduction in the amount of ether which is given. Where gas or ethyl chloride is given first, and especially where these agents have been preceded by morphia and atropine, the patient can be fully anæsthetized in from three to four minutes. The morphia and atropine given twenty minutes or half an hour before the anæsthetic is started reduces the amount of ether necessary during the progress of the operation. By following out this plan the ether given the patient is reduced to the minimum, and the after-complications which result from ether are greatly reduced. Dr. Gibbon wished to know in what number of the 100 cases which Dr. Van Kaathoven stated had been anæsthetized by students,

and in 81 per cent. of which no subsequent nausea or vomiting had occurred, morphia and atropine had been given prior to the anæsthetic.

Dr. Van Kaathoven, in replying to Dr. Gibbon's question as to the number of patients who had morphia and atropine given beforehand in the series of 100 anæsthetized by students, said that he did not think over 20 per cent. received this preliminary treatment, and that in at least fifty private cases there was the same percentage. He does not think the morphia renders the patient more prone to nausea. After the patient becomes conscious from the anæsthetic he often passes off into a comfortable sleep.

With reference to Dr. Allis' remarks, Dr. Van Kaathoven said that he realized the difficulty of impressing the student with the fact that just because he has a bottle in his hand there is no reason why he should always be pouring from it, and that it is only by keeping them to the other extreme that he is able to impress upon them the importance of not anæsthetizing too deeply. One never knows what is going to happen and it is therefore of the utmost importance to pay strict attention to the patient at all times.

STATED MEETING, HELD MAY 4, 1908.

Dr. G. G. Davis in the Chair.

HÆMOPHILIA TREATED BY TRANSFUSION.

Dr. Francis O. Allen related the history of a boy of twelve, who was admitted to the Presbyterian Hospital a year ago, with a history of having bled from the mouth for four days previously. The bleeding had been profuse.

On admission, the patient was comatose, very pale, the skin was flabby and waxy, and a thin stream of blood was oozing from the mouth.

He was treated for two days with various drugs and with saline solution subcutaneously. The oozing continued, and the boy became weaker and more deeply unconscious. The hæmoglobin on the day of admission would not register on a Hare hæmoglobinometer, which does not register below ten. The resident physician estimated it as four. The next day it was estimated as five. The blood from the mouth tinged the pillow-case a pale yellow.

The second day after admission, Dr. Stryker, in whose care the boy was, asked Dr. Allen to transfuse the child. This was accomplished after much trouble, an uncle of the child consenting to be the donor. The technic was bad, owing to a lack of the proper instruments. The boy must have received only a small amount of blood, but how much it was impossible to state. During the operation, his mental condition changed, becoming bright enough for him to complain of pain and call the doctor hard names.

Two days after the operation, the hæmoglobin had risen from five to fourteen, and the red cells from 1,060,000 to 1,240,000. The bleeding stopped after the transfusion, but recurred slightly at intervals for the next five or six weeks. The hæmoglobin continued to increase.

On the 4th of June, one month after admission, the hæmoglobin registered sixty-eight, and the red cells 3,930,000. The

boy was discharged in good condition the only thing observable being that the teeth were carious and very irregular. It was almost impossible to tell where the bleeding came from; at times it seemed to come out of the teeth themselves, two of which were mere shells; at other times, it seemed to come from the edge of the gums.

The boy has been back to the hospital three or four times since. During the past winter he was admitted with hæmoglobin registering fifteen. He was not transfused on this occasion, but treated medically. The hæmoglobin gradually rose. Two or three weeks ago he was in fair condition, although he had one swollen knee-joint, and there was a slight oozing from the gums on the least provocation.

HEMORRHAGE FROM THE BOWEL FOLLOWING APPENDECTOMY.

Dr. Chas. F. Mitchell related the history of a woman, aged twenty-six, who was admitted November 14, 1907, to the surgical ward of the Pennsylvania Hospital under the care of Dr. J. P. Hutchinson, with the following history:

Previous history negative: menses began when she was seventeen years of age, always regular, lasting four or five days, painful at times. No vaginal discharge. Has been married three years, and has had three children. Thinks she had a miscarriage about six weeks ago. Never was troubled with hemorrhoids or bleeding from the bowel, previous to admission.

Came to the hospital complaining that for the past six weeks she had almost constant bleeding from the vagina. When not bleeding there was a mucopurulent vaginal discharge present.

Physical Examination: Heart and lungs normal; slight tenderness noted in right lower quadrant of abdomen.

Vaginal Examination: Rather profuse vaginal discharge, not bloody. Cervix not dilated, uterus slightly movable. To the right of the uterus, a firm rounded mass felt, apparently connected with, but not continuous with the uterus. Mass not tender.

Urine examination negative.

Diagnosis.—Right-sided salpingitis with adhesions.

November 19th, under ether narcosis, a median laparotomy was performed, the pelvic mass to the right of the uterus was found to be a hæmatosalpinx, which was tightly bound down by

adhesions, the appendix being included in the mass. Left tube and ovary perfectly normal. After the adhesions were broken up, the mass which was made up of the right tube and ovary, was removed. The adherent appendix found to be very much inflamed, and was also removed, the stump of appendix first being crushed, and then turned in by means of a catgut purse-string suture.

Temperature immediately before and after operation was 98°, pulse 100. Patient did well until midnight, eleven hours after operation, when she became restless, complained of feeling faint, face became pallid, temperature dropped to 96.2°, and pulse became so weak and compressible that it could not be counted. There was no sweating. It was thought that a secondary hemorrhage had occurred, probably from the stump of the excised tube. The patient was again etherized, and the abdominal wound reopened, pelvis found to be perfectly dry, and no evidence noted anywhere of bleeding having taken place within the peritoneal cavity.

The stump of the appendix was then examined, but there was no sign of any bleeding at this region, the cæcum and colon being empty and collapsed. It was then noticed that the coils of small intestines about the umbilical region had a peculiar bluish color, were partially filled with fluid, which at the time was thought to be bloody in character. As the patient's condition was not good, no further exploration was made to locate the bleeding point or points, and before being removed from the operating table she was given intravenous injection of normal salt solution. Immediately after operation temperature was 97.2°, pulse 160.

November 20th, 5 A.M.: A little over four hours after the second operation, although still pale condition was fairly good. Temperature was 100.1, pulse 160, respirations 24. At 5 P.M. of the same day temperature was 98.4, pulse 124.

November 21st: Enema to-day brought away a large bloody stool, the blood being of a dark red color and mixed with fecal material. Later in the day passed three more stools, all of which contained blood.

November 22d: Had two stools to-day, both of which were made up principally of blood. Hæmoglobin 44 per cent., leucocytes 7250. Altogether there have been six bloody stools; unable to estimate exact amount of blood.

December 1, 1907: Eleventh day after operation, hæmoglobin 67 per cent.

December 6, 1907: Discharged from hospital to-day.

Dr. Mitchell added that during the last few years a number of cases of hemorrhage from the bowel following operations for appendicitis have been reported, the cause of this postoperative catastrophe being laid to some faulty technic of the operation. In a few of the reported cases the appendix stump was undoubtedly the site from which the bleeding came, as was proven either by secondary operation or post-mortem examination, but in the majority it was merely assumed that the bleeding came from the seat of operation.

He reported this single case to place on record a case in which the appendix was removed, the stump inverted by catgut purse-string suture, the operation being followed by severe hemorrhage from the bowel, which did not come from the inverted appendix, as was demonstrated by the secondary operation.

Dr. Wyeth[1] mentions in his paper on "Technic of Appendectomy," sixteen cases where the stump of the appendix was inverted, and which were followed by bleeding from the bowel, presumably from the stump of the appendix. In six of the sixteen cases was it clearly proven, by operation in five, and post-mortem examination in one, that the hemorrhage came from the stump of the inverted appendix. Thirteen of the sixteen cases recovered and three died.

Judd[2] reports an interesting case, which in many respects is similar to the case just reported. In his case the appendix was removed and the stump inverted by means of a silk purse-string suture. Eighteen hours after operation the patient complained of severe abdominal pain, and shortly afterwards passed by rectum about twenty ounces of bright red blood. During one hundred and forty-four hours succeeding the operation, passed fifty-eight ounces of blood. This patient was treated by morphine, quiet, no food, making an uninterrupted recovery, and was able to leave the hospital on the eighth day. In conclusion Dr. Judd says: "In this case the absence of any oozing from the stump was noted at the time of operation. It has always been

[1] Journal American Medical Association, vol. xlix, pp. 121–1907.
[2] Journal American Medical Association, vol. xlix, pp. 1843–1907.

my practice to clamp and tie with catgut any bleeding points before inverting the stump. In this case it seems incredible that such a hemorrhage should follow an operative procedure where the field was so dry, and in pondering over the subject it has occurred to me that some other explanation than bleeding from the stump is necessary to explain the cause."

I fully agree with Dr. Judd that it is most probable the hemorrhage in his case did not come from the appendix stump, but of course this fact was not proven. Its similarity to the case now reported suggests that the cause of the bleeding was the same in both cases.

It is a well established fact that bleeding from the stomach or bowels or from both, may follow any major operation. Busse [3] reports fourteen cases of his own, and eighty-two similar ones collected from the literature of the subject, in which bleeding occurred from the stomach or duodenum after abdominal operation. The mortality in this series of ninety-six cases was fifty-five per cent.

The pathological changes which take place after the various abdominal operations and give rise to the bleeding, either from the bowel or stomach, have not as yet been satisfactorily explained. A number of theories have been advanced, however, to explain this condition. Mr. Moynihan in his book on abdominal surgery, states that hæmatemesis may follow any abdominal operation, but is more especially to be looked for when the stomach, duodenum or bile-passages are the seat of disease. He mentions five theories as possible causes of hæmatemesis, which may hold good to explain bleeding from the bowel after operation, as well as from the stomach.

The five theories are as follows: (1) The anæsthetic; (2) distinct injury to the stomach or bowel, resulting in ulceration from which the blood comes; (3) (Von Eiselsberg) injury to the omentum, rough handling, twisting or ligating of the omentum, producing a thrombosis of the omentum, which is followed by embolism in the walls of the stomach or bowel; (4) sepsis (Dr. W. L. Rodman's theory); (5) reflex nervous influence (Mayo Robson).

Mr. Moynihan personally believes that Dr. Rodman's theory

[3] Archiv für klinische Chirurgie, 1905, p. 1568.

of sepsis is the correct one, and in support of this theory says: "This seems to me the most likely of all the explanations that have been given, though it cannot be denied that in some instances the obvious evidence of sepsis is wanting. In some of these cases it may be that the sepsis is of such a character as to produce a rapidly fatal toxæmia, the poison acting so rapidly indeed that local evidences, peritonitis, etc., have no time to develop.

Of the five theories just mentioned, that of sepsis, as suggested by Dr. Rodman, seems to the reporter to be the most feasible. In a few cases the bleeding may come from pre-existing gastric or duodenal ulcers, but in only a few instances can the cause be laid to these pre-existing conditions.

Dr. Astley P. C. Ashhurst said that he had never felt convinced that the majority of the cases reported by Wyeth were really due to hemorrhage from the stump of the appendix; for it has been known for some time that the French pathologists, especially Dieulafoy, have called attention to the black vomit of appendicitis. It is probable that a good many surgeons have seen this black vomit without realizing what it was. The appearance of the appendix in cases of so-called hemorrhagic appendicitis is well known. In such cases, all that can be seen macroscopically in the submucosa of the appendix is a hemorrhage of some kind. The French hold that appendicitis is merely a local manifestation of a general disease. There may be ulcerations, various sorts of ecchymoses, and erosions in other parts of the intestinal tract that pass unnoticed; and hemorrhage may come from some of these. The view mentioned by Dr. Mitchell as supported by Dr. Rodman, which regards sepsis and toxæmia as the cause of these lesions, is that on which modern ideas of pathology are based. This view was elaborated by Gandy, one of Dieulafoy's pupils, who (in his Paris thesès, 1899) showed that in all gastro-intestinal ulcerations there is some form of toxæmia; and that in all forms of toxæmia there is gastro-intestinal ulceration. Gandy traced in different diseases the various stages of the ulceration up to the well-formed ulcer, in which there may be either hemorrhage or perforation. Dr. Ashhurst therefore believes that it is the theory of sepsis and toxæmia upon which the pathology of this complication must be based. He has recently read in the Lancet an article by Hort, in which the claim is made that gastric ulcers and similar lesions are due to hæmorrhagins

and mucolysins. The writer also claims to have been able to produce these lesions experimentally in some of the lower animals; and to have cured them with antivaccines and serums, both in the lower animals and in patients. This shows that toxæmia must be the cause of these lesions.

Dr. Jopson said that while Dr. Ashhurst's explanation of the theories as to the cause of hemorrhage after appendectomy would be plausible in cases of acute infection, they would scarcely explain cases that come on after interval-operations and within such a short time that sepsis would not have a chance to be an active feature. If one operates between attacks and the patient has hemorrhage from the bowel eight or ten hours after the operation, one is inclined to ascribe it to the operative technic. While Dr. Jopson agreed with Dr. Ashhurst that perhaps the majority of these cases are not due to hemorrhage from the seat of the appendix, he thought that a certain number must be. Studies in anatomy have shown the occasional presence of an abnormal vessel at the base of the appendix which might easily escape a purse-string ligature, unless most carefully applied. Although Dr. Jopson has continued to use this method of ligation with inversion of the crushed stump, he has been careful to pass the ligature under the site of such a potential vessel at the base of the meso-appendix, so that it could hardly escape the grasp of the suture. This he considers a point of great importance. If active hemorrhage is present, after one cuts the crushed appendix, one should throw a ligature about it. The ideal method is complete excision and the application of the through and through hæmostatic suture, such as is used in gastro-enterostomy, followed by another continuous Lembert suture. One could not, however, venture to recommend this procedure to a large class of surgeons who are doing satisfactory operations by other methods. Nevertheless, it is the ideal method, anatomically speaking.

Dr. Davis asked whether the appendix had been crushed first and then inverted with a single purse-string suture, and remarked that a blood-vessel might enter the appendix between the loops of the purse-string suture and so escape constriction. If no circular ligature were applied, part of the circumference would be without pressure. For this reason, in cases in which no circular ligature was applied, the technic might have had something to do with the production of hemorrhage.

GASTRO-INTESTINAL HEMORRHAGE FOLLOWING RADICAL OPERATION FOR HERNIA.

Dr. W. E. Lee reported the case of a white male, who was referred to the Pennsylvania Hospital for radical treatment of two inguinal herniæ. As railway engineer, miner and prospector he had been accustomed for many years to severe physical work. During an illness of several months in his seventeenth year he had general anasarca but there was nothing else in his history which had any relation to his present hernial condition.

The examination showed an unusually well developed and well nourished man with heart, lungs and urine negative.

The right hernia appeared twenty years ago and had since been imperfectly supported with a truss. Seven years ago iodine injection treatment had been tried with negative results. At the time of admission there was an easily reducible scrotal mass about the size of a lemon.

The left hernia, which was of six years' duration and had been supported in a similar way with a truss, could just be felt at the left external ring.

Under ethyl chloride and ether anæsthesia the hernial sacks were ligated at the internal rings and excised, then the inguinal canals were reconstructed after Bassini's method.

During the following twenty-four hours he developed abdominal pain and slight distention, which were not relieved by free purgation, and toward evening he began vomiting a clear colorless fluid. The vomiting continued and the distention increased during the following day and fifty-four hours after operation he suddenly vomited 350 c.c. of dark fluid blood, after which the vomiting ceased. Twelve hours later and following a high alum enema he passed from the bowel 500 c.c. of blood very similar in appearance to that which had been vomited. There was no more evidence of blood in the stools and his recovery was uneventful.

It seems safe to assume that this hemorrhage was in no way the direct result of any operative procedure for there was no handling of any part of the gastro-intestinal tract. Numerous similar cases of postoperative hemorrhage of obscure origin are on record, and although the majority of them have followed abdominal operations they occur after operations upon all parts

of the body. Appearing usually during the first twenty-four hours, they may occur as late as the tenth day.

Various suggestions have been made as to the etiology. The fact that such hemorrhages are reported after operations with cocaine anæsthesia and even without any anæsthetic seems to discredit the anæsthetic being the cause. Trauma of the gastro-intestinal tract from the operative intervention is not to be considered in this case, for, except the gentle replacing of the coils of the small intestine as they appeared at the internal rings during the ligations of the sacks, there was no handling of the gastro-intestinal tract. Thrombosis of the arterial or venous systems with secondary embolism in the walls of the stomach and duodenum is suggested by the finding, post-mortem, of erosions and ulcerations in the organs. These lesions, however, are not constant and have only been found in a small number of the cases.

Sepsis, considered by Rodman to be the cause in a large number of cases, can also be eliminated in this instance, for there was no sign of any infection.

The prognosis seems to be very grave; in 96 cases collected by Busse there was a mortality of 55 per cent., while Purves reports 72.5 per cent.

The treatment is necessarily symptomatic. Morphia to quiet the movements of the gastro-intestinal tracts; gelatin by mouth or subcutaneously to increase the coagulability of the blood; and saline infusion to replace the lost blood have all proved useful.

TRAUMATIC CEREBRAL HEMORRHAGE.

Dr. Gwilym G. Davis reported the case of a woman, aged 34, who was brought into the Episcopal Hospital in an unconscious condition. It was ascertained that on the day of the injury she had been on a visit to her sister and had drank freely and later started for home evidently under the influence of liquor. While on her way home she fell and struck her head on the pavement. She was taken to the police station and thence sent to the hospital. On admission her temperature was 99°, pulse 88, respiration 24. Patient was dull, heavy, stupid, almost in coma. She seemed to be sleeping soundly but could with difficulty be aroused. The mouth was open and tongue dry. There was some

hemorrhage from the left ear and contusions of the nose, but no other apparent evidences of injury. There was a slight inequality of the pupils, the left being somewhat the larger. No paralysis of the extremities. Pulse full and strong; urine 1020; acid and slight trace of albumin; no sugar. Three days later she could be roused sufficiently to talk a little, but her mind was not clear. She fed herself with the left hand, but moved the right slightly. During the next ten days her mind became clearer, and her temperature normal and while much improved in her general condition the partial paralysis of the right arm persisted.

On the 14th day she was not so well and her temperature rose to 99.8°. The next day she was found almost comatose with a temperature of 100° and a full, strong pulse of 60 to the minute. The right pupil was dilated more than the left. She was immediately removed to the operating room and trephined on the left side below and in front of the parietal eminence. The dura bulged into the opening and looked congested, but showed no pulsation. On opening it no evidences of clot were discovered. She was turned on the other side and the trephine applied below and in front of the right parietal eminence. There was no pulsation, but on opening the dura a large clot was found. This was scooped and washed away, leaving the brain apparently normal. The dura was sutured, a wick drain inserted and both wounds closed. On the following day the drain was removed. Her temperature rose to 102° and her pulse to 132. On the 2d day after the operation she could be aroused and understood what was said. Her pulse improved and her temperature began to decline. On the 4th day her mental condition was improving, her temperature was nearly normal and she began to move her right arm. She continued steadily to improve and was discharged six weeks after the operation, cured. Her mind was clear and she had fully recovered the use of the right arm. This case was not operated on earlier because of the lack of localizing symptoms at the time of her admission and her subsequent steady improvement. Previous to the day of operation the localizing symptoms were bleeding from the left ear on admission, a slightly larger pupil on the left side and two or three days later a partial paralysis of the right arm. These symptoms all pointed to a lesion on the left side of the brain. On the day of operation, however, the right pupil was the larger. In view, however, of

the persistent right-sided paralysis and history of bleeding from the left ear it was decided to explore the left side first. The opening was so placed as to allow it to be extended forward if necessary and allowed of the areas of both the anterior and posterior branches of the middle meningeal artery to be reached. The paralysis as well as the absence of pulsation when the skull was opened showed that the left side of the brain was affected; whether it was by the direct concussion from the injury or by transmission of pressure from the right-sided effusion is a question. From the fact, however, of the paralysis not being noted until the 2nd or 3rd day after the injury we believe it to have been secondary and due to transmitted pressure. The fact of the clot being found on the right side shows that the dilated right pupil was a better index of the locality of the lesion than the partial paralysis of the right side. Traumatic cerebral hemorrhages whether epidural or subdural are most likely to occur at the site of impact. If, however, they are not found there then, as shown many years ago by Dr. Formad, they are found on the opposite side. While cerebral hemorrhages (clots) are very commonly the result of contrecoup cerebral fractures are rarely so and even when present are apt to be insignificant in extent. These hemorrhages by contrecoup are most likely to be subdural, although it is probable that in some rare instances they may be epidural or between the dura and the bone.

Dr. A. P. C. Ashhurst said that during the last few weeks he had seen, at the Episcopal Hospital, a case under Dr. Neilson's care, who was struck on the right side of the head during a fight, and was brought to the hospital in a semi-conscious condition. He was treated for fracture of the base of the skull. Dr. Ashhurst did not happen to see him again for several days, when he noticed that he was having twitching convulsions of the right forearm and both lower extremities; but the left arm was not moving at all. The right pupil was widely dilated, and pressing upon the supra-orbital nerve elicited facial palsy on the left side, very marked. Dr. Ashhurst had thought that it was a case of extradural hemorrhage. The patient grew worse and died, and at autopsy a fracture of the skull involving the base and a subdural hemorrhage were found, as in Dr. Davis's case. The dilated pupil was on the side of the lesion, the right side, as also in Dr. Davis's case.

REMOVAL OF THE LINGUAL AND MANDIBULAR NERVES BY THE TWISTING METHOD OF THIERSCH.

Dr. Gwilym G. Davis reported the case of a woman, aged 47, who applied for the relief of a neuralgia affecting the tongue and lower jaw. The pains had begun five years previously, they were intermittent and affected chiefly the left side of the tongue and cheek down to the angle of the jaw. The paroxysms became frequent and severe, coming on most often in the morning when arising from bed. Sometimes, though rarely, she would have attacks at night. The pupils reacted normally and the tongue when protruded would deviate slightly to the right and was tremulous. She was otherwise well. The following operation was performed: An incision was made beginning about a centimetre below the ear and carried down behind the ramus and angle of the jaw and forward along the under side of its edge to just forward of the anterior edge of the masseter muscle. With a periosteal elevator the soft parts were detached from the bone and turned upward. The jaw was cleared off upward until the coronoid notch (incisura mandibulæ) was reached. A half inch trephine was then placed midway between the notch above and the lower edge of the jaw below and a button comprising the outer layer of compact tissue removed. The bridge of bone between the trephine opening and notch above was removed and the canal opened by means of a chisel downward until near the mental foramen. The mandibular nerve being thus exposed was lifted from its bed and displaced upward. (Fig. 1.) The bleeding from the accompanying artery was controlled either by ligation or packing. The trephine was then again introduced and another button of bone comprising the inner side was removed. With a forceps a considerable amount of fat was taken out and the lingual nerve exposed lying almost directly beneath on the internal pterygoid muscle. With a curved, long jawed, hæmostatic forceps introduced through the trephine opening both nerves were grasped, being lifted by a blunt hook until they were well up from the end of the forceps. The forceps were then slowly turned, not faster than one turn in a half minute or more. It took 13 minutes to complete the removal of the nerves.

The wound was packed with gauze and closed with sutures. The gauze was removed on the second day and the stitches on

the fourth and the wound closed by primary healing. This mode of removing peripheral nerves by torsion very slowly applied was devised by Thiersch (Verhand. der Deutschen Gesellschaft für Chirurgie, 18th Congress, Berlin, 1889, p. 44).

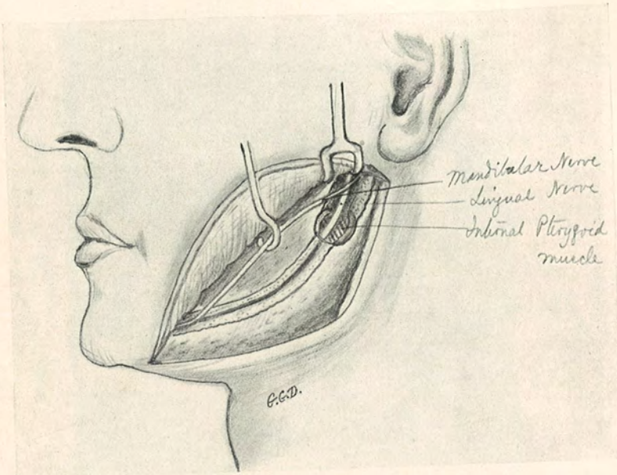
Angerer (Archiv. für klinische Chirurgie, Bd. 53, s. 179) gave the results in 26 cases; of these 2 changed to some other branch, 7 returned and 17 remained free, 16 had been operated on for more than 4 years. Of these three were reoperated on and one died of intercurrent disease. Of the remaining 12, three had a return of the pain and seven remained free.

Dr. Davis further remarked that these results are so much better than those in which only small portions of the nerve are removed as to demonstrate its superiority and necessitate the abandonment of the latter. The Thiersch method can be successfully employed for the supra- and infra-orbital, the mandibular (inferior dental) and lingual nerves. It seemed to him to be decidedly preferable to the operations devised by Kocher, Horsley, Lücke, Pancoast, Minter, Carnochan, and many others. The lingual nerve if alone involved can be readily removed by the Thiersch method through an intrabuccal incision, but to attempt the removal of the mandibular (inferior dental) nerve through the mouth by the method of Paravicini is a delusion and a snare.

The disfigurement arising from an incision along the posterior and inferior edges of the jaw will be but slight if the subcutaneous tissues are first brought together with catgut sutures and then the skin united with the subcutaneous suture or very fine interrupted sutures removed by the 4th or 5th day. In the case reported the bone between the trephine opening and incisura above was removed in order that the mandibular nerve could be raised up out of the way in order to complete the section of the bone and allow access to the lingual nerve below.

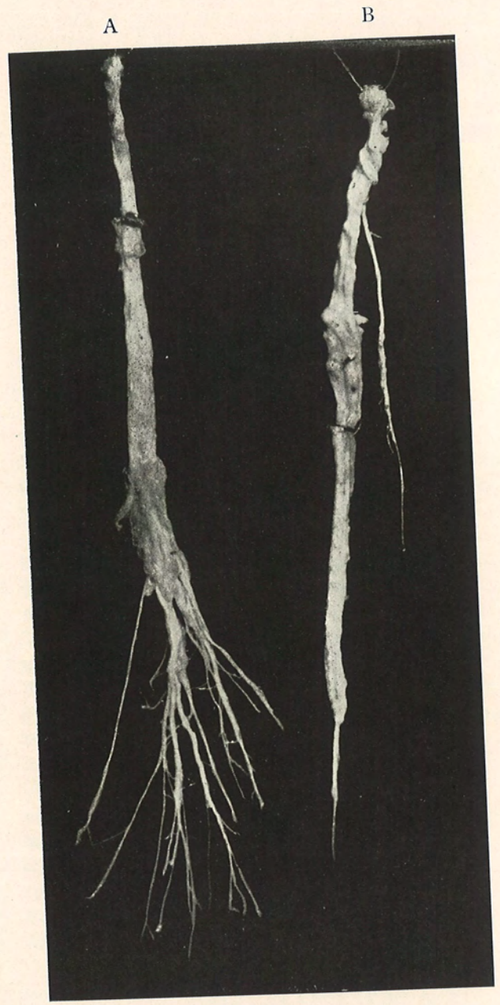
The length of the lingual nerve removed was 15 cm. (6 in.) and that of the mandibular 12.5 cm. (5 in.) (Fig. 2.) Had the bone been removed and the dental canal opened clear down to the mental foramen as should have been done then more of the latter nerve could have been removed. The commencement of the incision from below the ear to the angle of the jaw is to be carried only through the skin and subcutaneous tissue; the parotid gland lies beneath and it should not be incised but dragged upward out of the way. There is a great tendency for the nerves to slip

FIG. 1.



Operation for the removal of the lingual and mandibular nerves, by torsion.

FIG. 2.



A. Lingual nerve. B. Mandibular nerve. (Natural size.)

off the end of the forceps. To avoid this Dr. La Place suggested the use of a slender pair of long jawed curved hæmostatic forceps. Their use was found to be perfectly satisfactory in this case.

The area of anæsthesia produced by the operation embraced the left half of the tongue and the floor and outer wall of the mouth. The roof of the mouth, palate and upper alveolus were sensitive. Taste was lost on the left half of the tongue until its base was reached just in front of the circumvallate papillæ. On the outside of the face sensation was lost anteriorly in a line starting at the upper anterior edge of the pinna and passing downward and forward to the angle of the jaw; posteriorly the line extended from beneath the lobe of the ear, along the line of incision, to the middle of the chin. The patient is still free over a year since the operation.

Pathological Report.—A microscopical examination of the excised nerves by Dr. Geo. P. Müller revealed nothing except a slight proliferation of the neurilemma.

Dr. Morris Booth Miller recalled an experience that he had had about a year ago. In this case, Dr. Miller attempted to do an inferior dental nerve avulsion and at the same time he wished to avoid the disfiguring scar on the outside of the face. The method followed was first used by Paravicini, who suggested that the inferior dental nerve might be attacked through the mouth. Dr. Miller had a good deal of difficulty in performing the operation. The idea of avoiding any scar appealed to him, and he finally succeeded, but he had great trouble in reaching the nerve. He had thought that the spine of Spix and the internal lateral ligament would be landmarks more easily reached and identified than it proved. He caught a nerve and, after having pulled on it with a certain amount of force, he found that the tongue twisted with the twisting of the nerve. He therefore recognized that he had the lingual nerve, which was not involved. Fortunately, he had discovered his mistake in time to avoid damage. After a good deal of difficulty, he succeeded in getting out the proper nerve, but he would never undertake this method again. He considers the operation used by Dr. Davis the only correct one in reaching the inferior dental nerve, but the lingual can be reached more easily by the intrabuccal route. In working through the mouth, however, it is hard to get light and there is not much room for the finger or instruments.

Dr. Joseph M. Spellissy asked Dr. Miller whether there had been any return of the neuralgia in the case in which he had operated through the mouth.

Dr. Miller replied that the neuralgia partially returned some time after the operation.

Dr. George P. Müller said that he had done a number of these operations always removing the inferior dental nerve through an incision made along the angle of the lower jaw without having much of a scar, if the wound was closed by a subcuticular stitch. In two cases the incision divided the lower lobules of the parotid gland, and in one of these some trouble was experienced afterwards in closing a small salivary fistula. On one occasion he had removed almost as much of the nerve as in the specimen shown by Dr. Davis by trephining the angle and dividing the inferior dental nerve in the usual manner, and then, by means of a second incision, pulling it out of the jaw through the mental foramen and then twisting in the usual manner. The greatest difficulty he has encountered in these operations is to keep the nerve on the hæmostat while twisting. He uses a blunt hook to hold the nerve, keeping one hand on the hook, and the other twisting on the hæmostat. After having twisted the nerve three or four times and thereby loosening it, he allows it to untwist again and takes a more secure grasp with the hæmostat. The turns should be made very slowly.

Dr. Davis, closing, said that the operation is such a radical one so far as the amount of nerve that is removed is concerned and the fact that at least seven of the fourteen cases remained permanently cured makes it the procedure of choice when a peripheral operation is decided upon.

Regarding Dr. Miller's remarks in reference to the intrabuccal procedure, Dr. Davis said that the operation was that of Paravicini and was described in Bryant's "Operative Surgery." The lingual nerve is very readily reached beneath the mucous membrane immediately behind the last molar tooth, where it crosses obliquely toward the tongue, but to reach the inferior dental by the intrabuccal method, however, is quite another question. It is very deep and close to the inner side of the jaw. Going upward and inward from the angle of the jaw, one meets the internal pterygoid muscle. Between this muscle and the jaw there is a chink in which the nerve and the artery are found; the

muscle also is attached to the jaw with the spinamandibular ligament above it. The spine of Spix may not be perceptible to the sense of touch, for the finger will run along the jaw and over the spine to the ligament, which is in front of the nerve and the vessel. To reach these, one must get rid of the ligament. If it is cut, one is liable to cut the nerve, because it is so close. If you hook it forward and cut it, you can reach the nerve and artery; but the inferior dental artery will probably be cut, and as it is a good-sized artery its bleeding will obscure things. If, however, it does not bleed, and you proceed to take out the nerve, the distance between the lower part of the skull and the jaw is so slight that it would be difficult to remove the nerve thoroughly, on account of the difficulty in manipulation.

