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OF THE
PHILADELPHIA
ACADEMY
OF
SURGERY

VOL. IX.

1907

TRANSACTIONS

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NOTICE

The present volume of *Transactions* contains the papers read before the Academy from February, 1906, to December, 1906, inclusive.

The Business Committee thinks it proper to state that the Academy holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its *Transactions*.

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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 Orthopaedic Hospital; Surgeon to the Dispensary of the Children's Hospital; Chief of the Gynaecological 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.

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 Orthopaedic 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.

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. Gynaecologist 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 Orthopaedic 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 Phoenixville 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 Orthopaedic 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, Phoenixville, Wernersville and Norristown Hospitals.

† MEARS, J. EWING, M.D., 1535 Land Title Building.

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 Orthopaedic 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 Orthopaedic Hospital.

1905. NASSAU, CHARLES F., M.D., 1831 Chestnut Street. Surgeon to St. Joseph's Hospital; Consulting Surgeon to the Frankford Hospital; Assistant Surgeon, Jefferson 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. Gynaecologist 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 Orthopaedic 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.

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

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 Orthopaedic 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 Orthopaedic Surgery, Jefferson Medical College; Emeritus Professor of Orthopaedic Surgery, Philadelphia Polyclinic; Orthopaedic Surgeon to the Philadelphia Hospital; Consulting Orthopaedic 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 Orthopaedic Surgery, Philadelphia Polyclinic; Clinical Professor of Orthopaedic Surgery, Woman's Medical College of Pennsylvania; Associate in Orthopaedic Surgery, University of Pennsylvania; Assistant Orthopaedic Surgeon, Hospital of the University of Pennsylvania.

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

LIST OF FELLOWS WHO HAVE DELIVERED THE ANNUAL ADDRESS

1881 S. D. Gross.—"John Hunter and His Pupils."

1882 D. Hayes Agnew.—"The Life and Writings of Baron Larrey."

1883 William Hunt.—"Esmarch and Antisepsis."

1884 John H. Brinton.—The Minutes give no title.

1885 John H. Packard.—The Minutes give no title.

1886 R. J. Levis.—"Impediments to the Progress of American Surgery."

1887 J. Ewing Mears.—"Progress and Limitations of Operations upon the Abdominal Cavity."

1888 C. B. Nancrede.—"The Recent Advances in the Operative Surgery of the Brain and its Coverings."

1889 John B. Roberts.—"The Science of Successful Surgery."

1890 DeForest Willard.—"Erasion in Diseases of the Joints."

1891 William G. Porter.—"Twenty-five Years Progress of Modern Surgery."

1892 T. G. Morton.—"Progress of Surgery in 1891."

1893 C. W. Dulles.—"Former Surgeons of Philadelphia."

1894 W. B. Hopkins.—"A Sketch of the History of Surgery."

1895 John B. Deaver.—"The Indications and Nature of Treatment in Severe Abdominal Injuries and Intra-abdominal Hemorrhage Unaccompanied by External Evidence of Violence."

1896 James M. Barton.—"Intra-capsular Fracture of the Femur in its Medico-legal Relations."

1897 THOMAS R. NEILSON.—"Some Remarks on Wound Drainage."

1898 O. H. ALLIS.—"How Anatomy Should be Taught."

1899 WILLIAM J. TAYLOR.—"Treatment of Deformities of Spine due to Pott's Disease."

1900 NONE. Chas. B. Penrose was appointed.

1901 H. R. WHARTON.—"Wounds of the Venous Sinuses of the Brain."

1902 J. M. SPELLISSY.—"Abscesses in the Right Iliac Fossa of other than Appendiceal or Gynecologic Origin."

1903 R. G. LECONTE.—"Diagnosis of Intestinal Injury Following Abdominal Contusion."

1904 G. G. DAVIS.—"The Treatment of Fractures."

1905 J. CHALMERS DACOSTA.—"The Surgeon."

1906 RICHARD H. HARTE.—No Title.

1907 EDWARD MARTIN.—No Title.

WINNERS OF THE SAMUEL D. GROSS PRIZE

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

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

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

HONORARY FELLOWS

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Maurice H. Richardson, M.D. . . . . Boston, Mass.
George M. Sternberg, M.D. . . . . .
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L. McLane Tiffany, M.D. . . . . Baltimore, Md.
Nathaniel P. Dandridge, M.D. . . . Cincinnati, Ohio.
Roswell Park, M.D. . . . . Buffalo, N. Y.
Robert F. Weir, M.D. . . . . New York, N. Y.
Frederic S. Dennis, M.D. . . . . New York, N. Y.
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Robert Abbe, M.D. . . . . New York, N. Y.
C. B. G. de Nancrede, M.D. . . . . Ann Arbor, Michigan.
William J. Mayo, M.D. . . . . Rochester, Minn.
John C. Munro, M.D. . . . . Boston, Mass.

HONORARY FELLOWS

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

* Deceased.

ELECTED

1900 W. H. A. JACOBSON.....London, England.
1900 THEODOR KOCHER .....Berne, Switzerland.
1900 VINCENZ CZERNY .....Heidelberg, Germany.

1906 WILLIAM J. MAYO.....Rochester, Minn.
1906 DUDLEY P. ALLEN.....Cleveland, Ohio.
1906 ROBERT ABBE .....New York, N. Y.
1906 C. B. G. DENANCREDE.....Ann Arbor, Mich.

1907 JOHN B. MUNRO.....Boston, Mass.

CONTENTS

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

ANNUAL ADDRESS IN SURGERY.

EDWARD MARTIN, M.D.

To those of us whose days are fully occupied in the active practice of surgery, whose minds are not illumined by a flicker of originality, nor who show even the faintest trace of that quality of intellectual leadership which in its highest development, is called genius, there comes constantly the comforting assurance that in clinics, hospitals and laboratories the world over, those mechanically trained to the work, gifted with clear vision, and, exceptionally, endowed with the divine spark, are devoting their lives to the solution of problems having for their end the prevention of disease, the relief of suffering, the cure of disability and the betterment of surgical technique. Not only have we the stimulating conviction of this progress and betterment; but so soon as it is approved it becomes immediately available—for he who runs may read—And he whose clear brain and skilful hand elaborates either an efficient new treatment or a betterment of an old one asks no greater reward than that his professional brethren should promptly and fairly test his findings and reject or adopt them according to their merit. Hence he who believes he has found of the precious metal shouts aloud Eureka—shouts in print. Sometimes, but rarely, knowing that he has found nothing he still shouts, hoping, and in vain, to deceive others. Often he is self deceived and an analysis of his finding by the sensible rank and file of the profession proves it to be dross, though if he shout loud enough and often enough this ultimate analysis

may be long delayed. Now and again it is the voice of one crying in the wilderness, with the assured promise of benefaction to mankind. It is for this voice that we listen when we attend medical and surgical conventions, it is for the written word from such a source that we read with ever fresh interest and a subconscious hope, journal, brochure, magnum opus, research and even text book. The hope and interest are those of the gold hunter travelling ever forward into an unknown country bristling with surface markings of the precious metal below.

We have learned that among us there are wonder workers; not would be, but real ones, and the dictum of such we accept almost blindly. This is essentially true of the Mayos, of Murphy, of Crile, of Moynihan, of Macewen, of Finney of Brum of Monroe and indeed of many others. The endorsement of such men proves a proposition and assures its immediate trial and adoption. Thus the incalculable benefits conferred upon humanity by Murphy's paper upon the treatment of peritonitis was, fundamentally, incident to the fact that it appealed to the common sense of the profession and represented a distinct betterment of methods previously employed. Its immediate and wide acceptance, however, was due to the fact that it emanated from Murphy and that his writing and teaching show that quality of intellectual leadership which we all follow.

From the technical stand point his work on joints, and particularly the knee-joint is even more notable. Anchylosis of other articulations has yielded to surgical treatment, but a stiff knee-joint has offered no chance of betterment till Murphy demonstrated that by free ligamentous dissection, interposition of soft parts and subsequent suture he was able to secure a movable and useful articulation. He has also shown that by aspiration and subsequent injection of 2 per cent. formaldehyde glycerin he can cure an acutely infected knee, restoring it to complete functional activity without the need of more extensive operation. This last procedure though a logical deduction from what is known of the treatment of joint effusions represents such a radical departure from accepted practice that it would be received by a skepticism so great as to prevent even a fair trial if it were suggested by one less tried, known and approved than Murphy.

Perhaps the most startling, and, in its ultimate development the most promising feat of the wonder workers is the arterial suture of Carel. It is based on the simple fundamental principle—that greased surfaces do not cause coagulation. The technique is simple and has been proven not only by animal experimentation but by work upon the human. Of the various demonstrations of the practicability of his method Carel has given none which strike the imagination more forcibly than that of transposing the kidney from its normal region to the neck, suturing the renal artery into the carotid, the renal vein into the jugular and the ureter into the oesophagus and observing that the kidney retains its vitality and its secretory functions for a considerable period of time.

Moreover it has been shown that blood of the same species transfused by direct suture of artery to vein is physiologically interchangeable.

The practical application of Carel's work thus far lies in the direct transfusion of blood from one individual to another, an application certainly life saving in cases of severe hemorrhage, advocated as the best treatment for shock by Crile and as likely to prove serviceable in coal gas poisoning. A possible elaboration of Carel's work is the implantation of an entire organ, such as the kidney from a generous or mercenary or involuntary donor to one requiring this organ, or even the tansplantation of an entire extremity, since bone, nerve and muscle suture are perfectly feasible. A further application of the value of transfusion lies in its power of stopping hemorrhage, probably by increasing the coagulability of the blood, though this end probably can be attained as readily by a simpler method, since it has been shown that human blood serum, without its corpuscular elements, if injected, exercises

an almost immediate effect upon the hemorrhage of sporadic hæmophilics though it benefits little or not at all those afflicted with the hereditary form of the disease. W. J. Taylor has, however, demonstrated the value of thyroid extract in the pre-operative treatment of even hereditary hæmophilics.

Among the wonder workers who have most influenced surgical practice, and standing in the front rank, must be named Crile. Perhaps his most important, certainly his most life saving teaching on the subject of surgical shock is that this, in the operating room, should be prevented. Sensory impulses are blocked by eucaine injections, the blood loss is reduced to the minimum by position, and, when these are applicable, by temporary arterial clamps. The blood pressure is maintained by bandaging or by the air suit. Loss of body heat is prevented by proper clothing and thermal pads, and exceptionally tedious, bloody, or, in themselves, shocking operations are performed at more than one sitting. Because of these methods, and further, because of the employing of a skilled anæsthetist, profound post operative shock is now rare. That from non-operative trauma is however still common, and to those who suffer and either die or recover from it Crile has proven a benefactor by saving them from the mechanical and toxic results of hypodermic injections of ether, alcohol, ammonia, camphor, and strychnia, substitutes therefor the comfort, sometimes the cure, at worst the euthanasia of morphine. Moreover, he has by his method of naso-pharyngeal intubation and gauze packing made easy, safe and without subsequent pulmonary complications those nose and mouth operations which were formerly among the sloppiest and most dangerous in surgery.

And is not Cushing a wonder worker? I allude not to his almost diabolically ingenious proposition to drain the subdural space into the peritoneal cavity, but to his widely beneficent decompression method which, even if he be not the originator of the idea he has widely popularized and technically perfected.

More wide reaching in its effect upon surgical practice and its successful results than the genius of any individual or small group of individuals, is the greater diagnostic acumen of the average well trained medical man, his clearer conception of the limitation of diagnosis by physical and laboratory examination, and his growing confidence in the surgeon's ability to safely determine the nature of obscure affections by exploratory operation. This leads to timely intervention; and the lessened mortality of major operations, such as nephrectomy—noted the world over—is incident in part doubtless to improved technic but mainly to the fact that the diagnosis is formulated and the operation performed when the patient's vitality is good and the lesion is still without serious local or general complications.

There are few affections in which early diagnosis has been more productive of good than renal tuberculosis. It is generally accepted that tuberculosis is often primary in the kidney, at first is unilateral and is almost inevitably progressive under medical treatment. The methods of examination now practised satisfactorily establish the diagnosis of tuberculosis in its early stage, its unilateral seat, the competence of the unaffected kidney, and this at a time when the general health is but little affected and perirenal inflammation has not yet developed. A nephrectomy under such circumstances is easy and safe, and because it is being now practised at this stage there is noticed in statistical studies a striking diminution in mortality contrasted with the period when cachexia, total disorganization of the kidney and perirenal involvement, were regarded as the only indications for an operation which was both difficult and dangerous.

It may be stated as an axiom that were the limitations of diagnosis by physical examination more generally understood no person under medical supervision should die of a skin or subcutaneous cancer, including under the latter heading cancer of the breast. The diagnosis of cancer as set forth in text books and taught to students is that of the well developed

disease. When it is unmistakable the time for safe and probably successful intervention is past. Were the limitations of diagnosis by non operative physical examination more clearly recognized our young men would be taught that any apparently causeless and persistent lump or ulceration which is not obviously, unmistakably, and certainly benign or syphilitic should suggest malignancy and that this should be determined immediately by excision and microscopical examination.

To the sentimentalist one of the most pleasing changes in surgical practice is that which has to do with the after treatment of cases. Cast your minds back to the days of your resident physicianship and recall the patients racked with an overwhelming nausea, and wrenched by frequent vomitings incident to the prentice hand at the ether bottle—tortured by a consuming thirst, aggravated by hourly doses of saturated solution of Epsom salts, suffering an intolerable anguish from the after effects of the surgical trauma, catheterized in ten hours regardless of the real requirements of the case, worn, haggard, sleepless the next day, with the pain of surgical trauma relayed by a wearing backache, condemned to the dorsal decubitus for two or three weeks in the absence of any clear indications therefor now because of skilful etherization the nausea or vomiting are slight or wanting.

The thirst is relieved by enteroclysis and by giving water by the mouth, the pain is subdued by hypodermic injections of morphine or heroin, the backache is lessened by change in position, the catheter is used only to relieve an over full bladder incapable of emptying itself; the patient wakes the next day refreshed, the bowels are allowed to remain quiescent for two or three days—and the patient is allowed to be up as soon as his general condition and the proper healing of his operative wound make this possible. It is true that the simplification and humanization of after treatment is made practicable by a preoperative minute and intelligent attention devoted to the avoidance of conditons which experience has shown predispose to post operative complications. Some of these, however, are

in their etiology little understood, nor has an efficient therapeusis yet been devised for them. Such for instance is post operative embolus, fortunately rare, always prolonging convalescence, sometimes permanently crippling, exceptionally fatal. Even here, however, the star of hope shines bright for Wright has shown that alcohol well diluted with water markedly diminishes the coagulability of blood and Richardson has experimentally demonstrated that tobacco produces the same effect. Moreover it is well known that citric acid acts in a similar manner. It may thus happen that the after treatment of a surgical patient may be rendered not merely tolerable but actually agreeable. Since it is possible so to combine the juice of the lemon, water and alcohol as to make the resulting mixture distinctly pleasant, and a Havana cigar will generally be taken willingly if its effect in preventing the action of fibrin ferment on fibrinogen be clearly explained.

But the twenty minute limit given the paper is in danger of being overpassed. We the rank and file of the profession helped from a thousand sources are seeking with pathetic eagerness the few great minds which shall lead us to victory against formerly unconquerable foes.

The value and importance of a discovery and its practical application is too often gauged on its money earning or saving power. Thus it is calculated that Schmidt, an obscure country veterinarian, by his discovery of the cure for milk fever in cows, saved for the United States a sum equal to an income producing investment of more than a hundred and fifty million dollars. But who shall gauge the value of the discoveries made by members of our profession.

A sign of popular appreciation of supreme intellectual power when applied to the betterment of the human race is given by the French referendum which out of a vote of sixteen odd millions accorded an overwhelming majority to Pasteur as the greatest benefactor of his country in the last century.