Dr. Davis does not believe in any of the operations on cranial nerves that require one to work through too small an opening, because too little of the nerve is removed; for instance, the operation on the inferior dental through the mouth, or the operations through the zygomatic fossa in the temporal region on the maxillary and mandibular branches of the fifth nerve.

STATED MEETING, HELD JUNE 1, 1908.

FIBROLIPOMA OF SYNOVIAL FOLDS OF KNEE-JOINT.

Dr. James K. Young presented a man, 21 years of age, who five years ago sustained an injury to the left knee from a fall on the ice. He exhibited the usual symptoms of synovitis, of which pain was an important and persistent feature, continuing until 18 months ago, when he came under Dr. Young's observation. At this time the knee was partially ankylosed, there was thickening and induration about the patella, with atrophy of the muscles, and pain was excruciating. An exploratory arthrotomy was undertaken to verify the diagnosis of villous arthritis. The incision was a subpatellar one dividing all the structures in the anterior portion of the joint. The condition was found to be a fatty degeneration of the subpatellar bursa and synovial fringes. The recovery was uneventful and the functional use of the joint is perfect.

Dr. Oscar H. Allis said he had had four or five somewhat similar cases, but in these he thought the grade of inflammation was greater than in that of Dr. Young's case, and that that might have possibly been the reason why his results had never been so good. He had gotten fairly good motion, but nothing so complete as in the case presented.

Instead of the incision below, as in Dr. Young's case, which calls for the division of the patella tendon, Dr. Allis prefers an incision above the patella, as he does not think there is quite the same risk with this incision. A good view of the whole joint is obtained by either of these incisions, which are elliptical, turning the patella up in one instance, and down in the other. Dr. T. G. Morton was the first to split the patella longitudinally and turn the lateral halves outward, but with this procedure he did not think one got as good a view of the joint.

TENDON TRANSPLANTATION FOR TALIPES VALGUS.

Dr. Young presented a girl, 12 years of age, who had paralysis of the tibialis anticus muscle with marked valgus, of seven years' duration. For three months prior to the operation the

deformity had been increasing. The operation performed five months ago consisted in the transplantation of the peroneus longus into the tibialis anticus, the valgus having first been restored to normal position. The foot is now in a corrected position and its function normal.

PSOAS ABSCESS CURED BY POSTERIOR OPERATION.

Dr. Young presented a girl, 4½ years old, who was taken ill six months ago with incipient Pott's disease of the lower dorsal vertebræ. There was marked flexion of the thigh and psoas abscess was present. Four months ago the abscess was opened by a posterior incision, the so-called Treves operation. The abscess-cavity was curetted, the extremities of the wound were shortened by sutures, and drainage was maintained for only a very short time, the wound closing in seven weeks. The patient has now entirely recovered from the abscess.

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LUDWIG'S ANGINA.

REPORT OF FIVE CASES INCLUDING ONE AUTOPSY.

BY JOHN W. PRICE, JR., M.D.,

OF LOUISVILLE, KENTUCKY.

In the year of 1836, Dr. Ludwig of Stuttgart, described an acute septic inflammation of the submaxillary region, accompanied by a hard sublingual swelling, together with the symptomatology. This condition has been designated Ludwig's angina. Dr. Thomas has recently collected 106 cases in the literature including two of his own with a mortality of 40.3 per cent. I take this opportunity to express my indebtedness to this comprehensive article by Dr. Thomas for many of the references in my own paper. Probably many cases have occurred which have not been recorded. That it sometimes occurs in groups has been observed by F. Murchison, Klein, Seymour–Taylor and G. G. Davis. The latter says that five of his cases came from the same section of the city in a period of five weeks.

The five cases which I am reporting were admitted to the Episcopal Hospital, Philadelphia, between March 1 and May 12 of this year. Although two of them developed in the same ward of the hospital, I do not regard the condition contagious.

1. *The Infecting Organism.*—No specific organism has been found for Ludwig's angina. Dr. Thomas searched the literature and found eighteen cases reporting the bacteriological findings as follows:

The streptoccus was found alone in six cases. The streptococcus associated with other organisms, staphylococcus and diplococci in eight; the staphylococcus alone in two; the pneumococcus alone in one and an undetermined bacillus in one.

In my cases the following organisms were found:

CASE I.—Cultures and smears show mixed bacteria flora.

CASE II.—Cultures and smears show mixed bacteria flora—Staphylococcus, micrococcus salivarius—Biondi; Streptococcus cappelletti.

CASE III.—Micrococcus salivarius—Biondi.

CASE IV.—Micrococcus salivarius—Biondi.

CASE V.—Cultures from incision show Bact. ferrugineum. (Dyal); by aspiration, large diplococcus, small diplococcus, long, thin bacillus, streptobacillus (strepto-diplo-bacillus?).

2. *The Primary Focus of Infection.*—The most common primary focus of infection is dental caries. Dr. Davis reported one case in which the inflammation was started by a dentist injecting a solution of cocaine around a carious tooth and extracting it. Two of the cases now reported started in this manner. After cocaine had been injected in the gums and the tooth extracted, Case IV developed a submaxillary swelling in 48 hours and Case V developed a submaxillary swelling in 24 hours. Case III had carious teeth and a submaxillary swelling of a month's standing but a sudden enlargement of this swelling developed in four to eight hours after a dentist had pulled a tooth. Other foci that have been mentioned are wounds of the mucous membrane, otitis media, peritonsillar abscess. C. J. Aldrich reports a case that started from the tonsil and W. A. Humphrey describes a case preceded by tonsillitis.

One of the present patients (Case I) had an attack of tonsillitis with a temperature 103 which gradually subsided to normal in five days, but six days later the patient developed Ludwig's angina. Case II complained of sore throat and examination showed redness of the pharynx; the next day the patient had developed Ludwig's angina and in 55 hours he was dead.

3. *The Mode of Transmission of the Infection.*—If the primary focus is in the tooth as in Case III, IV and V, I agree with Dr. Davis that the inflammation involves the periosteum of the lower jaw and thence invades all the surrounding tissues by direct contiguity. But if the primary focus is the pharynx (Case II) or the tonsil (Case I) or some other point distant

from the submaxillary region, it is probable that the infection was carried by the lymphatics. It is possible there is transmission of the infection from the mouth by the ducts of the sublingual gland which show marked inflammatory cellulitis in the sections from Case II.

Regardless of the seat of the primary focus, the secondary infection in these cases is in the submaxillary region; the floor of the mouth; and the following muscles: digastric, stylohyoid, mylohyoid, geniohyoid, geniohyoglossus hyoglossus, chondroglossus, styloglossus, palatoglossus, sternohyoid, sternothyroid, thyrohyoid, omohyoid.

The connecting tissues and overlying subcutaneous tissue are also affected. The pharynx and larynx become rapidly involved. In a fatal case, as in Case II, the entire trachea may be invaded. The cellular infiltration travels by the lymphatic spaces and by contiguity.

The clinical picture of the condition given by Ludwig was that of a fatal case.

The following are the symptoms of the early and less severe types:

Constitutional.—There is early fever, temperature 99 to 103, headache, malaise, loss of appetite and insomnia.

Local.—Increase in the secretion of saliva which is of a thick ropy character. If there is an opening into the mouth there is a profuse mucopurulent discharge together with the saliva which may amount to as much as sixteen ounces in twenty-four hours. Soon the patient notices a submaxillary swelling of a shoe-leather resistance which is painful. There is also tenderness which may be marked or slight. Then there is rapid œdema of the sublingual tissues and swelling of the face as far up as the malar bone and swelling of the neck down to the clavicle. The larynx and pharynx are rapidly affected and there is difficulty in opening the mouth, in swallowing, talking and breathing.

Treatment.—As soon as the diagnosis is made, use local anæsthesia (ethyl chloride) and make incisions over the submaxillary triangles through the mylohyoid muscles and if

there is severe swelling also through the median line between the hyoid bone and the symphysis to the mucous membrane. Use rubber drainage-tubes through and through the lateral incisions.

If the sublingual tissue is markedly œdematous, incise the mucous membrane from the midline to the second molar tooth and then insert a curette and curette wherever there is a feeling of the tissues giving way. There is usually a profuse discharge of blood which clots immediately. There will then be a profuse mucopurulent discharge of a very foul odor and bad taste. The relief is instant. You can actually see the sublingual œdema subside, and the patient will tell you that he can talk better and you will be able to notice the change in the voice.

Prognosis.—Dr. G. G. Davis reports mortality 40 per cent. in the cases under his own care. Thomas in his recent paper gives the mortality as 40.3 per cent. for all the cases reported.

Of the five cases now reported, one died and four recovered—mortality 20 per cent. The first of these patients was admitted to the Episcopal Hospital in the service of Dr. William T. Van Pelt and the other four in the service of Dr. Thomas R. Neilson with whose kind permission they are presented.

Case I.—(Surgeon, Dr. William T. Van Pelt). J. T., age 29 years. Admitted December 24, 1907; suffering from interstitial keratitis. February 13, 1908, complained of sore throat, headache, backache and loss of appetite. 5.30 P.M. Examination: throat, pharynx and tonsils are red. 11.50 P.M., tonsils are slightly swollen and show a few follicles filled with pus. Treatment: H_2O_2 and $AgNO_3$ gr. lx to ℥i.

2–20–'08. Less pain in the throat. Tonsils are swollen and some crypts contain pus. Anterior cervical glands are enlarged.

2–23–'08. Very few crypts contain pus. Has no pain. Feels well. Temperature 98°.

2–29–'08, 9 A.M. Has complained all night of not sleeping and of pain in the throat. Difficulty in swallowing. Examina-

tions show tonsils red and anterior cervical glands are enlarged and painful.

3–1–'08, 12.15 A.M. Complains of pain and swelling of floor of mouth and difficulty in talking and drinking. Cannot take food. Examination shows marked cellulitis of neck and the submaxillary region is very painful and tender to touch. Very hard. Difficulty in moving tongue and opening mouth. Marked œdema of floor of mouth and mucous membrane. Tongue is swollen. Increased saliva. Condition resembles Ludwig's angina.

Operation by Dr. Price:—Local anæsthesia—ethyl chloride. Three incisions are made. One in the median line below the chin and two lateral incisions into the submaxillary triangle. Blood and serum flowed freely. Subcutaneous tissue œdematous. A rubber drainage-tube is passed through and through the lateral incisions. Patient says he feels much better.

3–1–'08. P.M. Patient is doing nicely. Not so much submaxillary swelling.

3–2–'08 (1st day after operation). Dr. Davis examined patient and considered it Ludwig's angina. Dr. Davis passed a knife by median incision, through the floor of the mouth. Incisions are draining blood and serum. Patient feels better. He can get his mouth open more easily. Tongue is only slightly swollen.

3–3–'08 (2nd day). General condition is very much better. Not so much swelling. Patient is expectorating a foul, bloody mucopurulent sputum. The pharynx is not so congested. Incisions are draining bloody serum—no pus. *Tube removed.* Iodoform gauze inserted.

3–4–'08 (3rd day). Says he feels quite well. Tongue is normal. The lymphatics are markedly improved; only slightly enlarged. Feels like eating. Incisions are draining very little.

3–5–'08 (4th day). Doing splendidly. All symptoms have subsided. Temperature normal, 98.2°. The cornea is also much clearer than it has been.

3–15–'08. The incisions are granulating. Cultures and smears showed mixed bacteria flora.

4–8–'08. Discharged. The cornea is still cloudy and conjunctiva is slightly congested. Has no pain. Vision is fair.

CASE II.—(Surgeon, Dr. Neilson). W. T., age 80 years. Diagnosis: On admission, leg ulcer. Revised, complications, œdema of larynx, nephritis, myocarditis, arteriosclerosis, submaxillary adenitis, Ludwig's angina. Result: Died.

December 30, 1907. Patient was admitted to hospital for leg ulcer, size of silver dollar.

April 4, 1908. Complained of sore throat. Examinations showed redness of pharynx, especially on left side. Teeth are mostly missing, but there are several stumps or snags in bad condition.

On the next day there was difficulty in speaking. Examination showed œdema of sublingual tissue and slight cellulitis of submental region and submaxillary regions, especially the left.

Operation by Dr. Price: Multiple incisions made in mucous membrane beneath the sides of the tongue. Local condition not relieved.

By the following day, 8 P.M., sublingeal œdema increased and patient does not talk so well. Has difficulty in breathing and swallowing and does not take food. An incision is made in the mucous membrane for one inch parallel to the alveolar margin along the base of the tongue on both sides. An incision is made in the median line into the sublingual tissue. These incisions seemed to relieve the patient at once of some of the œdema. He said he felt better and could talk more distinctly.

4–7–'08 (2nd day). Patient died at 6.45 A.M. It is said by the nurse that just before death he was talking to a patient in the next bed and that suddenly he fell over dead.

AUTOPSY.

Tongue.—Tissues of the mouth beneath the tongue seem to be swollen and œdematous; posterior part of the tongue is slightly swollen. Both tonsils are greatly enlarged, swollen, and on section in places show oozing of a small amount of thick creamy pus.

Pharynx.—Epiglottis greatly swollen and congested, reaching in places nearly half an inch in thickness. The larynx in the region of the vocal cords is greatly swollen and congested and œdematous, showing acute inflammatory œdema. The left side of the epiglottis and the larynx seem swollen more than the right.

Cultures were made from the larynx, from the tissues in the immediate vicinity of the larynx, and from the base of the tongue.

Smears from these regions were also made. The streptococcus capelletti and the *micrococcus salivarius—Biondi* were found.

Trachea.—Showed marked swelling of the mucous membrane covered with a fibrinous mucopurulent exudate throughout.

MICROSCOPICAL SECTIONS

1. *Tonsil.*—Shows marked congestion, vessels are markedly dilated and filled with blood; the crypts are filled with plugs of granular debris containing bacteria. The peritonsillar tissue shows marked congestion and marked œdema and the perivascular spaces show large collections of leucocytes.

2. *Epiglottis.*—Section shows epithelial surfaces everywhere covered with much mucus, epithelial cells and leucocytes. Below epithelium the tissue is everywhere infiltrated with leucocytes, red corpuscles and inflammatory œdema. In some areas these collections of leucocytes, especially around the vessels, form distinct round abscesses. The vessels are everywhere markedly congested. This inflammatory œdema and exudation extends down to the cartilage.

Base of Tongue and Sublingual Gland.—The sublingual gland shows marked inflammatory cellulitis. The stroma is markedly infiltrated with leucocytes. These cellular infiltrations are so great that they press on the glandular tissue in many places to such an extent that the normal shape is lost. The tissues surrounding the gland contain considerable fat markedly infiltrated with large areas of leucocytic collections. These collections of leucocytes are so great that they form small pockets of pus.

The inflammatory infiltrations *i. e.,* the leucocytic collections continue to the underlying muscular tissue and infiltrate the muscle fibres, separating them from one another. The intermuscular tissue in this area also shows considerable œdema and in some places there are to be seen small hemorrhages. All of the blood-vessels are congested.

Base of Tongue and Submaxillary Gland.—The submaxillary gland is apparently normal. The borders show slight inflammatory œdema and collections of leucocytes. The remainder of the section shows a similar condition described in section 3, *i. e.,* inflammatory exudate, œdema, hemorrhages and pus. Sections 5 and 6 also taken from the base of the tongue at different points show the same conditions. These six sections have also been stained to show the presence of bacteria. In the infiltrated areas there are moderately large micrococcus; a small diplococcus; a small diplococcus in chains. The study of sections with the microscope seems to show that the cellular infiltration has travelled by the lymphatic spaces and by contiguity.

Diagnosis.—Acute œdema of larynx secondary to a phlegmonous condition of the soft parts surrounding; marked interstitial nephritis; marked myocarditis with calcification of the larger vessels and sclerosis of the mitral and aortic valves and coronary vessels; old tuberculosis of the apices of both lungs; atrophy of liver with fatty change.

CASE III.—(Surgeon, Dr. Neilson). T. C., age 29 years. Diagnosis: On admission, submaxillary adenitis and sublingual cellulitis. Revised, Ludwig's angina. Result: Recovered.

Was admitted to hospital April 21, 1908.

Present Illness.—Began one month ago with a swelling beneath the right inferior maxilla. This was painless and hard and of very moderate size. For past three weeks he has had neuralgia of left upper part of face. One week ago he had the left canine tooth pulled. This relieved his neuralgia. A few hours later the submaxillary swelling had increased. Upon the following day he noticed sublingual œdema of right side only and swelling of right side of his tongue. This swelling rapidly increased so that on the morning of April 17, 1908, the tongue filled the posterior part of his mouth, touching the palate. On the left side of the tongue there was a small air-passage. He could breathe freely by the nose. Pain was due to pressure of tongue on the teeth. Speech was interfered with on account of inability to move his tongue freely. Says he was not hoarse. His breath was very foul. Saliva was increased to an enormous degree and was sticky and thick. Appetite was poor. He was able to swallow "milk and raw eggs," says that he would get this mixture in the anterior part of his mouth and then close the mouth and push the tongue forward like a wedge and thus force the mixture into the throat and swallow it. Temperature was not taken before 4–18–'08, and he does not know the degree. He slept in a sitting posture and the saliva would run from his mouth. His attending physician cut into the sublingual tissue but found only blood.

When admitted to hospital, April 21, his temperature was 100°; pulse, 72; respiration, 24. Fairly well nourished man who appears to be under tone. Face is drawn and cheeks are hollow. Pupils react. Tongue is coated gray throughout. It is swollen, especially on the right side, and posteriorly it touched the roof of the mouth. Speech is thick. Sublingual tissues are moderately œdematous on the right side only from the midline posteriorly and are higher than the cutting edges of the teeth. A small gray membrane to the right of the midline of the sublingual tissues marks the point of the attending physician's incision. Right first molar is carious and other teeth contain cavities. In the right submaxillary region there is a hard swelling slightly

nodular extending from the midline to the angle of the jaw. This swelling is not very prominent. Heart and lungs are normal.

11.30 A.M. He says that he expectorated three large masses of yellow-greenish mucopurulent material of very bad odor and taste one after another. These seemed to come from behind his tongue. He began to rapidly improve. Swelling of tongue decreased and he is able to speak more clearly.

3.30 P.M. Examination shows no discharging point, although the sputum cup is full of mucopurulent material and thin watery matter. This has a bad rotten taste.

5.30 P.M. Operation by Dr. Price: sublingual tissue is still œdematous and an incision is made into it, starting at the midline and going back to the last molar tooth. A curette is inserted (1½ in.) and used thoroughly. A great deal of blood that clots instantly is removed, also small bits of caseous material—possibly glandular. A small amount of light greenish mucopurulent material is seen. This seemed to come from near the midline. The curretting caused little pain. Pressure on the outside did not increase the flow. Cultures from incision showed "*micrococcus salivarius—Biondi.*" *

During the day thereafter, sublingual œdema and swelling of tongue became very much less. General condition very satisfactory.

By the third day the tongue was normal. Sublingual œdema slight.

Steady improvement thereafter; patient was discharged on the ninth day.

CASE IV.—(Surgeon, Dr. Neilson). J. D., age 22. April 24, 1908, a dentist injected cocaine around the first right molar in the lower jaw and extracted the tooth. Two days later he noticed a very hard painful swelling below the right inferior maxilla; began to lose his appetite, had slight headache and malaise, causing him to stop work after five days. May 1, he had difficulty in talking and swallowing, his voice was husky.

* M. salivarius—Biondi.—Morphology, cocci round slightly oval, stain by Gram's method; gelatin colonies, surface: round, grayish-white, which may become darker; gelatin stab, in depth beaded, white; potato: growth scanty; pathogenesis, innoculations of mice, guinea pigs and rabbits cause death in four to six days, cocci in organs, no inflammatory reaction in tissues; habitat, saliva of man.

After another day he had difficulty in breathing. May 3, he came to the hospital surgical dispensary when sublingual œdema was observed by Dr. Ivy. Then patient refused to remain in the hospital. The swelling continued to increase in size until 8 P.M. He had dull pain through his neck and cough and increased saliva. By the next day he had such difficulty in opening his mouth that he said he thought he was getting lockjaw and came to the hospital. He has been unable to sleep. He was finally received at the hospital May 4, 1908. He walked to the hospital. When admitted his temperature was 99.2°. Pulse, 92. Respiration, 26. Blood: leucocytosis, 12,200. The right cheek is swollen. There is a hard firm swelling the size of a half egg in the right submaxillary region. The submental region is also swollen from the symphysis to the hyoid bone and extends two fingers to the left of the median line. The sublingual tissue on the right side is markedly œdematous, being above the cutting edges of the teeth and pushes the tongue upward. On the left side it is only slightly œdematous. The tongue is covered with a gray pia. It is not swollen but it cannot be protruded beyond the lips. The face is flushed and the pupils dilated. Chest: lungs; left-apex resonance is impaired. The breath sounds are harsh. Remainder of lungs are clear. Heart: muscular tone is good. No murmurs. Abdomen is normal.

2.45 P.M. Operation by Dr. Price: One incision is made in the median line from without inward through the floor of the mouth. A second incision is made over the right submaxillary triangle through the mylohyoid muscle. A hæmostat is passed in beneath the mylohyoid from the lateral incision to the median incision and a rubber drainage-tube is inserted through and through. A third incision is made in the right sublingual tissue and a curette inserted. Nothing but blood and bloody serum removed. The blood clots instantly. No pus found. Wet dressing applied. Alcohol 65 per cent. Bichloride of mercury 1–4000 ää. Patient says that he feels much relief. Says that he can talk better.

7 P.M. Patient is expectorating large amounts of saliva and blood and blood-clots.

5–5–'08. Had only few short naps during the night.

(1st day.) Says he feels much better than before the incisions were made. Has less difficulty in swallowing and talking.

His voice is still husky. He still has pain on swallowing. No headache. No appetite. No shortness of breath. This A.M. his expectoration consists of a thick ropy mucopurulent material. Redressed. Discharge is bloody. Small amount of pus about the ends of the rubber tube. The sublingual and submaxillary swellings are about the same as yesterday.

(2nd day.) Examination shows increased sublingual swelling on the left side. Sublingual tissues extend above the level of the edges of the teeth. The submaxillary swelling on the left side has increased and is very hard. The left cheek is swollen. (Right side.) The submaxillary and sublingual swellings have markedly decreased and the submaxillary region is not so hard. Right cheek is still slightly swollen.

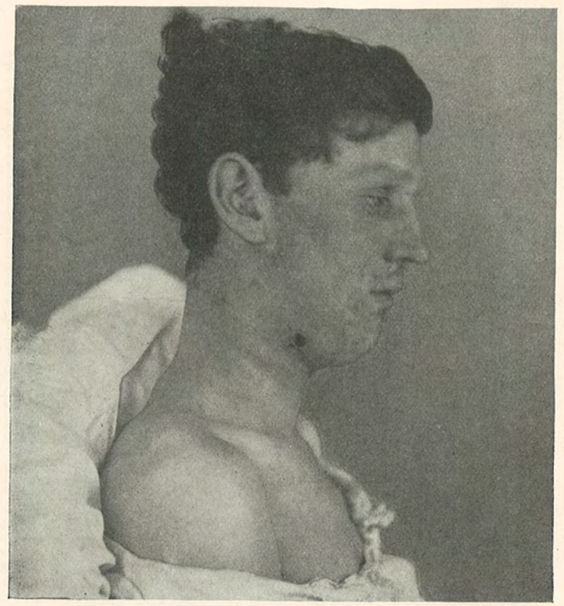
Second operation by Dr. Price: An incision one inch long, parallel to the inferior maxilla over the left submaxillary triangle, is made through the skin and mylohyoid muscle. A hæmostat is inserted and opened in all directions. To the left of the median line, one-half dram of pus is found. One or two large gas-bubbles are seen to come out with the pus. Cultures are made. The median incision is enlarged and a rubber drainage-tube is inserted through and through from the median line to the left lateral incision beneath the mylohyoid muscle. Original tube is removed and a fresh one is inserted in the region of the lateral incision. Wet dressings: Alcohol 65 per cent. Bichloride mercury, 1–4000 ää applied. (5 P.M.) Blood: Leucocytosis, 13,800. (6 P.M.) General condition is much better.

(3rd day.) Feels stronger. Sputum is foul and bad-tasting. He expectorates about two cupfuls each day, and each night. Examination shows all swellings much less than this A.M. Sublingual tissues especially appear almost normal. Swelling of right cheek has disappeared and swelling of left cheek is slight.

(4th day, 5–8–'08.) Blood leucocytosis, 8160. Slept almost the entire night. Expectoration for the night is one cupful. Appetite is better. Temperature, 98°.

Examination.—Swelling of left cheek has disappeared. Submaxillary and submental swellings are slight. Sublingual tissue appears about normal. Discharge is less and very foul. Steady improvement from this date and he was discharged from hospital well on tenth day.

FIG. 1.

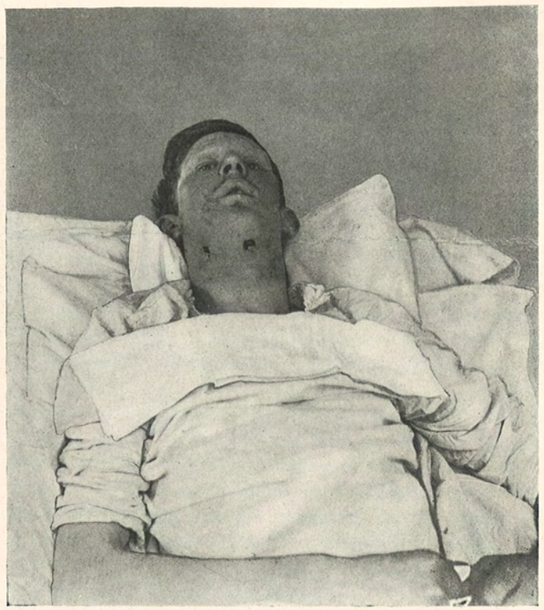


CASE IV.—J. D Showing the swelling in the submaxillary and submental regions, also the incision and drainage tube into the submaxillary triangle.

FIG. 2.

CASE IV.—J. D. Showing the drainage tube passing from the incision in the submaxillary triangle to the median incision in the submental region.

FIG. 3.



CASE IV.—J. D. Showing swellings of the right cheek, submaxillary and submental regions.

Cultures from incisions showed *micrococcus salivarius—Biondi.*

CASE V.—(Surgeon, Dr. Neilson.) C. B., female, age 16 years. May 1, 1908, patient had the first right molar extracted. May 8 she had cocaine injected around the second right molar and the tooth was extracted. On the following day she noticed a submaxillary swelling that was very hard and painful. Two days later she noticed sublingual œdema, also a hard swelling in the submental region. She complained of difficulty in swallowing and was able to sleep only three hours during the night. The sublingual œdema increased and the swelling below the jaw became larger and more painful and tender. Also difficulty in swallowing. Difficulty in talking. Her voice is husky. Difficulty in opening her mouth. Loss of appetite, headache and malaise. Breathing is not affected. Increased saliva that is thick and ropy. Applied for admission to hospital on the twelfth of May.

Physical Examination.—Well-nourished girl. Mouth: numerous carious teeth. The first and second molars are missing on the right side. The gums at this point is covered with a thin grayish-yellow slough. The sublingual tissues on the right side are œdematous but do not quite reach a level with the cutting edges of the teeth; on the left side they are slightly œdematous. There is a swelling of the right side of the face and neck extending from the malar bone to the sternum. The swelling over the submaxillary triangle and the submental region as far as the hyoid bone is very hard and of a shoe-leather resistance. There is no fluctuation. The anterior cervical lymphatics are palpable as a small chain of beads on the right side only. The thyroid gland seems slightly enlarged. W. B. C., 20,440.

Operation by Dr. Price immediately after admission. Local anæsthesia with ethyl chloride. Two incisions are made. One over each submaxillary triangle, parallel with the jaw and about one inch long. The incisions passed through the mylohyoid muscle. There was a free flow of blood and serum. Nothing that could be considered pus was seen. The subcutaneous tissues were quite œdematous. A hæmostat was inserted and opened in all directions and passed beneath the mylohyoid muscle from one incision to the other. A rubber drainage-tube was inserted through and through. Immediately relief followed the operation.

The following day the submaxillary and sublingual swellings were decreased. In the submental region the tissues were still quite hard. The swelling from the hyoid bone to the sternum had entirely disappeared. Patient much more comfortable. She expectorates a thick ropy white sputum profusely. Breath is foul.

Gradual subsidence of all symptoms, resulting in full recovery and discharged well on the eleventh day.

Cultures from incision showed Bact. ferrugineum (Dyal) and from aspirated material showed: large diplococcus, small diplococcus, long, thin bacillus, shorter, thicker bacillus, streptobacillus (strepto-diplo-bacillus?).

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Dr. T. Turner Thomas (by invitation) in discussing this paper said he believed that Ludwig's angina was more common than is generally supposed, but that these five cases occurring in one hospital within ten weeks made it appear more common than even he had believed. He thinks there is no doubt regarding the diagnosis in any of Dr. Price's cases. In many cases, however, he says there is much confusion in the diagnosis, many being reported as Ludwig's angina which were simply cases of submaxillary cellulitis, because the patient could not open the mouth, had difficulty in swallowing, in speaking, and in handling the saliva. In every one of Dr. Price's cases he thinks there are typical symptoms of the condition as described by Ludwig, which began in the submaxillary region, with possibly the exception of the second case, which began in the mouth and is of a different and more dangerous type. It is worthy of note that this was the only case which died.

Dr. Thomas considers that the danger in this condition is in the invasion of the larynx, and is particularly present when the floor of the mouth becomes involved because the tissue in the floor of the mouth is loose and contiguous with the submucous tissue of the pharynx and larynx, so that when this tissue is once involved it takes but a short time before the larynx is infected. Therefore, any infection of this character beginning in this region is a very dangerous condition, and the more dangerous, usually, the nearer its origin is to the larynx. Take, for instance, the cases reported by Semon; these were of the kind which begin in the region of the tonsil or in the neighborhood of the larynx itself, and in these cases the mortality was very high. A large number of them developed trouble also in the lungs or pleura.

Dr. Thomas considers that the most important point in the treatment of cases of Ludwig's angina is to recognize the focus from which the process is spreading and attack that. He does not believe the tonsillitis, the carious teeth, or the little ulcer in the mouth is the essential focus in the majority of cases. In one case reported in the literature the mouth became dangerously infected from a wound inflicted by the kick of a horse, knocking out several teeth; and lacerating the floor of the mouth. In one of his own cases the trouble began in the floor of the mouth from a gunshot-fracture of the jaw. He believes the great majority of cases begin in the submaxillary region, and that this is due to the fact that the infection enters the system by the way of a slight focus somewhere in the mouth, and from there extends to the lymphatic glands in the submaxillary region, where the infection becomes more active and causes rapid and great trouble; that is the real focus of origin.

Dr. Thomas does not believe much in the importance of the deep fascia of the submaxillary region as a restraining structure. He has dissected rather a large number of necks, and after taking away the platysma myoides muscle he believes what fascia is left is very delicate and cannot be an important structure in holding the swelling down.

Dr. G. G. Davis said that the bacteriological examinations in Dr. Price's cases, as in practically all of the other cases reported, showed the character of the infection to be of varying type. His paper also shows that the point of infection is not the same in every case. It is interesting that in two or three of the cases the

teeth proved to be the infecting point, and the question suggests itself, was it the injection of the cocaine by the dentist, or was it the pulling of the teeth which caused the inflammation to start up? In a case which Dr. Davis reported a lawsuit was threatened to prosecute the dentist for introducing the infection, whereas it is very well known that dentists, as a rule, object very seriously to pulling teeth or doing any operative procedures on the mouth when there is a marked inflammation of the structures.

Mention was made by Dr. Price of the lymphatics, and Dr. Thomas likewise referred to the lmphatics carrying the infection from the centre or interior of the mouth to the outside of the jaw in the submaxillary region. Dr. Davis has never thought that the infection was transmitted primarily by the lymphatics. However, in one of his cases Dr. Price mentioned that some of the lymphatics were involved. This is the first case in which Dr. Davis has ever heard of involvement of the lymphatics, as such, being recognized. In other words, although we have lymphatics in profusion along the deep vessels of the neck, yet we do not find isolated enlargement of lymphatic nodes, but we do find inflammation spreading along the cellular tissue.

Dr. Davis thought particular attention should be called to the treatment in the cases reported. He thinks their prompt recovery was due to the vigorous treatment which they received. The appearance of a patient with this condition is really alarming, and when these cases fall into the hands of general practitioners who are not proficient in severe surgical procedures, they are afraid to make such incisions as are demanded in such cases. The extent of the incisions demanded was well shown in some of Dr. Price's cases, in which he made an incision into the mouth from the outside in the median line, and likewise incisions on both sides in the submaxillary region.

THE CONSERVATIVE TREATMENT OF FRACTURES OF THE FEMUR.

NOTE ON THE END-RESULTS OF SIXTY-ONE FRACTURES OF THE FEMUR CONSERVATIVELY TREATED.

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THERE is at present a manifest tendency towards the operative treatment of recent fractures of the long bones, even when the fractures are not compound. Fractures of the femur, which are generally recognized as the most serious of all such fractures in regard both to their immediate mortality and their ultimate results, appear to offer no exception to this modern tendency, which some surgeons would even dignify by erecting into a rule of practice. It seems incumbent, however, on those who thus seek to alter the traditions of surgery, either to demonstrate the evil results which they regard as a necessary consequence of accepted methods, or to bring forward proof that by operation still better results can be obtained, and without unjustifiable risk to the patient. The advocates of operative treatment, in short, should either be able to show that the methods they propose will not increase the immediate mortality, and will greatly diminish or altogether prevent the unfavorable results of conservative treatment; or, failing this, they should at least convince conservative surgeons that the functional results of the accepted forms of treatment are such as can no longer be tolerated.

Sir Thomas Myles (Med. Press and Circular, 1907, lxxxiv, 35), speaking recently of fractures of the femur, said:

"My own experience of the result of routine treatment in these cases is not very encouraging. I have found that in nearly all cases occurring in adults there has been considerable shortening and consequent lameness, some stiffness in the knee-joint, some limitation of the movements of rotation at the hip-joint, a varying degree of muscular atrophy, pain with changes in the weather, and almost always an ugly knob of callus to be felt or seen at the seat of the united fracture. . . . At first I felt inclined to blame myself for these results, but further study of the subject soon taught me that they are the invariable and inevitable results of the methods of treatment usually adopted." He adds that it has hitherto been an accepted fact "that shortening of an inch or two is the inevitable outcome of such injuries, and that nothing can be done to prevent it." In support of these positive assertions he calls to witness museum specimens and skiagraphs; but in regard to such testimony we think it should be borne in mind that the former are selected as curios, and hence the chief desideratum is the presence of deformity and exuberant callus; while skiagraphs are notorious for exaggerating any deformity which may exist. Moreover, Myles presents no details of the end-results of the operative treatment which he so vehemently urges.

Among other surgeons who are champions of the operative treatment of recent fractures may be mentioned Lane and Knaggs, in England, and Vaughan and Martin, in this country.

König (Arch. f. klin. Chir., 1907, lxxxiii, 1032) favors operative treatment for recent fractures of the cervix, the trochanters, and for supracondylar fractures; fractures of the shaft he thinks may give quite satisfactory results under conservative treatment.

Bardenheuer (Die allgemeine Lehre von den Fracturen u. Luxationen, Stuttgart, 1907, 304), on the other hand, does not favor operative treatment at all; he calls attention to the fact that in spite of the advances in aseptic technique Tuffier among 22 such operations had 3 to suppurate.

The end-results under conservative treatment have not received much attention, with the exception of those of the neck of the femur; most surgeons are content with the "general impression" they have received from the results of the cases under their treatment. In fractures of the cervix femoris the prognosis as to ultimate function has generally been regarded as gloomy; but Mr. Bryant (cited by Stimson: Fractures and Dislocations, New York and Philadelphia, 1899, 326) was much more optimistic as to these patients than most surgeons; on more than one occasion he said that all his hospital cases of fracture of the cervix for many years (42 cases, average age 70 years) "went out with good and useful limbs"; a statement, which, as Stimson remarks, indicates much better results than have been reported elsewhere, even if the standard of "good and useful" is only that the patient can stand and walk a little with the aid of a cane. But it may be recalled that Dr. Le Conte, before the Philadelphia Academy of Surgery (ANNALS OF SURGERY, 1905, ii, 284), stated his impression that 80 per cent. of his patients with intracapsular fracture were discharged "with useful and valuable legs."

Scudder (Treatment of Fractures, Philadelphia, 1907, 6th ed., 336) reports the end-results of 16 fractures of the neck of the femur treated at the Massachusetts General Hospital. Only three of these patients were over 60 years of age at the time of the accident. Only two patients had functionally useful limbs, while thirteen had to use a crutch, a cane, or had disability in going up and down stairs. J. B. Walker (ANNALS OF SURGERY, 1908, i, 84) has recently published an investigation of 112 cases of fracture of the neck of the femur treated at the Bellevue Hospital, New York. There were 18 deaths, an immediate mortality of 16 per cent. (a number of patients, also, were transferred in a few days to other institutions; if these were included the mortality would probably be higher); 10 patients were still under treatment in the wards; 32 could not be traced; and of the 52 patients who were traced, no less than 30 (57.6 per cent.) were found

to be incapacitated, 12 were still compelled to use a cane, and only 10 (less than one out of five) could do their normal work.

Certainly there is a marked divergence between the results reported by Scudder and by Walker, and those observed by Bryant and by Le Conte.

As a contribution to this subject we have studied 121 recent fractures of the femur which have been under treatment in the Episcopal Hospital during the last three years; and we take this opportunity to acknowledge the courtesy of the staff in permitting us to examine their case-records and their patients. Although there have also been admitted during this time a few patients with ununited fractures of the femoral neck, these have not been included in our statistics, as the object was merely to ascertain the end-results of conservative treatment of recent fractures.

The following classification has been adopted:

Region of Femur Involved.	Condition on Discharge.
Cervix, 58 cases	Cured, 20 patients; improved, 20 patients; not improved, 2 patients, died, 16 patients.
Trochanteric, 13 cases	Cured, 12 patients; improved, 1 patient; died, 0 patient.
Shaft, 32 cases	Cured, 26 patients; improved, 1 patient; died, 5 patients.
Condyles, 18 cases	Cured, 15 patients; improved, 2 patients; died, 1 patient.

There has been no distinction made in our figures between intra- and extracapsular fractures of the neck of the thigh-bone. It is distinctly stated in only two cases that the fracture (cervix) was still ununited on discharge; but it is possible that no union was present in 8 other patients. It is reasonably certain, however, that firm union (probably not bony in all cases) was secured in 29 patients (69 per cent. of those who recovered). We have classed as trochanteric both fractures

"through the trochanters" and "subtrochanteric" fractures; and among fractures of the condyles are included, besides 15 typical "supracondylar" fractures, also 2 cases of fracture through the external condyle, and 1 case of compound epiphyseal separation, all three of the last-named fractures involving the knee-joint.

The mortality among these 121 cases was 18.1 per cent.

CAUSES OF DEATH.

The causes of death may be seen in the following table:

Cervix, 16 deaths, mortality 27.6 per cent.: shock, 2 patients; pneumonia, 3; decubitus, 3; exhaustion, 5; uræmia, 1; cancer of the pylorus, 1; enlargement of prostate, 1. (Age varied from 59 to 84 years, 11 patients being over 70 years; and the period until death varying from 1 day to 10 months).

Trochanteric, no deaths.

Shaft, 5 deaths, mortality 15.6 per cent.: other injuries, 3 patients, aged 76, 51, and 60 years; delirium tremens, 1, aged 33 years; pneumonia, 1, aged 71 years, after five days.

Condyles, 1 death, mortality 5.5 per cent.: œdema of lungs, 1 patient, aged 66 years.

With the exception of the fractures of the neck of the femur there was only one fracture in which on discharge firm bony union had not taken place. This patient, a woman aged 65 years, with a fracture at the junction of the middle and lower thirds of the shaft, went home over ten weeks after admission, wearing a plaster cast, with fibrous union. It has been impossible to trace her since her discharge more than two years ago. Several skiagraphs made while she was under treatment showed good apposition of a nearly transverse fracture.

The treatment adopted has been so various as to be fully representative. While all the surgeons employ longitudinal traction by means of Buck's extension apparatus, some use only sandbags in addition; others will have none of sandbags, but employ Volkmann's sliding splint; and some are partial to the double inclined plane, Smith's anterior splint, and

other more complicated appliances. A number of the fractures of the neck of the femur have been treated with encouraging results by both longitudinal and lateral traction, as advocated in 1869 by Phillips (Amer. Jour. Med. Sciences, 1869, lviii, 398), and as recently popularized by Maxwell, Ruth, and others.

The ages of these patients varied from 4 months to 86 years.

Notices were sent to all of the 99 patients who recovered. Of these, 29 returned to the hospital for examination; 17 were examined at their homes; and accurate accounts of the present condition of 15 were received from their family or friends. It was impossible to trace 37 patients. There are thus available for our report 61 patients showing the end-results of treatment.

Contrary to our expectation, the ultimate results in those patients who did not return for examination were as good as, and in some instances better than, those in the patients who came to the hospital. Thus one old lady of nearly 70 years, with fracture of the neck of the femur, was found busy housecleaning, having just moved all her parlor furniture into the front hall and vestibule. Other patients were visited at their places of employment, and were found too hard at work to spare the time to return to the hospital for examination.

We have classed the functional end-results under the following headings: (1) Perfect functional result, which, without regard to shortening, implies the entire absence of limp, and of any hindrance to the normal use of the limb. It should be stated, however, that none of these patients were acrobats, either before or after their injury. (2) No disability but limp. (3) Marked impairment of function, which implies that the limp was decided, and that in some cases the use of a cane, and in a few the use of a crutch, was still necessary, although even these patients were by no means helpless. Thus one patient (cervix), included in this class of "marked impairment of function," uses a crutch on the street, a cane at home, goes up and down stairs constantly, and supports herself by the

use of a sewing machine, which she runs with either foot indifferently. (4) Incapacitated, which implies that the patient has to use two crutches, or is confined to the house.

The end-results of the 61 cases may be thus tabulated:

END-RESULTS OF SIXTY-ONE CASES OF FRACTURE OF THE FEMUR TREATED CONSERVATIVELY.

Site of Fracture.	Cases Treated.	Cases Recovered.	Cases Traced.	I. Perfect Functional Result.	II. No Disability but Limp.	III. Marked Impairment of Function.	IV. Incapacitated.
Cervix	58	42	21	5	8	6	2
Trochanteric	13	13	9	5	2	2	0
Shaft	32	27	22	14	8	0	0
Condyles	18	17	9	4	3	0	2
Total	121	99	61	28	21	8	4

Forty-one patients were examined for shortening; the results are shown in the accompanying table:

SHORTENING.

Site of Fracture.	No. of Patients Measured.	No Shortening.	Shortening less than				
			1 cm.	2 cm.	2.5 cm.	4 cm.	5 cm.
Cervix	12	1	3	3	2	2	1
Trochanters	6	1	2	.	1	.	2
Shaft	17	5	8	4	.	.	.
Condyles	6	1	.	1	.	3	1
Total	41	8	13	8	3	5	4

Among 41 patients measured, 8, or about one-fifth, recovered without shortening; 32, or 78 per cent., had less than one inch shortening; none of the patients had more than two inches shortening; and none of the patients with fractures

of the shaft itself had more than three-fourths of an inch shortening.

Speaking of fractures of the femoral neck alone, we found entirely useful limbs in 13 out of 21 cases traced, or in nearly 62 per cent. Only two patients were entirely incapacitated: one of these, a woman 80 years old, was discharged with an ununited fracture, and died at her home three weeks later; the other patient, a man 78 years old, was living six months after the accident. The average age of the 21 patients traced was over 57 years at the time of the accident; or, if two children of 11 and 15 years be excluded, the average age of 19 patients was over 62 years; 12 patients were actually more than 60 years old at the time of the accident, and 7 of these were over 70 years. Of the 21 patients with fracture of the neck of the femur who were not traced, the average age was 64½ years, 10 of the patients being over 70 years of age. The difficulty of tracing them was no doubt due in part to some of them being dead.

Taking all the remaining fractures together, excluding those of the cervix, there were 40 patients traced. Of these, 36 (90 per cent.) had entirely useful limbs, though 13 of them had a limp. There was marked impairment of function in 2 patients (trochanteric fractures), one of whom, aged 70 years, had had the same femur fractured once before, three months previously; and the other, aged 65 years, sustained, besides the fracture through the trochanters, a Pott's fracture of the same leg. Two patients in this group were found to be incapacitated; both had supracondylar fractures—one, aged 55 years, had previously sustained a fracture of the neck of the same femur, which had united with shortening and deformity; he still uses crutches, over 18 months after his discharge;—the other patient, a woman of 62 years, has advanced rheumatoid arthritis affecting both knees and both hips; she is barely able to totter around her house.

We may conclude, then, that, with the exception of these four patients, the results of the conservative treatment of fractures of the femur, excluding those of the neck, were satisfactory; and we very much doubt whether operative treatment of such cases could do more than give entirely useful limbs in 90 per cent. of cases, and leave only one out of every three patients with no other functional impairment than a limp.

FRACTURES OF FEMUR, EPISCOPAL HOSPITAL. PATIENTS TRACED, 1905–1907 INCLUSIVE.

CERVIX.

1. Matthew G., 64 yrs., July, 1907. Examination 2–12–'08. Habitually uses crutch and cane. Can walk without support of any kind. Goes up and down stairs daily. Is still improving. Shortening 3 cm.; eversion; rotation fair. Abduction possible to 30°, flexion to 135°. Union firm. (Class III.)

2. Irene K., 11 yrs., January, 1904. Report 5–13–'08. No limp; all functions perfect. (Class I.)

3. Mary E., 72 yrs., January, 1905. Report 1–21–'08. Can walk with crutches; goes up and down stairs daily. Was treated by longitudinal and lateral traction. (Class III.)

4. John M., 53 yrs., February, 1905. Examination 1–25–'08. Scarcely appreciable limp. Rotation a little restricted; flexion to 90°; abduction to 10°. Union firm. Shortening 1 cm. (Class II.)

5. Chas. M., 35 yrs., December, 1905. Examination 2–10–'08. No perceptible limp. Shortening 2 cm. Flexion normal; rotation normal; hardly any abduction possible. Was treated by longitudinal and lateral traction. (Class I.)

6. Margaret B., 50 yrs., January, 1907. Examination 2–10–'08. Uses cane on street. Marked limp without cane. Eversion slight; rotation fair; abduction and flexion normal. Union firm. Shortening 2 cm. Was not brought to hospital until 5 weeks after injury in 1907. (Class III.)

7. Jane C., 65 yrs., March, 1907. Examination 5–13–'08. Moderate limp; no disability; good union. Found at her home housecleaning, and moving furniture around. (Class II.)

8. Lena M., 56 yrs., February, 1907. Examination 1–23–'08. Habitually uses two crutches, but can walk with only one cane. Very little limp when using cane. Goes up and down stairs easily. Firm union. Shortening 4 cm. (Class III.)

9. Eliza K., 70 yrs., June, 1905. Examination 4–2–'08.

Slight limp, no cane. Goes up and down stairs often each day, but not leg over leg. Eversion slight, rotation slight, abduction to 18°, flexion to 90°. Union firm. Shortening 1 cm. (Class II.)

10. Pauline T., 55 yrs., January, 1906. Examination 3–23–'08. Decided limp; uses one crutch on street, one cane at home. Goes up and down stairs constantly; uses sewing machine all day, working it with either foot indifferently. Rotation good; flexion to 90°, abduction to 20°. Union firm; shortening 2.5 cm. Was treated by longitudinal and lateral traction. (Class III.)

11. Anna C., 35 yrs., March, 1906. Report 5–13–'08. Marked limp, moderate outward rotation; perfect use. (Class II.)

12. Charles W. S., 70 yrs., June, 1906. Examination 4–20–'08. No limp, no disability of any kind. All functions normal. No shortening. X-ray showed fracture through base of cervix. (Class I.)

13. Mary G., 58 yrs., October, 1906. Examination 5–16–'08. Moderate limp; flexion to 90°; slight eversion. Union firm; shortening 5 cm. Scarcely any disability. (Class II.)

14. Jane McC., 78 yrs., May, 1905. Examination 5–20–'08. Very little limp; scarcely any disability. Union firm. No eversion. Shortening 2 cm. (Class II.)

15. Margaret G., 80 yrs., December, 1905. Report 5–20–'08. Died about three weeks after discharge; never left bed after return from hospital. Recorded in hospital records as "unimproved." (Class IV.)

16. Joseph S., 62 yrs., August, 1905. Report 5–23–'08. Moderate limp; always uses cane. Works as watchman. (Class III.)

17. Catharine B., 63 yrs., November, 1907. Report 5–23–'08. Scarcely appreciable limp; no disability at all. Fracture was impacted. (Class II.)

18. John B. M., 15 yrs., October, 1906. Examination 4–20–'08. No limp; flexion to 15° beyond right angle; abduction 5°; shortening 2.5 cm. Typical case of traumatic coxa vara. (Class I.)

19. Joseph K., 68 yrs., July, 1907. Examination 4–20–'08. No appreciable limp; slight eversion; flexion to 15 degrees beyond right angle; abduction 10°. Shortening 0.75 cm. Works as blacksmith. (Class I.)

20. Maxwell L., 78 yrs., October, 1907. Report 4–20–'08. Incapacitated; unable even to use crutches. (Class IV.)

21. Lydia L., 75 yrs., April, 1905. Report 5–28–'08. Died of pneumonia in January, 1907, nearly two years after fracture of hip. Until within a few days of death walked with scarcely appreciable limp, and with no disability. (Class II.)

THROUGH OR BELOW TROCHANTERS.

1. Gottlieb F., 45 yrs., December, 1905. Examination 5–16–'08. No limp; no deformity. Shortening 1 cm. (Class I.)

2. Carrie M., 12 yrs., June, 1906. Examination 5–16–'08. No limp; no shortening. Treated on double inclined plane. (Class I.)

3. Thomas H., 60 yrs., August, 1906. Examination 5–13–'08. No limp; no disability. Had double fracture of femur. (Class I.)

4. Daniel H., 40 yrs., May, 1907. Examination 4–20–'08. Moderate limp; works as rigger at Cramp's shipyard; climbs ladders constantly. Upper fragment slightly displaced forward. Shortening 4.5 cm. (Class II.)

5. Joseph Q., 57 yrs., September, 1906. Examination 4–20–'08. Limp not noticeable; flexion to 15 degrees beyond right angle. Shortening 1 cm. (Class I.)

6. Bernhard P., 43 yrs., March, 1905. Examination 2–6–'08. No perceptible limp; rotation slightly restricted; all other functions normal. Slight thickening through trochanters. Shortening 2.5 cm. (Class I.)

7. Joseph S., 69 yrs., December, 1905. Report 5–13–'08. Very slight limp; all functions normal. (Class II.)

8. Susan D., 70 yrs., July, 1907. Examination 1–4–'08. Walking with cane; slight limp. Had fractured same femur three months before admission for recent refracture. (Class III.)

9. Annie D., 65 yrs., March, 1906. Examination 5–23–'08. Walks around house without crutch; goes up and down stairs several times daily. Marked limp. Shortening 4.5 cm. Had also Pott's fracture of same leg, at same time as fracture of femur. (Class III.)

SHAFT.

1. Harry M., 6 yrs., September, 1905. Report 5–16–'08. No limp; all functions perfect. (Class I.)

2. Franklin C., 18 yrs., September, 1905. Examination 2–6–'08. Scarcely perceptible limp; all functions normal. Shortening 1 cm. (Class II.)

3. Robert L., 53 yrs., October, 1905. Report 5–16–'08. No limp; no disability; wife cannot tell which was the injured side. (Class I.)

4. John B., 13 yrs., October, 1905. Examination 1–28–'08. No limp, all functions normal. Shortening 1 cm. (Class I.)

5. John R., 34 yrs., November, 1905. Examination 3–19–'08. No limp; all functions normal except flexion of knee, which is impossible beyond 35 degrees more than right angle. Shortening 1 cm. Some callus at site of fracture, which was comminuted. (Class I.)

6. Harry D., 7 yrs., February, 1906. Examination 3–19–'08. Very slight limp; all functions normal. No shortening. Limp probably due to fracture of lower third of leg bones on same side, sustained since recovery from fracture of femur. (Class II.)

7. Geo. M., 54 yrs., May, 1906. Examination 5–16–'08. No limp; all functions normal. No shortening. (Class I.)

8. Fred. K. C., 41 yrs., June, 1906. Examination 4–18–'08. Slight limp; all functions normal. Shortening 0.5 cm. Had same hip injured again shortly after discharge from hospital. (Class II.)

9. Benjamin S., 27 yrs., August, 1906. Report 5–16–'08. Slight limp; all functions normal. (Class II.)

10. John K., 15 yrs., January, 1907. Examination 4–18–'08. No limp; all functions normal. Shortening 1.5 cm. Was crushed in elevator, sustaining contusions of pelvis, fractures of left femur, and of middle third of both bones of left leg. (Class I.)

11. John M., 43 yrs., November, 1906. Examination 5–16–'08. Slight limp; all functions normal; shortening 2 cm. Had also fracture of olecranon. (Class II.)

12. George D., 53 yrs., November, 1906. Examination 4–18–'08. Slight limp; flexion of hip only to 10° beyond right angle; all other functions normal. Shortening 1 cm. When 7 years of age had extensive operation on this femur for osteomyelitis. (Class II.)

13. James H., 10 yrs., May, 1907. Examination 4–21–'08. No limp; all functions normal. Shortening 1 cm. (Class I.)

14. William H., 30 yrs., June, 1907. Examination 5–13–'08. No limp; all functions normal. Shortening 0.5 cm. Had also fractures of both forearms, compound comminuted of left; concussion of brain; and delirium tremens. (Class I.)

15. Albert F., 4 months, September, 1907. Examination 4–21–'08. No deformity; functions all normal. No shortening. (Class I.)

16. John F., 15 yrs., October, 1907. Examination 4–23–'08. No limp; all functions normal. Upper fragment is displaced slightly outwards. Shortening 1.5 cm. (Class I.)

17. William M., 49 yrs., November, 1904. Report 5–18–'08. Committed suicide one year ago. Still had slight limp, but no other disability. (Class II.)

18. Annie K., 70 yrs., December, 1904. Examination 5–18–'08. No limp, no disability. Shortening 1 cm. (Class I.)

19. John S., 8 yrs., May, 1907. Examination 5–18–'08. No limp; all functions normal. Shortening 1.5 cm. (Class I.)

20. Joseph C., 5 yrs., November, 1907. Examination 5–18–'08. No limp; all functions normal. No shortening. (Class I.)

21. Joseph G., 16 yrs., March, 1906. Report 5–23–'08. Very slight limp; no disability at all. Same femur broken twice. (Class II.)

22. Marie K., 2 yrs., August, 1906. Examination 5–23–'08. No limp; all functions perfect. No shortening. (Class I.)

SUPRACONDYLAR.

1. Ungar D., 29 yrs., July, 1905. Report 5–16–'08. Had slight limp two years ago. (Class II.)

2. Samuel M., 44 yrs., September, 1905. Examination 1–30–'08. Scarcely perceptible limp; full extension, but flexion only to 10 degrees beyond right angle. Shortening 3 cm. This was a fracture through the external condyle, involving the knee-joint; and the patient had had a fracture through lower third of same femur five years before this injury. (Class I.)

3. Arthur D., 7 yrs., January, 1906. Examination 3–19–'08. No limp; not quite complete extension of knee. No shortening. This was a compound epiphyseal separation. (Class I.)

4. Nellie S., 27 yrs., February, 1907. Examination 5–16–'08. No limp; flexion of knee only to right angle; all other functions

normal. Shortening 2 cm. This was a fracture of external condyle, involving joint. (Class I.)

5. Mrs. W., 63 yrs., March, 1907. Examination 5–13–'08. Marked limp; no disability. Shortening 3 cm. (Class II.)

6. John D., 45 yrs., December, 1907. Examination 4–21–'08. Marked limp; all functions normal. Lower fragment is posterior and external. Wears heel three-quarters of an inch high. Shortening 4 cm. (Class II.)

7. William M., 65 yrs, April, 1905. Examination 5–20–'08. No limp; no disability. Shortening 5 cm. (Class I.)

8. Hannah C., 62 yrs., May, 1905. Examination 5–20–'08. Crippled by rheumatoid arthritis in knees and hips; barely able to walk; has not been out of house since return from hospital. Does no work. Right knee is more stiff and disabled than the fractured knee. (Class IV.)

9. James McC., 55 yrs., October, 1906. Report 5–20–'08. Incapacitated; still uses one crutch and cane. This fracture involved knee-joint; and the patient had previously had a fracture of cervix of same femur, which had united with shortening and deformity. (Class IV.)

Dr. Richard H. Harte said he could not understand why so many surgeons, instead of sticking to old and tried methods of procedure always wanted to try something else just because it was new. He really thinks it remarkable that in fractures of the thigh the results are so good, for he thinks this bone, above all others, is badly treated. Everyone seems to think that in order to treat a fracture of the thigh all that is necessary is to hang on to the heel 6 or 8 pounds of weights, paying no attention to the extension of the leg or the relative position of the sand-bags to the leg.

He thinks Dr. John Ashhurst is the surgeon to whom the greatest thanks are due for the conservative treatment of fractures of the thigh. To obviate the use of sand-bags he reverted to the use of the old-fashioned Dupuytren's splint in conjunction with bran-bags and weights.

Dr. Harte does not recall a single case of ununited fracture of the thigh in his experience. In cases where there are multiple fractures, great allowance should be made, as Nature is only capable of repairing a certain number of fractures at a time. Very often the larger bone is the one which will be the slowest to unite.

Dr. G. G. Davis said he thought the results in these cases rather surprising. When it comes to fractures below the neck we rather expect unfavorable results, but here in 21 cases of the neck we find 5 cases with apparently perfect functional results; 8 with no disability but a limp; 6 with marked impairment of function; and only 2 incapacitated. It is not infrequent for patients with intracapsular fractures to take to their beds and remain there until they die. Dr. Davis thought if the impairment of function in the 6 cases mentioned even allowed the patients to get around at all, that the results were surprisingly good, particularly when it is remembered that in these cases there were various forms of treatment. He understood that some of the methods pursued were not the so-called modern methods of abduction or lateral traction, but were simply the employment of the ordinary Buck's extension.

Dr. A. P. C. Ashhurst, in closing, said that of the 5 patients with fracture of the neck of the femur who recovered without functional impairment, two were children; one was a man 70 years of age. When this latter patient came back to the hospital with no impairment whatever, it was necessary to look up his history, which showed that the diagnosis had been confirmed by a skiagraph, to convince the examiners that he had really sustained a fracture of the neck of the femur. Dr. Ashhurst added that Dr. Newell and he agreed entirely with Dr. Harte that the question of shortening was of secondary importance, since, as Dr. Harte said, it was of course impossible to know what had been the length of the fractured limb before the accident. He thought, however, if a patient had been so unfortunate as to have one leg an inch or more longer than its fellow, he would have to be congratulated should the result of his fracture enable him to be discharged with two legs of equal length.

GERSUNY'S OPERATION FOR THE CURE OF ENURESIS.

Dr. Gwilym G. Davis presented a young girl, aged 15 years, who was admitted to hospital under his care with the following history: She had had most all of the diseases of childhood besides typhoid fever. Menstruation began at the age of 12, and she stated that she did not menstruate from the vagina but at each monthly period had considerable bleeding from the nose accompanied by headache. A year and a half previously she passed

through an attack of typhoid fever at another hospital. She has always been of a nervous disposition and a year ago began to have nocturnal incontinence of urine. She passed urine involuntarily five to seven times each night. She was under treatment for the trouble in the medical ward and was afterwards operated on for appendicitis three months previous to her present operation.

Urine: Sp. gr., 1020, acid, no albumin nor sugar; few epithelial cells; no urethral polypus or other abnormal conditions.

She was etherized and the urethra surrounded by a circular incision and loosened from its surroundings. It was then twisted three-fourths of a turn on its longitudinal axis until a feeling of resistance was experienced, the margin was then sewn to the adjacent tissues by interrupted sutures of fine chromic gut. A catheter was inserted and retained for two or three days. Primary union occurred and she was soon discharged from the hospital cured.

The procedure used in this case was that devised by Gersuny (Centralblatt für Chirurgie, 1888) and is similar to his well-known operation for incontinence of feces (Centralblatt für Chirurgie, 1893, 261). While his operation on the rectum is widely and favorably known, his operation on the urethra is comparatively little known and rarely employed. Incontinence of urine is so much more common than incontinence of feces that the field for the operation in the former class is much the wider. It is an operation comparatively easy of performance, lacking in any serious danger or after-effects and apparently efficient. It only needs to be more widely known in order to be more extensively employed.

A METHOD OF ANASTOMOSING THE DIVIDED VAS DEFERENS.

Dr. Gwilym G. Davis said that a couple of years ago while aiding an inexperienced assistant to do an operation for the radical cure of an inguinal hernia the vas deferens was torn. It was strongly adherent to the hernial sac and in attempting to detach it he tore it in two.

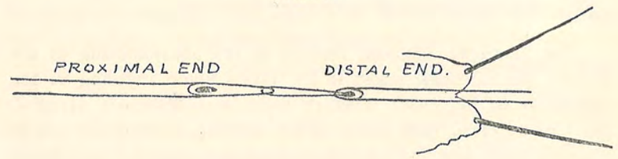
At the time the only methods known to Dr. Davis of repairing the injury were those which had been used for anastomosis of the ureter. The only method, as far as he knows, which has been devised for the anastomosis of the vas deferens is that of

G. Frank Lydston (Annals of Surgery, July, 1906, p. 92, vol. xliv.) who cut the ends off square, then introduced a filament of silkworm gut on a filiform bougie through an opening in the side and sewed the two square cut ends together. The sheath of the cord was then sewn around the point of union and the bougie withdrawn in ten days.

The method adopted in the present case was a modification of that devised by Poggi for the ureter. Poggi (Archives Provinciales de Chirurgie, vol. vi, June 1, 1896, quoted by Morris Surg. of Kidney and Ureter) dilated the distal end of the ureter and drew the proximal end into it by two sutures, one on each side. Both ends of the ureter were cut off square.

Mayo Robson modified this by slitting the distal end to facilitate the entrance of the proximal end. Van Hook introduced the proximal end through a slit in the distal end on which a ligature had been placed to close its extremity. In the case now reported the proximal end of the divided vas was cut off obliquely so as to leave a moderately long pointed extremity; the distal end was cut off on a short bevel, about 45°.

Fig. 1.



A piece of fine catgut was then threaded on two fine round sewing needles. One of these needles was passed through the tip of the proximal end then introduced into the lumen of the distal end and made to pierce the wall well beyond the opening. The second needle was then likewise introduced and brought out close to the first (Fig 1).

Traction was made on the threads and the pointed extremity of the proximal end entered the lumen of the distal end without the slightest trouble until its apex reached the point of emergence of the needles. The catgut was then tied and the apex fixed in place. Two additional fine catgut sutures were introduced, fixing the extremity of the distal end to the side of the proximal end

as seen in the lower figure (Fig. 2). Healing occurred by primary union, no epididymitis nor testicular complication occurred, and as far as known the result was satisfactory.

In making the anastomosis care should be taken not to make the pointed bevel on the proximal end too long and also to introduce the needles nearly or quite their fell length before piercing the side of the tube. The object of these two precautions is to separate as far as possible the two openings in the proximal and distal ends.

It appears to be unnecessary to slit the ends as did Mayo Robson and Van Hook in the ureter, and the procedure seems both easier of performance and more sure than that of Lydston.

FIG. 2.

DR. JOHN H. GIBBON, relative to the anastomosing of the divided vas deferens, asked if Dr. Davis knew anything of the end-result in his case; whether there was testicular atrophy. Dr. Gibbon once, very much to his distress, divided the vas in a young man, and did an invagination anastomosis, very much after the style of Murphy's anastomosis of a blood vessel. Although he was very much disappointed at the time of this accident, he got a great deal of comfort in finding out that a number of men who had done a large number of hernia operations had had a similar experience. He feels certain, however, that such an accident having once occurred, it is never likely to be done by the same operator again. In reply to this question Dr. Davis stated that the later history of the patient was not known to him.