That the quality of intellectual leadership is one of the rarest and most precious possessions of our race and that the

world can better afford to lose a city or province than one of its great investigators, philosophers or teachers is well shown by Little, who quotes to this effect an editorial comment of the Boston Herald which questions as to whether the running over and killing in Paris of a simple unassuming, absent-minded man, named Curie, did not in its relation to the welfare of mankind constitute a calamity greater than the destruction of San Francisco by earthquake and fire.

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

STATED MEETING, HELD FEBRUARY 5, 1906.

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

MODIFIED MÜLLER OPERATION FOR FLAT FOOT.

DR. H. AUGUSTUS WILSON presented a man upon whom he and Dr. R. V. Patterson had performed the combined operation of arthrodesis of the astragalo-scaphoid joint and transplantation of the tendon of the extensor proprius hallucis for the relief of flat foot, a modification of the operation originally described by Dr. Ernest Müller.[1]

Müller's operation consisted in using the tendon of the anterior tibial muscle, which he detaches from its insertion and passes through a hole drilled vertically through the scaphoid and attaches the tendon to the inferior-internal surface of the scaphoid, and divides the tendo achillis.

The operation as performed upon the patient shown was done in November, 1904, at the Philadelphia Hospital. The technique has been fully described.[2] Instead of using the anterior tibial tendon as Müller did, the tendon of the extensor proprius hallucis was taken. The hole through the scaphoid was made as by Müller. In addition to the tendon transplantation an arthrodesis was performed on the astragalo-scaphoid articulation.

Plaster-of-Paris fixation in the extreme over corrected position was maintained for four weeks. Carefully applied physical culture soon brought the muscles into function in their new relations, and enabled the patient to control the action of his feet

[1] Centralblatt f. Chirurgie, Jan. 10, 1903, p. 40.
[2] American Medicine, May 6, 1905, p. 725.

involuntarily. The loss of the extensor proprius hallucis in its former and normal position was very apparent at first, as the patient had toe drop. This was gradually overcome as the extensor brevis digitorum became developed in the assumption of its newly-acquired function.

The best evidence of the full success of the operation on the patient is the fact that during the year since the operation he has been engaged in hard work without inconvenience. He had been enabled to work full time without pain, which was impossible before the operation was done. As a preliminary to operative correction it is essential that the feet should be freed from all restraint of full free motion, as it is apparent that the presence of any restraint will interfere with muscular development. The necessary amount of free motion can be secured by the employment of the mechanical arch-producer devised by Dr. Wilson.

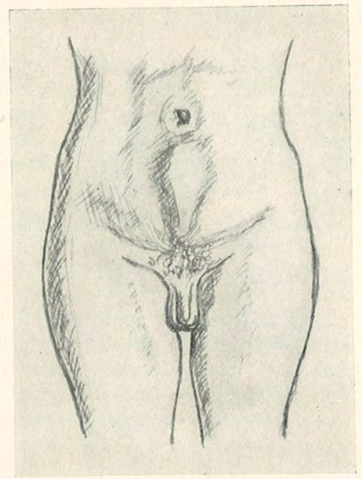
Dr. James K. Young said he had for several years employed in the treatment of flat foot the mechanical arch-producer devised by Dr. Wilson and found that it gave very good results. He generally applies the instrument after baking the foot for some time. This makes the parts more pliable and a greater degree of correction may be obtained at each sitting.

ABSCESS OF THE ABDOMINAL WALL COMMUNICATING WITH THE BLADDER WHICH CONTAINED A CALCULUS.

Dr. Joseph M. Spellissy related the history of a boy, eighteen years of age, who was admitted to the Methodist Episcopal Hospital on February 12, 1901. He had enjoyed perfect health till his sixteenth year. He then began to suffer with pain during urination and also and more particularly at the end of the act, when he passed pus. Occasional distress from retention of urine was relieved by catheterization. His condition sometimes kept him in bed and once he suffered for a week with œdema of the foot. During the three months prior to admission his abdomen had become swollen in the median line and he passed a small urinary calculus per meatum.

On admission, a reddened, elevated, tense inflammatory mass, shaped like an enlarged uterus, occupied the middle of the abdominal wall from just below the umbilicus to just above the pubes, and seemed on the point of rupture. (Fig. 1.)

Fig. 1.



Abscess of the abdominal wall communicating with the bladder containing a calculus.

Fig. 2.

The calculus of Case I, actual size.

FIG. 3.

Actual size of enterolith encrusted upon a pin; when first removed the enterolith completely enveloped the pin.

FIG. 4.

Inguinal abscess simulating hernia.

Under ether anæsthesia, the passage of a sound confirmed the suspicion of the presence of a vesical calculus; two incisions, one in the lower and one in the upper part of the abdominal mass, liberated a free amount of pus from apparently independent cavities in the abdominal wall. But a third incision, joining the other two, not only discovered a sinus uniting them but also a fistulous passage communicating with an indurated, thickened, suppurating bladder contracted on a roughened calculus (Fig. 2), measuring 2¼x¾ inches. The spontaneous effort of this calculus to deliver itself through a suprapubic abscess of the abdominal wall was assisted by incision, through which the calculus was removed. A catheter was inserted into the bladder per urethram, and both bladder and abscess walls were scrubbed with gauze and irrigated. Convalescence with suprapubic and urethral drainage terminated in an uneventful recovery with all sinuses closed in three months.

INFLAMMATORY MASS IN THE RIGHT ILIAC FOSSA CONTAINING AN ENTEROLITH THE NUCLEUS OF WHICH WAS A PIN, AND LATER DISCOVERED TO COMMUNICATE WITH THE APPENDIX.

DR. SPELLISSY also related the history of a man forty years of age who was admitted to St. Joseph's Hospital, complaining of a dense mass immediately internal to and apparently continuous with the anterior border of the right iliac bone, and extending from its anterior superior spine down to its junction with the pubis. He associated the origin and duration of this mass with an irreducible inguinal hernia existent for fifteen years.

Under ether anæsthesia, with the assistance of Dr. G. G. Davis, on April 11, 1903, an incision close to the margin of the right iliac bone, close to and below its anterior superior spine, passed through a most dense, apparently fibrous mass about three-quarters of an inch thick. Through this capsule an extraperitoneal space below the ileopectineal line was reached by blunt dissection and a hard fusiform body found within it. On extraction the body proved to be an enterolith, which on incision was found to contain a pin as its nucleus. (Fig. 3.) Nothing else was found in the cavity, which seemed to be a blind pocket, but it diffused a fecal odor. It was, therefore, drained and but partially closed. Within a week after the incision, a fecal fistula developed in the wound and persisted till the patient, without

warning, disappeared from the hospital; and was still present when he was readmitted, five months later, during the service of Dr. G. G. Davis.

Operation under ether anæsthesia by Dr. G. G. Davis, on September 23, 1903, found the fistula to communicate with the appendix. Both fistulous tract and appendix were excised, and the patient was discharged cured three months later.

AN INGUINAL ABSCESS SIMULATING HERNIA.

Dr. Spellissy presented a man, twenty-three years of age, an inmate of the Pennsylvania Training School for Feeble-Minded Children of Elwyn, who began three years ago to have in the right groin a small walnut-sized reducible mass, supposed to be an inguinal hernia. The subsequent growth of this mass was concealed by the patient until it was brought to the attention of the resident physician on November 25, 1905, when the condition illustrated in Fig. 4 was discovered and operation for strangulated inguinal hernia requested.

Examination showed an irreducible, untympanitic, painless mass (Fig. 4), with inflammatory pointing at a nodular apex coincident with an abdominal mass in the right iliac fossa, and a practically normal degree of temperature and rate of pulse and respiration. The patient's spine was undeformed, painless, and flexible. Diagnosis of iliac abscess gravitating to the thigh was made and interference postponed to the following day, that a long director for a counter opening might be obtained.

Under ether anæsthesia the inguinal abscess was incised, curetted, and drained with an evacuation of three to four pints of pus. The crural canal, however, was found impassable and there was no communication with the abdomen; the abdominal mass persisted and pressure upon it elicited no change in its bulk and brought no new pus into the inguinal wound. Exploratory incision for the removal of this mass is reserved for another occasion, and the diagnosis is now revised to inguinal abscess coincident with an independent abdominal mass.

PERI-ŒSOPHAGEAL ABSCESS CONTAINING A SWALLOWED FOREIGN BODY.

Dr. Spellissy related the following case: A freight conductor aged forty-four years was admitted to St. Joseph's Hospital with a large mass occupying the left side and median line of the neck, the thyroid cartilage being pushed to the right side. The mass did not fluctuate, the tongue was furred, and the pharynx was inflamed but neither it or the larynx, according to the report of Dr. G. Marshall, exhibited any marked abnormality.

The patient attributed his condition to the forcible swallowing of a piece of bacon, caused by a violent jolt while breakfasting, seven days before, in the caboose of a freight train that had stopped so suddenly as to throw the patient forward three feet. Efforts by the finger to recover the bacon were unsuccessful. Faucial distress was immediate, and reached such a degree by afternoon, that the patient went home to bed and remained there until his admission to hospital. During the interval he was subject to chills, fever, occasional delirium, and the gradual growth of the mass. The presence of any abnormality of the neck prior to the accident was denied.

An exploratory incision of three inches along the anterior border of the sternocleidomastoid, under ether anæsthesia and with the patient in the Trendelenburg position, discovered a prominent thyroid. Hypodermic exploration of this gland being negative, its out border was freed, the gland retracted inward and the dissection carried down to the vertebræ beside the œsophagus. Escape of foul pus into the pharynx and the wound was coincident with the disappearance of the mass and the discovery in the abscess cavity of a piece of bone, first thought to be the patient's hyoid but later found to be removable, to be foreign, and to measure $1\frac{1}{3} \times \frac{1}{2} \times \frac{1}{16}$ inches. Partial closure of the wound with drainage was followed by recovery without a fistula in forty-six days. Return of the patient for œsophageal bougieing was advised.

Dr. John H. Gibson was reminded by Dr. Spellissy's third case of a patient seen at the dispensary of the Jefferson Hospital while he was chief of clinic. The man brought an indignant note from his physician who said he sent the patient to a truss-maker and the latter had returned him with the statement that he had no hernia. Examination showed an iliac abscess which had come down on the sheath of the iliac muscle beneath Poupart's ligament. The mass disappeared when the man lay down, there was impulse on coughing and hence the swelling showed some of the signs of a femoral hernia. It was external to the vessels, how-

ever, and easily shown to be an abscess. There was no rigidity of the spine, as the abscess was iliac instead of psoas in type. The man was operated on and made a good recovery.

VICIOUS CIRCLE AFTER GASTRO-ENTEROSTOMY.

Dr. John H. Jopson reported the history of the following case: An adult woman had suffered for more than a year with symptoms of chronic gastric ulcer, including prolonged and obstinate vomiting, sometimes containing fresh, sometimes altered blood, without any excessive hemorrhages at any one time, and an inability to retain anything but liquid diet. In the feces the occult-blood test was positive. Then solid food was attempted. The disease had resisted prolonged and careful medical treatment including confinement to bed for about nine months out of twelve. At the time of operation she was a chronic invalid, rather neurasthenic, thin, and somewhat anæmic.

Operation, November 15, 1905, Dr. Willard assisting. The stomach was dilated and somewhat lower than normal. Rapid scrutiny showed no external evidence of ulcer or cicatrix. A posterior gastroenterostomy was performed by the aid of the Moynihan clamps. The opening in the bowel was made 4 or 5 inches below the duodeno-jejunal angle, and in the stomach at the most dependent point of the greater curvature. At its conclusion the edges of the opening in the transverse mesocolon were sutured to the jejunum beyond the anastomosis by three stitches, one median, and one to either side. After the left-hand stitch was placed it was casually noted that there was slight puckering of the bowel at this point. The operation was otherwise completed in the usual manner.

Following the operation the patient vomited occasionally for two days, after which nausea and vomiting became less frequent, and finally practically ceased. Six days after the operation (November 21) the vicious circle was rather suddenly established, and the patient began to bring up large quantities of dark green bilious material. The vomiting resisted all the usual treatment and persisted during the following day. On the 23d it became frequent, and the patient's general condition, heretofore good, at the end of the day became suddenly much worse. There was a rapid rise of pulse rate in a few hours from 100 to 140, and it was evident that unless prompt relief was afforded the

patient would succumb. She was re-operated at midnight, November 23. The abdomen was reopened through the primary incision, the abdominal cavity found clean, and sharp angulation of the gut at the site of the gastroenterostomy was found as the cause of the symptoms. There were slight fresh adhesions between the adjacent surfaces of the two limbs of the spur. There was firm union of the opening in the mesocolon to the bowel, the edges of the opening thickened and apparently contracting around it, causing acute and absolute obstruction of the flow from the proximal to the distal limb. The adhesions were separated, the bowel straightened itself out, and the proximal loop emptied itself.

There seemed to be an improvement in the general condition of the patient dating from this time, which permitted the operation, heretofore a hurried and anxious one, to be finished more deliberately. The choice of treatment lay between freeing the mesocolon from the bowel and re-suturing it to the posterior wall of the stomach, and an anastomosis between the two limbs of the potential spur. The latter method was decided upon, and a medium-sized Murphy button was introduced as far away from the anastomosis as the short proximal limb permitted. The button was reinforced anteriorly by a Cushing suture. After operation the improvement in the general condition was prompt and gratifying. Vomiting was not checked at once but was less in amount. Retching was for a time a frequent and distressing symptom. One week after the second operation she was retaining her nourishment fairly well, nourishment being still liquid, and only vomiting occasionally. Two weeks after operation vomiting had practically ceased. The button was passed on the nineteenth day. Since convalescence has been established she has gained rapidly in weight, is free from gastric symptoms, and enjoys a liberal diet.

Moynihan emphasizes as one of the eight important points in his method of gastroenterostomy the suturing of the transverse mesocolon to the jejunum. His remarkable record of successes and the freedom of his patients from regurgitant vomiting after operation would seem to be good proof that there is no flaw in his technique in this direction, and I can only attribute the result in this case to the fact that one or both of the lateral stitches were probably placed too far from the anastomosis. If this were the case then any separation of mesocolon from the thin wall of

stomach would tend to drag together the proximal and distal portions of the jejunum, as would also any contracture of the opening in the mesocolon. Moynihan says the stitches should be placed just outside the line of anastomosis. The accident which occurred in this case serves to emphasize the necessity of care in the least and most minute details; at the same time it may be questioned whether, theoretically, at least, the same contracture might not occur at a later period, no matter what precaution in this respect was observed and Moynihan refers to a case operated by Czerny and reported by Stendel in which obstruction of the efferent loop had been so caused. If as there seems to be in these cases, and as Deaver emphasizes there is a tendency for the opening in the mesocolon to contract and become tough and cicatricial, it may in time cause an obstruction to the intestinal flow at the anastomotic site. Deaver, in speaking of the measures necessary to prevent hernia of the gut through the mesocolon says: "To obviate the occurrence of this complication most surgeons have adopted the precaution of stitching the edges of the opening in the mesocolon to the stomach. Mr. Moynihan, on the contrary, advises stitching it to the jejunal loop below the anastomosis. I cannot approve of this modification of the usual technique. Mr. Moynihan does not give any reason for this preference, and to my mind no good reasons exist. By suturing the mesocolon edges to the stomach we in the first place close the opening into the lesser peritoneal cavity; this is the most important function of the procedure. But in addition to this we are sure the gastric opening being the lowest portion of the stomach, as the mesocolon draws the stomach down into a funnel-shaped depression, and we moreover avoid any possible constriction of either loop of the jejunum. That this last is an important feature of the operation, I think, cannot be denied. Probably every surgeon has seen cases where the opening in the transverse mesocolon, not having been sutured to the stomach, contracted, and, becoming quite tough and cicatricial, presented a very material obstruction to the emptying of the proximal loop of the jejunum into the distal loop. But, although I know this cannot be blamed for all cases of vicious circle, it is certainly my conviction that obstruction of the afferent loop is the most usual cause of pernicious vomiting." Deaver makes no criticism of the practice

of the Mayos of stitching the mesocolon to the site of the anastomosis itself.