THE USE OF ETHYL CHLORIDE AS A GENERAL ANÆSTHETIC IN THE PENNSYLVANIA HOSPITAL.

BY W. ESTELL LEE, M.D.,

Chief Resident Physician of the Pennsylvania Hospital.

DR. CHARLES F. MITCHELL, in the winter of 1902, first used ethyl chloride for general anæsthesia in the receiving ward of the Pennsylvania Hospital, and it proved so satisfactory for short light anæsthesias that it was introduced into the general surgical wards and there used for minor operations and painful surgical dressings. Dr. Francis O. Allen, when Resident Anæsthetist, first used it in combination with ether and chloroform during the early part of 1903.

There are now records of its use in 5575 cases during the period commencing December, 1902, and ending June 1, 1908, as follows: Alone, in 947; with anesthol, in 47; with anesthol and ether, in 391; with ether, in 4148; with scopalamine and morphia, in 1; with chloroform, in 2; and with intraspinal injections of stovaine, in 39.

The youngest patient was 24 hours old and the oldest 84 years. The lengths of the anæsthesias have varied from several seconds to 54 minutes. The average dosage for 3 minutes has been 10 grammes.

Bengue's preparation of ethyl chloride was first used, but it was soon found that an American product known commercially as antidolorin was just as satisfactory and the latter has been used in practically all of the cases.

Several of the many forms of closed and semiclosed inhalers devised for its administration have been tried and abandoned for gauze. If a prolonged anæsthesia is desired or the ethyl chloride is to be followed by another anæsthetic, the patient should have the usual anæsthetic preparation; otherwise, it may be given without this preparation. Lying in the supine position the patient is told to breathe quietly, close the

eyes and prepare for sleep. Upon several layers of wide mesh gauze, held from 6 to 8 inches from the face, the anæsthetic is slowly dropped. As the patient becomes drowsy the dose is increased and the gauze brought closer to the face and with the loss of consciousness, the gauze, 4 to 8 layers thick, is placed over the mouth and nose and the ethyl chloride given with the spray. Sometime before the loss of consciousness the patient is anæsthetic to very severe pain and many minor operations requiring but a few minutes may be done in this stage. Frequently in this stage there is a respiratory arrest, especially if the anæsthetic has been given too rapidly or too concentrated, but with its continued administration the respirations are resumed becoming slower and deeper. With the progress of the anæsthesia the eyeballs begin to roll and the pupils partially dilate when the patient enters the second stage, in which there is deep anæsthesia without, however, much muscular relaxation and with, frequently, considerable muscular rigidity and spasm. Progressing still further the eyeballs become fixed, the pupil widely dilated and immobile, the corneal reflex disappears and the face is flushed and covered with perspiration. This is undoubtedly the danger-line beyond which the respirations become insidiously shallower with consequent deepening cyanosis, there may be an external squint of the eyeballs and frequently muscular rigidity and spasm or as rarely occurs general relaxation. The fatalities seem to be due primarily to respiratory and secondarily to cardiac failure. Large and Brown, in their experiments on dogs, seem to have confirmed the clinical observations that there is always a fall of blood-pressure, which in a few cases may be preceded by a temporary rise, and their explanation of the respiratory failure is that it is due to a paralysis of the respiratory centre produced possibly by the lowered blood-pressure.

When ether is to follow the ethyl chloride it is gradually introduced drop by drop upon the same gauze at the period when the patient loses consciousness and while its dosage is rapidly increased, the ethyl chloride is gradually withdrawn. If, however, a sudden change is made from the ethyl chloride

to the ether, the patient will in the majority of cases recover from the ethyl chloride intoxication before that of the ether appears. It is the feeling in the hospital that with this slow induction requiring from 2 to 3 minutes, the gradually increasing dosage and the free admission of air allows a more careful observation of the progress of the anæsthesia and a timely recognition of the danger-line, and when one remembers that with large concentrated doses and a closed inhaler a patient can be carried beyond this line in from 8 to 20 seconds this will be understood, also with this method we do not have the frequent occurrence of muscular spasm, post-anæsthetic vomiting and headache so strongly emphasized by those using the closed method.

Safety is undoubtedly the first consideration in the use of any anæsthetic and though ethyl chloride has been used since 1847 and very generally used in England and on the continent since 1897 there is still a great difference of opinion as to its mortality. Hewitt places it between ether and chloroform with an estimated mortality of 1–10,000 and in the latest edition of his book quotes McCardie's figures of 1–3000. Luke makes one estimate of 1–8000 and a few months later 1–150,000. Each of these men have had personal experience in over 2000 cases without any fatalities. Herrenknecht reports 3000 cases without a mishap.

Such varied difference of opinion, Hawley suggests, would indicate that there may be other elements present, independent of the anæsthetic itself, to cause death, and a careful analysis of the reported fatalities seems to support this suggestion. There are recorded in literature in a rather imperfect way some 21 cases which have been collected by Luke, and to these we now add 4 more. Another fatal case reported by Dr. Allen is case No. 3 in this list.

In view of Hawley's suggestion an analysis of these cases is very interesting.

Case 2 was a 12-months-old child with diphtheritic laryngeal obstruction.

Case 5 was a large healthy man 24 years of age with a huge

eyes and prepare for sleep. Upon several layers of wide mesh gauze, held from 6 to 8 inches from the face, the anæsthetic is slowly dropped. As the patient becomes drowsy the dose is increased and the gauze brought closer to the face and with the loss of consciousness, the gauze, 4 to 8 layers thick, is placed over the mouth and nose and the ethyl chloride given with the spray. Sometime before the loss of consciousness the patient is anæsthetic to very severe pain and many minor operations requiring but a few minutes may be done in this stage. Frequently in this stage there is a respiratory arrest, especially if the anæsthetic has been given too rapidly or too concentrated, but with its continued administration the respirations are resumed becoming slower and deeper. With the progress of the anæsthesia the eyeballs begin to roll and the pupils partially dilate when the patient enters the second stage, in which there is deep anæsthesia without, however, much muscular relaxation and with, frequently, considerable muscular rigidity and spasm. Progressing still further the eyeballs become fixed, the pupil widely dilated and immobile, the corneal reflex disappears and the face is flushed and covered with perspiration. This is undoubtedly the danger-line beyond which the respirations become insidiously shallower with consequent deepening cyanosis, there may be an external squint of the eyeballs and frequently muscular rigidity and spasm or as rarely occurs general relaxation. The fatalities seem to be due primarily to respiratory and secondarily to cardiac failure. Large and Brown, in their experiments on dogs, seem to have confirmed the clinical observations that there is always a fall of blood-pressure, which in a few cases may be preceded by a temporary rise, and their explanation of the respiratory failure is that it is due to a paralysis of the respiratory centre produced possibly by the lowered blood-pressure.

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Case 5 was a large healthy man 24 years of age with a huge

submaxillary abscess. Several minutes after the removal of the anæsthetic and after the abscess had been opened, respirations stopped so suddenly as to suggest that there was some acute laryngeal obstruction. At least four minutes later a tracheotomy was done without the reëstablishment of respiration. The autopsy showed marked œdema of the glottis with a relaxed fold of the mucous membrane over the abscess wall " which might have been " sucked into the small air-passage of the glottis.

Case 6, a male 67 years old, whose autopsy showed a very large mass of malignant cervical glands encroaching upon the lumen of the pharynx and larynx and involving the vocal cords.

Case 3, reported by Dr. Allen in 1903, was a colored man 28 years of age with an incarcerated hernia. He had been vomiting freely but the vomitus was not fecal in character, otherwise his condition was good. During the change from ethyl chloride to ether he suddenly recommenced vomiting and brought up large quantities of a clear fluid. This lasted three to four minutes, after which respirations were not resumed. An examination by the surgeon failed to show any pharyngeal or laryngeal obstruction and he considered it an anæsthetic death. There was no autopsy.

Case 22.—Ethyl chloride was chosen as the anæsthetic for a negro 17 years of age, with an acute ischio rectal abscess, because of a harassing cough, profuse expectoration and signs of a chronic consolidation of the left lung. He was placed in the lithotomy position, and though never deeply anæsthetized, received considerably more than the usual ten grammes for the anæsthesia extended over a period of more than 15 minutes. Ten or fifteen minutes after the withdrawal of the anæsthetic there was a violent paroxysm of coughing, after which the respirations ceased and were not reëstablished with vigorous stimulation, artificial respiration and tracheotomy. The pulse in this case continued beating for some time after the respiratory arrest. At the post-mortem examination the whole left lung was found to be involved in a tuberculous consolidation with a small cavity in the apex; there was a tuberculous pericarditis with a large amount of fluid in the sac and a tuberculous peritonitis.

Case 23.—A negro 30 years old, while attempting a highway robbery one week previous to his admission to the hospital, received a load of buckshot in the lower part of the left axilla.

He had remained in hiding all this time without medical attention and when he entered the hospital there was a large gaping wound in the lower portion of the left axilla and the physical signs of a general peritonitis and profound sepsis. While being placed upon the operating table his pulse became imperceptible and after receiving less than a gramme of ethyl chloride given in the usual way and before any operative procedure could be commenced his respirations gradually ceased. The autopsy showed a large wound of the left pleura and an empyema of the same pleural cavity; a wound and empyema of the pericardial cavity; a wound of the diaphragm; perforations of the stomach and intestines and a purulent peritonitis.

Case 24.—D. H., an unmarried negress, 30 years of age, was being treated in the medical wards for Adiposa Dolorosa and developed a Ludwig's Angina, associated with marked laryngeal obstruction. Incisions beneath the jaw opened the sublingual tissues and allowed a few drops of pus to escape. When the patient was placed in the dorsal position the laryngeal obstruction was considerably increased and after receiving about 5 grammes of ethyl chloride given in the usual way her respirations stopped, the pulse remaining unaffected, but with the removal of the anæsthetic and artificial respiration they were quickly resumed. Twenty-four hours later, the œdema and the laryngeal obstruction having increased, another operation was attempted and as before the respiratory obstruction was greatly increased by the dorsal position and after receiving about a gramme of ethyl chloride it became complete and was never reëstablished, though a quick tracheotomy was done. The autopsy showed acute inflammation and œdema of the pharyngeal, sublingual and cervical tissues with œdema of the glottis.

Case 25.—A young married negress with the diagnosis of tubo-ovarian abscess was given an unknown quantity of ethyl chloride preliminary to a proposed ether anæsthesia. After taking the anæsthetic for one or two minutes the respirations suddenly ceased and though the pulse could be felt for a short time after the respirations had stopped it soon disappeared and cardiac stimulants together with artificial respirations produced no effect. There was no postmortem examination and a physical examination made just before the anæsthetic was given was negative except for the presence of a loud systolic heart murmur without any signs of lost compensation.

Seven of these fatalities recorded in the literature occurred during dental operations and the anæsthetic was given by the dentist or his assistant. In eight cases the patients were in the upright position when the ethyl chloride was administered. In seven cases where the method is recorded a closed or semi-closed inhaler was used 3–6 c.c. of the ethyl chloride being sprayed at once into the bag and given to the patient.

The occurrence of several deaths under anæsthesia at Guy's Hospital is the cause for an editorial in the *Hospital*, London, in which anæsthetic deaths are carefully considered. During the period of 6 years from 1901 to 1907 there occurred at Guy's 36 deaths under anæsthesia; in another hospital 31 in 85,000 anæsthesias, and in still another 7 in three years. And it raises the question of whether it is right to credit all of the operative deaths which occur under anæsthesia to the anæsthetic when the surgeon wishing to give the patients every possible chance will operate upon them when almost moribund. It also criticizes the compiling of statistics from various hospitals and thus estimating mortalities.

With these criticisms in mind we have reviewed the records of all the anæsthesias given in the hospital during this same period of five and a half years. They were administered by the Resident Anæsthetizers and Resident Physicians. Squibb's ether was used in practically all of these cases. In a very few, during the early part of the period, the anæsthetics were given with an Allis inhaler, in all of the remaining ones the gauze and drop method was employed.

There have been 5575 cases in which ethyl chloride has been used as a general anæsthetic and during the administration of which 5 cases died. The ethyl chloride was used alone in 947 times and all of these deaths occurred while it was being used in this way and none when used in combination with other anæsthetics, ether, chloroform, or anesthol, of which there were 4628. The fact that the ethyl chloride was given first and to all the cases which were considered bad anæsthetic risks distorts these statistics:

Ether was given 5592 times and during its administration 3 deaths occurred. As with the ethyl chloride all of these deaths occurred while it was being used alone in 1444 cases, one as the operation was begun, the other two near their completion.

An agent which may in 15–20 seconds produce deep anæsthesia and whose danger-signs are so easily passed cannot be used with impunity, and a few of the reported fatalities certainly demonstrate its danger in inexperienced hands. Another objection to its use is the muscular spasm and rigidity which occurs especially in alcoholics and very frequently in others. This, however, may be overcome more or less by the preliminary use of morphia and atropine and by following the ethyl chloride with ether.

Its advantages, on the other hand, are very tempting. For the patient there is no irritation of the respiratory tract with its usual coughing, increased secretions, gagging and vomiting; and therefore no respiratory struggle so often seen in ether and chloroform anæsthesia. The rapid onset of unconsciousness is not to be overlooked and its advantage will be appreciated by any who have taken ether patiently for 6 to 10 minutes. And most important the usual amount of ether necessary for the induction of anæsthesia to the third stage is eliminated and as this averages four ounces with the open drop method the excretory organs are saved a considerable task. In our experience it certainly lessens the occurrence of post-operative vomiting.

To the anæsthetist the ease and rapidity of induction with complete elimination of the preliminary stages of ether and chloroform speaks for itself.

Though the mortality with ethyl chloride in this series of cases, is apparently greater than that of ether it is still being used in the hospital for (*a*) minor surgical procedures where a short anæsthesia of a few seconds to five minutes is desired; (*b*) the dressing of the more painful surgical wounds, such as the removal of abdominal packs; (*c*) and in combination with ether and chloroform.

Dr. G. G. Davis asked how many of the patients which died were colored people? He thinks anæsthetics are far more fatal with this race than with white people because their color prevents the early recognition of the changes due to failure in the circulation.

Dr. John H. Gibbon said Dr. Lee had shown how superlatively statistics can lie, and he thinks that everyone reaches his own conclusions as to the safety of anæsthetics from his personal experience. For five or six years Dr. Gibbon has used chloride of ethyl absolutely for short operations, nothing but chloride of ethyl, and practically always uses it as a preliminary to ether. He has in his experience but one death to report. That was in a man who had a Ludwig's angina and an endocarditis. He was afraid to give him any general anæsthetic because of his heart condition, and therefore infiltrated the line of incision with Schleich fluid first, and then he found that the patient had a lot of exudate deep down in his neck and manipulation was very painful, so it was necessary to give him an anæsthetic. Chloride of ethyl was given, followed by ether, and Dr. Gibbon then evacuated a quantity of turbid fluid from behind the sternum. Just as this fluid was evacuated the patient ceased breathing and died on the table. No ether had been given for a number of minutes, as the patient seemed completely anæsthetized. A quick tracheotomy was done and artificial respiration kept up for some time, but without avail.

As Dr. Lee has said, deaths in these cases occur from any anæsthetic. Excepting the case just recorded Dr. Gibbon has never had a death from chloride of ethyl, and he has used it thousands of times with the greatest impunity. His feeling is that in safety it occupies a place between ether and chloroform. Most people think it more fatal than ether, and probably less than chloroform. Dr. Gibbon gives it to the youngest and to the oldest patients—children a few days old, very ill patients with typhoid perforation, and patients with tuberculous lesions of the lungs. It is the anæsthetic of choice in his worst cases.

In one, a tuberculous case, he resected four ribs for empyema, and he has done other extensive operations lasting as long as twenty minutes. In the cases where death has occurred, he thinks it would have occurred with any anæsthetic. He has had more than one death occur on the table from ether alone, and in one

of these cases there was no pulmonary or cardiac lesion. The patient was suffering from tuberculous glands of the neck and died just as the incision was made.

Dr. Gibbon's experience with chloride of ethyl makes him feel that it is a safer anæsthetic than ether. It is not disagreeable to take, and he says this because he has himself taken it. He does think it should be given with discretion. It has the great advantage of shortening the time for the anæsthetic and cutting down the amount of ether which the patient will have to inhale and afterwards eliminate.

In comparing the mortality in anæsthesias we should also include the cases of postoperative pneumonia, bronchitis and suppression of urine occurring as a result of ether.

Dr. A. P. C. Ashhurst reminded the Fellows that his father, the late Dr. John Ashhurst, Jr., used to lay a great deal of stress on giving ether in a good light, and constantly inveighed against the miserable dark holes provided for the administration of anæsthetics in one large hospital to which he was surgeon.

Dr. Richard H. Harte had used ethyl chloride a great deal and for many years, but is not as enthusiastic over its use as some operators are. Every time he gives it it is with a feeling of uncertainty, because one cannot carelessly give an anæsthetic which is so quick in its action. He has many times started to count twenty with the beginning of this anæsthetic and by the time twenty would be reached the patient would be completely anæsthetized. The great danger of this anæsthetic is therefore the little warning which is given. It is, however, one of the most delightful anæsthetics which can be imagined—no nausea, no choking sensation, no distress of any kind, the patient simply passing into a quiet sleep.

Dr. Harte feels, however, that if it was used as indiscriminately and as carelessly as is ether, the mortality from its use would be much greater. He considers it a great wonder, with the careless way in which ether is administered, that its mortality is not greater. Ethyl chloride is given by few surgeons, and only practically by persons skilled in its use or in the use of anæsthetics, and consequently the mortality rate is low. It has a great many advantages, particularly preliminary to the administration of ether, and it has also undoubtedly cut down the quantity of ether necessary to complete unconsciousness.

Dr. Harte never gives ethyl chloride except as a preliminary in any case where he expects a delay. He uses it for opening an abscess or for putting in a drainage-tube, but where the patient is to be kept under the anæsthetic for any length of time, say more than five or six minutes, he does not use ethyl chloride.

Relative to the remark made by Dr. Gibbon that he had never experimented with anæsthetics on himself, Dr. Harte thought more could be learned from such experimentation than from the anæsthetization of five hundred other people.

Dr. W. Joseph Hearn agreed with Dr. Harte that the rapidity with which anæsthesia is induced with chloride of ethyl is its chief danger. A few years ago at the Jefferson Hospital when the bottle of ether was immersed in a tub of hot water during administration it was found that the concentration of the vapor was too great, and this method of administration consequently had to be abandoned because the anæsthesia was induced so rapidly that it was hard to recognize the danger signals.

Dr. Walter E. Lee, in closing, said that in regard to the color of the patients who died, all five of them were negroes and that one of the ether deaths occurred in a patient of this same race. The question of the rapidity of the appearance of anæsthesia, of which Dr. Harte and Dr. Hearn have spoken, is undoubtedly an objection to the general use of ethyl chloride. As it is given in England in large mass doses of from 3 to 10 c.c. in a closed inhaler with the admission of very little air, deep anæsthesia is reached after 5 or 10 inspirations. In Dr. Lee's experience the danger signs during the administration of ethyl chloride are very difficult to recognize, the slowing of the respiration is insidious and they have probably ceased for some seconds before the anæsthetist realizes it. For this reason the closed inhalers have been abandoned in the hospital and the open method used which has lengthened the administration period from 8 to 10 seconds to 3 to 4 minutes, giving more time for the recognition of the danger signals.

STATED MEETING, HELD OCTOBER 5, 1908.

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

GUNSHOT-WOUND OF THE ABDOMEN.

Dr. Charles F. Nassau presented three patients who had sustained gunshot-wounds of the abdomen. He said that it had always been his practice to immediately explore all gunshot-wounds in which there was a possibility that the ball might have entered the abdomen. Naturally, one should not do this, unless surrounded by the proper conditions and with the proper help to go ahead and perform any operation that the conditions found might necessitate. It seemed to him axiomatic that no gunshot-wound or stab-wound should be treated expectantly where there is the slightest suspicion of penetration of the abdominal cavity. The risks of delay are so disastrous and the danger of exploration so slight that the patient should be given the benefit in every instance.

Case I.—A white woman, aged 22, married, was admitted to St. Joseph's Hospital January 16, 1906, with the history of having been shot by her husband. When seen by Dr Nassau about three quarters of an hour after the injury, she showed such marked symptoms of internal hemorrhage that she was removed at once to the operating room. She was etherized, scrubbed and operated upon at once. The wound of entrance was situated about two inches to the left of the middle of a line drawn from the anterior superior spine of the ilium of the umbilicus. The ball had travelled upward and inward for about three inches in the abdominal wall, before it penetrated the peritoneal cavity. On opening the abdomen, there was a free gush of a large quantity of bright red blood which was found to be coming from a large vessel towards the root of the mesentary of the small intestine. This was at once ligated. There were found altogether five perforations of the small intestine, two perforations of the mesentery, and one each of the greater omentum and the gastrocolic omentum. The patient was given an intravenous transfusion of salt solution during the course of the operation. She was on the

operating table one hour and twenty-five minutes. The abdominal wound was closed without drainage by a combination of buried and through-and-through sutures. Wound healing was by first intention.

The patient's temperature fluctuated between 100 and 102 for 10 days. It came down to normal for four days; then for 28 days it ranged from 99 to 101; then for four days from 101 to 104, followed by five days of normal temperature. There remained a slight elevation of temperature until her removal from the hospital on April 12, 1906.

In explanation of this fever he stated that while she was being put to bed, after the operation, it was discovered that she had another bullet-wound, entering about two inches to the right of the eleventh dorsal vertebra. This bullet was lodged to the left of the spine, as shown by an X-ray plate, and had in its course completely divided the spinal cord. She was, of course, totally paralyzed from the waist down. This injury ultimately caused her death, some months after she was removed to her home.

CASE II.—Colored, aged 25, single. Shot at 11 P. M., March 7, 1908. Walked four squares to the station-house, from which he was brought to St. Joseph's Hospital, in the patrol wagon at midnight. The patient walked from the patrol wagon to the receiving ward, suffering no distress whatever. He had not vomited, and his pulse, temperature and respiration were normal. The wound of entrance was one inch above the crest of the ilium in the mid-axillary line on the left side. The bullet could be felt under the skin one and a half inches to the right of the umbilicus. He was operated on at 1.30 A. M., and was on the table one hour and thirty-eight minutes. After exploring the wound of entrance, and determining that the peritoneal cavity was open, the abdomen was then opened along the outer border of the left rectus muscle from just below the margin of the rib to within an inch of the pubes. There were found two perforations in the transverse colon; these were so large and so close together that it required a sutured area nearly six inches in length to make a safe closure of the bowel. There were 12 perforations of the small intestine; two perforations of the mesentery of the small intestine with considerable bleeding; one perforation of the descending mesocolon, just above the sigmoid flexure. At one

spot the bowel was so abraded that it was almost a perforation. The abdominal wound was closed without drainage by buried catgut, and through and through silk-worm gut sutures. The temperature went up to 103 at 4 P. M. of the same day. It fell to 100 during the night, and reached normal in three days. A portion of the upper angle of the wound broke down in about ten days, and healed by granulation, leaving a very small fistula at the upper end of the incision connected with the small intestine. Otherwise, in every way his recovery was normal. During the second week of September the patient had a bad cough and one day coughed so violently that he broke open his wound, and two loops of small intestine, about a foot in length, were extruded. Fortunately for him, this happened while he was in the hospital; the bowel was replaced by the resident physician, and the wound packed with iodoform gauze. The temperature went up to 101, but came down to normal the next day. Condition October 4, 1908, temperature normal, pulse 80, respiration 20. Dr Nassau said that he proposed to close the fistula shortly.

CASE III.—A white woman, aged 24, married, was admitted to the receiving ward at St. Joseph's Hospital July 7, 1908, at 2.45 A.M., suffering from an accidentally inflicted gunshot-wound of the abdomen. She was vomiting great quantities of dark brown fluid, was much shocked, and seemed to be suffering an excessive amount of pain; temperature was 97, pulse 102, respiration 26. She was operated upon at 4.30 A.M. She was on the table one hour and thirteen minutes. The wound of entrance was about two inches to the right of, and one and a half inches above the umbilicus. The abdomen was opened through the right rectus muscle, and in the peritoneal cavity there was much free blood; this bleeding came from the wounds in the transverse mesocolon and from the stomach. There were found one perforation in the hepatic flexure of the colon, two perforations in the transverse mesocolon, one being near its root and involving a very freely bleeding vessel in the anterior layer which necessitated ligation, three perforations in the small intestine high up; one large perforation or slit, nearly three inches in length, just above the attachment of the gastrocolic omentum, about the junction of the left and middle thirds of the stomach. The abdomen was closed without drainage by buried catgut, and through-and-through silk-worm gut sutures. While searching for the source

of the hemorrhage, which came from low down in the mesocolon, he could see the point on the lateral internal surface of the abdominal wall, where the bullet had passed out from the abdominal cavity, and buried itself in the muscles of the back. This was just below the spleen and above the anterior surface of the left kidney. The temperature ranged from 100 to 102 for five days, and then dropped to 99 and gradually came to normal. A portion of the wound healed by granulation. She was discharged from the hospital absolutely well, August 23, 1908.

About ten days after leaving the hospital she returned to the dispensary, and the bullet was removed from beneath the skin at a point just below the costal border, and about four inches from the spines of the vertebra on the left side.

None of these cases were drained. During the course of the operation the intestines and abdominal cavity were flushed constantly and copiously with normal salt solution. He thought that none of these cases had waited long enough before operation to involve any great amount of soiling of the peritoneum. The only question in his own mind was as to whether the various points of perforation were adequately repaired. If these were not going to leak, then he did not see reason for drainage. Certainly, one could not attempt to drain the many numerous and small areas that might be infected; therefore, he felt safe in trusting to the peritoneum whatever amount of infection might be left after his copious flushing. At all events, all the patients got well. In two of the three the bullet was recovered. All three were shot by a 32-calibre revolver at close range; the greatest distance being about five feet, and in the last case probably not more than eighteen inches, as the woman's nightgown was set on fire.

Dr. Nassau called attention to a condition that he observed in these three cases, and that he had also seen in several cases of perforation of the bowel during typhoid fever, where operation was undertaken early. The intestinal walls, and the mesentery are of a pinkish color, and spread over them the vast network of lymphatic vessels seem to be over-distended, chalky white, and if any of these little branches be scratched with a needle point, a milky fluid exudes. In operation, as prolonged as any of these three, this condition, by the time the abdomen

is closed, has almost entirely disappeared. Is this not nature's first great effort to do what she can to increase peritoneal resistance?

Dr. John H. Jopson spoke of three cases of penetrating wounds, with perforation of intestine in two cases, and of stomach and intestine in one case, which he had observed.

Case I.—A white boy, aet. 14, was admitted to the Presbyterian Hospital September 18, 1906. Four hours previous to admission he had received a wound in the right side of the abdomen, on a line above the umbilicus, by a 22-calibre rifle ball. On admission the temperature was 99°, pulse 120, small and tense. The abdomen was slightly distended, tender, tympanitic in the centre, and dull in the flanks. Had vomited several times before admission.

Operation seven hours after accident. The bullet-wound had taken a downward and outward direction through the abdominal wall, and was very dirty. The peritoneal cavity contained a large amount of free blood and some beginning serous effusion. There was a large opening in the lower ileum opposite the mesenteric border, single and irregular, and two openings in the cæcum. All were closed by Lembert sutures of silk. The mesocolon was perforated, and digital examination discovered the much deformed bullet in the retroperitoneal tissues, from which situation it was recovered. Irrigation of abdominal cavity and drainage of pelvis by tube and gauze. There was considerable peritoneal reaction, free drainage and suppuration of the wound in the track of the bullet, but the boy made a good convalescence, and was discharged from the hospital a month later.

Case II.—A boy, aet. 6 years, was admitted to the Presbyterian Hospital December 28, 1907, having received an accidental wound by a ball from a 32-calibre revolver about a half hour previously. The patient showed some evidence of shock on admission; his temperature was 98.4°, pulse 120. Condition at time of operation good. Operation about two hours after accident. The bullet-wound lay in the median line, running downward from a point just below the ensiform cartilage. Oblique performation of the abdominal wall. There was a small amount of blood clot in the peritoneal cavity. The stomach and transverse colon were drawn out, examined carefully and found uninjured. The small intestine was then examined, and two per-

forations found in the jejunum about three inches from its origin, opposite each other, at the mesenteric and antemesenteric borders, and two openings in the mesentery. All were closed by suture of celluloid thread. The entire small intestine was gone over for other perforations, but none found. The ascending and descending colon could not be examined through the median wound, but as the bullet had apparently taken a direction obliquely backward it was thought they had escaped injury. Operation was well borne. Irrigation of the peritoneal cavity and a cigarette drain. The child had a fairly good night except for some restlessness. The pulse gradually increased in frequency and lessened in force. The temperature steadily rose. There was suppression of urine, but little vomiting. A little sanious discharge from the wound. The patient died 24 hours after operation.

Examination of the abdomen, post mortem, showed no macroscopic peritonitis, but a perforation of the large intestine, exact location not detected by resident physician, but probably of descending colon or sigmoid. The cause of death was probably a rapid peritonitis in spite of the absence of gross signs, clinical or pathological. The bullet was not traced or found, and before death the possibility of a wound of the kidney was considered as the explanation of the suppression of urine. This was probably a toxic condition, however.

Case III.—A lad, aet. 15 years, a sturdy, active boy, was shot on May 11, 1908, at 3.30 P.M., by a B. B. cap fired from a 22-calibre rifle at a distace of about seven feet. The ball penetrated clothing and abdominal wall. There was little pain and no shock, and the boy did not know he was wounded until a bystander examined him. He walked five or six blocks to a physician's office, who at once sent him to the Presbyterian Hospital. On admission he presented no symptoms whatever. There was a small wound of the abdominal wall about two inches below the border of the ribs on the left side and one inch outside the semilunar line. No rigidity or tenderness of the abdominal wall. Temperature 97.8 °, pulse 84, respiration 24. The ball could be felt beneath the skin of the back at the edge of the erector spinæ.

Operation five and one-half hours after accident. A four-inch incision was necessary to trace the small bullet wound

through the muscular abdominal wall into the peritoneal cavity, which contained a small amount of blood. The splenic flexure of the colon lay immediately beneath the wound, and was surrounded by a hematoma beneath its peritoneal covering. It was with difficulty brought up into the wound. Prolonged examination failing to show the source of the hemorrhage, the peritoneum external to the colon was divided and stripped forward, when two small perforations were found in the colon, one on its anterior and another on its posterior surface, which were closed by double continuous Lembert stitches of Pagenstecher thread. The anterior wound had been the source of the hemorrhage. Blood and gas were seen to be coming upward from the direction of the cardiac end of the stomach, examination of which showed one perforation on the anterior and one on the posterior surface, very near the greater curvature. Both were closed by double layers of sutures. The intestine was gone over from the duodenum to the colon, examined, cleansed and returned. The upper abdomen was cleansed by wiping, and drained through the wound by cigarette drain and gauze packs. Partial closure of wound. The boy was turned on his side, and the skin nicked and the bullet removed from its subcutaneous location in the back. There was no shock and no diffusive peritoneal injection, although there was free drainage from the abdominal wound. Twelve hours after operation he drank all the water from a flower vase beside his bed. He was in the hospital a month and was discharged well.

Dr. Jopson said further that the questions raised by Dr. Nassau applied to the cases he reported. As to the importance of immediate operation in civil practice, there can be no question. The figures collected by Moynihan in his book on Abdominal Operations, and based on an analysis of 112 cases of gunshot-wound of the stomach, show a rapidly increasing mortality where operation was delayed.

As to the site of incision in the cases of gunshot-wound, it seemed to him that where there is only one wound, and this well to one side of the median line, it is preferable to make the incision in this site rather than in the median line, but where there are several wounds one must rely on the median incision.

In the second case a perforation in the descending colon or sigmoid was overlooked, and he did not see how this could have

been discovered unless there had been added to the primary wound another on the left side of the abdomen. This question is one of considerable importance, as the responsibility of overlooking a gunshot-wound of the intestine is not lightly to be taken.

Regarding the technic of suture of small wounds there is a little difference of opinion. Some surgeons think a purse-string causes too much narrowing.

The question of drainage depends somewhat on one's predilections. The importance of posterior drainage in gunshot-wounds of the stomach has been pointed out by Roswell Park. In cases of gunshot-wound of the cardiac end of the stomach, such as the one here reported, anterior drainage will probably often suffice.

ACUTE CARCINOMA OF BREAST.

Dr. William L. Rodman presented a woman, 45 years of age, who had been the subject of acute cancer of the mammary gland, the second he had encountered of this very rare affection.

Her history is as follows: Her mother is living at seventy years, her father died at seventy-two. None of four sisters had mammary tumors. She has had but one child, who is now nineteen years old. She never had abscess of the breast.

In January, 1908, she noticed a marked retraction of the nipple of her left breast. The entire breast then began to enlarge and she very soon noticed that the greatest enlargement was in the axillary hemisphere. There was, however, no distinct tumor. In short, the process was a diffused, not a discrete one. About three years ago she accidentally struck this breast while getting out of the window. In March, 1908, she consulted one of the surgeons in one of the most prominent hospitals of this city, and a diagnosis of mastitis was made. If her condition in March was at all similar to what it was early in September, the mistake in diagnosis can easily be understood.

When first seen by Dr. Rodman the gland was vividly red and covered by an eczematous eruption. Indeed, it closely simulated mammary abscess. A careful examination of the supraclavicular glands showed unmistakably enlargement of both chains. He could not believe that such enlargement was sympathetic and inflammatory, and therefore believed it to be acute cancer. Notwithstanding this, he took the precaution, as he always did in cases admitting of a doubt, to have a competent microscopist present at the operation; and the entire breast was not sacrificed until the examination of a frozen section confirmed the diagnosis. The report showed it to be medullary carcinoma. After the breast was entirely removed and the specimen carefully examined, it was shown that there were small deposits of pus throughout the gland. There was extensive carcinomatous infiltration throughout the glandular structure.

Dr. Rodman said that at first he hesitated as to whether or not operation was indicated because of its acute course and the involvement of the supraclavicular lymphatic glands. Certainly, nothing short of a most radical procedure was indicated. This was carried out the next day and the subclavicular triangle was also attacked and cleared of enlarged glands and fat. The finger would be carried behind the clavicle from the wound above to the one below it. In spite of a very large wound he was able by extensive undermining of the flaps, to approximate their edges and secured primary union in both wounds.

She made an excellent recovery and was sitting up in forty-eight hours; but two weeks had elapsed since the operation, but she was well enough to be presented before the Academy.

He presented the case with the hope that others would report any cases of acute cancer in their practice, meaning by the term cases not only more than ordinarily rapid in their course, but so closely simulating mastitis as to have warranted the name by so good a surgeon and pathologist as Volkmann, who described it as "carcinomatous mastitis." In other words, there is no local or discrete growth in a part of the gland, but a general carcinomatous infiltration. He had seen quite a number of cases of both sarcoma and carcinoma occur in pregnant and lactating women. While such cases pursue at times a very rapid course, the patients he had seen had not, strictly speaking, acute cancer, as there were wanting inflammatory symptoms, the diagnosis was always plain enough, and only one of them simulated mastitis. Acute cancer is somewhat more likely to occur in the breasts of pregnant and lactating women, undoubtedly; but to warrant the term "acute cancer" there must be inflammatory symtoms simulating mastitis. In other words, a diffused, not a discrete lesion.

Billroth reports a case where the tumor appeared in the

breast five weeks before delivery, and the patient died one day after a normal labor. So that in less than six weeks from the beginning of the disease the patient was dead.

In the first case that he saw, many years ago, in Louisville, Kentucky, the patient, a pregnant woman, never lived to be confined, but died within three months after the beginning of the growth.

Dr. John H. Gibbon said that within the past few months he had seen two cases of acute carcinoma of the breast as described by Dr. Rodman. The first case was in Dr. Le Conte's service at the Pennsylvania Hospital. She was a young woman, had recently been confined, and the entire right breast was red, hard and brawny. It looked very much like an extensive mastitis. The second case he saw with Dr. E. P. Davis. She was a woman about 35 years of age and seven months pregnant at the time. The breast in this case was very large, red and indurated; the entire breast was involved. This condition started last May, and the patient died a week or two ago. No operation was done in this case, as the growth was too extensive at the time that consent to operate was given. Dr. Davis did a Cæsarean section in order to save the child, and the mother died about two or three weeks later as the result of the extension of her disease. This breast looked exactly like an infiltrating abscess of the breast, excepting that there were no soft areas.

Dr. Edward B. Hodge said that he would add to the history of Dr. Gibbon's first case just mentioned. The patient was a rather young woman, not over thirty. She was pregnant and she is now coming to his service at the Out-patient Department of the Pennsylvania Hospital with a granulating area. She has pain in her back, low down, and about the pelvis, which looks as if she might have a recurrence in the spine. Her pregnancy is over. Her general condition is poor.

Dr. Charles F. Nassau said that a patient came to him from New Jersey, who is at the Jefferson Hospital at the present time, with a breast tumor which has existed for eight or ten weeks. It was so acute, pained her so much, and had this redness that Dr. Rodman speaks of, and looked so like an abscess that her doctor had opened it for an abscess, but she had very extreme and extensive involvement of the axillary glands in her subscapular fossa, and the growth had attached itself to

the ribs and sternum. This whole process had made its appearance very rapidly. He did not think it had been more than ten weeks since the patient was perfectly well. Her physician thought she had an abscess, but one which he acknowledged he could not cure, and suggested the removal of the breast.

Dr. William J. Taylor said that he had had one instance of acute scirrhus of the breast in a young woman of 24 years. She was seen only a few weeks after the tumor appeared. At operation there was very extensive involvement of the axillary glands, and in six months she was dead from a recurrence.

Dr. Rodman added that in case of acute cancer of the mammary gland both breasts are often involved. The right breast in the case presented is absolutely free of disease. There has been in most of the recorded cases of acute scirrhus a certain amount of purulent infiltration of the gland. In some there has been a well marked abscess, as in the case of S. W. Gross. Vivid redness and thickening of the skin, together with an eczematous eruption here and there, well justified Volkmann's name, "carcinomatous mastitis."

As regards the case presented he did not feel optimistic as to the ultimate result.

STRANGULATED INGUINAL HERNIA.

Dr. William L. Rodman reported the case of a man, 55 years of age, who was brought into his service at the Medico-Chirurgical Hospital at 8 P.M., October 20, 1908, with a well-marked strangulated hernia. He had had a right inguinal hernia for years, which was controlled ordinarily by a truss. The hernia, however, had come down in the afternoon, and at 5 o'clock he was taken with severe pain. He was then unable to reduce the tumor. He was admitted to the hospital at about 8 o'clock. He had not vomited, nor had he had nausea at any time. The tumor was very tense. The operation was done and he had never seen a tighter constriction at the end of three hours, excepting in one or two small tense femoral hernias. There was a loop of ileum which had been out only three hours, but was of a deep rose color, cold and clammy, and he was satisfied that necrosis would have set in and a resection of the gut have been necessary if the patient had gone until the following morning for operation,—say twelve or fifteen hours after strangulation.

Dr. Rodman said that he reported the case because in a pretty large number of herniotomies for strangulation he had never before encountered a case that did not vomit, excepting one or two epiploceles. He certainly had never seen an enterocele nipped so tightly as to be on the point of necrosis that was unaccompanied by nausea and vomiting. The one symptom emphasized by all authorities is vomiting; first, gastric contents, then bilious, finally stercoraceous in character.

Dr. John H. Gibbon said that he did not think that vomiting always occurs in these cases, even where the bowel is gangrenous. Recently he had operated upon a man who was 64 years of age, who had developed an irreducible hernia in the morning, and all day attempts at reduction had been made. The man's scrotum and penis were œdematous, and black and blue. He voided urine and it was found to contain sugar, diacetic acid and albumin. He had not vomited at all, nor had he any eructations of gas. Section was done with infiltration anæsthesia, and four inches of ileum were found, which, if the man had not been a diabetic, he would have resected; but he kept the wound open a long time, and the color of the gut improved so much that he restored it and did a Ferguson operation without the removal of the lower portion of the sac. The œdema of the penis increased after his operation for the next 12 or 18 hours, as if he was going to develop a diabetic gangrene of the scrotum and penis, but this is now much better. There is no doubt about it that this bowel was strangulated. One thing that made him hesitate to resect this bowel was the fact that the circulation of the mesentary seemed so good. There were no evidences of clotting in the vessels of the mesentery—a very important thing and a good criterion to go by in cases of strangulated bowel.

APPENDICOSTOMY FOR CHRONIC DYSENTERY.

Dr. William L. Rodman presented a man, who had been a soldier in the Philippines, where he was taken with amœbic dysentery. He was referred to him by Dr. Anders for appendicostomy, as he did not respond to ordinary treatment. He has been greatly relieved by it, and instead of having 60 actions a day, as in May, 1908, when he was operated, he now has only one of very good consistence. He irrigates himself daily.

I did this operation a week ago on a case in the Presbyterian Hospital for diarrhœa, and the patient is greatly relieved since the two or three irrigations he has had. He believed that this procedure will be done very much more frequently in the future for chronic dysentery diarrhœa, and mechanical obstruction of the large bowel with acute exacerbation. It is a very easy matter to overcome the acuteness of the symptoms by draining the appendix. There is no reason why the mortality in these cases could not be very greatly reduced by doing an ileosigmoidostomy and at the same time draining the bowel by an appendicostomy. It would be infinitely better than an attempt at resection.

Furthermore, it is possible to feed patients through the appendix in this way, where the rectum gives out and it is desirable to rest the stomach.

INTRAVENOUS INFUSION OF TWELVE PINTS OF NORMAL SALINE SOLUTION FOR HEMORRHAGE.

Dr. R. G. Torrey said that through the courtesy of Dr. Edward Martin he was able to report the case of a negro woman, 32 years of age, who was brought to the hospital September 18, 1908, with an incised wound of the abdomen. When seen on admission there was a prolapse of a number of loops of gut through a rather ragged incision on the right side of the lower abdomen some five or six inches in length, some external bleeding; a pulse which was very weak and running, the rate about 150. Her skin was cold and leaking, and the respirations very shallow. The patient was conscious, but seemed profoundly shocked.

A clean cover was placed about the exposed gut and the patient hurried to the operating room, where she was left on the litter without being transferred to the operating table. She was sufficiently conscious to recognize her assailant at this stage, although she appeared too weak to speak.

An intravenous infusion of normal saline solution was started at once and allowed to flow quite rapidly till nearly two pints had entered the circulation, when the flow was decreased. Hot towels had been placed over the gut and ether started at once.

Two punctured wounds of the prolapsed portion of the small

gut were encircled by purse-string sutures and closed, and the fecal matter carefully washed away. The edges of the wound were then retracted and a large amount of clotted and free blood removed from the abdominal cavity.

The bleeding was considerable, and great difficulty was experienced in locating and ligating the bleeding vessels. After increasing the incision, four bleeding points were ligated and the bleeding seemed fairly well controlled.

On further inspection of the intestines two more wounds of the small gut were found and inverted by purse-string sutures, and a contused area on the transverse colon, about 1 x 1½ in., which was perforated at its central portion, was also inverted by a purse string and reinforced by a couple of Lembert sutures.

During the search for bleeding points and the inspection of the gut, which occupied a considerable time, the patient's condition was much of the time alarming.

The salt solution was taken up rapidly, and there seemed to be no opportunity to stop its administration, as the signs most of the time pointed to a failing circulation. When the pulse became very bad and the skin leakiness increased, the aorta was compressed and held closed for some time by a hand in the upper part of the cavity. This procedure seemed to have a good effect on the circulation and also may have facilitated the location of the bleeding points by reducing the hemorrhage in the abdominal cavity.

While on the table the patient received about 10 pints of salt solution by the vein. There was a little leakage during the injection of the first pint, but after that not a drop was lost. About three pints of salt solution were poured into the abdomen and the wound was closed by layers in the usual manner, with catgut continuous and silkworm-gut interrupted sutures. Two Mikulicz drains inserted, one in the lower portion of the wound extending down, the other in the upper angle, directed at the wound in the transverse colon.

In spite of the time occupied by the operation, about two hours, the patient left the operating room in remarkably good condition. In fact, after the bleeding was checked and the intestines returned to the abdominal cavity (the latter task no easy feat), the pulse became at once stronger, and the skin dry and of good tone.

At the close of the operation the temperature was 95 ° and the pulse 156. There was a rapid readjustment of circulatory tone, the pulse rate dropping steadily and gradually, and the temperature rising until after eight hours the pulse rate was 110 and the temperature registered 100.2 °.

The patient's condition was remarkably good for 48 hours, but at this time she began to complain of severe pain in the abdomen, most marked at the epigastrium and extending downward more on the left side than on the right. The upper abdomen was distended and tympanitic. Peristalsis was active and rigidity slight. Patient became nauseated and retched considerably, but did not vomit. A stomach tube and a rectal tube were passed, and about a pint of very offensive fluid was withdrawn from the stomach. It was clear, almost colorless, and had a strong butyric odor.

Considerable flatus was expelled during the next two hours and the relief from distress was almost complete.

The skin-wound after three days began to show signs of infection, and two of the skin sutures were removed to allow of better drainage. In less than a week all of the skin sutures were removed. Union was secured only at the lower angle of the wound, but the fasciæ seemed well united and have since remained firm.

There was at no time a free discharge from the tubes. Oozing of a slightly blood-tinged fluid was present for two days, but after that the upper drain was almost dry and there was a small amount of thick pus in the lower tube at each dressing. There was marked tenderness in the vagina for three days after operation, but no bulging of the vault, and the tenderness disappeared after the fourth day.

Enteroclysis was continuous for more than 48 hours after operation and well tolerated. Nothing was given by mouth for 24 hours, when small amounts of water and albumin water were allowed, followed by beef juice and Liquid Peptonoids.

The urine has been negative throughout, though dysuria was present for a week.

The blood after operation showed 45 per cent. hæmoglobin, with 20,800 leucocytes and 3,370,000 red cells. Two days later, September 20, there was 38 per cent. hæmoglobin; on the 24th the red cells numbered 2,080,000, with the hæmoglobin at 42

per cent.; on the 28th and 30th the hæmoglobin stood at 48 per cent., with the red cells about 2,700,000; on October 4 the hæmoglobin had risen to 57 per cent., and the red cells were close to 3,000,000. A differential count on the 28th showed 74 per cent. polynuclears and 22 per cent. lymphocytes.

The temperature has twice reached 102 °. There has been a diurnal variation of about a degree, but the trend of temperature and pulse has been steadily downward.

The patient's present condition is perfectly satisfactory. The wound is granulating rapidly and is almost clean, the fasciæ firm. There is no abdominal tenderness. Bowels move regularly and urine is voided freely. Except for a slight pleuritic pain in the left side convalescence seems now normal and uneventful.

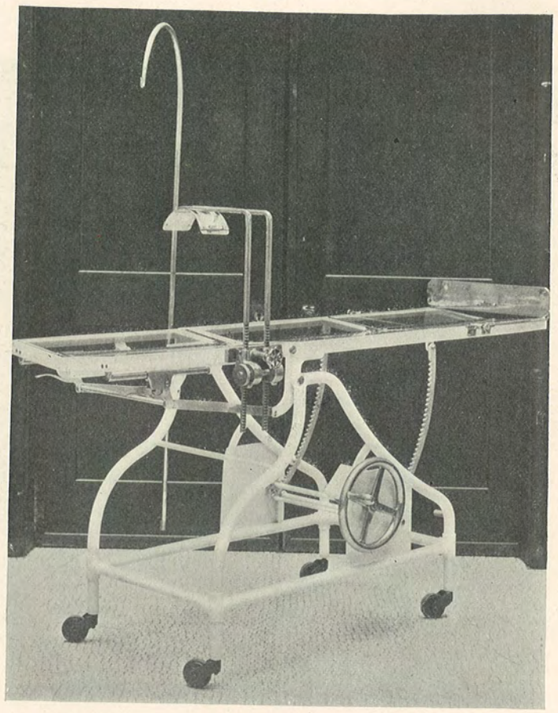
Dr. John B. Deaver said that through the saline solution and the skilful surgery this woman's life was saved, but without the saline solution he questioned if she would have survived. His experience had been more or less extensive with saline solution, but he had never transfused so large a quantity; to him the results obtained in this case are striking indeed. He had seen profound shock, not alone where there has been much loss of blood, respond effectually to this treatment.

Dr. Edward Martin thought the major point brought out by this case is the common-sense application of principles. The residents did what all residents should do,—they did not look on the dose of saline solution as one, two or three pints, but as sufficient to bring up the blood pressure.

Another point worthy of remark was that they did not have time to bandage the extremities, but they took the quickest means of keeping the blood where it was of most use. One of the residents kept the aorta down with his thumb. The quantity of solution given by the bowel was enormous. They hesitated to mention it, it being many gallons, and most of it was absorbed. The work done by the kidneys was extraordinary.

The third point was the complication recorded. The second or third day there was acute gastric irritation, evidenced by enormous distension, by the presence of tympany, by the absence of tenderness, and by the profound effect upon the heart, pulse and respiration. Stomach tubes relieved it immediately. He had had one or two other cases of this kind where this acute gastric dilatation, taken in the early stage, yielded at once. After

Fig. 1.



Frazier's operating table.

FIG. 2.

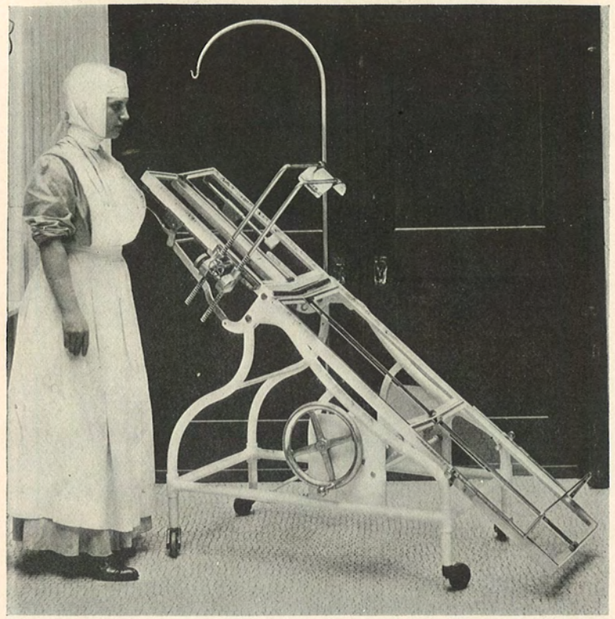
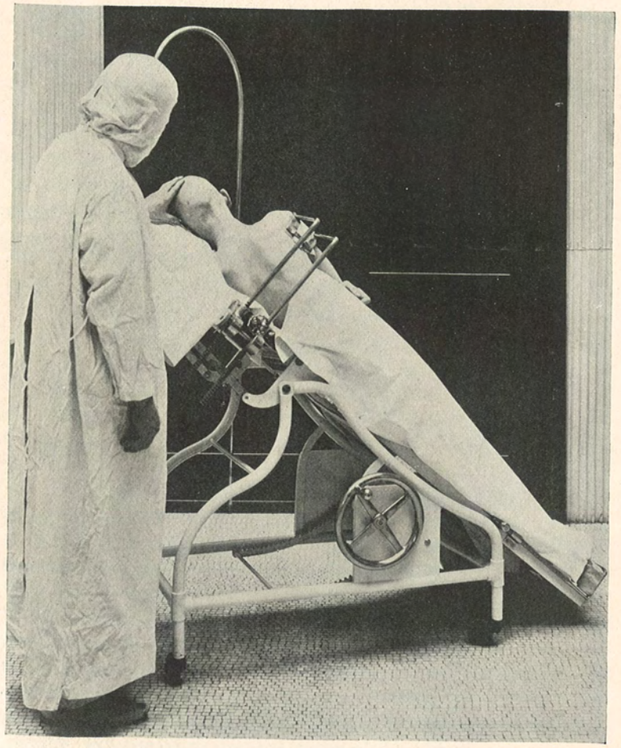


Table in position for elevation of head.

FIG. 3.



Showing patient supported in elevated head and lateral position.

the stomach is over-stretched, it is like a piece of rubber over-blown, and cannot get back.

Dr. Astley P. C. Ashhurst said that Dr. Martin had spoken of the results obtained by the use of large quantities of saline solution, and that this had recalled to mind a case of rupture of the liver in which the results were very surprising. The quantity of salt solution used was much less than in Dr. Martin's patient, being only 5½ pints, but at the end of the operation, instead of blood coming from the liver it was salt solution; the patient died soon after the conclusion of the operation.

AN OPERATING TABLE DESIGNED FOR OPERATIONS UPON THE HEAD AND NECK.

Dr. Charles H. Frazier said that for many reasons it is desirable in operations upon the head and neck to have the patient's head and shoulders elevated to an angle of forty-five degrees. The greatest advantage to be gained from this posture is its influence upon hemorrhage; particularly venous hemorrhage. Gravity so lowers the pressure of the blood stream within the veins that bleeding from this source is very noticeably diminished.

If one elevates the head and shoulders of the patient on any operating table hitherto on the market the field of operation is so far above the floor that the operator's assistants and etherizer are compelled to stand on stools. This in itself is a matter of no little inconvenience. He presented a table, constructed for him by the Bernstein Manufacturing Company, of Philadelphia, which enables one to obtain the necessary elevation and yet have the field of operation at a level convenient to the operator as he stands on the floor (see Fig. 1). In operating upon the thyroid, the cervical lymph-nodes, in excisions of the superior or inferior maxilla, in operations for the removal of malignant lesions of the face and neck he had found this table a very valuable addition to their equipment.

Primarily, however, the table was designed for operations on the posterior cranial fossa. It has been his custom for several years to have the patient in the sitting posture when operating for lesions of the cerebrum, but in cerebellar operations this is manifestly impossible. In order to render the suboccipital region accessible the patient's head must be flexed and to control bleed-

ing the elevated posture is desirable. Furthermore the majority of cerebellar lesions are in the cerebellopontile space, and he had found it most convenient to approach these from the lateral aspect along the posterior surface of the petrous bone. By placing the patient on his side (see Fig. 2), elevating the table, and flexing the head, satisfactory conditions for cerebellar work can be obtained.

In order that this position may be maintained and to prevent the patient rolling over on his face when under the relaxation of the anæsthetic a special device has been attached to the table which grasps the arm in the deltoid region. It is most important in cerebellar subjects that, when under the anæsthetic, throughout the operation respiration should not be interfered with.

This device will be found serviceable for any operation in which it is desired to keep the patient on his side, as in operations on the kidney and thorax.

Attention is called furthermore to an adjustable foot-board which may be moved up or down, according to the height of the patient, and by means of an automatic catch retains its position, thus preventing the patient from sliding off when the table is elevated.

While the table was designed for a special field of surgery, the essential features of a general utility table were not sacrificed. The foot of the table will drop so as to enable one to place the patient in a position suitable for operations on the perineum or in the Trendelenburg position for pelvic work.

STATED MEETING, NOVEMBER 2, 1908.

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

CONGENITAL DISLOCATION OF THE KNEE.

Dr. John B. Roberts said that at the meeting of the American Surgical Association on May 9, 1901, he presented a paper reporting a case of arthrotomy for congenital anterior dislocation of the tibia.[1] The girl, who was aged five years, was operated upon in March of that year through a large horse-shoe incision made across the front of the knee. After division of the ligament of the patella and almost complete section of the lateral ligaments of the joint the dislocation was easily reduced. A partial section of the four-headed extensor muscle of the leg was necessary in order to repair the cut ligament of the patella. Some infection of the wound occurred and it became necessary to open it and thoroughly drain the knee-joint, using also irrigation with mercuric chloride solution and subsequently with formaldehyde solution. After a number of weeks the child returned to her home with the bones in proper position, though there was still great restriction of motion at the knee-joint.

He presented illustrations showing a skiagraph and photographs of the child before operation. The photograph now presented (Fig. 1) shows the child as she is at the present time. Her physician, Dr. F. S. Nevling, reports that the child, who is a dwarf, can now use the operated leg just as well as the other and needs no brace or support for it. She can run and jump just like any other little girl. She is now about thirteen years old and has long since ceased to grow. The doctor thinks she is little, if any taller than when she was operated upon at the age of five. Inspection of the photograph indicates that she is probably a cretin. She has a large head and prominent abdomen. Her expression, however, is not that of a child of very defective

[1] Transactions of the American Surgical Association, 1901; and Annals of Surgery, August, 1901.

intellection. The scar of the operation on the left knee is shown on the picture; and the legs appear to be of the same length.

She is somewhat defective mentally, but Dr. Nevling says she can care for herself and ask for everything she wants, but that she gets very cross, if not humored. The parents have treated her like a baby and have not sent her to school. The physician mentioned has advised that they send her to school, but this has never been done. The other children are normal and bright. She has two brothers of adult age who are nearly six feet tall and weigh from 160 to 180 pounds each, and two sisters aged 17 years and 19 years who are bright and weigh from 125 to 150 pounds. There is another brother older than she and one younger. The latter is now 10 years old and weighs about 90 pounds. There have been no other deformities in the family, and Dr. Nevling thinks that possibly the dislocation of the knee was caused during delivery of the mother, as she says that she had a very hard time at that particular confinement. He can give no reason for the child's ceasing to grow and being a dwarf.

RECURRENT ACUTE APPENDICITIS AFTER OPERATION.

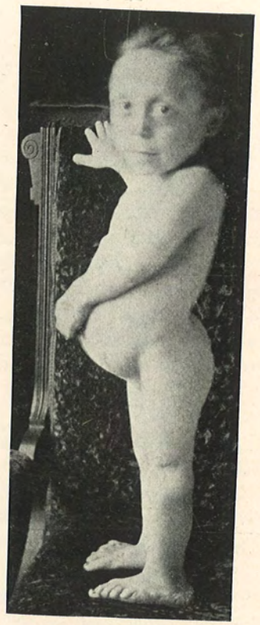
Dr. George G. Ross said that to a patient who has been operated on for an acute suppurative appendicitis and whose appendix has not been removed, the possibility and danger of another attack is no small matter. The actual occurrence of such an attack is not a rarity, and these cases offer additional difficulties at the second operation and bring to both the surgeon and the patient a realization of the shortcomings of the first.

During the past three months he had operated on three such cases, all at the German Hospital. In two the occasion for a second operation was an acute attack of appendicitis, in the third the procedure was for the relief of a persistent abdominal sinus.

The details of these cases are as follows:

Case I.— Mr. H., aged 37. On September 27, 1907, patient was taken ill with appendicitis. He was treated medically, apparently improved, and at the end of the second week passed about three pints of pus by the bowel in several evacuations. His chills and evening temperature however persisted, as did the tenderness and distress in the right iliac fossa. He lost forty pounds during his illness. He was finally sent to the Hospital and on October 31, 1907, an abscess to the right of the ascending colon was opened

Fig. 1.



Showing result of arthrotomy for congenital dislocation of the knee at the end of seven years.

and drained. The appendix was not searched for. The patient, after a long convalescence, made an apparent recovery. On August 23, 1908, he was admitted to the German Hospital. He complained of not feeling very well and of a tenderness at the site of the old scar, which had been present for six months. Physical examination revealed an exquisitely tender mass the size of a man's fist beneath the old scar, which had given away, leaving an incisional hernia. An incision removing the superficial scar was made, opening the peritoneum in the line of the original incision. The adherent intestines were separated from the cicatrix and a postcæcal abscess cavity opened. Within it was found a gangrenous appendix sloughed in two. The appendix was ligated and removed, the abscess cavity cleaned out and drained by a rubber tube through the loin, and gauze anteriorly. The patient made an interrupted recovery.

Case II.—Mr. C. S., age 30, had been operated on three years before at the Bellevue Hospital, New York, for acute appendicitis. His wound was drained and he was told that his appendix had been removed. He was admitted to the German Hospital of Philadelphia, August 3, 1908.

His present illness began one week ago, when after an indiscretion in diet he had an attack of diarrhœa lasting all night. Since then he has had a desire to have his bowels move very often, yet passes but little fecal matter each time. At the same time he has had general abdominal pain. The night before admission the pain became acute and was localized to the right iliac fossa. He vomited once.

Physical examination shows the absence of rigidity or distention. There was an excessively tender mass beneath the old scar.

Operation, September, 1908: old scar excised; intestines walled off with gauze pads and a pericæcal abscess exposed; the small amount of pus found was wiped away and an inflamed necrotic appendix found, which was ligated and removed; the abscess cavity was drained by the means of a rubber tube and gauze. Patient made an uninterrupted recovery.

Case III.—Mr. C. G., age 24, at the end of November, 1907, was operated on for acute appendicitis. He had been ill for three days before admission and had been treated by his physician with purgatives. At the operation an abscess containing very

foul pus was opened and drained. The record of the case states that a gangrenous appendix was found and removed as a slough. It is of interest in this case, that threatened obstruction from contracting adhesions was averted by repeated daily doses of castor oil.

Ever since the operation the patient has had a discharging sinus, for which he came for operation in June, 1908.

At this operation, after placing a probe within the sinus, the old scar was dissected out in the usual way and the intestinal adhesions separated. The sinus was found to communicate with the lumen of the remaining one-inch-long portion of the appendix. This inch of appendix was removed, a small drain introduced and the wound closed. The recovery was uninterrupted and did not recur.

Dr. Ross further said that a consideration of the cases cited would direct our inquiries to several points: (1) the liability to recurrence after the simple opening and drainage of an appendiceal abscess; (2) the propriety of removing the appendix in cases in which the trouble outside of the organ is marked; (3) the importance of operation before the trouble becomes extra-appendiceal.

The Liability to Recurrence.—There can be no doubt that as long as any portion of the appendix in communication with the cæcum remains, recurrent attacks are to be feared. Could we predict in any particular instance what the subsequent behavior of the appendix would be it would be easy for us to determine whether to be content with the simple evacuation of an abscess or to search more thoroughly for the appendix. Yet this is manifestly impossible.

Sir Frederic Treves states that of 100 cases of appendiceal abscess operations which came under his observation, 16 had recurrences and 8 subsequently had the formation of inflammatory exudates in the right iliac fossa, no doubt appendiceal in origin—24 per cent. then really had recurrences after operation. And while this distinguished author states that of 100 patients operated on by simple drainage of the abscess 84 did not have recurrence, I would reverse this method of presenting the facts and emphasize the point that 16 per cent. to 24 per cent. did have recurrence.

Nor can any given patient, under such circumstances, be sure

at any time, however remote, that he will not again be the victim of an attack of appendicitis. It is almost impossible for us to calculate the hindrance that such a constant apprehension must be.

It is only in those cases in which the appendix has sloughed, disintegrated and really become a portion of the abscess mass that a recurrence is unlikely, and these, unfortunately, we are unable to recognize at operation unless one searches for the cæcum to locate the origin of the appendix. Twice in making such a search I have discovered a hole in the cæcum where the appendix had sloughed off. Several times in making a search for the appendix, unsuspected, isolated collections of pus have been discovered.

Nor is it necessary for the whole appendix to be present for us to have a re-awakening of the old trouble. Instances have been reported of cysts and infections of appendiceal stumps and Treves in his series of 100 cases found two in which subsequent trouble was due to pus formation in a mere stump of an appendix.

The leaving of such a portion of the appendix may occur in two ways:

1. The operator may do this by faulty technic. This is doubtless a rare occurrence, particularly at the hands of any one who has had the benefit of observation before attempting to operate.

2. After opening an appendiceal abscess the sloughed appendix may be removed and a portion inadvertently be left. This would also seem not likely to occur, yet Case III is an illustration of this.

On the other hand while the distal end of the appendix may be comparatively free, the proximal may be a portion of an abscess wall which the operator does not wish to disturb.

Should the appendix be already sloughed off an examination of the cæcum will often reveal the fact that the line of separation is some distance removed from the junction of the cæcum and the appendix and that therefore a considerable stump is left, which must be removed.