This case also illustrates the well-recognized necessity of prompt operation in the more acute cases of vicious circle. The symptoms may be as acute as those due to the commoner obstructions of the bowel, which are so rapidly fatal unless promptly operated.

PERFORATED GASTRIC ULCER; SUTURE AND RECOVERY.

DR. JOHN H. JOPSON related the history of a man, 50 years of age, who for five years had suffered from stomach trouble, his symptoms consisting of pain in the epigastrium, coming on after eating, and occasionally associated with vomiting. Vomiting had ceased after a few months, but pain had continued up to the present time, and for eight weeks before admission had been much more severe. He had vomited once, two weeks before admission. On September 9, the day before he entered the hospital, pain in the epigastrium grew rapidly worse and soon spread to the right iliac region. Twelve hours later it involved the entire abdomen, being most severe in the right iliac fossa.

He was admitted on the evening of September 10, 1905, suffering acutely and complaining of pain in the right iliac fossa. Temperature 100⅗°, pulse 120, respiration 28. The abdomen was slightly distended, and rigidity was generalized but most marked on the right side. Tenderness was extreme in the right iliac region, slight elsewhere. The expression was good. He was admitted for operation with a diagnosis of appendicitis, and the history of long-standing gastric trouble was not elicited before operation. The duration of the acute symptoms and the physical examination indicated a spreading peritoneal inflammation, apparently originating, still more pronounced, in the appendicial region, and it was with this diagnosis that he was transferred to the operating-room one hour after admission.

An incision at the outer border of the right rectus muscle disclosed free turbid fluid in the abdomen and pelvis. The cæcum and appendix were congested, the base of the appendix surrounded by a curtain of peritoneum, as though it had found lodgment in one of the recto-cæcal pouches and later herniated through its wall. The appendix was liberated, and removed. It partook of the diffused peritoneal inflammation but was not

the cause of it. The ileum was examined and found to exhibit signs of beginning general peritoneal inflammation only. Fresh adhesions were discovered above the wound in the direction of the gall-bladder and pylorus. The wound was enlarged upward, almost to the costal margin, and a perforation, one-eighth of an inch in diameter, was found on the upper border of the pylorus, actively leaking, and was turned in by a layer of interrupted and one of continuous Lembert sutures. The infection had travelled downward to the pelvis along the right side of the abdomen, as indicated by numerous fresh adhesions and lymph-patches in this region. After free flushing with saline solution, the abdomen was drained from diaphragm to pelvis by iodoform and plain packing above and to the inner side, holding back the small intestines, a strip into the kidney pouch, and tubular and gauze drainage in the pelvis. A few silkworm-gut sutures were placed over the packing to hold it in place, but the wound was not closed. The patient stood the operation remarkably well and suffered but little shock at any stage, in spite of free manipulation of the abdominal contents and widespread infection.

After operation he was placed in the Fowler position and given frequent saline enemata, and convalescence was uneventful except for some vomiting on the second day after operation. The bowels were moved spontaneously on the third day and he was fed by the rectum for five days. The large wound healed slowly and he was in bed for nearly two months, and in the hospital for three.

The patient was brought in as a case of appendicitis; the gravity of his condition was recognized by the resident physician, and preparations for operation were begun at once.

Had a more complete history been elicited before operation a diagnosis of ruptured gastric ulcer should have been arrived at. As it was, the physical signs pointed strongly to an infection, reaching its greatest intensity in the appendicial region, symptoms which accorded well with the history of an illness dating back only a day or two, which the patient gave when first seen. There were no disadvantages attending the primary low incision; indeed it was proved to be advantageous, as when extended it gave the best possible drainage along the entire route from pylorus to pelvis, which the infection had already travelled, and the drainage was much more effective than could have been obtained by

primary incision in the epigastrium and secondary suprapubic drainage, as is usually advised. The freedom from shock during and after operation was very striking in a case with such an extensive peritoneal involvement.

GASTROPTOSIS AND DILATATION.

Dr. Edward B. Hodge reported the case of a woman 33 years of age who was admitted to the Presbyterian Hospital, July 31, 1905. For the preceding three months she had been under treatment in the dispensary of the hospital, but without benefit.

Since the birth of a child, in 1892, she had suffered from sour eructations, vomiting, burning pain in stomach, flatulence, marked constipation, with headache and extreme nervousness. From her usual weight of 140 pounds she had fallen to 114 pounds.

On inflation of the stomach, its lower border was found to be two and one-half inches below the umbilicus.

After some weeks' observation in the hospital, during which her weight had fallen still further, to 95 pounds, and she had become anxious for some operation for her relief, it was decided to elevate the stomach by shortening the gastrohepatic ligament.

On October 13, with Dr. Willard's assistance, Dr. Hodge opened the abdomen in the middle line below the ensiform. The lesser curvature was about half way to the umbilicus, and the greater curvature ¾ inch below the umbilicus. There was no evidence of ulcer, recent or old; the pylorus was opened and the gall-bladder found to be normal. Three transverse rows of interrupted silk-sutures were put in the gastrohepatic ligament, bringing the stomach well up under the liver. As the stomach was dilated, at Dr. Willard's suggestion, about 2 inches of the anterior gastric surface was folded in with a continuous transverse silk suture, midway between the curvatures. The abdomen was closed in layers. Convalescence was easy, and before patient left the hospital, on November 28, she was eating a generous mixed diet. She is now perfectly comfortable, does all her housework except washing, and weighs 125 lbs., a gain of 30 lbs. The bowels move daily without a laxative. Stomach tympany extends from just below the ensiform to ½ inch above the umbilicus.

Dr. H. D. Beyea said he had performed this operation upon

eight patients. All except one improved very remarkably. The exception was an extremely neurasthenic girl, who improved during a period of six months and then was obliged to nurse two sisters during attacks of typhoid fever; she is now no better than she was at first. All the other patients gained weight and all were relieved of the gastric symptoms.

URETERAL CALCULUS.

WITH A REPORT OF FIVE CASES.

BY JOHN B. DEAVER, M.D.,
OF PHILADELPHIA,
Surgeon-in-Chief to the German Hospital.

A SURGEON who is called to operate upon five patients suffering from ureteral calculus within as many months, has his attention somewhat forcibly drawn to the importance of diagnosis, and to the difficulties of treatment of this class of cases. In former years calculi arrested in the ureter were considered rare, but since more accurate methods of making a diagnosis in urinary surgery have been available, the frequency with which this condition is present has become more widely appreciated. According to Dr. C. L. Leonard [1] the use of the Röntgen rays has proved the ratio of ureteral to renal calculi to be as 66 is to 33 in cases where the diagnosis has not been confirmed by operation or recovery of the stone and as 44 is to 29 in cases where the X-ray diagnosis has been thus confirmed.

Renal calculi in their descent to the bladder are prone to be arrested at three points in their course: (1) Two inches from the pelvis of the kidney, as the ureter bends forward over the psoas muscle; (2) at the brim of the pelvis, where it dips down across the bifurcation of the common iliac artery; and (3) close to the vesical orifice of the ureter. The normal ureter is said to be one-seventh of an inch in diameter at the upper, one-fourth of an inch at the middle, and only one-tenth of an inch in diameter at the lower constriction. In the 44 cases of ureteral calculus referred to by Morris [2] the stone was arrested at the upper constriction in 19 instances, at the pelvic brim in ten and at the vesical extremity of the ureter in 15. These figures correspond very closely to those given by Bovee,[3] who collected 64 operations in which an impacted

calculus was removed from the ureter by the extraperitoneal route. Among these, 22 were found near the upper constriction, 17 at the pelvic brim, and 18 close to the bladder; while the remaining stones were found at other portions of the ureter.

The symptoms produced by the passage of a renal calculus are sufficiently familiar, and it only remains, after such symptoms have arisen and have subsided, to determine whether the stone has been forced back into the pelvis of the kidney, has been discharged into the bladder, or whether it has been arrested at some point in its journey. If it escapes into the bladder, symptoms of vesical calculus arise; and if the stone remains in the kidney those of renal calculus continue. The point that chiefly concerns us is to determine at what point of the ureter the stone has lodged. This is not always possible from the symptoms alone. Indeed Mr. Freyer[4] asserts that the symptoms produced by ureteral calculus are precisely those of renal calculus, except when the stone is lodged in the lower end of the ureter, within an inch or so of the bladder. He admits indeed that tenderness at the seat of impaction may be a guide, but claims that the Röntgen rays are even less satisfactory than in cases of renal calculus. Although I cannot entirely agree with his premises, I heartily endorse his conclusion, which is that the rule of surgery in doubtful cases is to first explore the kidney through the loin, and to pass a sound down the ureter before concluding the operation. If a stone is found in the ureter the wound should be enlarged, and the calculus extracted by appropriate means.

It appears to me, that tenderness at the seat of impaction and the information gained by a technically perfect skiagram, are two very valuable aids to diagnosis. From the symptoms alone it may be possible to determine that renal calculus has existed, and that a calculus is still present, either in the kidney or in the ureter, or in both. It is because we cannot be certain that not more than one calculus is present, that it becomes necessary to make sure that none is overlooked in the kidney even after the stone found in the ureter has been extracted.

A skiagram to be of value in these cases must throw a shadow of structures less dense than the least dense calculus; and as phosphatic and uric acid stones are by no means dense, it is necessary to see the shadows of the psoas muscle, to make sure that no calculus is present.

If after an attack of renal colic symptoms of renal calculus persist, we may be certain that the stone has at any rate not travelled as far as the lower ureter. In the latter case the symptoms of vesical calculus arise, and though no calculus can be found in the bladder, its location may usually be detected by rectal palpation or by cystoscopic examination.

Although a calculus may remain lodged in the ureter indefinitely without producing serious symptoms, yet such cases are exceptional and were such a calculus to be discovered by chance, it is questionable whether it would not be the surgeon's duty to remove it as a prophylactic measure. Leonard[5] refers to 26 calculi, found as it were by accident, impacted in the ureter, all of which were safely passed into the bladder while the patients remained under medical care. Cabot[6] thinks highly of massage in such cases as an aid to the descent of the stone. But it seems to me that the dangers which may ensue from neglect of ureteral calculus are greater than those which attend its removal by operation. Among 21 operations mentioned by Fowler[7] there were only three deaths; and in reviewing the literature of the last couple of years while preparing this paper, records of 25 operations for ureteral calculus have been found, many of them not in Fowler's list, with only 2 deaths—one in a patient with recurrent carcinoma of the ureter, and the other in my own patient, to be presently mentioned.

If the stone is rough and mammillated it is more apt to excite ulceration and inflammation, although less apt to absolutely occlude the ureter than a smooth stone. On the other hand, while a small stone may be more easily passed by ureteral peristalsis and by the *vis a tergo* of the kidney's excretion, yet if it does become arrested it is almost certain to cause hydronephrosis, and give rise to serious symptoms in a short

time. When such cases are seen before marked infection is present, the mortality from the operation is slight, as the kidney does not then require removal. The condition of the kidney is really, I think, the main point upon which the success of treatment must depend. In the only one of my cases which terminated fatally, there were calculi impacted in both ureters and the operation which removed the stone from the left ureter was unsuccessful because of the diseased condition of the right, which was not known until the post-mortem examination.

The route to be chosen for the removal of the stone is a matter of much importance. If the stone is known to be near the bladder, it is usually most successfully removed intravesically. In the female the vaginal route has been employed, and the ureter exposed within the layers of the broad ligament. This appears to be less satisfactory a method than the intravesical, and the same may be said of the perineal route in the male. In the female the urethra can be dilated sufficiently to admit suitable forceps, or even the finger, and, after slightly incising the vesical orifice of the ureter, the calculus can usually be extracted without much difficulty. This plan obviates the possibility of a vesico-vaginal or uretero-vaginal fistula, which is not very remote when the vaginal route is chosen. In one of Freyer's patients the ureter was exposed by incising the vagina, but the stone slipped further up the ureter and could not be extracted. It was, however, found in the dressings on the following day; but the patient developed pelvic cellulitis, had a very slow convalescence, and when last seen still suffered from kidney symptoms. In the case of a patient where intravesical manipulations had failed to dislodge the stone, Millet [8] succeeded in evaginating the obstructed ureteral outlet through the dilated urethra, by means of one finger within the bladder and another in the vagina. With the parts thus under full control he was able to remove the calculus with success. Crawford [9] successfully removed from a male patient a calculus measuring one and three-eighths inches in diameter by intravesical dilatation of the ureter. In the

third case recorded to-night I found it impossible to extract the stone extraperitoneally, and accordingly opened the bladder above the pubes, and by slightly incising the ureter was enabled to deliver the stone into the bladder and successfully remove it.

But this means will not suffice unless the calculus is lodged very close to the vesical orifice of the ureter; and for those stones impacted more than an inch away from the bladder wall, I would strongly recommend the extraperitoneal operation. This is of course the route selected in cases where the location of the calculus is doubtful, since it affords access to practically the entire length of the urinary tract. In enlarging the lumbar incision downwards care should be taken not to injure the spermatic cord, and at the conclusion of the operation the anterior abdominal wall should be repaired as after an operation for ventral hernia. Even in a child of 3 years Betham Robinson [10] exposed, extraperitoneally, the ureter close to the bladder wall and successfully removed the impacted calculus.

As the peritoneum is stripped back from the iliac fossa, it carries the ureter along with it, and this stricture is therefore to be sought on the vesical side of the wound. Proper knowledge of pelvic anatomy is essential to the operation. When a stone is exposed in the ureter, it is proper to try to dislodge it, and to push it either upward into the pelvis of the kidney, or down into the bladder. In doubtful cases, where the kidney alone is first exposed, it may be possible to push the calculus on into the bladder by a bougie, or even to extract it through the kidney by means of the urethral forceps. If it can be pushed on into the bladder it can be satisfactorily removed by the evacuator.

An incision into the ureter itself is usually to be avoided, although in my own opinion the probability of a permanent urinary fistula remaining is exaggerated. But an incision through the renal cortex, or one directly into the pelvis of the kidney, is to be preferred, since the tract required for drainage is shorter, and the wound may be more closely sutured. But if the calculus cannot be dislodged, it is safer to incise the ureter than to attempt to crush the stone *in situ*. If the cal-

culus is oxalate of lime it may be impossible to crush it, without so injuring the ureter as to cause sloughing; and even if it could be successfully crushed, the detritus would be very likely to give rise to very serious trouble before being completely evacuated. The plan adopted by Mitchell [11] and by Corson [12] of placing sutures before extracting the stone, thus using the calculus as a bobbin, may prove advantageous when the wound is deep. It has been my practice to employ when possible two rows of sutures, the first, of catgut, for the submucous tissues, and another of silk, and of the Lembert type, for the muscular walls of the ureter. This plan I am convinced decreases the probability of a urinary fistula persisting. Fiori [13] has recently recorded a remarkable operation in which he exposed the ureter extraperitoneally, split it for a distance of sixteen centimetres (12 centimetres in its abdominal and 4 centimetres in its pelvic portion) and thus succeeded in extracting 11 or 12 small calculi, the largest weighing 5 grammes, being impacted close to the bladder. He then reconstructed the ureter by sutures using a sound as a guide; and had the satisfaction to have the urinary fistula which resulted close a few days after the operation. Although, as he acknowledges, it was a difficult and somewhat hazardous operation, yet the event justifies his course of action in preferring ureterolithotomy to nephrectomy, which would have been the only alternative.

Finally, a word may be said about the occurrence of carcinoma in the ureter, as the result of calculus disease. One of the patients I operated on showed the presence of carcinoma in the ureter immediately above the site of impaction, but this would probably have escaped detection if the kidney had not been so diseased as to require removal, and hence to allow a microscopical study to be made of the entire specimen.