This was the case in an instance encountered recently by a colleague, Dr. Whiting. In a case which he operated on the thirteenth day of the attack, the entire distal end of the appendix was a slough, a whitish string almost, while a distinct stump was left, the lumen being closed by healing that had already taken place.

As regards such spontaneously healed appendiceal segments we know that they can also remain harmless and retain their nourishment for indefinite periods and that their reinfection and inflammation gives rise to attacks and lesions entirely similar to an acute appendicitis.

Williams (*Brit. Med. Journ.*, 1907) has lately cited the curious instance of acute inflammation in an appendix entirely separated from the cæcum, causing a typical appendicitis.

The lesions which we may expect from the remnant of the appendix, or rather the pathological processes to which it may give rise, may be classed as follows: (1) acute appendicitis, with or without abscess; (2) continuation of primary infection or residual abscess; (3) fistula.

An appendix left at operation for abscess is somewhat less liable to give another attack of appendicitis than one left unoperated in a mild attack. Yet the possibility is not remote. As might be expected in cases where there has already been so much damage to the structures of the right iliac fossa, abscess formation in these cases is common. Case II is an example of this class. Here a man, in good health for three years after an appendix operation, becomes subject to another very acute attack with abscess formation.

A residual infection, or one in which there has probably never been an entire subsidence of the infection about the appendix, and a gradual abscess formation takes place as shown in Case I. As to symptomatology they furnish us with a picture of slow abscess formation with mild infection as opposed to the acute signs as in cases of class 2. As to pathological conditions within the abdomen, and their treatment, they furnish us with nothing that varies from those of the first class.

In class 3, the fistula cases, we may really have two varieties: (*a*) those in which the appendix portion or stump acts solely as an irritant in keeping open a sinus tract; (*b*) those in which the sinus communicates with the lumen of the appendix, either of the appendix proper or of a sloughed segment, as in a case reported by Dr. Deaver.

It is not always possible to ascertain when the appendix is the underlying cause of the persistence of a sinus. Should we be able to exclude the possibility of the presence of a portion of ligature, etc., it will be probable that the fistula either arises from

the stump of the appendix or is kept active by the presence of a fecal concretion, etc. It is but in a few instances that we see a sinus or fistula of long standing in which at operation some such cause is not demonstrable.

The treatment of such recurrent infections, residual abscesses, or fistulæ, is based upon one general principle, viz., to remove the primary cause of the trouble and to repair the damage done by it.

To leave the appendix a second time in abscess cases would be only to invite another attack and the formation of another abscess with a continuation of local infections finally leading to a general infection.

But far more important than the treatment of these conditions is the question of their avoidance at the primary operation. It is known that they occur after abscess or pus cases. The question then arises: What is the proper operative treatment for appendicitis and abscess?

The treatment of appendiceal abscess cases must have been carefully considered by every one who has had occasion to deal with a number of these cases.

Authorities have differed greatly as to the mode of approach, the method of incision and of drainage and the after treatment. Equally have they differed as to the method of dealing with the appendix in these cases.

Amongst many surgeons the simple evacuation of an appendiceal abscess is held to fulfil all the indications in such a case, and that the treatment of a case is such as would be applied to a simple abscess anywhere in the body. This is a method of treatment much more in vogue upon the continent of Europe and especially in Germany than among American and English surgeons. Mr. Bottle has recently advocated secondary operation for the removal of the organ before the patient passes out of the surgeon's hands.

Others, such as Dr. Morris, of New York, speak for the removal of the appendix in every case regardless of its location or relationship to the abscess wall, etc.

The large majority of surgeons heretofore, however, have taken the position held by Dr. Deaver,—that it is advisable to remove the appendix whenever it is not so situated in the wall of an abscess that to remove it would be to spread infection over the general peritoneal cavity.

As will be seen the meaning of this statement varies largely with the surgeon applying it. In the opinion of the reporter the incision and drainage of an appendiceal abscess represents the most unsatisfactory of all operations for acute appendicitis. To operate upon a resultant pathological condition and leave the original focus and cause of infection *in situ* is opposed to all the fundamental principles of surgery.

A primary incision with secondary operation for the removal of the appendix is no less unsatisfactory. As a rule patients cannot be induced to return when they are feeling well even if they know that they may at any time become most gravely ill. This method also exposes the patient twice to anæsthesia and the discomfort and inconvenience of operation. Not only this but a second operation shows us instead of a free appendix or one covered by fresh adhesions, easily loosened, an appendix hidden and covered by adhesions often so dense that the removal of the organ becomes a surgical procedure of the greatest difficulty and danger.

A decision must be made, between those who would always remove the appendix, and those who advise its removal as a rule but do not regard its remaining as a serious matter.

He was not willing to say that the appendix should be removed in absolutely every case. But his experience with these recurrent cases that he had himself operated, and others that had come under his observation, leads him to believe that the cases in which the appendix should not be removed are rare indeed. Surgeons have been too fearful of hunting for the appendix in the presence of small amounts of pus, too prone to hesitate in removing it from among adhesions or from the limiting membrane of an abscess.

The leaving of the appendix in an acute abscess case is a serious matter. Such an incomplete procedure simply tides the patient over the acute condition and one should not be satisfied until the offending organ is in a bottle of alcohol. Until this happy event takes place the patient remains in a condition of no uncertain danger.

He had left an appendix in but one case for two years and had not lost one of these cases as a direct result of the removal.

But one other point remains,—instead of reoperating in abscess cases, surgeons should not have to operate on abscess cases

at all. A case of appendicitis, diagnosed and operated early, cannot give rise to a fraction of the complications that delay brings with it. Operation should follow diagnosis at once and there would result clean cases, without drainage, mortality or complications.

Unfortunately we seem to be far from this happy state of affairs. Sometimes it seems as if we were still in the pre-surgical stage, when the evacuation of an appendiceal abscess into the intestines, as in one of these cases, was esteemed a most fortunate result.

To the average layman the word appendicitis is spelled OPERATION. Where then lies the fault for the large percentage of appendiceal abscesses still encountered?

Of 194 cases of acute appendicitis on the records filed so far this year, January to September inclusive, at the German Hospital but 79 or 40 per cent., were clean *i.e.*, early cases.

Of 23 cases that he operated there during the summer but 10 were clean cases that could be closed without drainage.

Since January 1, 1907, he had operated 161 cases of appendicitis,—100 at the German Hospital, 56 at the Germantown Hospital, and 5 at other institutions. Of these, 105 were clean cases which were closed without drainage, this included both chronic and acute cases. There was one death. The patient was a Jew and had, in addition to his appendix troubles, enlargement of the lymphatic glands of the mesenteric chain as far as the finger could reach. After operation he was extremely restless, became actively delirious and died promptly of exhaustion. A partial postmortem revealed nothing about the seat of operation to account for death. The glands were not malignant, probably tubercular.

Fifty-six cases required drainage for pus, either in localized collection or involving the entire peritoneal cavity.

So far as he could recall, or the records state, there was but one case in which the appendix was not removed. This man had been operated a year before at the Bellevue Hospital, N. Y., and reported at the German Hospital, September, 1907, with a sharply outlined abscess in the right iliac fossa, which was opened extraperitoneally by an incision parallel to and above Poupart's ligament. He recovered and was discharged nineteen days later.

Three died,—two of these had general peritonitis and sepsis

which was very profound before operation and which did not improve, one of these died in the operating room of acute septic œdema of the lungs, the other had had intestinal obstruction for four days before admission. The third case was one of localized abscess presenting in the median line. The pressure of the collection had caused complete occlusion of the rectum. The surroundings of the abscess were necrotic from pressure necrosis. The patient had been ill for two weeks.

As far as could be traced the three cases of peritonitis were infections of the retroperitoneal space. Total mortality, 2.4 per cent.; non-drainage cases, 0.9 per cent.; drainage cases, including general peritonitis, 5.3 per cent.

Dr. John H. Jopson mentioned three cases of this kind operated within a few months of each other. One case was a patient Dr. Wharton operated upon, with the assistance of Dr. Jopson, the other two cases were his own. These three cases emphasized the necessity of removing the appendix in all cases of abscess. He could recall only two cases in recent years where he could not remove the appendix. In one a careful examination of the cæcum showed it sloughed off, and in the other it could not be found. In one of his own cases the child had had an operation for drainage of an appendiceal abscess a year or two previous, then had a second abscess at the time the appendix was removed, and a third abscess after removal of the appendix.

It always seemed to him that to open an abscess and leave the appendix was a very unsatisfactory procedure and incomplete surgery. It had frequently been his experience when removing the appendix where there was an abscess, to find fresh pockets of pus behind and around it.

One hears much less advice now in favor of leaving an appendix which "forms part of the abscess wall." It is much less dangerous to remove such an appendix, after careful protection of the uninvolved peritoneum, than to leave it and run the risk of overlooking other purulent collections.

AMPUTATION AT THE SHOULDER-JOINT FOR EMPHYSEMATOUS ("TRAUMATIC") GANGRENE.

Dr. Astley P. C. Ashhurst reported the case of Laurence S., aged 14 years, who walked into the receiving ward of the Episcopal Hospital on December 27, 1907. While at his usual

work in a yarn factory he had caught his right arm in the machinery, and had had the skin squeezed off it from just above the elbow to above the wrist, by the revolution of two rollers. The skin hung loose like the inverted sleeve of a coat. A somewhat similar case, in which the skin had been squeezed off the hand from the wrist to the fingers, had recently been under treatment in the hospital, and as a considerable portion of this hand had been saved by conservative measures, the Resident Surgeon determined to attempt to save this second patient's arm. Accordingly, after thorough cleansing of the parts, the skin was stitched in place, leaving ample spaces for drainage through various rents in the tissues. The arm was surrounded with hot water bottles. It was considered barely possible, as the deeper structures were not injured, that some degree of union might take place, and that amputation, if it had to be done eventually, might be done through the forearm, and not at the middle of the humerus, as would have been necessary had it been done on admission.

The patient did well for twenty-four hours, when his temperature rose abruptly to 102° F., his pulse however not exceeding 104 per minute. On the third day after admission, at the morning dressing, a little emphysema was noticed in the forearm. The temperature had fallen to 100° F. The patient was isolated by direction of Dr. Frazier. When seen by Dr. Ashhurst in the afternoon, the emphysema had spread, and he urged amputation below the shoulder. Consent of the family could not be obtained, however; and in accordance with the advice of Dr. Neilson, the sutures were all cut, and the limb was placed under constant irrigation, this being the only form of palliative treatment that seemed available. Free incisions were also made throughout the emphysematous tissues, thus relieving the patient's pain, and giving exit to quantities of frothy fluid. A culture was made from this fluid, and it was found that an air-producing bacillus was present; but unfortunately, owing to changes in the laboratory, the culture was mislaid before it was possible to determine whether the growth was due to the bacillus of malignant œdema, to the *Bacillus aërogenes capsulatus,* or to some other gas-producing micro-organism.

The next morning, December 30, the patient appeared better, and the local condition was no worse: the fingers were absolutely gangrenous, and the whole forearm, as well as the elbow, was

numb. The temperature was 100° F., and the pulse 90 to 100, rather weak, and very irregular. The patient was clear in his head, as on the previous days, and did not present the aspect of one who was seriously ill. The accompanying photograph (Fig. 2), made on this date, shows the appearance of the arm. As the emphysema had not spread toward the trunk, being sharply limited by the circular wound above the elbow, where the skin had been torn loose, it was considered safe to postpone amputation, in the hope that a line of demarcation might form. As a matter of fact, the next day, December 31, there was a suggestion of a line of demarcation at the border of the skin surface above the circular slough in the lower third of the upper arm. The notes for this day read: "Forearm is emphysematous and gangrenous. Gangrenous process does not appear to pass beyond point of sutures at elbow. Several incisions made in forearm to liberate gas and fluid. Upper arm is discolored for about two inches above line of incisions. General condition good. Pulse is irregular and slow, but of good volume." The pulse, on this and the preceding day, varied from 52 to 94 per minute. No digitalis had been given.

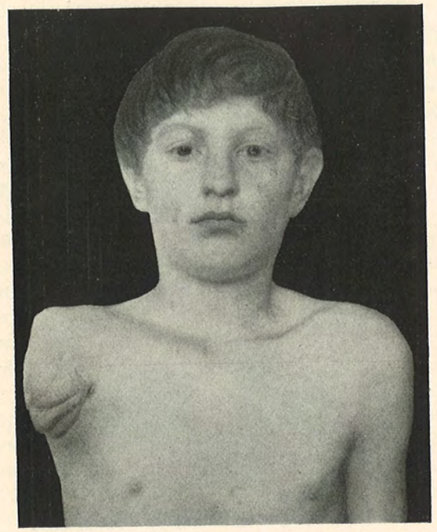
On the morning of January 1, 1908, it is noted that "there is slight crepitation for about one inch above line of suturing, and the discoloration seems to have spread nearer the shoulder, the upper arm is somewhat more swollen. Pulse irregular and not so strong." The temperature was just below 98° F., and the pulse from 64 to 68 per minute.

As it was evident that the infection by the gas bacillus had crossed the barrier set up by the solution in continuity of the skin and subcutaneous tissues, produced by the original injury in the lower third of the upper arm, amputation was decided upon at once. It was found that the inner surface of the arm almost to the fold of the axilla was greenish in hue, and that the only region from which a flap could be obtained was the deltoid; accordingly amputation at the shoulder joint was done by Dupuytren's method, using Wyeth's pins and an Esmarch band for hæmostasis, cutting the deltoid flap from without inward, and the inner, short flap, from within outward, after disarticulating the humerus at the shoulder. A large rubber tube was left in the stump for drainage, and the flaps were not sutured tightly. The patient was much shocked, though only a few drachms of blood

FIG 2.

Emphysematous gangrene.

FIG. 3.



Amputation at shoulder joint for emphysematous gangrene.

had been lost, and the operation had been completed with reasonable speed (about 25 minutes).

After the amputation the patient's temperature rose in a few hours to over 103° F., and by 4 A.M. the next morning reached 105.6° F., his pulse being about 138–148. At 4.30 A.M. he was given one pint and a half of saline solution, intravenously. This somewhat improved the force of his pulse. From the time the boy came out of ether, on the afternoon of January 1, to the morning of January 5, he suffered from the most frightful and violent traumatic delirium: he shrieked and yelled constantly, acting over and over again in his delirium the scenes of his accident, and throwing himself around on the bed so vehemently that he was with difficulty kept off the floor, even by strapping his ankles to the bed, and fastening his body by a sheet. During the first 72 hours succeeding the operation he obtained only six and one-half hours sleep, in two periods of about three hours each, in spite of the generous use of morphine, chloral, and hyoscine. Finally on the night of January 4, after a dose of paraldehyde, but perhaps merely as a result of exhaustion, he slept seven hours and a half, and awoke the next morning clear in his head. His temperature had gradually fallen, and after this date did not rise above 100° F.

The wound was dressed on the second day after the operation, to make sure that the gangrene had not affected the flaps; fortunately these were found in excellent condition.

To combat the toxæmia which seemed to be the cause of his delirium, he was forced to take as much liquid diet as possible. On the day after the operation, only 16 ounces of liquid nourishment could be taken, but this was supplemented by giving him a pint and a half of saline solution intravenously, as already mentioned. On the second day he took by mouth 68 ounces of fluid; and on the third day 65 ounces. No doubt it would have been beneficial to administer more saline solution intravenously, or by hypodermoclysis, but his delirium and tossing were so absolutely uncontrollable, that it would have been impossible to do either without the administration of a general anæsthetic. No record could be kept of the amounts of urine excreted, as these, as well as his bowel movements, were passed in the bed.

Two days after he came to his senses, he was removed from isolation, and returned to the general ward. His recovery henceforth was uneventful. A photograph made four weeks after operation, shows the appearance of the stump (Fig. 3).

This case is deemed worthy of record because of the rarity of recovery from emphysematous gangrene, even after prompt amputation. Although a case of this form of gangrene is received at the Episcopal Hospital every few years, this is, so far as can be determined, the first case to recover. In 1902, a man was admitted to the service of Dr. Neilson with compound fracture of the left elbow-joint; one morning, a few days after his admission, he was found to have developed emphysematous areas in his arm above the elbow. Three or four hours later, when seen by Dr. Neilson, the emphysematous crackling had invaded the thorax, and all thought of operation was abandoned, the patient dying the same afternoon or evening. In the summer of 1907, a patient who had been operated on for typhoid perforation, in Dr. Deaver's service, developed emphysematous gangrene in the abdominal wound, and died in a few hours.

Dudgeon and Sargent (*Trans. Pathol. Soc.*, London, 1905, lvi, 42) refer to two cases of emphysematous gangrene due to the Bacillus aërogenes capsulatus, following crushes, both patients recovering after amputation. Gayet (*Revue de Chir.*, 1908, i, 575) has recently reported the case of a patient with compound fracture of the forearm, which was repaired by operation, and who developed "benign gaseous gangrene," but recovered without amputation in three months and a half.

Writers in general recognize two main forms of "traumatic" or spreading gangrene (*"gangrène foudroyant"*)—the more serious form of malignant œdema, caused by Koch's Bacillus, in which variety the formation of gases is a secondary and minor characteristic; and a less serious form, due to any one of a number of gas-producing micro-organisms, of which that most frequently encountered is the Bacillus aërogenes capsulatus of Welch. Among other bacteria which may be the cause of emphysematous gangrene, Freeman ("Keen's Surgery," Phila., 1906, vol. i, p. 340) mentions the Bacillus proteus vulgaris, Bacterium pseudo-œdematis maligni, and the Bacterium coli commune.

The infection in the present case was probably due to one of the less malignant bacteria; and it seems not impossible that the delay in the emphysematous gangrene spreading toward the trunk may have been due to the form of the injury, which ripped the skin and subcutaneous tissues from around the arm above the elbow, thus leaving a gap in the lymphatic and cellular tissues

between the infected and healthy parts, which completely encircled the limb, and prevented extension of the infection upward.

The slowness of the pulse (52 to 64), and the absence of local inflammatory reaction before the operation, are also noteworthy. These features, as well as the fact that emphysema developed before the parts became gangrenous, show that the condition was not one merely of putrefaction in already mortified tissues; a fact which is further testified to by the finding of gas-producing bacilli in the fluids of the part, before the gangrene itself was evident.

Dr. Ashhurst expressed his indebtedness to his chiefs, Dr. Chas. H. Frazier, and Dr. G. G. Davis, in whose services the patient was treated, for the privilege of operating, and of reporting the patient's history.

TEMPORARY PARALYSIS OF LEFT VOCAL CORD AFTER EXCISION OF TUBERCULOUS CERVICAL LYMPH-NODES.

Dr. Ashhurst also reported the case of Frank J. S., aged four years, who was admitted to the Children's Hospital on July 28, 1908, in the service of Dr. E. B. Hodge, Jr., to whom he was indebted for the privilege of operating and of reporting the operation. In February, 1908, this patient had had his tonsils removed at the Children's Hospital by Dr. F. R. Packard, and shortly afterward developed measles, on account of which he was sent home. During his convalescence from the measles the lymph-nodes in the left submaxillary region became enlarged, and in spite of palliative treatment the swelling persisted. When he returned to the hospital in July, there was a firm, nodular mass in the left submaxillary region, the size of a goose egg, seven or eight more or less fused nodes being palpable through the skin. Operation was undertaken July 30, 1908. Through Dowd's incision parallel with the border of the mandible, and about an inch below it, the mass of lymph-nodes was removed entire: they surrounded the great vessels for a distance of about two inches and a half, a distinct groove being left in the specimen where the vessels ran. The hypoglossal nerve and descendens hypoglossi had to be dissected out of the inflammatory mass, and in so doing profuse hemorrhage arose, thought to be from a puncture of the internal jugular vein. The bleeding vein was clamped, but as the hemorrhage was then seen to come from a longitudinal slit, and not from a mere puncture of the vein, it was impossible to apply a

ligature satisfactorily, so the rent in the vein was sutured with fine chromic catgut. When the hemorrhage had thus been effectually stopped, it was seen that the tear had not been in the internal jugular itself, but in the temporomaxillary vein close to the trunk of the jugular; as part of the mass of lymph-nodes lay below this vein, it was accordingly ligated in two places and divided between the ligatures, in order to facilitate the operation. The deep fascia was closed with buried sutures of chromic gut, and the skin with silk-worm gut, a small gauze wick being inserted for drainage. The duration of the operation was one hour.

As the child had shrieked continuously for fifteen minutes before the anæsthetic was started, it was without much surprise that he was noticed to be very hoarse the next day. But as this hoarseness persisted with no appreciable diminution for two weeks, it was considered wise to have a laryngoscopical examination made, as it was feared the superior laryngeal nerve had been injured. Dr. Packard very kindly examined the child's larynx, and reported as follows: "I only saw him once and it was pretty hard to make an accurate diagnosis as he was very nervous. I thought at the time that there was a partial paralysis of the vocal cord on the side upon which the operation had been performed, and which I attributed to injury of the recurrent laryngeal nerve. Of course, if his superior laryngeal had been injured there would have been loss of sensation in the laryngeal mucous membrane, and the paralysis in such cases is never quite as marked as it appeared to be in the case which I examined. I have seen at least one other case of this kind, in an adult who had had tubercular cervical glands removed from her neck, following which she developed hoarseness and the vocal cord on the side which was operated upon was in a cadaveric condition. She regained the use of her voice completely. I think in these cases the recurrent laryngeal must be injured by being pulled upon or pressed, and as it is not completely severed, it recovers spontaneously after a greater or less lapse of time."

The hoarseness gradually diminished, and eventually disappeared completely, as did the slight facial paralysis present immediately after the operation.

If the injury had been to the recurrent laryngeal nerve, it seems certain that it must have been produced indirectly, by pulling upon the trunk of the vagus while dissecting the lymph-nodes off the great vessels; if the paralysis of the vocal cord was not due to injury of the fibres of the recurrent laryngeal nerve, then it must have been caused by injury to the superior laryngeal, which supplies the cricothyroid muscle and through stimulation of this muscle elongates the vocal cord of the same side, by elevating the anterior border and depressing the posterior border of the cricoid cartilage.

ACUTE PANCREATITIS.

Dr. John B. Deaver presented the following case history: Male, age 27 years. One year before admission to hospital had four or five attacks of abdominal pain accompanied by jaundice.

Two and a half weeks before admission had severe attack of epigastric pain accompanied by nausea and vomiting. Pain continued to day of admission, with frequent exacerbations. Pain started in epigastrium, referred to lower abdomen, back and shoulders. Has been jaundiced more or less ever since onset of this attack.

Physical Examination.—Patient is jaundiced, the respiratory excursions are limited, the respirations are short. Liver extends from the sixth interspace to two finger-breadths below the costal margin in the mammillary line. There is slight epigastric fulness and spasticity of both recti muscles. Some tenderness over entire epigastrium, quite marked over Mayo Robson's point. The pain continued without relief up to the time of operation. Temperature on admission 98.4°, and, during entire course of illness, febrile for only about three days after operation, with a maximum of 100.4°.

Operation.—Incision through right rectus. The gall-bladder was found adherent to colon and omentum and contained calculi. Posterior to the stomach there was a soft, fluctuating mass about the size of two fists, pushing the stomach forward. The finger placed in the foramen of Winslow found this to be in the position of the pancreas. The gall-bladder was walled off with gauze pads and aspirated. Forty cubic centimetres of mucopurulent fluid were removed. This was sterile, as shown by culture. The gall-bladder was then incised and four large and twenty-four small stones were removed from it and the cystic duct, which was dilated. Tube drainage was introduced into the gall-bladder and the gall-bladder sewn to the parietal peritoneum. The chole-

dochus was patulous. The laparotomy wound was closed after placing a gauze drain in the subhepatic space.

The patient was then placed on his right side and an incision made in the left loin, extending down 7 cm. from the costal margin and just external to the outer border of the erector spinæ. In the fatty capsule of the kidney there was much fat necrosis. An abscess was evacuated in the location of the pancreas and about half a litre of bloody purulent fluid escaped. The cavity was drained with a large rubber tube and two pieces of gauze.

The patient made an uneventful and practically afebrile recovery. The drain was left in the gall-bladder eleven days, and in the posterior incision for several weeks, although the drainage gauze in this incision was all removed in six days. The discharge from this wound was found to be very irritating to the skin.

Dr. Deaver remarked that this case presented these points of interest: (1) The slow pulse and afebrile course; (2) the presence of biliary calculi,—for which the operation was performed; (3) the presence of fat necrosis in the abscess cavity; (4) the irritating character of the pancreatic discharge.

THE VALUE OF THE CAMMIDGE REACTION IN THE DIAGNOSIS OF PANCREATIC DISEASE.

FROM THE PRIVATE LABORATORY OF DR. JOHN H. MUSSER.

BY EDWARD H. GOODMAN, M.D.,

OF PHILADELPHIA,

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THE diagnosis of pancreatic disease is usually a matter of the greatest difficulty, and any symptom, sign, or test which is suggested as an aid to our diagnostic equipment, should be given a thorough trial before it is accepted or discarded.

Great assistance has already been given by the laboratory worker, for the most part from the study of the fæces, though strangely enough the urine has been grossly neglected. Glycosuria has been urged as a symptom of pancreatic disease, but its absence in the majority of cases robs it of any diagnostic importance, and the same may be said of the other, almost forgotten, urinary findings.

In the Arris and Gale Lecture for 1904, Cammidge [1] reported the result of his extensive research on pancreatic disease, and described a new laboratory test which he claimed to be of great value in diagnosing pancreatic lesions. Based on the fact that acute and gangrenous pancreatitis are usually associated with fat necrosis, and chronic pancreatitis not infrequently, Cammidge believed that even in the latter condition when there was no visible sign of fat splitting, there might still be some change in the chemical composition of the blood. This change he believed might be due to glycerin, but after a few unsatisfactory examinations of the blood for this substance or its derivatives, he devoted his attention to the study of the urine. At this time he made use of two tests, the A and B reactions. Cammidge believed that in certain diseases of the pancreas the formation of crystals with the A reaction could

be prevented by preliminary treatment of the urine with mercuric chloride, and this formed the basis of the B reaction.

The very unscientific claims urged for the method by Cammidge, and the insufficient grounds for most of these claims, called forth a storm of criticism from subsequent observers (Ham and Cleland,[2] Schroeder,[3] Gruner,[4] Willcox,[5] and Haldane[6]) and the pancreatic reaction as first described, has fallen into almost universal disrepute.

To render the test free of the personal bias of the investigator, Cammidge[7] has modified his reaction, making the technic a little more complicated, but at the same time making the result an absolute one. This third reaction has been named by him "improved method" or "C" reaction, and is the one I have used in the present series of cases.

A portion of the twenty-four hours' urine, or a portion of the mixed night and morning specimens, is examined for albumin and sugar. If albumin is present it is removed by boiling with the addition of a few drops of acetic acid, cooled and filtered. The removal of the sugar will be spoken of later. To 40 c.c. of the filtered, albumin-free, acid-urine are added 2 c.c. of concentrated hydrochloric acid, and the mixture gently boiled on the sand bath for ten minutes following the first evidence of ebullition. A small flask, with a funnel as a condenser, is used for the purpose. After ten minutes' boiling the flask is removed from the sand bath, cooled in a stream of running water, and the contents made up to 40 c.c. with distilled water; 8 Gm. of lead carbonate are then added to neutralize the excess of acid, and after standing a few minutes the flask is again cooled in running water, and the contents filtered through a moistened, close-grained filter-paper.*

At this stage of the procedure, if sugar has been found on qualitative analysis, a portion of yeast is added to the clear filtrate, and the flask placed in the incubator over night. The next morning the solution is filtered and the test is continued.

The acid filtrate is thoroughly shaken with 8 Gm. of

*I have found the most satisfactory paper to be Schleicher & Schüll 589 Blue Ribbon.

tribasic lead acetate, and the precipitate removed by repeated filtration through a well moistened, close grained filter-paper. To get rid of the excess of lead, 4 Gm. of powdered sodium sulphate are added, the mixture heated on a wire gauze to the boiling point, cooled in running water to as low a temperature as possible, and the precipitate removed by careful filtration. Ten c.c. of the filtrate are put in a small flask, made to 17 c.c. with distilled water, and to this are added 0.8 Gm. of phenylhydrazin hydrochloride, 2 Gm. sodium acetate, and 1 c.c. of 50 per cent. acetic acid. The flask is then fitted with a funnel condenser and gently boiled on the sand bath for ten minutes, at the expiration of which time it is filtered hot through a filter-paper moistened with hot water. The filtrate if necessary is made up to 15 c.c. with hot distilled water, and the whole well stirred with a glass rod.

"In well-marked cases of pancreatic inflammation a light-yellow, flocculent precipitate should appear in a few hours, but in less characteristic cases it may be necessary to leave the preparation over night before a deposit occurs. Under the microscope the precipitate is seen to consist of long, light-yellow, flexible, hair-like crystals arranged in delicate sheaves, which, when irrigated with 33 per cent. sulphuric acid, melt away and disappear in ten to fifteen seconds after the acid first touches them. The preparation must always be examined microscopically, as a small deposit may be easily overlooked with the naked eye, and it is also difficult to determine the exact nature of a slight precipitate by macroscopical investigation alone." (Cammidge, *loc cit.*, p. 253.)

The nature of the phenylhydrazin precipitate is unknown, though Cammidge believes that the body is a pentose, not preformed but obtained by hydrolysis. To quote his words (*loc. cit.*, p. 251), "We are not in a position to make any definite statements with regard to the nature of the mother-substance from which the sugar is derived, but our earlier experiments proved that it was not the so-called animal gum of the urine, and the fact that a positive reaction has not, so far, been obtained by the 'improved method' with the urine,

from any but pancreatic cases, suggests that it is probably a body resulting from change in the pancreas, and possibly derived directly from that organ. The relatively large proportion of pentose-yielding material in the pancreas (2.48 per cent.) . . . points to the pancreas as the most likely source. It cannot be denied, however, that the disintegration of other tissue may also at times influence the urine in this respect, and it has also to be remembered that the ingestion of large amounts of pentose-containing food-materials may also cause small quantities of pentose to be excreted in the urine. Therefore while we maintain that a positive reaction by the 'improved method' of performing the so-called 'pancreatic reaction' is strongly suggestive of inflammatory disease of the pancreas, we are not prepared to contend that it is pathognomic of pancreatitis."

Cammidge's present attitude toward his reaction seems to be a very fair one, as the last sentence of the above quotation indicates. He has made 250 consecutive examinations, of which 125 were negative. These negative reactions were observed in 50 normal cases, 92 miscellaneous cases concerning which no further information is given, 10 cases of gall-stone in common duct, 11 cases of gall-stones in gall-bladder, both conditions unassociated with pancreatitis, and 12 cases of cancer of the pancreas. Two cases of acute pancreatitis gave a positive reaction. There were no negative findings in cases of chronic pancreatitis *sui generis* or of pancreatitis accompanied by gall-stones.

Control work on this "C" reaction has been slow in forthcoming, probably on account of the adverse criticism aroused by the previous reactions.

Watson [8] in a series of 250 analyses from 120 consecutive cases found the reaction positive in such cases as acute and chronic pancreatitis, acute suppurative appendicitis and peritonitis, malaria (jaundice with epigastric tenderness) pneumonia (arteriosclerosis), alimentary glycosuria and constipation, duodenal ulcer and chronic pancreatitis, gall-stones in common duct (pancreas inflamed), pregnancy (alimentary glycosuria), mitral stenosis (inflammatory disease of pancreas), uræmia, colitis, gout, tuberculous enteritis, constipation, chronic nephritis, cerebral hemorrhage, exophthalmic goitre, gastric ulcer, malignant disease of stomach, leukæmia, chronic bronchitis, arteriosclerosis, nephritis, simple catarrhal jaundice, and lymphosarcoma.

This is a startling variety of conditions and would tend to invalidate Cammidge's claims. Watson arranges the cases giving a positive reaction in the following three sub-divisions:

1. A group in which there is a definite clinical or pathological evidence of serious organic disease of the pancreas, for example, acute and chronic pancreatitis, usually associated with disease of the bile-ducts.

2. A group in which the reaction in the urine is associated with pronounced arteriosclerosis, a condition usually accompanied by more or less sclerosis in different glands.