Primary cancer of the ureter is admittedly rare. Metcalf and Safford [14] only one year ago were unable to find more than 7 authentic cases on record, including one of their own; and in a majority of these cases no calculus was present. It is probable that most cases of cancer of the ureter have escaped

detection, and that as operations on the ureter are more frequently performed, such changes will be more often found. The mere possibility of malignant changes occurring, however, only serves to emphasize the need of prompt removal of the calculus.

The following cases of ureteral calculus are reported with the hope of exciting discussion among the fellows; and among some of the unsettled points on which I am anxious to learn their views, I would particularly mention the following:

The value of the X-ray and the cystoscope with bougieing of the ureter in diagnosis; the significance of localized tenderness. The propriety of exploring the ureter intraperitoneally to locate the suspected stone.

The question of removal of quiescent or latent stones.

The best route for the removal of juxta-vesical stones: whether perineal, vaginal, intravesical, suprapubic, or extraperitoneal.

The proper treatment of the stone when found: whether it should be pushed on into the bladder, should be crushed, or whether the ureter should be incised.

The best method of suturing the ureter.

Whether nephrectomy is to be countenanced, except for incurable disease.

All of the following cases were operated upon in the German Hospital:

Case I.—*Ureteral Calculi (Impacted) Removal.*—Miss ——, white, aged 22. Admitted July 24, 1905. For past two years has complained of pain in right kidney region, referred downward into inguinal region; pain almost constant, but has had three attacks of severe pain at intervals of six months; duration seven to fourteen days, always accompanied by nausea, vomiting and dizziness.

Abdominal examination. Right kidney movable, not enlarged, no distention or rigidity, no tenderness over abdomen. No X-ray taken.

Operation; July 25, 1905. Vertical incision right ileocostal space; pelvis of the kidney found to be the seat of small hydrone-

phrosis, about the size of a lemon; ureter found dilated to the size of the little finger. The ureter was incised and the fluid allowed to escape, a probe was introduced and a stone palpated; after much effort the stone was brought upwards and delivered through the opening in the ureter at the pelvis of the kidney. Discharged, cured, August 21, 1905.

CASE II.—*Nephrolithiasis Double. Impacted calculi both Ureters.* Mr. ——, white, aged 33. Admitted September 7, 1905. On day of admission was seized with sudden acute pain in left lumbar region radiating from near crest of the ileum to the left testicle, testicle retracted. The patient was nauseated, suffered from frequent urination, passing large quantities. Abdomen soft, no rigidity, no pain on pressure over left kidney or course of ureter. No palpable mass. X-ray; dense shadow in region of right kidney.

Operation, Sept. 9, 1905. Oblique incision left flank.

Calculus found impacted in ureter 3 cm. below the pelvis of the left kidney. An effort was made to work the stone up into the pelvis, but failed; the kidney was delivered and an incision made horizontally to the poles into the pelvis and scoop and forceps used to deliver the stone, but failed. On palpation the stone was felt in previous location; an incision was made in the long axis of the ureter over the calculus and the same delivered. The stone was the size of a small pea, irregular and very hard. Before suturing the ureter a probe was passed into the bladder. This patient did well for three weeks, when he was seized with severe pain in the right loin and in a very short time became anuric and died October 10, 1905. Autopsy showed an impacted stone in the right ureter.

CASE III.—*Urethral Calculus. Suprapubic Urethrolithotomy and Lumbar Incision.*—Mr.——, white, aged 49. Admitted October 16, 1905. In 1896 was operated for acute appendicitis. In January, 1905, was seized with severe pain in right side referred downward to the right groin. Was operated for abdominal adhesions in June, 1905, but not relieved.

Present illness: Pain in paroxysmal, coming on suddenly at any time, beginning apparently in the right inguinal canal and referred to the right kidney. These attacks are followed almost immediately by vomiting, requiring morphine for relief, but are not followed by irritability of the bladder.

Abdominal examination: Tenderness on pressure at a point on the semilunar line opposite the anterior superior spine. X-ray showed large dense shadow in region of the kidney, and small one near bladder.

Operation October 30, 1905. Curved oblique incision right lumbar region to the anterior spine of the ilium. A stone was located in the ureter in the wall of the bladder. After many attempts to dislodge the stone either into the bladder or by drawing it up into the ureter, all of which were unsuccessful, the wound was covered and the patient placed in the dorsal position and the bladder opened suprapubically; the vesical orifice of the ureter was incised slightly and by pressure from behind the stone was finally brought into view and delivered. The stone was the size of a split pea and very hard. The suprapubic fistula closed on the eighteenth day. Patient was discharged cured Nov. 25.

CASE IV.—*Ureteral Calculus.*—Mrs. ——, white, aged 32. Admitted November 21, 1905. Patient states that at the age of 21 she had an acute attack of epigastric pain, with vomiting; this attack lasted for one or two days and was associated with severe headache. Had a similar attack six years ago, lasting three days. Patient never vomited blood, always biliary material.

Present history dates back five years, when patient began to suffer with acute pain in the left iliac region radiating to the right loin and back; pain was so acute that anodyne was used for its relief. These attacks occurred at intervals from one to two attacks each month. For one year the patient was free from these attacks.

Six weeks before admission to the hospital attacks of very acute pain, beginning in the right iliac region, radiating to the right lumbar region, occurred every day or night. Large doses of morphine were used for these attacks. Patient was never jaundiced, never noticed blood in the urine.

Upon examination, the right kidney was palpable and movable; left kidney not palpable; no tenderness elicited over either right or left iliac region.

X-ray; dense shadow in region of right kidney, formed body.

Operation, November 25, 1905. Incision right flank, kidney exposed. A stone was found in the ureter. Stone was removed and the kidney, being diseased beyond operative repair, was also removed. Patient was discharged cured December 14, 1905.

CASE V.—*Calculus in Right Ureter.*—Miss ——, white. History of right renal colic for five years. Nothing of note in family or personal history other than attacks above referred to. Point of tenderness a little above the line of the right anterior superior spine of the ilium very decided; upon one occasion this tenderness suggested to the mind of the medical attendant the probability of inflammation of the appendix; this was ruled out, however. X-ray, negative.

Operation revealed a stone in the right ureter three inches below the pelvis of the ureter, with stricture of the ureter to the extent of one inch, through which it was difficult to pass the smallest probe. After incising the ureter above the stricture the stone was removed. The ureter between the stricture and the kidney was dilated to the size of the little finger. The kidney was so diseased that it was removed. The patient made an uneventful recovery. Microscopical examination of the ureter showed clearly carcinomatous change.

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THE TRANSPERITONEAL EXAMINATION OF THE URETER IN CASES OF SUSPECTED URETERAL CALCULUS, AND THE COMBINED INTRA- AND EXTRA-PERITONEAL URETERO-LITHOTOMY.

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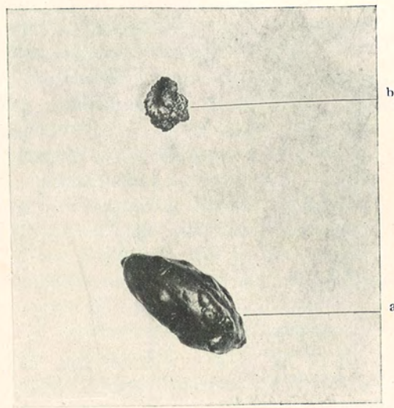
DURING my recent service at the Pennsylvania Hospital I had three cases which illustrate well certain advantages to be derived from the transperitoneal examination of the ureter and the necessity for a thorough palpation of the ureter when the abdomen is opened for lesions of other organs, and especially for the less acute varieties of appendicitis. Before enumerating these advantages a brief report will be made of two cases of ureteral calculus in which the stone was located by transperitoneal palpation and removed by combined intra- and extra-peritoneal uretero-lithotomy and of a third case in which ureteral calculus was suspected but not found and yet in which the real lesion, a cystic kidney, was detected.

CASE I.—An Italian, 39 years of age, male, admitted to the Pennsylvania Hospital on August 3, 1905. The patient spoke English very badly but was sent in by his physician as a case of subsiding appendicitis. He gave a history of repeated attacks of pain in the abdomen, accompanied by vomiting and diarrhœa. The attacks lasted for three or four days, when he was able to get up and go about. Until the present attack he had been well for a year. The present attack had lasted for three or four days and was accompanied by vomiting. Excepting for some slight tenderness in the right iliac fossa the patient at the time of his admission was free of symptoms. There was no tenderness over the kidney and he complained of no urinary symptoms; there continued a persistent tenderness on deep pressure in the right iliac fossa. He improved so much in a few days and the tenderness was so slight that my first inclination was to allow him to go out and return later if he had another attack. In other words, I was

not prepared to accept the diagnosis of appendicitis. In view of the history, however, I concluded to operate. The patient's urine showed a number of red-blood corpuscles. Under chloride of ethyl-ether narcosis I operated on the 8th of August. The abdomen was opened through the right rectus and when searching for the appendix my finger came in contact with a hard mass just below the iliac vessels in the true pelvis. It seemed about the size of a hazelnut, was very hard, and at first immovable. Although shaped like a gland it was hard and there were no other glands enlarged. As it was in the line of the ureter I concluded it was probably a ureteral stone. I left it for further investigation and proceeded to examine the appendix. This organ showed evidences of an old inflammation, the vessels over it being very tortuous and there being numerous adhesions all about it excepting at the extremity. These adhesions bled quite freely when divided. The appendix stump was crushed with forceps and inverted by a purse-string suture of gut. In order to make a more thorough examination of the small mass in the pelvis I enlarged my incision downwards through the rectus. I was then able to determine that the mass was a stone in the ureter and decided to remove it extraperitoneally without however making another incision through the abdominal wall. The original incision was further increased downwards and the peritoneum stripped from the abdominal and pelvic wall down to the ureter. With one finger in the pelvic cavity I was able to push the ureter and stone up into the extraperitoneal wound within easy reach, but not within sight. I then opened the ureter longitudinally and removed a long, black stone about the size of the end of the little finger and cucumber shaped. In order to remove the stone quite a large opening was made in the ureter. A gauze drain was then passed down to the opening in the ureter and the peritoneal cavity was tightly closed with a continuous gut suture. The upper portion of the wound in the rectus was closed with sutures through the fascia. The superficial tissues were closed excepting at the lower end of the wound, where the gauze drain made its exit. In spite of the flow of urine through the gauze, which was quite profuse for about two weeks, the abdominal wound healed without any infection. On the 2d of September very little urine was discharged from the sinus, and on the 6th of September the sinus was closed. It opened later, however, for a short time, but closed again.



Ureteral calculi, exact size; a, Case I; b, Case II.

Case II.—A domestic, aged 32, was admitted to the Pennsylvania Hospital, August 12, 1905. This patient was sent into the hospital at night as a case of appendicitis and was seen in my absence, by Dr. Francis T. Stewart. Dr. Stewart did not think the case one of appendicitis or one demanding immediate operation. I saw her the next day and could not make up my mind that there was any inflammation of the appendix. She gave a history of repeated attacks of pain in the right side of the abdomen in the appendiceal region, accompanied by vomiting. The pain was more or less fixed, there being no radiation to the back or to the bladder: there were no urinary symptoms. The examination of the urine, however, on the day after admission showed a few red-blood corpuscles and a trace of albumin. Repeated examinations of the urine continued to show red-blood corpuscles. Examination of the abdomen the day after admission showed considerable tenderness over the right kidney. This, however, disappeared and the only tenderness was in the iliac region. A few days later the patient passed both blood and mucus by the bowel and the cæcum and sigmoid were quite tender. These symptoms did not persist, as did the microscopic blood in the urine. A differential diagnosis between appendicitis, colitis, renal calculus and ureteral calculus had to be made. With the disappearance of the renal tenderness and of the blood and mucus in the bowel movements, and in view of the absence of the characteristic symptoms of appendicitis, I made a diagnosis of a probable ureteral calculus on August 30th, and advised operation. This diagnosis was based on the continued tenderness in the iliac region, the repeated attacks of pain accompanied by slight rise of temperature, and especially the microscopic blood in the urine. Urinary symptoms were absent in this case, as in the previous one; there was no frequency of micturition and no pain in the bladder. The right kidney was not movable. The menses had been irregular and painful. I determined to follow the same technique as in the previous case, especially as I was in some doubt regarding the diagnosis. Therefore, on the 31st of August under ethyl chloride-ether anæsthesia the abdomen was opened through the outer edge of the right rectus, low down, the appendix being readily found and removed as in the previous case; it was perfectly normal. The ureter, which was thickened, was easily felt crossing the iliac vessel. About one inch below the

vessels a hard, small, immovable mass was felt. The peritoneum was stripped away from the abdominal and pelvic walls after increasing the incision downwards. The ureter was exposed and brought plainly into view. Great assistance was also derived in this case from a finger within the pelvis pushing the ureter up into the extraperitoneal wound. The ureter was incised longitudinally and a small irregular stone, very rough and adherent to the ureteral mucous membrane, was removed. A gauze drain was inserted down to the ureteral wound, the peritoneal cavity was closed, and all but the lower portion of the wound in the abdominal wall. Although in this case a smaller incision in the ureter was required than in the previous one, there was a greater and more prolonged leakage of urine. The abdominal wound healed promptly excepting at the point of drainage, and the patient never had an abdominal symptom. On September 30th, one month after the operation, there was no flow of urine, there was, however, some discharge from the drainage tract which remained open for about two weeks. The patient was discharged on November 29th, the wound having remained closed for about a week.

Case III.—A man, aged 22, admitted to the Pennsylvania Hospital, December 21, 1905. This patient had been in the hospital a number of times, once for typhoid fever, again in December, 1903, for an appendiceal abscess which was operated upon by Dr. Le Conte; in February, 1904, he was again admitted suffering from attacks of pain which seemed to indicate a renal calculus. At this time Dr. Harte explored the left kidney but found no stone. Upon his last admission the patient stated that since his last operation he had had attacks of pain coming on every few weeks. The character of the pain was much the same as in his previous attacks and was accompanied by nausea and vomiting and fever. At the time of his admission he was suffering considerable pain and had some temperature. This promptly subsided and he was quite comfortable the next day. When examined there was considerable tenderness in the left lower abdomen and the pain extended down to the bladder and into the left lumbar region. Later, the tenderness seemed more marked over the kidney and ureter. The tenderness over the kidney gradually disappeared but that in the left iliac region and in the course of the ureter remained. On admission there were a few red-

blood corpuscles in the urine, but these were not found at any of the subsequent examinations. As the kidney had been thoroughly explored only ten months before and as the tenderness persisted over the ureter, I determined to explore this organ. As there was nothing to indicate the exact situation of the supposed stone I determined to open the abdomen as in the previous cases and thoroughly palpate the entire urinary tract. On December 30th, under ethyl chloride-ether anæsthesia, I made an incision through the left semilunar line into the abdominal cavity. I had no difficulty in finding the ureter and tracing it from the bladder to the kidney. It was normal in size and there was no evidence of any stone. The right ureter also could be felt in its lower portion and there was nothing abnormal about it. I had previously examined the bladder for stone with a negative result. On palpating the kidney through the wound I discovered it to be enlarged and cystic. The patient was turned on his abdomen, the kidney exposed through a straight incision in the lumbar region, and removed. During the separation of the kidney from the peritoneum I kept one hand in the abdominal wound as a guide. This greatly facilitated the separation of the kidney, which was densely adherent at its lower pole to the colon and peritoneum. The abdominal wound was closed before the nephrectomy was completed. Several of the cysts were ruptured before the kidney was delivered but not before the abdominal wound was closed. The fluid in the kidney did not have an ammoniacal odor and was of a milky consistency. The whole kidney was a mass of large cysts. The pedicle was ligated *en masse* and the individual vessels tied with smaller gut. A small drain was inserted. The patient's convalescence was perfect excepting for a severe pneumonia which he developed promptly after the operation. It is interesting to note that this pneumonia occurred in the right lung. A few days after the operation he was passing as much as sixty-five ounces of urine. There was no doubt from the examination of the kidney and from the character of its contents that the right kidney was secreting all the urine passed at the time the operation was done.

Palpation of the ureter through an abdominal wound is nothing new. I have for some time made it a routine procedure in all cases where the abdomen is opened for other con-

ditions and where these conditions do not seem to be sufficient to account for all the symptoms, and I am especially careful to do this in all interval operations for appendicitis. Although never generally advocated, the immediate removal of a stone detected by palpation through the abdomen has been practiced, yet, so far as I can learn, the removal has been done through the peritoneum or through one of the various extraperitoneal incisions, such as the lumbar, iliac, inguinal, sacral, vaginal or rectal. I believe then that the practice in the two cases reported by me of the removal of the stone extraperitoneally but through the same incision in the abdominal wall, and while the abdominal wound remained open, has not before been employed. Most authorities recommend the closure of the peritoneal cavity and the making of another incision for the extraperitoneal exposure and removal of the stone. In the two cases just described there was no doubt of the great advantages to be derived from having a finger in the peritoneal cavity and on the stone during the exposure of the ureter in the extraperitoneal portion of the wound. An objection to this method which naturally presents itself is the danger of infection of the peritoneum, but in neither of my cases did this occur and if the operator hesitates to open the ureter while the peritoneal wound is still open he can easily close the latter after the thorough exposure of the ureter; he will then have had all the advantage of the finger in the abdomen during the exposure of the ureter and the location of the stone. With a certain amount of care, however, I know that infection of the peritoneal cavity can be avoided, and moreover that the exposure of the ureter and extraction of the stone are easier and accompanied by less injury of the ureter itself when the operator has the assistance of a finger in the pelvis pushing the stone and ureter up into the extraperitoneal wound.

Another advantage to be derived from the manipulation both within and outside the peritoneum is the fact that in this way the ureteral stone can be more easily forced into the bladder if this is thought possible or back into the dilated ureter where an incision is apt to close earlier and better than

at the site where the stone has been arrested. Case III illustrates the advantage of intraperitoneal examination of the ureter, even when no stone is present. It enabled me in this case to detect a cystic kidney on the left side which I would not have been able to diagnose by palpation until it had reached much greater size. In a certain number of cases of stone in the lower portion of the ureter it is difficult to determine in which ureter the stone is. In such cases localization through an abdominal incision is strongly recommended.

From the limited experience gained by these two cases I am not prepared to advise the removal of every ureteral stone by the combined intra- and extraperitoneal method, but in all doubtful cases and in all cases where a stone is found in a ureter when the abdomen has been opened for some other condition I do advocate its immediate removal either through a separate incision or after the manner just described. To remove these stones through the peritoneum is seldom justifiable, as the risks of a peritonitis are too great.

In neither of the above cases was the ureter sutured. I felt that the wound would close after simple drainage just as the common duct closes after the removal of a stone. In any future cases, however, I think I shall close the incision in the ureter and introduce a drain down to the sutures. Henry Morris states in this connection that suture of the ureter is of doubtful utility when it is much damaged and that it may be harmful.

I would urge the careful palpation of the ureter in all cases where the abdomen is opened for chronic or subacute inflammation of the appendix or uterine appendages. And also that where nephrotomy is done for stone, whether a stone is found or not, a thorough examination of the ureter, by means of a ureteral probe, should be made. One of the great objections to the use of the ureteral probe through the bladder is the difficulty of catheterizing the ureters in the male, and the further difficulty of differentiating a stone from some other form of obstruction, such as a kink or stricture. The presence

of microscopic blood in urine, especially after an attack of pain, is of great diagnostic value.

Dr. William L. Rodman, speaking to the questions propounded by Dr. Deaver, said that the Röntgen rays are not always satisfactory in the diagnosis of calculi in the kidney and ureter, many mistakes being made thereby. This is especially true when the supposed lesion is low down and well toward the median line of the pelvis. In this location little bodies described as centres of calcification in cartilages have by different observers been mistaken for calculi. With Dr. Pfahler the speaker had had at least three such cases. In the first case, a woman, the skiagram showed what seemed to be certainly two stones in the ureter low down near the bladder. His suspicions were aroused, the ureter was catheterized and the hard bodies felt and demonstrated to be disconnected with the ureter. Very recently a similar condition was shown by a skiagram in a young man without renal or vesical symptoms. It was plainly such a case as Bevan and others have demonstrated to be points of ossification or calcification of the ligaments. Bevan, of Chicago, has seen many such cases. As to opening the ureter by the transperitoneal or extraperitoneal route he believes there is no doubt of the almost unanimous opinion that the extraperitoneal is the safer. In fact, it may be said in view of all that has been learned upon the subject that the intra-abdominal method is at the present scarcely warranted. The operation can be done by this method but the surgeon who so does is courting disaster. In cases of encysted stone near the bladder the site can usually be reached through the bladder by means of a suprapubic cystotomy. He was interested in Dr. Gibbon's reported combining of extra- and intraperitoneal methods in removing a calculus. Dr. Gibbon is correct in saying there is danger of soiling the peritoneum; he would prefer the extraperitoneal route always, but when working in the abdomen as was Dr. Gibbon the method employed by him may very well be used.

Dr. George G. Ross spoke of a case of ureteral calculus in which operation was not performed. The patient had repeated attacks of renal colic and after each passed bloody urine. The X-ray showed a dense shadow near the neck of the bladder. The man was a travelling salesman and declined operation, taking

morphine to relieve the attacks. One morning he reported jubilantly that he would have no more attacks as the night before he had passed an enormous amount of urine during sleep and a day or two later the calculus was passed by the urethra. There evidently had been obstruction of the ureter and hydronephrosis, which was relieved by the passage of the stone.

Dr. John B. Roberts said that ten years ago he reported the transperitoneal removal of a ureteral calculus. He found no difficulty in keeping the peritoneum perfectly clean and both the ureteral and abdominal wounds healed by first intention.

Dr. Gibbon, in closing, corroborated Dr. Rodman's statement regarding transperitoneal operation upon the ureter; it is seldom justifiable. In the cases reported, however, the removal of the calculus was not transperitoneal, the ureteral operation itself being entirely outside of the peritoneum. Under such circumstances if the surgeon so desires he can close the peritoneum before taking the stone out of the ureter, but the manipulation made possible by the peritoneal opening enables one more easily to remove the calculus. Without such opening it is utterly impossible to get at the ureter throughout its entire length unless the kidney be delivered and access gained in that manner. In both the cases reported the microscopic findings of blood in the urine were of great diagnostic value. If a stone is found in the ureter when operating for appendicitis, it should be removed. In such an instance, as before stated, the surgeon can choose the route by which he will remove the calculus.

RENAL CALCULUS WITH MAGGOTS WITHIN THE STONE.

Dr. John H. Gibbon reported the case of an Italian laborer, 33 years of age, who was admitted to the Pennsylvania Hospital July 21, 1905, and transferred to the surgical wards on July 24. At this time he had all the symptoms of a pyonephrosis on the left side, although he was able to be up and about at times. There was a large quantity of pus in the urine and marked tenderness over the left kidney. Cystoscopic examination was unsatisfactory. He was operated upon and a large soft calculus was found to occupy nearly the whole pelvis of the kidney, which extended up in the calices and was removed in two portions. There was a large quantity of pus in the kidney which had a very foul odor, The wound was drained and partially closed. The stone was examined in the laboratory on the same day of its removal.

The larger portion measured 2x2½ cm. in diameter; the small portion measured 1x1½ cm. and the weight of both was 17.5 grams. Passing through the larger portion of the stone were a number of small smooth channels in which were found numbers of minute maggots. Dr. Gibbon saw the specimen the next day when the maggots were still quite active, crawling in and out of the channels in the stone. The maggots were so small that their nature was doubted for a while. A number of them with a portion of the stone was sent to Dr. Charles Wordell Stiles, of Washington, who reported that they were the maggots of the ordinary domestic fly. On the fourth day after the operation the dressings removed from the wound were kept over night wrapped in a sterile piece of gauze surrounded with wax paper, and on the following morning there were a large number of full-grown maggots present. In none of the subsequent dressings were maggots found. The patient made a good recovery from his operation, but as the sinus continued to discharge large quantities of pus, and as occasionally the drainage would be interfered with, Dr. Gibbon removed the kidney on November 25th. The patient made a satisfactory recovery from the second operation.

In questioning the patient it was learned that in Italy he had some years previous had inflammation of the bladder for which irrigation was done. The first symptoms of his present illness appeared a few months before his admission to the hospital and at this time he irrigated his own bladder. He says that he was always careful in performing this irrigation to have the catheter and solution clean, and he cannot recall ever having seen flies on the catheter. It is probably true, however, that this was the source of the infection.

HYDRONEPHROSIS; DISTENTION OF URINARY BLADDER.

Dr. Gibbon also reported *a case of cystic kidney with obliterate ureter associated with a fibroid uterus causing a chronic distention of the bladder with retention of urine.*

This patient was admitted to the Pennsylvania Hospital on November 17, 1905. She was 43 years of age, a widow, and had never had children. She came to the hospital because of a large tumor in the lower portion of the abdomen and marked vesical and rectal tenesmus, the latter symptoms being of but a few weeks' standing. Examination showed a tumor projecting above

the pubes which was quite hard and which on bimanual examination seemed to move with the uterus. Two distinct tumors could be felt in the uterus, one in the anterior portion just above the cervix which pressed upon the bladder, and the other could be felt through the rectum which was nearly occluded by it. A diagnosis of fibroid tumors of the uterus was made and a hysterectomy recommended. When the abdomen was opened it was discovered that the tumor felt above the pubes was a greatly distended bladder. One hour previous to the operation the patient had been catheterized and 26 oz. of urine withdrawn; on the table the catheter was again introduced and 20 oz. of urine withdrawn. The bladder did not contract when emptied but collapsed in thick folds, the wall appearing to be about ½ inch thick. The uterus contained a number of fibroids; one on the anterior surface low down pressed against the bladder in such a way as to produce obstruction just as an hypertrophied prostate does in a man. Examination of the ureters at their point of crossing over the iliac vessels showed no distention of either. An examination of the kidneys showed a normal right kidney but the left was an enormous cyst. A hysterectomy was done and then the left kidney was exposed through a lumbar incision. It was so large that it was impossible to remove it without emptying it, and even after the escape of a large quantity of grayish, odorless fluid the delivery of the kidney was difficult. In ligating the pedicle the ureter could not be made out. This kidney was subsequently examined in the laboratory and no ureter could be found. The kidney substance had been so completely destroyed that none could be found microscopically. The kidney measured 25 cm. in length by 15 cm. in width, and the wall varied from 1 to 4 mm. in thickness. The patient made an uninterrupted convalescence.

UNREDUCED ELBOW DISLOCATION.

Dr. William J. Taylor showed a skiagraph of an unreduced forward dislocation of the elbow taken three weeks after the accident, as well as a skiagraph taken the day following the reduction of the dislocation.

The patient was a young man of 29 who, while playing football, fell upon the ball, and as he fell another player running up behind accidentally kicked him on the lower end of the left

humerus just above the elbow; this produced the dislocation without fracture.

Three weeks after the accident he came to Dr. Taylor, who had a skiagraph taken which revealed the true condition of affairs. Owing to some unavoidable delay it was nearly four weeks after the accident before the attempt could be made at reduction. He was given ether and after a great deal of physical effort and limbering up and breaking up the adhesions of the elbow, reduction was accomplished. The second skiagraph showed very well the bones in their proper relation.

AN ETHER INHALER FOR USE IN OPERATIONS REQUIRING THE PRONE POSITION.

Dr. Thomas C. Stellwagon (by invitation) presented this apparatus. It was devised to obviate the difficulty experienced in administering ether to patients when prone, especially when the Edebohl technic is employed. In addition, with the ordinary inhaler a very large amount of ether is required. He at first used a rubber bulb to force ether into the old inhaler but this proved unsatisfactory. The present modification has been in use in the Jefferson Hospital during the past six months and has met with general approval. With it considerably less ether is required. The addition consists of a lateral extension, near the lower end of the instrument, which is placed over the mouth of the patient. The hood-shaped mouthpiece is reversible to allow application when the person is on either side. But one hand is required to hold this inhaler to a patient's face. A question regarding the device that is not yet entirely settled is whether the patient gets sufficient air with the ether. Possibly a valve above the mouthpiece is needed to permit the egress of expired air.

STATED MEETING, HELD MARCH 5, 1906.

The President, John B. Roberts, M.D., in the Chair.

CLINICAL EXPERIENCES WITH MECKEL'S DIVERTICULUM AND OTHER VESTIGES OF THE OMPHALOMESENTERIC DUCT.

BY JOHN B. ROBERTS, M,D.,
OF PHILADELPHIA.

My observation of the congenital anomalies mentioned in the title of this paper is limited to the following instances:

Case I. *A Meckel's diverticulum on the mesenteric side of the ileum.*—I reported in 1896[1] a case of diverticulum, arising from the ileum a few inches above its entrance into the cæcum, seen while assisting Dr. L. W. Steinbach in an abdominal operation. This diverticulum was an inch and a-half long, with a base about half an inch wide, and tapered to a rounded end like the finger of a glove. It was connected with the gut at its mesenteric border and was attached to the mesentery or developed upon it. It was not the seat of any inflammatory action and its point was directed upward,—that is, away from the cæcal end of the ileum. It had nothing to do with the condition for which operation was done, which was obstruction due to old inflammatory adhesions about the colon near the cæcum.

Case II. *Fatal strangulation of the intestine by cord consisting of obliterated omphalomesenteric vessels.*—About ten years ago I saw a middle-aged man, with Dr. H. A. Stout, of Wenonah, N. J., dying with great distention of the abdomen from intestinal obstruction of five days duration. We prepared for immediate operation, but the man died just after he was placed upon the operating-table.

The autopsy showed a loop of bowel encircled by a thin

[1] Annals of Surgery, XXIII, 1896, p. 612.

cord of fibrous tissue, looking like the white string used for tying up parcels. This cord was about thirteen centimetres long, and extended from the front wall of the abdominal cavity to the mesentery above the point of strangulation of the bowel. From another part of the bowel hung a pedunculated mass, four and a-half centimetres long. The cord ran through an opening in this appendage, as through a pulley. The appendage arose from the intestine opposite the mesentery, but had no lumen. The specimen was exhibited to the Philadelphia Pathological Society on October 28, 1897. Dr. David Riesman [2] considered the cord to be the obliterated vitelline, or omphalomesenteric, vessels.

CASE III. *Strangulation of the ileum by a Meckel's diverticulum (a remnant of the omphalomesenteric duct), relieved by operation.*—A boy, four and a-half years old, was brought to me by Dr. H. J. Butte on January 8, 1906, with a history of unrelievable intestinal obstruction. He had complained of pain in the abdomen for four days previously, which he attributed to a kick by another small boy. Vomiting had occurred promptly and was accompanied by absolute constipation. There had been no previous abdominal crises in the history of the case. At the time of admission the temperature, pulse and respiration of the boy were practically normal.

After two or three hours' observation, an incision was made near the middle line of the abdomen, extending from an inch above the umbilicus to a point two inches above the pubes. The intestines were markedly distended and congested. About three feet from the ileocæcal valve a slender diverticulum of the ileum was found. Its diameter was less than that of the normal vermiform appendix. Its end was a mere fibrous cord attached to the abdominal wall near the umbilicus. The structure was distended at its middle into a sac similar to that which is sometimes seen in the appendix when it is inflamed. Between this sac and the ileum there was a patent tube lined with mucous membrane. There was evidence of inflammation of these structures. The ileum a short distance from the point of origin of the diverticulum was tightly strangulated by the passage of the diverticulum and its fibrous continuation across it. A deep groove was thus made in the portion of the bowel opposite the mesentery, similar to

[2] Meckel's Diverticulum and the Omphalomesenteric Duct, University Medical Magazine, June, 1898.

that often seen in cases of tightly-strangulated hernia at the femoral or inguinal ring.