3. A group in which the reaction is dependent on congestion and catarrhal conditions of the gland duct and substance, with associated toxæmia, for example, advanced heart disease, appendicitis, pneumonia, malaria, and the like.

Despite the many varying disorders which give a positive pancreatic reaction Watson believes the test will prove of great value to physicians and surgeons in the diagnosis and treatment of pancreatic disease.

Edgecombe [9] publishes the report of an interesting case of mumps in which, owing to abdominal pain and tenderness with vomiting, an examination of the urine for the pancreatic reaction was undertaken. Cammidge himself conducted the observation and diagnosed "an active inflammation of the pancreas" based on a positive pancreatic reaction.

Schroeder [10] found a positive reaction in chronic pancreatitis, cancer of the pancreas, cancer of stomach, gall-stones, catarrhal jaundice, tuberculous peritonitis, and tumor of upper abdomen, probably of pancreas. Negative findings were seen in chronic pancreatitis, cancer of stomach, abscess of pancreas, gall-stones (three of four cases), catarrhal jaundice (three of four cases), cancer of liver, cholecystitis, and pulmonary tuberculosis. His conclusions are as follows:

1. It has been proved that inflammatory and destructive diseases of the pancreas may give rise to the appearance of certain as yet undefined bodies in the urine, belonging possibly to the sugars or related compounds.

2. The reaction is not pathognomonic for disease of the pancreas in the clinical sense.

3. Extensive clinical observation on the urine in pancreatic and other diseases must finally determine the value of the pancreatic reaction.

In making my observations on the pancreatic reaction, I purposely chose to exclude examination of any normal cases, as Cammidge has reported 50 normal urines of which none gave a positive reaction. I have so far examined 62 individual cases. In several of these, control-examinations were made, which I have not enumerated. The majority of these cases were from the practice of Dr. Musser, but additional cases were furnished me by Dr. J. B. Deaver, Dr. W. Wayne Babcock, Dr. Joseph Sailer, and Dr. Warfield T. Longcope, all of whom I wish to thank for their courtesy. Great kindness has been shown me by Drs. Sailer and Speese in allowing me to study the urines of their cases of experimental pancreatitis. Full details of these are omitted, as the question of the value of the Cammidge reaction based on experimental and pathological work will be presented in a subsequent paper in conjunction with Dr. Speese.

My series includes only abdominal disorders, and I have tried to select several cases presenting the same disease, as a means of control. The list includes acute experimental pancreatitis, acute pancreatitis, chronic pancreatitis, cancer of the pancreas, cirrhosis of the liver, cancer of the gall-bladder and liver, cholecystitis, cholangeitis, gall-stones, cancer of the stomach including cases of mural, pyloric, and cardiac carcinomata, gastric ulcer, gastritis, hyperchlorhydria, gastroptosis, enteritis, renal calculus, fibroid of uterus, autointoxication, and diabetes mellitus. These cases I have tried to arrange in a consistent table, but the combination of several diseases has prevented a systematic classification.

	No.	Pos.	Neg.
Experimental pancreatitis (acute)	4	2	2
Acute pancreatitis	1	1	0
Chronic pancreatitis	2	2	0
Carcinoma of the pancreas	1	0	1
Carcinoma of the stomach and pancreas	2	1	1
Carcinoma of pylorus	3	0	3
Carcinoma of stomach wall	1	0	1
Carcinoma of cardia	1	0	1
Sarcoma of stomach	1	0	1
Gastric ulcer	2	0	2
Hyperchlorhydria	1	0	1
Gastroptosis	1	1	0
Gastritis	2	0	2
Cirrhosis of liver	10	0	10
Carcinoma of gall-bladder	2	0	2
Cholecystitis	4	0	4
Cholangeitis	1	0	1
Gall-stones	2	2	0
Enteritis	1	0	1
Abdominal tumor of obscure origin	1	0	1
Renal calculus	1	0	1
Fibroid of the uterus	1	0	1
Autointoxication	2	0	2
Diabetes mellitus	14	1	13
Myocarditis	1	0	1

Of the 62 cases studied, but ten cases gave a positive Cammidge reaction and in six of these the diagnosis of a pancreatic lesion was confirmed at operation. The case of acute pancreatitis died with all the classical symptoms of the disease, and the diagnosis of the case of carcinoma of the stomach and pancreas was corroborated post mortem. The case of gastroptosis was sent me by Dr. Babcock, with symptoms suggestive of pancreatitis, but revealing a markedly ptosed stomach on examination. As this condition was the prominent feature, I have classed the case under this head, but it is not unlikely that a pancreatitis may have been associated with the gastroptosis. The fourth case was a diabetic woman, a private patient of Dr. Musser, who had been troubled for some time with irregular attacks of indigestion and constipation. Von

Noorden [11] says, "To make a diagnosis of pancreatic diabetes in the absence of symptoms referable to marked pancreatic lesion is most daring"—and although this is very true, the question of the concurrence of pancreatitis with many cases of diabetes must be borne in mind, even though no symptoms are present (Herzog,[12] Ssobolew [13]).

Four cases of experimental pancreatitis were examined, two of which were positive and two negative. The two cases giving a negative reaction were found at autopsy to show barely discernible evidences of pancreatitis. The two positive cases were typical cases of acute hemorrhagic pancreatitis. Further work is being carried on in this direction, and will be reported in a later paper in collaboration with Dr. Speese.

I have studied but one case of carcinoma of the pancreas *per se,* and this gave a negative reaction, agreeing with Cammidge's results. Of two cases of carcinoma of the stomach with metastases to the pancreas, one was positive and one negative, so of the three cases of pancreatic carcinoma, two were negative, giving a percentage of 33 per cent. positive reactions. Cammidge found four positive reactions in 12 cases of carcinoma of the pancreas, or 33 per cent.

The finding of a positive pancreatic reaction in gallstones associated with pancreatitis is a common occurrence, according to Cammidge, but Schroeder found three negative reactions in four cases of cholelithiasis. My cases are not numerous, but confirm the report of Cammidge.

The cases of cirrhosis of the liver were studied with a special object in view, inasmuch as they were all cases in which an alimentary levulosuria has been found after the ingestion of 100 Gm. of levulose. It has been stated by Steinhaus [14] that the principal reason why cirrhotic cases are not able to utilize levulose is because of the common association of a chronic pancreatitis with the cirrhosis. This was based on post-mortem findings, but has not been generally credited, so it was thought of interest to examine all cirrhotic cases for the pancreatic reaction. As will be seen from the table, ten cases

were studied, but with no positive reaction. This would seem to point to another interpretation of alimentary levulosuria, as was mentioned in my preliminary report before the Section on Medicine of the College of Physicians last January.

All cases of glycosuria were examined for the reaction, and in but one case was it obtained.

Conclusions.—Of 62 cases studied, but ten gave a positive reaction. In seven of these the diagnosis was confirmed by operation or autopsy. One case died with all the clinical symptoms of acute pancreatitis, and in the other two a concurrent pancreatic lesion was not improbable. In no cases other than those presenting clinical evidence was a positive reaction obtained.

I firmly believe the test to be a very useful one and to mark a decided advance in the diagnosis of pancreatic disease. The technic is long and complicated and requires great care, but is one that can be readily mastered and is within the scope of any clinician with facilities for laboratory work. Sometimes the end-reaction is obscure on account of crystals forming which are not properly the osazon described by Cammidge, but observation as to structure and their insolubility in 33 per cent. sulphuric acid suffice to render the diagnosis less difficult.

The test is not pathognomonic, and the discoverer himself has never had the temerity to claim this property for it; but taken in connection with the clinical history and examination, and a careful study of the fæces, the Cammidge reaction is strongly suggestive of inflammation of the pancreas.

NOTE.—Since reading this paper I have studied many more cases and have made between 150 and 200 examinations. The results of these observations are in harmony with the above conclusions.

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Dr. John H. Musser (by invitation) said that in the main he agreed with the writer, feeling that there is in this test a symptom or sign of great significance in the diagnosis of pancreatic disease. In the previous reactions as described by Cammidge, however, he had felt that there was very little of satisfaction, and he had so reported at the Association of Physicians a few years ago. There were good chemical reasons for one to feel that perhaps the reactions were artificial rather than arising from the occurrence of any pancreatic disease or any change in the urine the result of pancreatic disease. The C. reaction has proven much more satisfactory, however, in the few cases observed, but as Dr. Goodman has said, one must consider it only an aid, a suggestive, but certainly not a pathognomonic, sign in pancreatic disease.

He had just recently put on record nine cases of acute pancreatitis. Four had been under the care of surgeons and three got well. The fourth was seen very early in our studies of pancreatic disease, as long ago as 12 or 15 years, and while an abdominal section was done in the presence of the extraordinarily large accumulation of blood, it rather made the surgeon hesitate to go further than to do an exploratory operation, and in consequence—or perhaps it would have happened anyway—the patient died. In the present time more heroic measures might have been carried out and the patient's life been saved. Of the five remaining cases three died and two got well, so that a person with pancreatic disease may get well without surgery, and therefore one must consider that acute pancreatic disease is in part,—that is up to a certain degree,—a medical affection, but the time comes very soon when it is a surgical disease. That borderland, so far as known at the present time, is not so distinct as one would

like to have it, but it cannot really be said that in every case of pancreatitis an operation should be done, and perhaps more particularly not because of the pancreatitis but because of the associated features in connection with the various cases. Pancreatitis is more frequently seen in patients past 50 or 60, who have other lesions, particularly degenerative lesions of the heart and blood-vessels, which may prevent operative interference. Under such circumstances perhaps life is not in quite as much peril as if operation were resorted to. In his experience the patients who got well were both young subjects; for the patient who died, an autopsy confirmed the diagnosis of pancreatitis. It is not an easy matter to make a diagnosis of pancreatic disease in acute pancreatitis. Of the nine cases mentioned five were women, four men, and five of the number were over 50 years of age.

Dr. William L. Rodman said that this test of Cammidge had been too long neglected by American physicians and chemists. It has been used with great advantage in England. In Leeds six years ago Robson and Moynihan spoke optimistically of this test in pancreatic disease and cholelithiasis. Neither liked to do an operation without the opinion of Mr. Cammidge, and both have reported, at that time and subsequently, that he was almost invariably right. He did not know why it was that the test had not been more satisfactory in this country, unless perhaps it was due to the fact that it is such a complicated procedure and requires a skilful technic in order to obtain results. It is certain that in the right hands and made in the right way it is a good test. The experience he had had with the test led him to believe that it was most valuable. Of course, it may not be a pathognomonic sign, but that it is a really substantial aid in cholelithiasis and in pancreatic disease there was not the slightest doubt. The test is not apt to be positive in carcinomatous pancreatitis. It is in chronic pancreatitis that it finds its best field of usefulness.

Dr. John B. Deaver, in closing, said that he was inclined to take the same view that Dr. Goodman had brought out in his paper. He agreed with Dr. Musser entirely when he speaks of a case of acute pancreatitis as being medical in the beginning of the attack. He also agreed with him as to the difficulty of diagnosis in the great majority of these cases, and certainly he felt that this test should be made, at any rate before operative interference was resorted to, particularly in acute pancreatitis. His expreience in

acute pancreatitis,—and he had seen a number of cases,—was that one should not be in too great a hurry to open the abdominal cavity. In cases where he had had the best results he had operated posteriorly, and this is what he proposed doing in the future if he could locate the lesion.

THE VALUE OF OPERATING IN TWO STAGES IN STRANGULATED HERNIA WITH THREATENED GANGRENOUS PERFORATION.

Dr. John B. Roberts said that inspection of the intestine after opening the sac of a strangulated hernia sometimes leaves the surgeon in doubt as to the wisdom of returning to the abdomen a coil, upon which there are dark spots suggesting approaching gangrene. This is not an infrequent occurrence after exposing to view a portion of gut, which has been tightly constricted by Gimbernat's ligament in femoral hernia.

Resection of the suspicious area or the formation of an artificial anus at the time the kelotomy is done are eminently proper procedures, when there is no doubt of the impending death of portions of the wall of the gut. Pushing the suspected part of bowel just within the inner ring of the hernial canal and providing for drainage have often been used.

A year ago he operated with local anæsthesia upon an old woman in feeble health with a tightly strangulated femoral hernia. He found a black line running around the gut where the ligament of Gimbernat had exercised linear pressure. The general condition of the patient and the suspicious character of this dark line made him doubtful as to what was the safest procedure. Resection seemed a serious risk and to replace the gut without waiting for more definite knowledge of the extent of damage appeared unwise. He finally concluded to allow the intestine which had been relieved of constriction to hang out of the wound. It was covered with a sterile dressing with the idea that in a day or two, he would know definitely whether or not perforation would take place from devitalization. The result justified this action; for a day or two afterwards the healthy condition of the exposed loop showed that all danger of gangrenous perforation had passed. He then, without general anæsthesia, loosened up the plastic adhesions which were easily broken and reduced the hernia. The wound was then closed and the patient made a prompt recovery.

It is likely that many surgeons have acted in this way under similar circumstances, but he had never done so, being willing in other cases to finish the kelotomy in one stage.

THE RELATIVE MERITS OF SUPRAPUBIC AND PERINEAL PROSTATECTOMY.

Dr. John B. Deaver presented three specimens of prostate glands recently taken out, the smallest of which was removed for a chronic prostatitis with persistent urethrovesical catarrh, and the two larger for obstruction, both of which were of the soft adenomatous type. The larger of the prostates weighed 9 ounces, and was the largest gland he had ever taken out. Both of the patients were 80 years of age; they were both sitting up in bed on the fourth day after operation.

The points he wished to raise for discussion were the following: That the suprapubic method is the method of choice in large adenomatous prostates under all circumstances; that the small adenomatous, as well as the hard prostates, be they fibrous, tubercular, carcinomatous, or sarcomatous, are possibly best attacked by the perineum, the so-called Young operation; that greater damage to the bladder results from the infrapubic removal of the prostate in large adenomatous prostates (and the hard prostate where the sheath of the gland is closely adherent); that the rectum is more likely to be injured in the infrapubic operation; that a permanent fistula, urinary incontinence and secondary hemorrhage are more likely to follow the infrapubic operation.

When secondary hemorrhage occurs after the infrapubic operation, the control of which entails packing the perineal wound, urinary incontinence and fistula are greatly favored. The primary bleeding, while it is greater in some cases in the suprapubic operation, it is more easily arrested by packing the cavity made by removal of the gland, and particularly purse-stringing with a catgut suture the mucous membrane around the opening of the cavity. Secondary hemorrhage seldom occurs following the suprapubic, while this cannot be said to be the case in the infrapubic operation. Though the prostatic urethra is destroyed in the majority, if not in nearly all suprapubic operations, the ultimate result is as good as when the urethra is saved. The one

thing however in favor of leaving the prostatic urethra is the lessened chance of stricture following. That stricture follows both the suprapubic and the infrapubic method in a percentage of cases is true. The question of preserving the ejaculatory ducts in the large adenomatous prostates, occurring as they do at an advanced time of life, to his mind cuts no figure. Again, he deemed it better practice to remove the adenomatous gland entire than to leave the portion forming the floor of the prostatic urethra on account of the likelihood of recurrence of obstruction from increased growth.

That the power of voiding urine occurs as early in the suprapubic as in the infrapubic is quite true. That the infrapubic operation calls for a master hand, if it is to be carried out with the least amount of risk to the surrounding structures he admitted to be so, but in either operation the more expert the operator the better must be the results. That the mortality of the two operations is practically the same in equally good hands is true; providing the statistics are honestly made and not doctored. That the ultimate comfort of the patient is greater following the suprapubic method in the class of cases he regarded as fitted for it, he was sure was so. He had done a sufficient number of operations by both routes to convince him that he was correct in making this statement.

That the chief factors in the mortality following either operation in advanced life are governed by the functionating ability of the kidneys and especially the great care and judgment in the after-treatment, he knew to be so.

One of the most important symptoms in connection with enlargement of the prostate, and fortunately comparatively rare, is free hemorrhage. Free bleeding endangers the life of the patient from retention and clotting in the bladder, which can only be thoroughly emptied by suprapubic incision. It was his experience that the danger to life under these conditions is greater than the operation of suprapubic prostatectomy under favorable circumstances. He had known patients to loose as much as one pint of blood at a urination. A repetition of the loss of this amount of blood demands at least that prostatectomy be seriously considered.

The infrapubic removal of the prostate in some of the cases of gonorrhœal chronic prostatitis and vesico-urethral infection is the only thing that offers permanent relief. This will not be

disputed by those who have had much experience with this troublesome class of cases and with the operation under these conditions. He protested, however, against the indiscriminate selection of these cases, and wished to warn the young surgeon of the responsibility he assumed when advising the removal of the prostate in this type of cases. Further, he never performed this operation without having told the patient of the risk of injury to the ejaculatory ducts; this should not occur, however, yet that it can occur is true.

STATED MEETING, HELD DECEMBER 7, 1908.

Dr. Gwilym G. Davis in the Chair.

CARCINOMA OF PYLORUS; HOUR-GLASS STOMACH.

Dr. William L. Rodman presented a woman, 43 years of age, who had given the history of chronic gastric trouble since she was fifteen. Six months ago her dyspeptic symptoms returned in a more pronounced way than ever before. She vomited irregularly, usually every two or three days. Her stomach contents did not show excess of hydrochloric acid or presence of lactic acid. A tumor near the pylorus was made out. The symptoms and signs clearly indicated an hour-glass stomach and a skiagram demonstrated such a condition. The pyloric compartment was very small and the cardiac compartment very large. There was considerable gastroptosis.

Three weeks ago this patient was operated on, and a large tumor was found near the pylorus. The pyloric end of the stomach was adherent to the liver and the pancreas. She bore the anæsthetic badly, and it was thought best to limit the surgical interference to a gastrojejunostomy, as the cardiac compartment was so large and the pyloric so small that they were practically dealing with a dilated stomach.

She has never vomited since the operation and her improvement has been steady and uninterrupted. She now claims that she never felt so well in her life. This, Dr. Rodman was satisfied, was a case of cancer ingrafted on the base of an old ulcer.

PERFORATING TYPHLITIS.

Dr. Rodman presented a girl, aged 17 years, who was brought to him from Cape May, N. J., during a most pronounced attack of what was thought to be appendicitis. He saw her thirty-six hours after the onset of symptoms, which seemed to have followed eating peanut candy. Her pulse was 120, her temperature 103°, the rigidity of the right rectus muscle was most marked, and her pain was intense.

As soon as the abdomen was opened, thin pus and fæces were seen to be escaping from a hole in the cæcum about one inch from the base of the appendix. The latter was not free, but bound down in the mass of adhesions. The cæcum was very red, soft, and friable. He did not think it wise either to remove the appendix or to attempt to suture the opening in the cæcum. Therefore gauze drainage was made, one piece protecting the general cavity centrally, one passing downward to the pelvis, one upward towards the liver, one in the flank. The fifth piece led down to the opening in the cæcum. The superficial wound was not sutured. The Fowler position with Murphy's continuous irrigation was instituted at once after operation.

At the end of two weeks the pus and fecal discharge had ceased, and a second operation was done to remove the appendix. No perforation of the appendix was found, and it was easily removed in spite of the great amount of inflammation existing a fortnight previously. The wound was closed with tier sutures, and her recovery has been smooth and uneventful. This was evidently a case of typhlitis, rather than appendicitis. Dr. Rodman said that he had seen two or three other cases like it, each showing a marked perforation in the cæcum, in one of them as large as a quarter of a dollar.

SARCOMA OF THE BREAST.

Dr. Rodman presented a woman from whom a very large sarcoma of the breast was removed two weeks ago at the Presbyterian Hospital. It was a periductile sarcoma. Sarcoma of the breast is a rare neoplasm. He had operated upon but three cases in his life, two of these, strangely enough, in the last year.

S. W. Gross estimated that sarcomata comprised 8 per cent. of mammary neoplasms. Roger Williams examined 2300 cases and found that sarcomata comprised 3.8 per cent. Dr. Rodman had carefully examined the statistics covering 5000 cases of mammary neoplasms with the result that sarcomata comprise less than 3 per cent. of mammary growths.

Although a diagnosis of sarcoma was made in this case, a free axillary dissection was carried out just as in cancer of the breast. He thought that this should always be done, inasmuch as sarcoma not infrequently causes infection of the neighboring lymphatic glands.

PERFORATION OF FEMORAL ARTERY BY OSTEOPHYTE.

Dr. Rodman presented a man, aged 30, from North Carolina, who had suffered for fifteen years with disease of the right femur. There had been from time to time sinuses through which small pieces of dead bone were discharged. He came to the Presbyterian Hospital for treatment September 1. A few days afterwards another abscess formed; it was opened, nothing further being done. Within forty-eight hours afterwards he had hemorrhage from the popliteal. The wound was packed with iodoform gauze and the hemorrhage in this way controlled. Each time the packing was removed, hemorrhage recurred. The femoral artery was ligated under cocaine at the apex of Scarpa's triangle. This controlled the hemorrhage for a week, when another free bleeding occurred, presumably when the circulation was re-established. The femoral was again ligated under cocaine just below Poupart's ligament. The hemorrhage was controlled for another week. Recurring, it was deemed best to amputate the thigh. He almost perished from shock. After the limb was removed, two spiculæ were found, sharp as the prongs of a fork, sticking backwards in the popliteal space, which had cut both artery and vein across. The specimen presented shows clearly enough the injury to both vessels.

It is hard to understand why gangrene did not ensue. The femur was two and a half or three times its normal size, the result of chronic osteoplastic osteitis. The amputation was made in the upper third of the thigh. He has gained twenty pounds in weight and all of his septic symptoms disappeared promptly after operation.

OMENTAL CYST.

Dr. Rodman presented a girl, aged 17, who was operated upon three weeks ago in the Medico-Chirurgical Hospital for an enormous cyst of the abdomen weighing sixty pounds. It had been variously diagnosticated by different surgeons as a pancreatic cyst, an ovarian cyst, and as free fluid in the peritoneal cavity. She had been tapped three times, the fluid being clear and limpid as spring water. The tumor was beneath the parietal peritoneum, covered over by an additional layer of peritoneum, but superior to the great omentum. It had no pedicle at all. But a single vessel was tied, and that a small one. It shelled out as a walnut from its covering. The cyst was unilocular. Seemingly, it was a cyst of the omentum. No abdominal viscus was seen during the operation.

Her recovery was rapid and complete.

SARCOMA OF BREAST.

Dr. John Speese presented, for Dr. Jopson, a specimen of sarcoma of the breast, occurring in a colored woman fifty years of age, in which the macroscopic appearance suggested that of the cystosarcomata described by many German pathologists. Several cysts were present, the contents having undergone coagulation. Microscopic examination revealed a malignant growth of connective-tissue origin, consisting of great numbers of spindle cells. The glandular portions of the breast also showed evidences of hyperplasia, the epithelial cells being heaped up in the ducts and tubules, but not infiltrating the surrounding tissues.

HYPERNEPHROMA OF THE KIDNEY.

Dr. John H. Gibbon presented a man 54 years of age, who was received into the medical wards of the Pennsylvania Hospital on September 18, 1908, under the care of Dr. Stengel. Three weeks before admission he began to have pain in the upper right quadrant of the abdomen, which he stated was increased by taking food. At this time a distinct tumor was easily palpated below the costal border, and apparently was connected with the liver. There was nothing in the repeated urinalyses to suggest any inflammatory condition of the kidney. The patient's hæmoglobin was 55 per cent.; color index, 0.674; leucocytes, 4100; and his red cells 4,360,000. An X-ray plate was made but showed nothing. It was thought that the tumor was probably connected with the kidney. Ureteral catheterization was done by Dr. Stewart, and proved of great diagnostic value. The catheters were inserted in the ureters and the glasses attached at 11.45 o'clock; at 12.05 a four-grain capsule of methylene blue was given. At 2 P.M. the methylene blue appeared in the urine from the left ureter, and in the urine from the right kidney not until more than an hour later. The catheters were removed at 3.07, during which time there were excreted from the left kidney 97 c.c. of urine, and from the right 9 c.c. There was no pus in the urine and the patient had no leucocytosis.

An incision was made through the sheath of the right rectus

and the peritoneum overlying the tumor was divided. In separating the tumor from the surrounding tissues a projecting mass from the posterior surface was found, which was probably an extension of the disease beyond the capsule, so that its complete removal was made more difficult. The operator finally, however, was able to get completely around this mass, although it was densely adherent to the spine. The ureter and vessels of the pelvis were ligated separately and the tumor removed. There was considerable oozing from the large cavity left after removal of the tumor, and a gauze drain was inserted. No sutures were placed in the posterior peritoneum in this case. The anterior wound was closed excepting at the point of drainage. The patient stood his operation well and made a good recovery. He had an X-ray burn which has now healed. For a time he had œdema and tenderness in the posterior abdominal wall. This entirely disappeared, however, and he seems now in a fair way to make a complete recovery from his operation, although recurrence is to be expected.

The pathological diagnosis of the growth in this case was hypernephroma of the kidney.

SARCOMA OF THE KIDNEY.

Dr. John H. Gibbon presented a boy, four years of age, who was operated upon a year ago at the Jefferson Hospital. The case occurred in the practice of Dr. George T. Tracy, of Beverly, New Jersey, and was seen by Dr. Gibbon in consultation with Dr. E. E. Graham. The boy at that time had an enormous tumor involving his right kidney. This tumor was first noticed a few weeks before admission. It was large enough to be easily seen at a considerable distance. Because of the size of the growth the prognosis was particularly grave, nevertheless the patient's parents were anxious that operation should be done.

The child was given chloride of ethyl-ether anæsthesia, and the peritoneal cavity opened over the tumor. The posterior peritoneum over the tumor was then divided and the entire mass removed. There seemed to be no extension beyond a well-defined capsule. The tumor was delivered through the abdominal wound before the pedicle was ligated. After ligating the blood-vessels of the pedicle an attachment to the lower portion of the tumor came into view, which turned out to be composed of kidney substance, and extended across the spinal column to the opposite side, where it was attached to the other kidney. It was about the size of a little finger. The left kidney seemed normal in shape, and had a distinct pelvis. The connecting link passed to its lower pole. There was no evidence of any disease in this isthmus, which was then ligated and divided. The posterior peritoneum was closed and the abdominal wall closed in layers without drainage. After removal the tumor was split and the growth found to be one which completely surrounded the kidney but only partially involved this organ. It had apparently started from the suprarenal. The specimen is nearly as large as the child's head. The ureter and calices were normal in size. One calix extended into the isthmus which had been divided.

Pathological diagnosis of this growth was spindle-celled sarcoma.

The boy made a prompt and very satisfactory convalescence. About a month after his operation he passed some blood in his bowel movements. Since that time, however, he has steadily improved in spite of an attack of measles, of chicken-pox, and one or two attacks of croup. He has gained ten or twelve pounds in weight and is passing a satisfactory amount of normal urine. There is no evidence of any hernia at the site of the incision, nor is there any evidence of any recurrence of the trouble. The boy has a good color and seems perfectly well. These large sarcomata involving the kidney are peculiarly fatal, and recurrence after removal usually takes place promptly.

Dr. Henry R. Wharton thought it rather remarkable to have a child doing well a full year after an operation for sarcoma of the kidney. He recalled two similar cases in which recurrence took place within six months, proving fatal in a short time, and he had never had a case in which recurrence has not taken place sooner or later.

THE RESULT FIVE YEARS AFTER EXCISION OF THE HUMERAL HEAD FOR CONGENITAL SUBACROMIAL DISLOCATION OF THE HUMERUS.

Dr. John B. Roberts presented a boy, eight years of age, who was operated on for congenital dislocation of the left humerus at the Methodist Hospital five years ago.[1] The head of

[1] American Journal of the Medical Sciences, Dec., 1905.

the humerus was excised at that time. Examination shows the left humerus to be very much shorter than the right, but the motions of the arm as a whole are much more free than at the time he was seen previous to operation.

Measurements from the tip of the acromion to the external condyle are difficult to make with accuracy because of the boy's perpetual movements, but the right arm is apparently 9¾ in. in length from the points mentioned; the left, 7 in. The upper end of the humerus seems to move quite freely under passive motion made by the surgeon and there is marked grating.

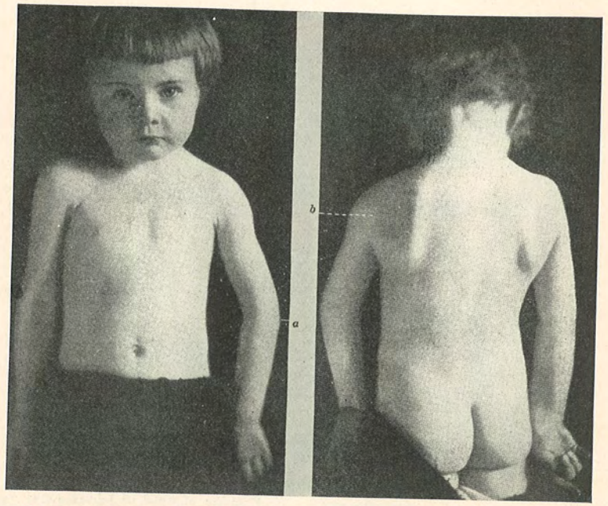
When the child places his left hand on his right shoulder or on his head the scapula, however, moves with the humerus. He can put his left hand on the opposite shoulder, on the top of the head, and on the back of his neck, and move it from the occipital region to the vertex without difficulty and without using the right hand to aid the left arm by lifting the elbow as he did originally. He cannot raise the left arm outward much above the horizontal line, though he can sling it higher than that.

Both arms hang at the side with the thumbs out and with the humerus quite near the chest. External rotation of the hand carries the thumb of the left hand nearly as far outward as on the right side. There is, however, no rotation made at the shoulder joint as on the normal side. The entire external rotation is in the forearm. The humerus can be rotated outward passively, but the little boy does not do it himself. It is a little difficult to get a true estimate of the ability to make the voluntary motions desired because of the boy's restlessness and inattention. The grasp of both hands is apparently the same, and the power of flexing and extending the elbow-joint seems alike on both sides. The biceps on the left side shows the abnormal swelling due to the loss of the proper attachment of one head, but the flexion of the elbow seems to be about as strong as on the other side. Supination of the hand is a little restricted.

The boy can bring the upper arm quite close to his ribs and as stated before can place the palm upon the neck and head with ease. He can pull his left ear and right ear, and can place the left hand readily behind him and touch the lumbar region with the back of the hand.

There is some atrophy of the muscles in the supraspinous and infraspinous fossæ of the scapula, as there is of the muscles of

FIG. 1.

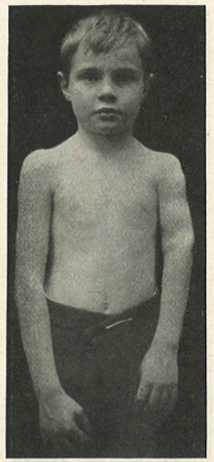


Congenital subacromial dislocation of the left humerus. Boy, aged three years. Observe abduction and inward rotation of humerus. Before operation. *a*, olecranon points directly outward and external condyle forward. *b*, head of humerus.

FIG. 2.

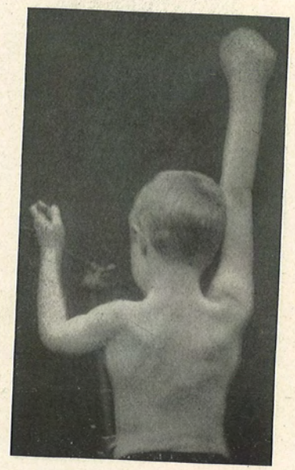
Excision of head of left humerus five years ago for congenital subacromial dislocation of humerus. Boy is now (Dec. 7, 1908) eight years old. Observe shortening of arm.