The cord-like end of the diverticulum was detached from the belly wall, and the diverticle itself was ligated near its ileac attachment and removed. The groove made in the gut, thus relieved from pressure of the tense band, was so dark that I feared that perforation from sloughing would occur. I therefore turned in the suspicious portion by a series of Lembert's sutures. The mesenteric glands were very large, and the veins in the mesentery greatly distended and black, as though actual thrombosis had occurrd. There were a few flakes of lymph on the surface of the bowels, but no distinct peritoneal inflammation existed. An attempt was made to bury the stump of the diverticulum after its mucous membrane had been sterilized with a drop of undiluted carbolic acid. If my recollection is correct, I finally abandoned the endeavor to bury it, because of the tension made on the wall of the gut by the sutures, which had to be placed so near those used to turn in the constricted area. When I made the abdominal incision, which was near the middle line, I had to avoid on the inside of the belly-wall a white fibrous cord, which was probably the remains of the right hypogastric artery or the urachus.

For a good many days the patient's condition was rather critical, with high temperature and a weak, intermittent pulse. A movement of the bowels was obtained on the day after operation. Some days afterward the stools became exceedingly offensive and suggested the possibility of there having occurred some sloughing at the point of former strangulation. The convalescence, however, continued satisfactorily, and at the end of a little over three weeks he was discharged from further surgical observation.

CASE IV. *A Meckel's diverticulum found at autopsy.*—Within the last week, I have obtained a specimen, from a patient, whom I treated at the Polyclinic Hospital for traumatic rupture of the bladder and fracture of the pelvis. He died a month after injury from hæmorrhage occuring from duodenal ulcer.

At the autopsy, made by Dr. John M. Swan, a diverticulum was discovered, about four inches long. At its origin it is about the size of the ileum. It resembles in shape the finger of a glove. It was situated about two feet from the ileocæcal valve. The

man's death was in no way dependent upon the existence of the anomaly.

CASE V. *A possible instance of persistent, though modified omphalomesenteric structures.*—In 1895 I exhibited to the Section on General Surgery of the College of Physicians of Philadelphia [3] a pedunculated myxoma of the abdominal cavity. While operating on a very large umbilical hernia in a woman, I found among the intestines in the sac a translucent tumor as large as a pea. It had a long thread-like translucent pedicle descending into the abdomen. The growth was not attached to the hernial sac or its contents. The slender stalk was pulled out of the opening in the belly-wall till a foot or more was in my hands. Its lower attachment was not revealed. The tumor and a part of its footstalk were excised.

Dr. W. M. L. Coplin examined the specimen and pronounced it a myxoma. It was covered by epithelium, most of the cells of which were flattened, though some were more rounded in contour. The pedicle contained a single artery and vein, but no nerve-fibre was evident.

I have thought that perhaps these structures might have been the remains of the omphalomesenteric vessels, which had become free at the umbilical end and by modification had been transformed into the pedunculated tumor.

The surgical lesions liable to result from congenital persistence of the omphalomesenteric duct, in whole or in part, should be borne in mind by operating surgeons. This tubular structure, leading from the primitive intestine to the vitelline, or yolk sac, is usually obliterated in the second month of embryonic life. It may, however, remain patulous in the fœtus and cause a congenital intestinal fistule at the navel in the child after birth. This condition is similar in origin to the urinary fistule at the navel, due to an unobliterated urachus.

In other cases the umbilical portion alone may fail to undergo embryonic obliteration and leave a pouch at, and inside of, the navel lined with mucous membrane. Occasionally, and perhaps more frequently the intestinal end remains open and gives rise to a Meckel's diverticulum of the intestine.

[3] ANNALS OF SURGERY, XXIII, 1896, p. 295.

In still other cases the two ends of the duct may undergo the normal disappearance, and leave an unobliterated tube, or cyst, in the middle region; or the entire duct may disappear, leaving, however, a simple fibrous cord, representing the omphalomesenteric blood-vessels.

Various degrees of involution modify these conditions, and quite an array of surgical lesions needing operative treatment result therefrom.

Many cases of strangulation of the bowel, supposed to be due to old inflammatory adhesions are doubtless due to vestiges of the omphalomesenteric duct resembling inflammatory bands. Fistula at the navel, supposed to be caused by a sloughing umbilical hernia, is sometimes a persistent duct. The diagnosis is not very difficult, if the possibility of the rarer condition be remembered.

A diverticulum may become the seat of ulceration and perforation, like the vermiform appendix, from pyogenic or typhoid infection. It may be the cause of intussusception, and may be the whole, or a part, of the content of a hernial sac.

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DR. JOHN H. GIBBON referred to three cases in which he had met with a Meckel's diverticulum. In one case a diagnosis of general peritonitis was made and at the operation a gangrenous Meckel's diverticulum constricting the small intestine was found. This case was reported in the *American Journal of the Medical Sciences.* The other two diverticula were met with in operating for other conditions. Our idea as to the frequency of Meckel's diverticulum has changed greatly since the abdomen has been more frequently opened. No doubt this malformation was in the past frequently the cause of peritonitis.

DR. WILLIAM J. TAYLOR mentioned two cases of Meckel's

diverticulum, one of which he had reported to the Academy, the other to the Johns Hopkins Medical Society. The latter occurred in a child who was supposed to have had three attacks of appendicitis, the symptoms resembling those of a brother who had a few months previous been operated upon for that condition. When the abdomen was opened a globular mass protruded and examination revealed a large diverticulum which was twisted on itself three times, the entire mass being gangrenous. It was cut away at the base and the gut united, the result of the operation being very satisfactory. In the case reported at the Academy, the diverticulum was a long fibrous band that completely encircled the gut and passed through the mesentery. By gradual contraction it had narrowed the intestine. This patient also made a good recovery.

COXA VALGA.

Dr. James K. Young reported the case of a boy, eight years of age, who was brought to him for examination January 27, 1906, by Dr. M. A. Roberts. The patient had a fall about five years before, after which his mother noticed that he walked "crooked." The deformity has been increasing of late. When he falls down he has difficulty in getting up again.

The boy stood on his left leg with right knee thrown forward and inward, and spine curved, with the convexity to the right, and with the left shoulder depressed. In walking he limped on the right leg and the over-development of the quadratus muscles is noted. In standing the crease of the buttocks is inclined to the left, and the abdomen is pendulous and prominent. In the lying position there is slight lordosis and the pelvis is tilted upward on the right side. The right leg is apparently longer than the left, although the bony measurements are the same. In the right hip flexion is abnormal, the thigh is carried outward in adduction during flexion, and adduction is then limited. The adductor tendon is smaller. In the left hip all the movements are normal, and adduction is normal. The right limb is adducted upon the pelvis. Flexion of both knees shows the femur of the right limb to be a little longer than that of the left, and the lordosis is not entirely lost until both thighs are flexed upon the abdomen. The spine is flexible in every direction, and there is no osteitis present. There is an increased

development of the quadratus lumborum muscle and also in the latissimus. There is pain upon motion in the groin above the insertion of the adductor muscles, and this point is also sensitive to pressure.

Skiagram shows the angle of neck and femur on right side to be decreased to about 100°, the normal angle in the adult being about 130°, but varying in individuals, the variation being in an inverse ratio to the stature and to the development of the pelvic bones.

On February 8, 1906, Dr. Young divided the adductors from their pelvic attachment, encased the leg in plaster, and adducted the limb for two weeks. The patient will wear an elevation on the left foot, with the expectation that the weight falling at a different angle upon the neck will correct the angle of deformity.

This has occurred in a similar case of coxa valga in a child who was 2½ years old in March, 1904, when he was brought for treatment. The biceps tendon in this case was divided and by the use of a high shoe upon the other foot the angle changed.

SABRE BLADE DEFORMITY.

Dr. James K. Young reported two cases of sabre blade deformity.

Case I.—A girl, eleven years of age, applied to the Polyclinic Hospital December 1, 1904. She was a tall, healthy-looking girl. When she was one year old she fell out of bed and was unconscious for a time. When two years old the mother noticed that she dragged the leg. She wore braces for a year. Has not worn them since. Five weeks previous to date of applying at hospital she stepped suddenly down from a flight of steps at school and the leg gave way under her. On her way home she fell again. The leg was very painful and she reached home with difficulty. Was unable to walk from that time until coming to the hospital. Examination of the leg at this time showed a bending of the tibia, and the end of the lower fragment of the broken fibula could be felt under the skin. Skiagraph showed fracture of lower tibia and fibula, and of upper third of tibia, with a small amount of callus. Ends of fibula not approximated. Forward bending of tibia. Tibia also showed areas of softening.

December 10, the ends of the fibula were excised and an

attempt made to unite them with silver wire, but the bone was too soft and too much diseased to hold the wire. About ¾ of an inch of bone was removed and the periosteum sutured together. The bone was brought into a straight line. Nothing was done to the tibia. A subsequent skiagraph showed growth of bone within the periosteal sheath, and union of the fibula had occurred. Examination at this time (1906) shows the fracture still ununited.

Case II.—A boy, fifteen years of age, applied to the Polyclinic Hospital July 16, 1904. In the early part of 1903 while walking he fractured the tibia above the malleoli. Leg was not set at time of injury. Tibia was deformed for eight years.

When he applied at the hospital his ankle was fixed with the foot at right angle to the leg. There was considerable pain in the leg, increased upon standing and walking. Skiagraph showed typical sabre-blade deformity. He was fitted with brace, and after four weeks reported that he had much less pain.

Dr. DeForrest Willard said that five days previous he operated on a colored boy eight years old who had marked sabre-blade deformity. Several years previously the tibia had given away but not knowing that fracture had occurred the boy had continued walking and when seen by Dr. Willard the condition well illustrated the remarkable compensatory power of bones. The fibula had remained intact and had developed to three times its normal size; the tibia had atrophied and absorbed. The lesion was treated as an ununited fracture, the tibia being cut down upon and wired, while a wedge from the fibula was resected.

Dr. Henry R. Wharton said the interesting point in the cases of sabre-blade deformity reported was the occurrence of fracture. In his experience, fracture is a rare complication of the condition. In a number of cases upon which he had operated he found the bone dense and the compact portion increased in thickness. The treatment he finds most satisfactory in these cases is to make an incision in the soft parts from epiphysis to epiphysis and then lay open the bone to the medullary cavity throughout its entire length. This can be done with a circular saw propelled by a dental engine or with a Hey's saw. This method of operating shows the thickness of the bone as before

mentioned, the hard part being from one-eighth to one-fourth inch thick. Having thus exposed the marrow throughout its entire length, the external wound is closed without drainage. Generally there is relief of pain. Several cases have been relieved in this manner after a long treatment with potassium iodid had proved ineffective.

HEMIPLEGIA FOLLOWING OPERATION FOR APPENDICITIS.

Dr. H. R. Wharton reported the case of a boy, aged eight years, who was admitted to the Girard College Infirmary, in May, 1905, suffering from bromidrosis, with excoriation about the toes and feet. He was exceedingly nervous and became hysterical when the feet were dressed. One week after admission he complained of pain in his right iliac fossa; no rigidity, very slight tenderness on pressure. These abdominal symptoms passed away after the use of an enema. Two days later the abdomen became markedly distended, and there was pain and tenderness, with slight rigidity of the muscles over the right iliac fossa, but the pain was never severe at any time. The temperature at this time was 99° and the pulse 108. Six-hour leucocyte counts showed a gradually-increasing leucocytosis—13,000, 20,000, 22,000, 28,000.

The appendix was exposed by an incision through the outer edge of the right rectus, and was found to be much inflamed, and enlarged about three times its normal size. It was firmly adherent to the omentum, was gangrenous, and perforated at its distal end, and contained a good-sized concretion. An abscess, circumscribed by adherent bowel, extended into the pelvis. The appendix was removed, and the abscess drained with glass tube and gauze drains. The patient did well after the operation, there was free purulent discharge from the wound for a few days, and all drainage was removed from the wound at the end of the first week.

On the third day after the operation the patient, who had been previously bright, answering questions and talking freely, suddenly became quiet, and examination showed inability to protrude the tongue or to speak. There was ptosis of the right eye, facial paralysis on right side, complete paralysis of motion of the right leg and partial of the right arm, with diminished

sensation in both these members. Babinski reflex present in right foot, patella and ankle; clonus reflexes normal. The patient had no marked elevation of temperature, never being over 100 2-5° during the first week, and his abdominal condition was entirely satisfactory.

At the end of the third day, after the appearance of the hemiplegia, the patient began to improve, the voice returned and the sensation was normal in the limbs. Motion was regained first in the fingers and toes, and at the end of the sixth day he could use his hand fairly well, but made no attempt to do so unless his left arm was tied to his side. Improvement of the motion in the leg was slower, reflexes negative, except for a slight ankle clonus.

The nurse in charge of the case reported that when visited by members of his family he apparently redeveloped the paralysis of the arm and leg, and could not be induced to move either member.

The abdominal incision was healed after the twenty-third day, and from this time the patient was encouraged to use the limb in walking, and in a few days walked quite well. He developed typhoid fever during the early fall, and made a satisfactory recovery from this disease. In December, 1905, he was in good condition, with no evidence of impairment of function in the right arm or leg.

When Dr. Wharton saw the case a few hours after the development of the hemiplegia, he was inclined to attribute it to embolism, but the rapid disappearance of some of the symptoms, beginning in three days, and the previous nervous condition of the patient, the development of marked nervous symptoms on slight provocation before the operation, and the redevelopment of the symptoms of paralysis of the arm and leg when visited by members of his family, suggested the possibility of hysterical hemiplegia. Although many of the symptoms could be explained as hysterical manifestations, a careful study of the case rendered it difficult to explain all of them upon this hypothesis, notably, the presence of facial paralysis, ptosis, and the Babinski reflex, which all point to an organic lesion.

Dr. Wharton Sinkler saw the patient a few days after the development of the nervous symptoms, and sent the following report of his observations:

"The case was probably one of thrombosis of one of the vessels supplying the motor area, but there is reason for the belief that the patient was also suffering from hysteria. The reason for this opinion was that hysterical facial paralysis is so rare that it may be excluded. In addition to this the boy had ptosis of the same side and complete paralysis of motion in the right leg and partial in the right arm.

"The Babinski reflex was present and ankle clonus was present to a slight extent on the right side. These phenomena indicated the existence of an organic change. The rapid recovery is explicable on the supposition that the collateral circulation was rapidly established. Rapid recovery in the hemiplegias of children, occurring after acute illnesses, is not unusual. That some of the symptoms alleged by the relatives of the boy were due to hysteria, there can be little doubt."

STRICTURE OF THE ŒSOPHAGUS.

Dr. H. R. Wharton presented a patient in whom gastrostomy, followed by retrograde dilatation, was performed more than five years ago for stricture of the œsophagus.

Robert B., seven years of age, was admitted to the Children's Hospital, October 13, 1900, suffering from difficulty in swallowing and regurgitation of food. He had four weeks previously swallowed a solution of lye, which he mistook for milk. At the time of admission he was emaciated, and seemed unable to swallow any food; even liquids were regurgitated, unless taken in very small quantities.

Upon examination with an œsophageal bougie, a stricture of the œsophagus was located, 9¼ inches from the line of the teeth, through which it was found impossible to pass even the smallest bougie. The patient was given nutritious enemata, and for a time improved slightly in weight under their use.

On December 17, as it was found impossible to pass any instrument through the stricture, and as he was losing rapidly in weight and was greatly emaciated, gastrostomy was done, and the patient was fed through the gastric fistula. He improved rapidly under regular feeding through the fistula, and ten days later he was anæsthetized and an attempt was made to pass an instrument through the mouth without success. A small flexible catheter was then passed through the fistula and into the

œsophagus, and after a number of attempts it was passed through the stricture and appeared in the pharynx. A stout silk ligature was attached to the extremity of the catheter, and it was withdrawn through the fistula. A small rubber drainage-tube was fastened to the end of the ligature, and it was well stretched and drawn through the stricture until its end appeared in the pharynx. The string attachment to the rubber tube was brought out of the mouth and secured to the cheek by a strip of plaster, and the lower end of the rubber tube was secured outside of the fistula by a safety-pin. At intervals of two or three days rubber tubes of increasing size were attached to the tube and drawn through the stricture and secured as described as above. At the end of three weeks the rubber tube was removed, and dilatation of the stricture was continued by passing bougies through the mouth. When the stricture had been dilated to about 26 French scale, he could swallow food quite well.

As he was able to take food well by the mouth, and the skin in the region of the fistula was excoriated, it was decided to operate for the closure of the gastric fistula. This was done by circumscribing the fistulous opening by an incision and dissecting it down to the abdominal muscles. The orifice of the fistula was incised at each end, and the mucous surfaces inverted and secured in this position by silk sutures; another layer of sutures next secured the aponeurotic structures over this, and the skin incision was finally closed with sutures.

There was a little leakage through the line of sutures for a few days, but this then ceased, and the wound healed firmly. The boy left the hospital in August in good condition, and at this time was able to swallow ordinary food without difficulty.

The patient was not seen again until November, 1905, when he was admitted to the Medical Ward suffering from fever, supposed to be typhoid. This proved not to be typhoid fever, and he was discharged in a few days. At this time he was able to take ordinary food without difficulty.

The procedure employed, gastrostomy, followed by retrograde dilatation of the stricture with rubber tubes, was most satisfactory in this case, and should be resorted to when dilatation of the stricture by bougies passed through the mouth is impossible. The modern operations of gastrostomy, which aim to produce a fistula without leakage, and do not give sufficient access to the stomach for the passing of bougies are not applicable in these cases.

TETANUS AFTER AMPUTATION FOR GUNSHOT WOUND OF FOREARM.

Dr. H. R. Wharton reported the case of a young man, aged eighteen years, who received a gunshot wound of the forearm at close range, with No. 6 shot, on October 27, 1905. The skin and subcutaneous tissue for a space of several inches, about three inches above the wrist, were torn away, but the bones were not injured. He was seen by Dr. Carpenter, who controlled the bleeding and sutured the tendons. On the third day after the accident gangrene of the hand developed, and he was sent to the Presbyterian Hospital. At this time the patient had a temperature of 103°, was delirious, and was septic.

The forearm was amputated three inches below the elbow, and immediately the patient's general condition improved. This improvement continued until December 4, when he complained of stiffness about jaws, which was followed by the rapid development of marked symptoms of tetanus. He was immediately given injections of tetanus antitoxin, and at the same time chloral hydrate and bromide of potassium in full doses. In spite of the treatment he became progressively worse, having from four to five convulsions in the twenty-four hours. At the end of a week he had taken fifteen injections of antitoxin, 30 c.c. each. At this time the injections of antitoxin were discontinued, and the chloral hydrate and bromide of potassium were continued. To control the convulsions the inhalation of nitrite of amyl, ether and chloroform were used. The latter drug was the only one which proved satisfactory. Morphia was also used freely to relieve pain and secure sleep. The patient was also given large quantities of liquid nourishment. For a week after discontinuing injections of antitoxin, the convulsions were frequent and severe, but in the third week diminished in frequency and disappeared entirely in the fourth week. The patient gradually improved in strength and was discharged on December 16, 1905.

Dr. Wharton said that his experience in the treatment of tetanus by antitoxin had not been encouraging. The recovery in this case, he thought was due to the fact that they were able to support the patient until the disease had run its course, re-

lieving pain and securing sleep by the use of morphine, chloral and bromide, and to prevent death from spasm of the respiratory muscles by the use of chloroform during the convulsions.

INFECTIONS OF THE KNEE-JOINT.

Dr. Dudley P. Allen, of Cleveland, Ohio, read a paper entitled "A Study of Infections of the Knee-Joint, with Their Treatment."

In beginning the paper he explained that it was called a "study" because the subjects to be presented were still under consideration and definite conclusions had not been reached with reference to them. The paper was based upon material gathered at Lakeside Hospital during six or seven years, but work bearing upon the subject in hand had only been carried on during the last three or four years. The material under treatment showed that there were numerous cases of infection of the knee-joint in which the chief manifestations were swelling with effusion, pain and tenderness on pressure or motion. To such cases has commonly been applied the term of articular rheumatism. Many of the cases were admitted to the medical ward with this diagnosis. Some of the cases yielded quickly to treatment by the salicylates, the pain rapidly disappearing. Other cases were unaffected by such treatment, and a study of such cases was instituted. The paper, however, took up certain other classes of cases.

The first class of cases to be considered was those of infection of the knee-joint as a result of external wounds or trauma. In a number of cases of very severe infection an attempt had been made primarily to save the joint by drainage and irrigation. After it was evident that this had failed, a more radical method of procedure had been instituted. The knee-joint had been opened by a transverse incision across the front of the joint, separating the ligamentum patellæ, and by two incisions on either side, opening the joint to its upper extremity. After thoroughly clearing out the joint, the entire cavity was filled with iodoform gauze, with the joint in the flexed position. This secured absolutely perfect drainage. As it became evident that the acute infectious process was under control, the iodoform gauze was removed, a smaller amount returned, and the leg was gradually brought into the extended position. By this means the patient's

life was saved and the leg was preserved, although the knee-joint was perfectly stiff.

This method of procedure was recommended in cases of grave infection where it was evident that the patient's life, or at least his limb, was jeopardized by any more conservative treatment, the fact being pointed out of the seriousness of infections of the knee-joint. Several cases of unusual gravity were reported which had been treated by this method.

As opposed to this radical method of treatment, a case was reported of suppuration of the knee-joint, a pure culture of streptococcus being obtained. In this case the joint had been washed out with 1 to 40 carbolic acid, and then injected with an emulsion of iodoform in glycerine. This treatment had been repeated several times, and the patient recovered, with a joint which could be flexed to a right angle. The possibility was suggested that the further study of causes of infection of the joint might show that while some cases require the most radical treatment others might be treated in a more conservative manner.

Two cases were reported of infection of the knee-joint with pure cultures of pneumococcus. One of these cases had been treated as acute articular rheumatism, having been in the hands of a physician of large experience. Immediately upon admission to the hospital the joint was aspirated and thoroughly opened. The pus obtained gave a pure culture of pneumococcus. Incision failed to relieve the condition and the thigh was amputated, but the patient died. A careful post-mortem failed to disclose a diseased condition elsewhere.

Cases of this sort seem to emphasize the importance of early positive diagnosis.

Tubercular infection of the knee-joint was the next subject to be considered. The aid to be gained in such cases by means of X-ray photographs was pointed out and illustrated. It was also pointed out that in many cases early diagnosis by ordinary means was extremely difficult, due to the fact that the appearances were not always characteristic, and the X-ray photograph gave no assistance. Some cases were reported which had been seemingly very successfully treated by the injection of iodoform emulsion. It was pointed out, however, that statements with reference to cases of this kind must be very conservative, and could be convincing only after long observation, since the tend-

ency to recurrence of trouble in a knee after tubercular infection was well known. A strong probability was thought to exist of benefit from the injection of iodoform by thoroughly established results gained elsewhere. The writer pointed out a series of cases of tubercular disease of the vertebræ, with the accumulation of large amounts of pus. In these cases after aspiration and injection of iodoform emulsion, in some cases the process being repeated as high as ten times, a considerable number of permanent cures had been obtained. If such results could be obtained in tuberculous abscesses, having their origin in the spinal column, it seems strongly probable that beneficial results might follow a similar treatment of the knee-joint.

Following the cases treated by injections of iodoform was a series of cases of tuberculosis of the knee-joint, in which the joint had been laid widely open. In one such case in which a positive diagnosis had seemed impossible, a movable body could be felt. On opening the joint this was found to be attached at one extremity to the synovial membrane surrounding the joint. There were other similar movable bodies of small size. These were removed and on microscopic examination they presented positive evidence of being tubercular. The writer insisted upon the value of early diagnosis thus gained by incision of the joint. Diagnosis by other means often proves unsatisfactory, since the material aspirated from tubercular joints often failed to give cultures of bacilli which could be discovered by microscopical examination, and the inoculation of animals also proved, in a certain number of cases, unsatisfactory as a means of diagnosis. While not prepared to take too radical a position, the writer had a growing inclination to the incision of questionable joints of this kind, since in a series of cases no evil results had been encountered, and the results obtained had seemed more rapid and more positive than those gained by other means.

In conjunction with the aid given in the diagnosis of tuberculosis by the use of the X-ray apparatus, the writer reported other cases of floating cartilage. In one of these a considerable amount of effusion was present in the joint, and a diagnosis was difficult. By the aid of the X-ray a floating cartilage was located and removed, and the fact established that it was not tubercular in character.

Another class of cases described were those of gonorrhœal

rheumatism. Although multiple joints may be involved, it was the writer's opinion that the joint which suffered most frequently, and probably most seriously, was the knee-joint. A careful study of the history of the cases, together with a thorough examination, usually gives at least a strong suspicion as to its nature. Such cases untreated often result in marked stiffening if not in ankylosis of the joint. This is sometimes associated with marked deformity. The writer had treated a number of cases of the kind by a thorough washing of the joint with carbolic acid. In some, in addition to this, an emulsion of iodoform had been used. The results obtained seemed much superior to those secured from less radical methods.

The last class of cases to be considered were those commonly classified as acute articular rheumatism, in which little if any benefit was found from the administration of salicylates. The close resemblance which these bore to others which are known to be due to a definite infection is such as to arouse a strong suspicion that they are also infectious. The results obtained in such cases are often long delayed and most unsatisfactory. Some cases of this kind had also been treated by washing and iodoform injection. Recently, in a series of cases, the joint had been opened by a long incision parallel to the patella, laying the joint open throughout its entire length. These cases had either been swabbed out with a 95 per cent. solution of carbolic acid, or carbolic acid had been poured directly into the joint. As soon as this had come in contact with every part of the joint, the joint was thoroughly washed with a 95 per cent. solution of alcohol, in order to limit the effect of the carbolic acid. On opening joints of this kind the synovial membrane had been found greatly thickened and reddened, and the intra-articular fringes in a similar condition, and also very greatly hypertrophied. Careful bacteriological and microscopic examinations had failed to disclose any organisms. The clinical appearances, however, were such as to lead one strongly to suspect their presence. In a small number of cases treated by this method, the results at the time of the report have been most encouraging, sufficiently so to warrant the further trial of the method.

After a consideration of the various sources of infection the writer's conclusion was that although it was perhaps too early to make a final statement with reference to the points under

consideration, enough experience had been gained to warrant the more radical treatment of infections of the knee-joint. The joint should no longer be considered a closed cavity which might be opened only with great danger to the patient. Under proper precautions it should be opened as quickly as any other closed cavity of the body, and its condition ascertained. By early interference much can be learned and many cases might receive prompt and efficient treatment with the hope of speedy and positive benefit, which otherwise would be left to conditions more chronic and much less hopeful.

Dr. DeForest Willard said that as regards prompt and radical treatment in infections of the knee there can be no question. If we can determine the diagnosis by means of the X-ray, by aspiration, and by bacteriological investigation, there is no reason for delaying operation. Early and thorough opening of the joint is most important. How open this shall be depends upon the character and virulence of the infection. In the most virulent cases the joint should be laid entirely open so that every portion may be cleansed and drained, thus avoiding amputation. Other less virulent cases need not be so thoroughly opened. A stiff knee is much better than an amputation through the thigh. Hence in infections radical measures are indicated. As to aspiration and injection of iodoform, Dr. Willard is not in accord with Dr. Allen, as the results after such procedure have not been satisfactory. Especially in the case of tuberculous joints has he been sadly disappointed by these injections. He now employs aspiration only as a diagnostic method or as a step preceding opening and drainage. In the case of gonococcal infections, the open treatment is the only one likely to yield good results, as such cases are liable to the rapid formation of adhesions unless the joint be opened and thoroughly cleansed. The majority terminate satisfactorily if the joint is opened; otherwise ankylosis is common even if early motion is made. This is particularly true of the knee-joint.

Tuberculin as a diagnostic agent has proven very unsatisfactory. As to the use of carbolic acid and alcohol in rheumatism, Dr. Willard is glad Dr. Allen has taken up the theory of infection in these cases. What is ordinarily called rheumatism is often an infection, a great number of cases being called rheumatism when they are not rheumatism at all. For instance gonorrhœal rheumatism ought never to be thus misnamed. Even cases of true rheumatism are instances of auto-infection, and the open treatment as detailed by Dr. Allen is along the right line.

Dr. William L. Rodman said that his experience accorded with that of Dr. Allen in regard to the injection of iodoform. From its use he obtains very good results. As with any other procedure, disappointment from its use will now and then be met, but he has depended upon it, particularly in lesions of the wrist-joint where erasion, excision, or other operative measures are not particularly desirable or satisfactory. In two cases of wrist-joint tuberculosis he secured absolute relief by injecting iodoform. It is a measure that should be repeated if necessary, failure being often due to the fact that it is not persisted in. Dr. Rodman strongly advocated an aggressive policy in the treatment of tuberculosis of joints. Surgeons in general have too long been afraid to do things in these cases. A tuberculous joint is difficult to infect and one may do almost as he pleases with such a lesion if he practices scrupulous antisepsis or asepsis. He has often opened such a joint and performed an atypical resection and thorough erasion without producing infection and without the operation resulting in ankylosis. In one case of knee-joint tuberculosis the entire inner condyle was removed and the joint drained for six weeks. Perfect use of the part resulted. The man is an enthusiastic sportsman and walks during his shooting expeditions, moving the joint as well as can any other person. In streptococcic infections, he believes that the plan detailed by Dr. Allen may be proper in the more virulent infections. It must be remembered that there are streptococcic infections and streptococcic infections, there being between them a marked difference in severity. Most radical treatment may be necessary in some cases, but in two instances of as virulent infection as appears possible Dr. Rodman had obtained good results from a middle course of treatment. One case was that of a plumber who ran a rusty nail into his knee-joint. He was treated by a physician for several days, during which a most violent infection developed. The patient insisted that the nail was not in the joint, though Dr. Rodman suspected its presence. When the joint was opened a pint of pus was evacuated and the headless rusty nail secured. Free drainage was instituted and, although a most extensive streptococcic infection spread from

the knee to the hip, inducing an intense erysipelatous condition with sloughing of large masses of tissue, a good result was finally obtained. The knee can now be bent past a right angle and the man can walk as well as he ever did. The second case was that of a boy who because of a suppurative osteomyelitis had one leg amputated above the knee. Suppuration of the opposite knee developed. The joint was irrigated daily for four weeks with sublimate solution, and the leg was saved with a movable joint. From these cases it will be seen that through-and-through drainage, with a tube, will accomplish much, and is to be preferred to more radical measures which make ankylosis a certainty. Dr. Rodman does not now operate on so-called rheumatic joints, though he may in the future.

Dr. Richard H. Harte said all surgeons recognized that in grave diseases, as typhoid fever, pneumonia, and like affections, there is apt to be infection of the joints. Where infection of the joints exists the best method of treatment is to open and drain. He has opened joints when they were involved by tuberculosis and by other infections, using iodoform emulsion; he believes in the efficacy of this agent. He also frequently leaves iodoform drains in for a long time. Dr. Harte endorses the very radical method advocated by Dr. Allen for the treatment of virulent streptococcic infections. This is the standard to which he believes surgeons are going to come, and adherence to it will result in saving limbs which formerly have been amputated. Regarding joint effusions, as in articular rheumatism, they at times follow trauma; synovitis then develops, followed by infection and finally rheumatoid arthritis. Dr. Harte was particularly interested in Dr. Allen's negative findings in cases of articular rheumatism. In conclusion, he stated his belief that the best working rule regarding joint infections is to operate on all doubtful cases. This may appear radical but it is better than to let the cases drag along for an indefinite period, until an extensive joint involvement has taken place. He sees *comparatively* little danger in thoroughly opening and draining the joint and removing the foci of infection.