FIG. 3



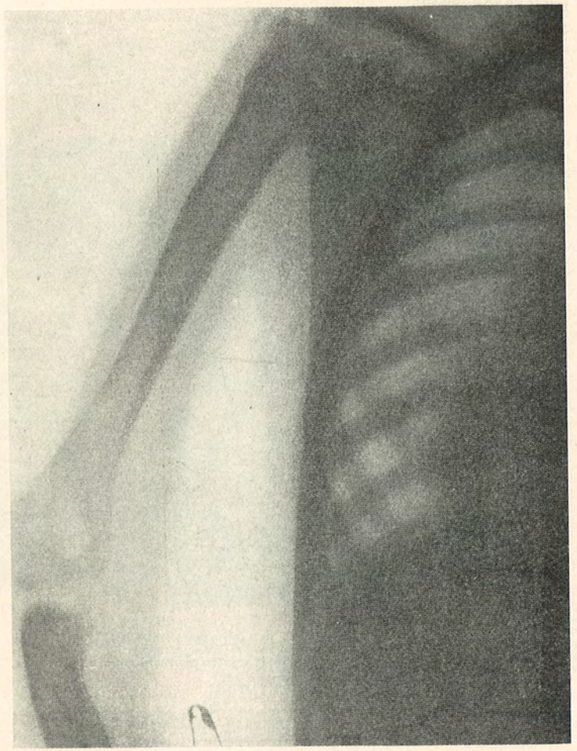
Excision of head of humerus five years ago for congenital subacromial dislocation of humerus. Boy is now (Dec 7, 1908) eight years old. Observe shortening of arm and the ease with which left elbow is carried near chest.

FIG. 4.



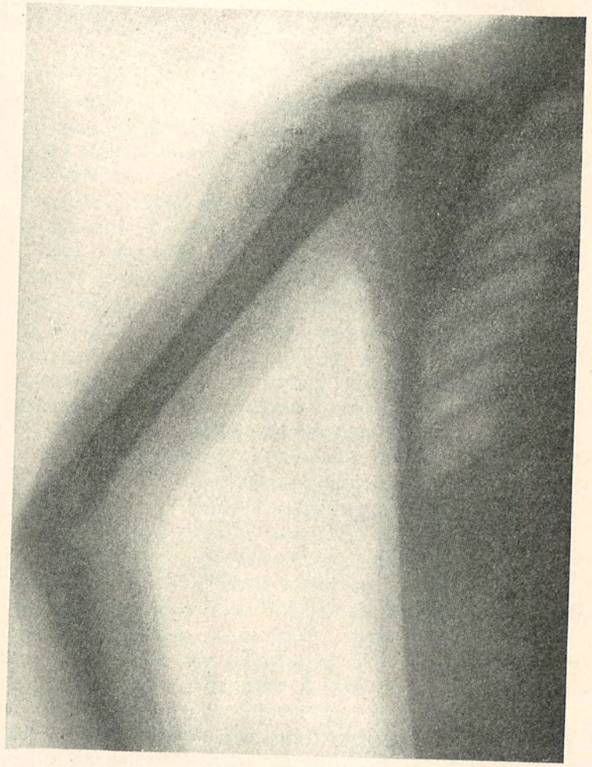
Hand on head rest is up as high as he can get it without twisting body. Before operation five years ago he could not raise left arm without aiding it with other hand.

FIG. 5.



Congenital subacromial dislocation of the left humerus before operation. Observe abduction rotation of humerus, shown by the elbow being held away from the thorax, with olecranon pointing outward.

FIG. 6.



Congenital subacromial dislocation of the left humerus, after excision of the head. Skiagraph taken about three months after excision of the head of the humerus. Observe the absence of abnormal rotation of the humerus, which is seen in the skiagraph taken before operation. The abduction of the humerus seen here is voluntary.

the forearm and upper arm. When he attempts to elevate the left arm, as in using the deltoid, he has to give it a swing, and the scapula moves with the humerus. He can then bring the arm up quite well, though he cannot retain it above the horizontal line.

There is little, if any, lateral spinal curvature.

There is shortening of the left clavicle, which from the sternum to the scapula measures 5½ in., whereas the left is 6 in. long. The ulna on the abnormal side appears to be the same length as that on the normal side, measuring 8¼ in. from the insertion of the triceps to the head of the ulna at the wrist.

Dr. Gwilym G. Davis said that the bulk of these luxations seem to be congenital, very likely produced at the time of birth, traumatic ones acquired after birth being comparatively rare. He thought the congenital cases are more common than is usually supposed. It is usually caused by the internal rotation of the arm, and it would be interesting to know whether in this case there was a history of difficulty in birth.

Dr. John B. Roberts said that these dislocations are supposed by many to be results of parturition. There have, however, been reported a few cases of bilateral dislocation, and several cases of the occurrence of this dislocation more than once in the same family. It seems unlikely that a child would get double subacromial dislocation of the humerus in parturition, or that two or three children in one family would have the same accident. He could not but believe that they are as much congenital as dislocations of the hip. Some believe them to be due to paralytic conditions of the arm produced at birth. They are interesting and deserve more study than is given them, for they are rare. Dr. Roberts believed them to be true congenital dislocations. He had seen but two such cases, the one operated upon and another in which the patient's friends objected to operation.

FRACTURE OF THE PELVIS WITH RUPTURE OF THE ABDOMINAL WALL.

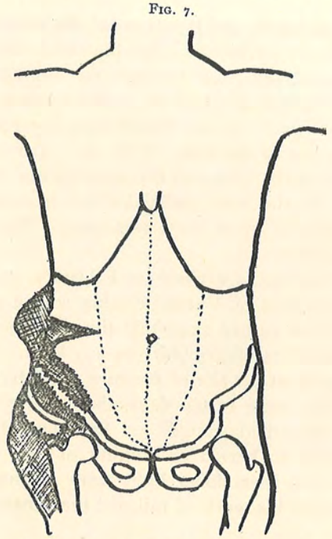
Dr. Astley P. C. Ashhurst reported the case of a man, 26 years of age, who was admitted to the Episcopal Hospital, in the service of Dr. Davis, Jan. 1, 1908. He had been caught between two trains, his pelvis having been crushed laterally. There was no marked shock on admission. There was a comminuted frac-

ture of the crest of the right ilium, from the region of the anterior superior spine backwards for about four inches, the larger fragment being about two inches in breadth and four inches long. There were no particular symptoms of intra-abdominal injury. Urine drawn by the catheter was clear. There were numerous abrasions and contusions, and there were several immense hæmatomata in the subcutaneous tissues of right flank, external iliac fossa, right buttock, upper part of thigh, sacrum, and lumbar spine. Below the right costal border a rent in the abdominal muscles was clearly palpable through the skin, which was nowhere perforated. As the hæmatomata steadily increased in size, it was determined to attempt the repair of the abdominal wall and the replacement of the fractured bones, and to exclude intra-abdominal injury by exploration.

Accordingly, at midnight, four hours after the injury, a transverse incision was made at the level of the umbilicus, over the most evident seat of injury. This incision extended from the right semilunar line outward for three or four inches. Over a pint of fluid and clotted blood was evacuated, and a large and ragged rent was found in the oblique and transversalis muscles of the abdominal wall, with the lower intercostal nerves, apparently intact, spanning the gap like fine silken threads; a coil of gut, covered only by the parietal peritoneum, bulged into the wounded area. The peritoneum was opened, and two fingers inserted for exploration at once caught hold of a long, thick, and rigid appendix, which was drawn out for inspection: The appendix was not inflamed, but contained a firm concretion near its tip, and its lumen was distended with fecal matter of the consistence of putty, thus accounting for its rigidity. The appendix was removed. A gauze sponge, passed into the pelvis, found no evidence of blood or fæces, so the peritoneum was closed. The rupture in the transverse muscles was repaired in layers, by buried sutures of chromic gut, and the skin incision was then enlarged at right angles to the first, downwards over the site of the fracture of the pelvis. Here the oblique muscles were found completely detached from the crest of the ilium, and the iliacus also was torn loose from the internal iliac fossa for two inches towards the sacro-iliac joint. The whole crest of the ilium was broken loose, and was drawn downwards and outwards on to the buttock, by those few fibres of the glutei muscles which had not themselves

been ruptured. Much liquid and clotted blood was evacuated from this region also. The displaced fragments were pulled back to their normal relations, and were held there by passing interrupted mattress sutures of heavy chromic catgut, by means of a Reverdin needle, from the gluteal muscles below, through the remains of periosteum and muscular tissue on the crest of the ilium, and up through the oblique muscles of the abdominal wall,

FIG. 7.



Fracture of crest of right ilium, with rupture of the abdominal wall. (Shaded area represents hæmatomata.)

and then back again to the starting point in reverse order, so that when these mattress sutures were pulled tight and tied, they drew the gluteal muscles up from below, and the oblique muscles down from above, and thus fixed the iliac crest with reasonable security between the two. Drainage from the fractured area was provided for by a rubber tube and two pieces of gauze. The superficial fascia was sutured with buried sutures, and the skin with silk-worm gut. Finally, an incision was made over the hæmatoma in the kidney region, and this was drained by a rubber

tube. No attempt was made to evacuate all the blood in the various hæmatomata, as to do so would have required incisions all down the thigh as well as over the sacrum. Yet the sound of the liquid blood splashing about in these cavities was sufficiently alarming as the patient was lifted off the operating table, the admission of air to the cavities making the sounds very audible even across the room. The duration of the operation was fifty minutes.

The patient did well, and it was noted the next day that there was no pain except on motion. By the third day all the other hæmatomata had drained out through the one opening. Three weeks after the operation (Jan. 21, 1908) there was high fever, and considerable constitutional disturbance, due to the damming up of a hæmatoma in the loin. This was opened through the original incision in the loin, and the temperature reached normal the next day. At this time the abdominal incisions were practically healed, only a small sinus remaining. The bone seemed firmly fixed in place.

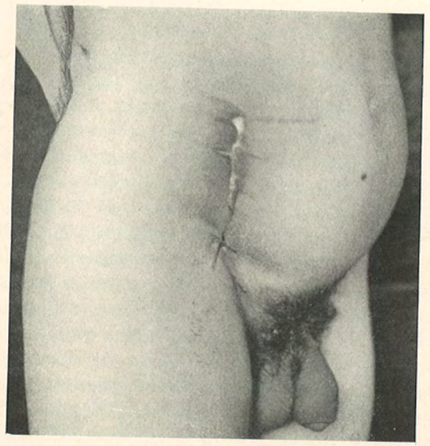
The patient sat up in a chair on February 17, and was discharged about the first of March, walking with a moderate limp. He has been an out-patient since that time, and now walks without any limp, and has no disability of any kind. A small sinus, due to slight caries at the site of fracture, persists, but it requires to be dressed only once in ten days, there being almost no discharge. The abdominal wounds are firm, and there is not the slightest tendency to hernia or bulging of that portion of the abdomen. He has been doing light work all summer, but has not yet returned to his work of railroad brakeman.

EXTRAPERITONEAL RUPTURE OF THE BLADDER, WITHOUT FRACTURE OF THE PELVIS—TWO CASES.

Dr. Ashhurst related the histories of the following two cases:

Case I.—Archibald McD., aged 43 years, was admitted to the service of Dr. Davis, Jan. 30, 1908. While at work, in a stooping posture, he had been struck across the right loin by a falling telegraph pole, and was crushed to the earth. On admission he was seen by Dr. Davis; at this time there was moderate shock (temperature, 97.2° F.; pulse, 88; respiration, 32), and it was ascertained that two ribs on the right were fractured; there

Fig. 8.



Fracture of pelvis with rupture of abdominal wall. Counter-incision in loin to drain hæmatoma.

were no other symptoms. About five hours later, signs of internal hemorrhage began to be evident, the patient having recovered from his shock. There was great tenderness over the right kidney region, and some abdominal rigidity. Nearly pure blood, with no clots, was drawn by catheter. Small amounts of boric acid solution injected by the resident into the bladder were all recovered. (Later it was learned that only two ounces at a time had been injected.) Examination at this time showed evidences of deep hæmatoma in the right lumbar region, with swelling, dulness, and marked tenderness. Dr. Ashhurst thought it probable that there was an extraperitoneal rupture of the right kidney.

Operation at 9.45 P.M., about eight hours after the injury. An oblique right lumbar incision was made, retroperitoneal; a moderate-sized hæmatoma was evacuated from among the lumbar muscles, but the kidney when brought into the wound was found to be uninjured. The lumbar wound was closed without drainage. The patient was turned over on his back, and a hypogastric incision through the right rectus muscle was made. Free extraperitoneal hemorrhage was found in the space of Retzius, but it was decided to explore the other kidney and the ureters as a matter of precaution. The peritoneum was therefore opened: the intestines were normal, and there was no free fluid; the left kidney was found normal on palpation, and no evidence of intraperitoneal injury could be discovered. There was a large hæmatoma in the extraperitoneal tissues of the *left* pelvis and the *left* iliac region. The median hypogastric incision was closed without drainage; and a third incision was made through the left rectus muscle, close to the pubic bone, opening the extraperitoneal hæmatoma, which seemed to have its origin around the neck of the bladder and the prostate, though no definite rupture of the bladder could be found. A catheter passed by the urethra showed the bladder to be empty, and no rupture could be brought to view. The oozing areas around the neck of the bladder were packed with iodoform gauze, and the bladder was opened at its dome, was stitched to the abdominal wall, and drained by a large rubber tube. The operation lasted one hour. During most of it the patient was pulseless, and only by the use of saline solution intravenously did he leave the operating room alive.

The next morning the patient appeared to have some chance of recovery; four ounces of nearly clear urine had drained from

the bladder, and there was very little hemorrhage from the pelvic tissues. Up to the time of death, twenty-nine hours after operation, eleven more ounces of urine drained from the bladder, or fifteen ounces in all since the operation. As there was no further bleeding, and no evidences of peritonitis, death was attributed to shock.

CASE II.—Fred S., aged 20 years, was admitted to the service of Dr. Frazier, Nov. 23, 1908. While driving a wagon it rolled down an embankment, killing one of the horses, and crushing the patient. On admission there was considerable shock (temperature, 97° F.); there was inability to pass urine, and pure blood was drawn by the catheter. It was impossible to recover any fluid which was injected. There was great abdominal pain and rigidity, with dulness in the flanks, which seemed to be varied by the position of the patient. There was dulness in the suprapubic region, and no change was produced in this dulness by injections through the catheter. No fracture of the pelvis could be demonstrated even by rectal examination. On account of the great abdominal rigidity and tenderness, with the doubtful movable dulness in the flanks, it was considered wise to explore the abdomen, though the diagnosis of intraperitoneal rupture of the bladder was not definitely made.

A median hypogastric incision was made six hours after the injury. There was blood in the space of Retzius, and on opening the peritoneal cavity a little bloody fluid was found. This came from a rent of the bladder, involving the serous coat only, to the left of the middle of the posterior wall. This area was sutured with a continuous Lembert suture of linen. The lower angle of the peritoneal incision was closed, and a gauze drain from the pelvis was brought out of its upper angle. Then, through the same hypogastric wound, but extraperitoneally, the bladder was detached from the pelvic wall, and liquid blood and clots were evacuated from the extraperitoneal region to the left of and in front of the bladder. No bleeding points could be detected, and no definite rupture of the bladder could be found. Two gauze packs were placed to the oozing area around the triangular ligament and neck of the bladder, both extraperitoneally. The bladder was then opened, and bloody urine escaped; the end of the catheter in the urethra could not be felt within the bladder; evidently it had passed into the hæmatoma to the left of the bladder,

through a rupture in the neighborhood of the prostatic urethra. The bladder was drained by a rubber tube, through the suprapubic wound, and the middle of the abdominal incision was closed, leaving the peritoneal drain emerging at the upper end and the extraperitoneal and bladder drainage emerging at the lower end. The time of the operation was forty-five minutes.

The patient rallied well from the operation, but died in twenty-four hours with uræmic symptoms (restlessness, delirium, slight dyspnœa, etc.); there were no symptoms of peritonitis. Examination of the wound after death showed no fluid in the peritoneal cavity, no inflammatory lymph, no adhesions, and no injury to any viscera except bladder. There had been no more hemorrhage from the extraperitoneal region where the rupture of the bladder was supposed to be. No fracture of the pelvis was detected.

Dr. Ashhurst said that in order to gain some idea of the mortality and complications of cases of fracture of the pelvis, he had searched the records of the Episcopal Hospital from Jan. 1, 1895, to Dec. 1, 1908. During that period there had been treated in the wards 57 patients with fracture of the pelvis; 18 of these patients died, a mortality of 31.57 per cent. Of these 18 fatal cases, there were no visceral injuries in 8, death in most of these cases being due to other injuries (crushes of the extremities, fractures of the skull, etc.). There were 10 cases complicated by visceral injury, as follows:

	Cases.	Recovered.	Died.
Rupture of the urethra	4	1	3
Extraperitoneal rupture of bladder	4	1	3
Rupture of undiscovered portion of urinary tract	1	0	1
Rupture of liver	1	0	1
	10	2	8

In addition to the above cases of extraperitoneal rupture of the bladder, there had been treated 3 other cases (all fatal) without fracture of the pelvis, including the two cases reported by Dr. Ashhurst to-night. Among the entire series of 7 cases of extraperitoneal rupture of the bladder, only one patient recovered (see Case VI in appended list).

As to the relative frequency of intraperitoneal and extraperitoneal ruptures of the bladder, it was generally stated that

the latter were much rarer, forming only 10 to 20 per cent. of all cases of rupture of the bladder; and this statement had been made by Dr. Ashhurst himself, in publishing statistics of 110 cases of intraperitoneal rupture of the bladder treated by laparotomy (*Amer. Jour. Med. Sc.*, 1906, ii, 17). But as he had found only 3 cases of intraperitoneal rupture at the Episcopal Hospital, to 7 cases of extraperitoneal rupture, he was inclined to think the rarity of the latter had been overestimated. It must be acknowledged, however, that in many of these, as in most other cases of extraperitoneal rupture reported, no definite rupture had been found, the diagnosis being based on the presence of bloody urine both inside the bladder and in the extraperitoneal pelvic tissues.

In regard to ruptures of the abdominal wall from crushing force, they must be acknowledged to be extremely rare. Besides the case now reported, where there was also fracture of the pelvis, only one other case had been found at the Episcopal Hospital since 1895. This was in a patient of Dr. Neilson's (C. W., 23 yrs., April 24, 1900), who also had extraperitoneal rupture of the bladder, but no fracture of the pelvis. Although the abdominal wall was repaired as well as possible, death occurred the next day.

CASES OF FRACTURE OF PELVIS COMPLICATED BY VISCERAL INJURY.

(Episcopal Hospital, Phila., 1895–1908.)

I. *Fracture of Rami of Pubis and Ischium, Rupture of Urethra.*—Frank D., 29 yrs. Adm. March 26, 1896. Treated by catheterization. Recovered.

II. *Fracture of Pelvis, Fracture of Skull, and Rupture of Urethra.*—John B., 23 yrs. Adm. March 1, 1897. Developed emphysema of abdominal wall, and peritonitis. No operation. Died in 2 days.

III. *Compound Fracture of Ilium and Pubes, Rupture of Urethra.*—Chas. P. M., 22 yrs. Adm. May 24, 1905. Railroad crush. All muscles of thigh and buttocks completely torn out. Bleeding from urethra. Wounds packed. Catheter in urethra. Died in 2 days.

IV. *Fracture of Left Pelvis, Rupture of Urethra, Dislocation of Left Femur, Rupture of Left Lung.*—Frank K., 32 yrs. Adm. May 9, 1907. No operation. Died in 1 day.

V. *Compound Fracture Left Ilium, Extraperitoneal Rupture of Bladder, Rupture of Femoral Vein.*—Alfred M., 25 yrs. Adm. Aug. 27, 1903. Existing wound enlarged by resident, Dr. Havens, femoral vein ligated, extraperitoneal pelvic tissues packed. Died in 2 hours.

VI. *Fracture of Pubic Ramus, Crush of Left Leg, Extraperitoneal Rupture of Bladder.*—James B., 23 yrs. Adm. Oct. 8, 1903. Leg amputated on admission; bloody urine by catheter, but no other pelvic symptoms. Two weeks later, a fluctuating swelling in left groin was opened by Dr. Hutchinson, urine and blood evacuated from extraperitoneal pelvic tissues, and rupture in anterior wall of bladder found. Bladder drained by tube. Recovered.

VII. *Fracture of Rami of Pubis and Ischium, Both Sides; Extraperitoneal Rupture of Bladder.*—Frank B., 46 yrs. Adm. Sept. 2, 1907. No operation. Died in 4 hours.

VIII. *Fracture of Descending Ramus of Right Pubis, Hæmatoma in Space of Retzius.*—Harry F., 48 yrs. Adm. May 17, 1908. Operation by Dr. Neilson 24 hrs. after injury. Peritoneum opened, intestines punctured for flatus, no obstruction found. Extraperitoneal pelvic tissues packed to control hemorrhage, possibly from obturator artery. Blood in urine; but no definite rupture of bladder found. Died in 7 hours.

IX. *Fracture Near Right Sacro-iliac Joint; Perhaps Rupture of Ureter.* Adam M., 59 yrs. Adm. Aug. 14, 1905. Fell 35 feet. Fluid injected into bladder all recovered. Operation by Dr. Deaver, 7 hours after injury. Free fluid, mostly urine, in peritoneal cavity; no rupture of bladder. Then right lumbar incision, no rupture of kidney found, none could be found in ureter or its pelvis. Packed. Died in 12 hours.

X. *Fracture of Right Pelvis, Rupture of Liver.*—John F. McG., 24 yrs. Adm. March 26, 1906. Symptoms of internal hemorrhage. Patient refused operation for 24 hours. Then operation by Dr. Davis; pint of free blood in peritoneum, large laceration in liver packed; sponged dry. Did well for 2 days, then developed peritonitis, and died on 5th day.

AN APPARATUS FOR THE INTRODUCTION OF SALINES INTO THE RECTUM.

BY GORDON J. SAXON, M.D.,

OF PHILADELPHIA,

From the Laboratory of Experimental Surgery of the University of Pennsylvania.

THE plan of the apparatus here presented is the outgrowth of observations of the various methods of administration of the Murphy treatment. Inquiries have also been made into the method generally employed; and while all have for their common end the slow continuous introduction of salt solution into the rectum, there is a great divergence regarding many of the smaller details of technic.

The matter of regulating the relation between the intra-abdominal pressure and the hydrostatic pressure in the apparatus employed is by no means an easy one, when economy of time and the labor of nurses in the crowded wards of a hospital are to be considered. It is stated in the directions for treatment that the hydrostatic pressure be slightly in excess of the intra-abdominal pressure. If the reservoir employed for holding the salt solution be placed at such an elevation that the two pressures be alike, then there will be no flow. If now the reservoir be placed one inch higher the external pressure will be the greater and the flow will begin. Since only a comparatively few minutes are required for the salt solution to lower itself one inch, it follows that the two pressures will again be similar and the reservoir will again require elevation; in other words, almost constant attention is necessary if this nicety of adjustment of pressures be kept in mind.

Another observation which will be more fully explained on the basis of some physical experiments will show that as ordinarily given the salt solution enters the rectum after the first half-hour of administration at a temperature only slightly above that of the room.

With these things in mind it was my object to design an apparatus from which the flow could be controlled in a manner which would not interfere with the quick passage of flatus or the sudden expulsion of salt solution back through the tube and from which the fluid would enter the rectum at a temperature ranging from 100° to 115° F. Many forms of mechanism might be devised which would fulfil the above-mentioned conditions perfectly. Thermostatic regulators, "Thermos" reservoirs, etc., have been suggested, but in the administration of a treatment so widely used as that laid down by Murphy it is essential that the apparatus be as inexpensive as is consistent with fair work. To aim too strenuously toward perfection would make the cost prohibitory. It is not unusual in a large hospital to see as many as six patients at a time receiving continuous proctoclysis.

In order to get accurate data on the subject of heat radiation some laboratory experiments were done. To this end an improvised apparatus consisting of a reservoir surrounded by a chamber for holding a warming fluid was used. An attempt was made to keep the water in the reservoir at a fairly constant temperature and accurately to record the temperature of the fluid as it emerged from the end of the tube. The tube was four feet long and three-eighths of an inch in diameter. In the first experiment the fluid in the reservoir was kept at a temperature never above 130° F. nor below 124° F. and the rate of flow was regular, 350 cubic centimetres per hour. The temperature of the water at the end of the tube was obtained by having a thermometer bulb placed within its lumen, and readings were taken every ten minutes. Beginning with 129° F. they were as follows: 120° F., 92° F., 86° F., 84° F., 83° F., 82° F., 80° F., 79° F., 78° F., 80° F., and 78° F. From this it will be seen that at the end of two hours the temperature had dropped from 129° F. to 78° F.; in other words, it dropped to within two degrees of room temperature.

In a second experiment the same apparatus was used and temperatures were taken at the exit every ten minutes, the

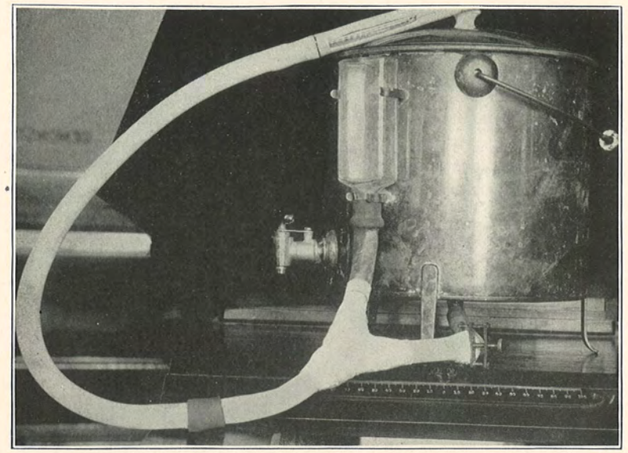
rate of flow being 400 cubic centimetres per hour. The reservoir stood at 129° F. and water was emerging at 110° F. At the end of fifty minutes the same readings were 100° F. and 86° F. respectively.

In a third experiment an irrigating bottle was filled with water at 185° F. and the whole was placed in a basin of constantly boiling water. A tube four feet long was used and the rate of flow was 400 cubic centimetres per hour. The first thermometric reading at the distal end of the tube was 176° F., and in twenty-five minutes it had dropped seventy-six degrees. The room temperature was 74° F.

A fourth experiment was conducted to meet as nearly as possible the directions given by Murphy in the June, 1908, number of *Surgery, Gynæcology, and Obstetrics.* In an irrigating bottle was placed water at 120° F. On either side hot water bottles at 180° F. were suspended. The distal end reading began at 100° F. and in one hour it had dropped to 81° F. The rate of flow was 500 cubic centimetres per hour and the reservoir remained at 120° F.

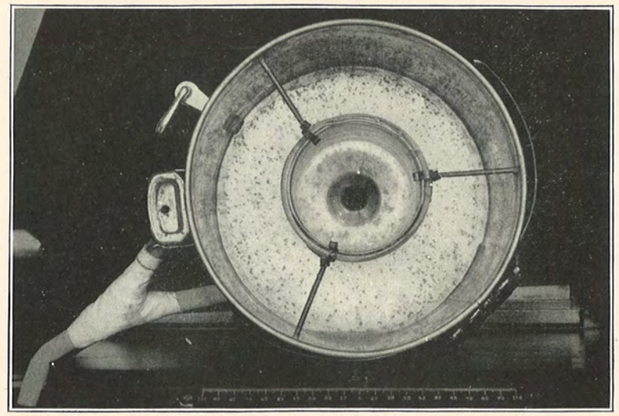
From these results it will be seen that not only must the water in the reservoir be kept at a higher temperature than is usually employed, if water at 100° F. to 110° F. be desired to enter the rectum, but some advantage must be taken of a means to prevent radiation from the tube. To meet this a tube was constructed which consisted of an inner tube wound with asbestos and over this a larger tube was placed enveloping completely the inner tube and its windings. The asbestos was used to prevent the two tubes from coming into contact and to entangle within its substance an air space. With the use of such a tube and the apparatus about to be explained the results were striking. Salt solution after running at a rate of only 300 cubic centimetres per hour was entering the rectum at 115° F. at the end of the first hour, 110° F. at the end of the second hour, and 92° F. at the end of the third hour. The solution was placed in the reservoir at 140° F. and was surrounded by boiling water. No change was made in either of the waters until the end of the third hour. If the

FIG. 1.



An apparatus for the introduction of salines into the rectum. Side view.

FIG. 2.



An apparatus for the introduction of salines into the rectum. Top view.

warming fluid had been changed the second hour the solution would have entered the rectum not lower than 105° F. The experiment just referred to was done on a patient and continued from 2 P.M. until 2 A.M. It was conducted by pupil nurses of the Germantown Hospital Training School. The rate of flow was controlled by a pinch-cock on the proximal end of the tube. The salt solution was renewed only twice and the warming fluid only three times. The rate of flow was as slow as 250 cubic centimetres per hour (a condition most favorable to heat radiation); and only once did the fluid at the thermometer at the distal end of the tube register as low as 92° F. Salt solution stained with fecal matter was expelled back into the shunt reservoir from time to time as the patient would cough, or strain from the pains of an existing acute pyosalpinx.

A description of the apparatus as per accompanying photographs is as follows:

A copper bucket provided with legs on which to stand it, a handle by which it can be hung, and a lid for prevention of excessive heat radiation has in its bottom a central opening and on its side a faucet.

Through the central opening passes the curved nozzle of a graduated litre glass chamber. This is supported and made to press firmly against a rubber washer which surrounds the hole in the bottom of the bucket by a frame and movable fasteners. In this manner a warming fluid is held within the bucket and made to surround the reservoir which contains the salt solution by a layer of water two and one-half inches thick. This can be quickly changed by running it off through the faucet and pouring boiling water in the top.

The tube is constructed throughout as above explained; that is, two tubes with a layer of asbestos between. One foot from the proximal end a Y-tube is interposed, and just proximal to the Y, and on the tube running from the reservoir, a pinch-cock is placed in order that the flow may be controlled. On the other proximal end of the Y is placed a shunt tube which fastens to a receiving bottle provided with an opening

in either end, and attached to the side of the bucket. In this manner the flow can be exactly regulated and at the same time the salt solution or flatus can be easily expelled. This has worked very successfully in actual experiment on patients. There is allowed a to-and-fro movement of the fluid as easily as if no pinch-cock were used. From the distal end of the Y the tube continues to within seven inches of the rectum, at which point an enclosed thermometer is interposed. This in itself not only records the temperature, but it serves as a guide to the rapidity of the flow. If the flow be too slow the mercury falls and if it be too rapid the mercury rises. The tube is three and one-half feet long and is so constructed that a flow of from 400 to 500 cubic centimetres per hour will enter the rectum at 105° F. to 115° F., provided salt solution be placed in the reservoir at 140° F. and the warming fluid be used at the boiling point. The tube should not be over three and one-half feet long. This permits the placing of the apparatus at or near the foot of the bed. The warming fluid should be changed every two hours.

Directions for Use.—Fill the warming chamber with boiling water. Fill the reservoir with salt solution at about 140° F. Open the pinch-cock and allow the fluid to flow freely until the tube is well warmed. Close the pinch-cock until about two drops per second are flowing. To judge this hold the rectal tube point upward not more than four inches below the level of the water in the reservoir; otherwise one will be deceived by the rapidity with which the tube will empty itself distal to the stop-cock when the rectal nozzle is held too low.

Place the rectal tube—of the type directed by Murphy—in the rectum and strap to the inner surface of the thigh. Place the apparatus on an adjustable stand or tree, four to ten inches above the level of the anus.

If salt solution be expelled into the bed or back into the shunt bottle the apparatus may be lowered and the rate of flow slightly decreased. If the patient persists in expelling the solution discontinue the treatment for one hour and then proceed as before.

I wish to make known my indebtedness to Drs. A. D. Whiting and George Lord de Schweinitz for criticisms and for the use of clinical material in the wards of the Germantown Hospital, and to Mr. Keen, of Chas. Lentz & Co., for this trial apparatus constructed for my use.

DR. A. D. WHITING said there are two or three advantages of this apparatus. One is that the rapidity of the flow can be regulated very readily by means of the pinch-cock. Without the shunt there is no way for the patient to relieve himself of gas, and if the bowel becomes distended by the solution not being absorbed there is bound to be contraction of the muscle and expulsion, if there is not some way by which the solution can flow back. It can readily be seen that this prevents the soaking of the bed. There is always free circulation and the gas can be seen passing into the bottle, and very often colored solution coming back from the rectum. One of the most important things is the tube, which prevents to a great extent the reduction in temperature of the solution. As employed at the Germantown Hospital the temperature of the solution as it enters the rectum has ranged from above 90° to 105° for two or three hours, and the benefit to the patient is much greater than if a cooler salt solution is given.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

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