Dr. Henry R. Wharton said his experience with iodoform injections had been similar to that of Dr. Willard; this agent was more freely used years ago than it is now. Regarding the wide-open treatment of streptococcic joint infections, he has

been content with free drainage consisting of multiple incisions and many drains. Functional results are satisfactory. In young children particularly he has seen recovery with good function. In cases of acute epiphysitis with pus, free drainage often leads to recovery with a useful joint; the older writers called attention to this result. Regarding gonorrhœal arthritis, he has treated a few cases by incision and many by aspiration. The latter procedure should be employed early and when repeated often leads to the restoration of good function of the joint. He has never used carbolic acid or iodoform injections for this affection.

Dr. James K. Young cited an instance of wide-open treatment of streptococcic infection of the knee-joint in a man of forty-five years. An incision had previously been made across the patellar tendon. He opened the joint freely, removed the patella and drained. The joint did not become ankylosed and the patient wears a brace. In his experience iodoform is of value in small joints, even the wrist and ankle; in the larger joints it does not give good results. He has abandoned its use in the hip and knee-joints, because in them it generally acts as a foreign body and has to be removed.

STATED MEETING, HELD APRIL 2, 1906.

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

TRAUMATIC INTUSSUSCEPTION.

DR. FRANCIS T. STEWART reported the case of a man, aged 30 years, who was struck just above the crest of the left ilium by a heavy steel beam. Shortly afterwards he was admitted to the Germantown Hospital in the most profound shock. At the end of 20 hours his temperature had risen to normal and the pulse had fallen to 110. He had vomited twice and passed 12 ounces of bloody urine. There was great pain all over the abdomen, a large hæmatoma in the left loin, and intense rigidity of the abdominal muscles. Liver dulness was decreased by three finger-breadths, and no dulness could be detected in the flanks. The abdomen was opened in the middle line below the umbilicus and a large extraperitoneal extravasation of blood found extending from the bladder, whose walls were infiltrated with blood, to the left kidney, which was normal to palpation. The abdominal muscles on the left side were torn from the left iliac crest. The peritoneal cavity was opened and found to be clean; there was no visceral rupture. In numerous places the small intestine was tightly contracted, the areas involved varying greatly in extent, so that in certain regions the intestine seemed to be ligatured, while in others it resembled a piece of tape. In one place the contracted intestine had passed into the relaxed segment below for a distance of two inches. The intussusception was reduced, the peritoneal cavity closed and the extraperitoneal tissues drained. The patient died four hours later of shock.

Dr. Stewart observed that every surgeon has probably been struck by the tetanic contraction of portions of the intestine in traumatic cases, and has conceived the possibility of a traumatic intussusception, but of this there is no record. Attention, however, has been called to the fact that this muscular contraction may prevent the escape of intestinal contents for some days, even when the bowel has been completely divided.

In some cases areas of dulness due to the contraction of large segments of bowel may be detected before operation. It may be that in some cases of transient intestinal obstruction after laparotomy for nontraumatic conditions the lesion is a spastic stenosis due to the necessary violence of the operation.

DR. ROBERT G. LE CONTE briefly described a case he had seen eight years ago which resembled in many points the one reported by Dr. Stewart. A boy of nine was stabbed in the left side of the abdomen, the wound penetrating to the peritoneum, as shown by omental protrusion. Under ether the abdomen was opened and a careful search of the intestine did not reveal any injury. Considerable hæmorrhage had taken place into the abdominal muscles, and also in the peritoneal cavity, from some large vessel which had been severed in the rectus muscle. While searching the intestine for a wound a direct intussusception about an inch long was found about the middle of the small gut, and two or three feet lower down two more were found, one direct, the other retrograde, each about three-fourths of an inch in length, while the sheath or intussuscipiens covering them was probably two inches in length. These intussusceptions resembled in appearance the kind so frequently observed at post-mortem examinations. There was no sign of inflammation, no congestion or change of color in the gut or mesentery, the peritoneal coat was normal in appearance, and reduction was accomplished with very light traction. Treves, in his work on intestinal obstruction, divides invaginations into two great forms, according to the circumstances of their origin: (1) The common or obstructive intussusception, and (2) the intussusception of the dying.

The latter form he attributes to certain irregular peristaltic movements which may be conceived to occur during the act of dying, either from changes in the circulation or from irregular stimulations of the vagi nerves. Such intussusceptions may form many hours after death, as is well illustrated in the case of Rurah (Archives of Pediatrics, April, 1896). While making an autopsy twenty hours after death on the body of an infant he saw an intussusception of the ileum form, and on handling the intestines other portions of the ileum began to invaginate themselves, so that in a few moments the entire small

gut had become a mass of intussusceptions varying from 5 cm. to 10 cm. in length.

In the case reported by Dr. Stewart, and in his own, the intussusceptions present resembled in all particulars the so-called moribund invagination, and not the obstructive intsussusception.

Three theories present themselves as a possible explanation: 1. The mechanical injury to the abdomen (the blow). 2. Hæmorrhage which may produce local changes in the circulation of the intestine or irregular stimulation of the nerves controlling peristalsis. 3. Opening the abdomen and handling the intestines while searching for the wound. This latter would seem the most probable cause.

GALL-STONES WITH ACUTE SUPPURATIVE PANCREATITIS.

Dr. Stewart related the case of a man, aged 51 years, who had suffered with attacks of indigestion for many years. February 25, 1906, he entered the Pennsylvania Hospital in the service of Dr. Le Conte. He had been ill for three weeks with severe epigastric pain, particularly after eating. There had been no vomiting or jaundice, but the temperature fluctuated irregularly, sometimes reaching as high as 103°. The epigastric muscles, especially on the right side, were rigid, and Dr. Thornton, who had had charge of the case, thought that at a previous examination he could feel an indefinite mass; he advised operation, believing the patient to be suffering from cholecystitis, with possible involvement of the pancreas. The urine was normal. At operation the gall-bladder was found tensely distended, the common duct unobstructed, and the pancreas hard lobulated and several times its normal size. There were no adhesions, and the stomach and duodenum showed no pathological change. The gall-bladder was opened and drained; it contained three large gall-stones and a mixture of bile and mucus which proved to be sterile. The cystic duct was filled with a quantity of a sand-and-putty-like material. Two days after operation the patient became slightly jaundiced, and between this time and the second operation he had three chills. The tube drained between one and two ounces of muco-bile during the course of each twenty-four hours. The bowels moved regularly and were always colored. On the eleventh

day the abdomen was opened through a separate incision to the outer side of the original incision, which had become infected. The pancreas seemed to be in the same condition as at the previous operation. Some sandy material had lodged in the distal end of the cystic duct and could only be removed by excising a portion of the duct. A probe passed into the hepatic duct and down in the common duct revealed no obstruction, and these ducts were empty and collapsed. The patient died three days later, the jaundice becoming more intense, but the fever not recurring. At the post-mortem no obstruction was found in the ducts, but the head of the pancreas contained an abscess cavity holding perhaps two ounces of pus, which proved to be caused by the colon bacillus. There was a septic phlebitis of the portal vein and miliary abscesses in the liver. The remaining abdominal organs and the heart and lungs were normal. Quénu and Duval have collected 118 cases of pancreatitis coexisting with cholelithiasis. Of 104 cases in which the seat of the stones was stated, in 56 the common duct was involved, while in 46 the calculi were in the gall-bladder or cystic duct. A study of the relation of the location of the stones to the variety of pancreatitis shows that the chronic form is most frequently associated with lithiasis of the common duct, the suppurative form with calculi in the gall-bladder, and the hæmorrhagic variety with stones in the ampulla of Vater. In 72 cases there was a history of infectious or retention jaundice. Of the 118 cases, 20 were hæmorrhagic, 7 suppurative, 63 chronic, one cyst of the pancreas, and 7 reported as pancreatitis without any other epithet. In the great majority of the acute cases the process was localized to the head of the gland. Abscess of the lesser peritoneal cavity and phlebitis of the splenic or portal vein were common. In 20 cases there was a disseminated fat necrosis.

Pancreatitis developing in the course of biliary lithiasis is generally regarded as a complication. The relation is easily explained when the common duct is involved. The infection spreads by contiguity to the head of the pancreas, by continuity along the pancreatic duct, or it invades the intrapancreatic lymph-glands. Obstruction at the duodenal papilla may cause pancreatic stasis and regurgitation of infected bile, while a stone lodged in the pancreatic segment of the duct may compress the canal of Wirsung and lead to pancreatic retention,

thus predisposing to infection. The passage of a stone by dilating the ducts favors an ascending infection from the duodenum, the contents of which are rendered more septic by the absence of bile. There is no satisfactory hypothesis for the occurrence of pancreatitis in cases in which the stones are lodged in the gall-bladder. Desjardins suggests that the initial infection in these cases is an ascending one which causes cholelithiasis and pancreatitis contemporaneously. Probably in some cases there is absolutely no relation between these two affections. The operative mortality in five hæmorrhagic cases was 100 per cent.; in 16 suppurative or necrotic cases, 50 per cent., and in 62 chronic cases almost 13 per cent. In acute cases the pancreas should, of course, be drained. In the case reported above, the induration felt at the time of *operation* was thought to be due to chronic inflammation, and this may have been true, the suppuration occurring subsequent to the cholecystostomy. The same course was taken in five of the 21 operations for acute pancreatitis reported by Quénu and Duval, with death in each instance.

SARCOMA OF THE OVARY.

Dr. Stewart related the case of a woman, aged 31 years, who was admitted into the Polyclinic Hospital, February 26, 1906. About two years ago the patient noticed a small, painful lump in the right iliac region. The tumor gradually increased in size until at present it almost fills the abdomen. There are irregular attacks of sharp pain which have been so severe during the past two weeks that the patient has been unable to work. The menses began at twelve, are always regular, and last from two to three days; they are more painful but no more profuse since the lump was noticed. There has been no loss of weight or symptoms referable to the digestive or urinary apparatus. The tumor is hard, smooth, symmetrical, and slightly movable with the respirations and on pressure. Pulsation and bruit are quite distinct over the whole growth. There is no œdema of the legs. There is a patch of tympany behind the tumor in the left flank, and dulness in the right flank, giving way to tympany when the patient turns on the left side. The growth was removed through a median abdominal incision about eight inches in length. There

were no adhesions and but little fluid in the abdominal cavity. The pedicle attached to the right horn of the uterus was about three inches in diameter. The left ovary, which was about four inches in diameter and cystic, was also removed. At each point where the aneurism needle had been passed through the pedicle of the tumor there was free bleeding. An attempt was made to control this by sutures, but each additional needle puncture also caused bleeding, so that a piece of gauze was pressed against the bleeding points and allowed to remain in place. The patient suffered little shock and reacted promptly without vomiting. At the end of thirty-six hours she quietly began to regurgitate stercoraceous material. Under ether the gauze was removed and a slight kink in the bowel straightened; this did not appear, however, to be sufficiently great to produce obstruction. The patient did not vomit for the succeeding twelve hours, at which time the stercoraceous regurgitation recurred. There was no pain, no fever, and no active peristalsis, although the bowels moved once by enema. The incision was reopened and the entire intestinal canal found moderately distended and motionless. There were no evidences of peritonitis or obstruction. An artificial anus was established by anastomosing a rubber tube to the bowels by means of a Murphy button, but there was absolutely no drainage from the tube until the time of death, which occurred twenty-four hours later. The lesion was probably an intestinal paralysis caused by the sudden relief of long-continued pressure.

The tumor weighs 2830 grammes. Microscopic diagnosis, round-celled sarcoma. Left ovary, angiosarcoma.

PERFORATING TYPHOIDAL APPENDICITIS.

Dr. John B. Roberts reported the case of a boy of nine years, who was admitted to Dr. James Hendrie Lloyd's ward of the Methodist Hospital on January 5, 1906, with symptoms of typhoid fever. The illness was said to have begun seven days previously, when he went to bed with severe headache, but he had had no nose-bleed or pain in the back. There was no cough, and no diarrhœa. When he was admitted to the hospital his tongue was coated; temperature 104°; respiration 26; pulse 108. The abdomen was flaccid, showed no rose-colored spots and was not tender on pressure. The blood obtained on

the day of admission gave a positive Widal reaction, and on January 7th rose-colored spots appeared on his abdomen. His urine showed a specic gravity of 1020, contained no albumen or sugar, and gave the diazo-reaction. The white blood-corpuscles numbered 5600. The hæmoglobin was 80 per cent. The heart and lungs and other viscera showed nothing special, except that the spleen was palpable.

On January 8th the general condition of the patient was good. There was no pain or tenderness in the abdomen. The morning temperature was 102°; pulse 96; respiration 24. In the evening the temperature rose to 104°, with pulse 120 and respiration 24.

In the early morning of the 9th, the patient, after being sponged, complained of pain in the abdomen, and a little later had a distinct chill. His temperature dropped to 100.6°, but subsequently rose to 103°, which was followed by free perspiration and a rapid drop during the evening, until at midnight the temperature was 98°, with pulse 110; respiration 24. During the time of this fall of temperature the patient had marked diarrhœa, with a large amount of mucus, but no blood. The pulse was not altered very much in frequency, but during the period of perspiration the patient seemed weak and the pulse varied somewhat in quality. The patient looked white, and vomited. A blood examination made at midnight by the resident physician, Dr. L. L. Powell, showed 44,480 leucocytes. At 3 A. M. of the 10th the patient's temperature was 97.8°, though the pulse was only 104 and the respiration 24. The patient's facial expression was bad, and there was pain in the abdomen, with marked tenderness, and with rigidity on the right side. Symptoms of perforation seemed sufficiently positive to warrant operation; and Dr. Roberts opened the abdomen about six o'clock in the morning, making an incision 6 cm. long, through the right rectus 2 cm. to the right of the umbilicus, beginning 3 cm. below the level of the umbilicus. The incision ran obliquely downwards and toward the middle line. On opening the peritoneal cavity a small amount of pus was found, but no fæces, among the intestinal coils. It was rather thick and did not have the colon-bacillus odor. The appendix was somewhat swollen and congested, and showed a small perforation near its junction with the cæcum. The lower three feet of the

ileum were inspected, but no perforation was found. The peritoneum of the intestine did not show any discoloration to indicate where the inflamed Peyer's patches were situated. There was no marked congestion of the intestine, and no enlarged mesenteric glands were seen. The cæcum and the first eight inches of the large bowel were examined, but showed nothing abnormal. There were no adhesions about the appendix or the examined intestines. The perforated appendix was excised, and the stump touched with carbolic acid and dropped into the abdomen. A large rubber drainage tube was inserted in the iliac fossa and iodoform gauze placed around it in the wound. Examination of the pus removed from the abdominal cavity showed a few diplococci.

The child's temperature remained at about the normal point for some thirty hours after operation, then began to ascend in a characteristic typhoid-fever curve. A blood examination made the evening of the day of operation gave the positive Widal reaction and showed a leucocytosis of 17,760. The drainage tube was pumped out by means of a syringe every few hours at gradually longer intervals and was finally removed on January 21st. A leucocyte count on January 16th showed that the number of leucocytes had decreased to 7,650. For two or three days after operation there was considerable abdominal distention, which was relieved by enemas of asafœtida. The patient convalesced without interruption, and on February 28th was discharged from the hospital.

Dr. Roberts said that it was well established that the appendix is very frequently the subject of pathological changes during the course of typhoid fever; and that these lesions are similar to those found in the lymphatic structures of the mucous membrane of the rest of the intestine. This may with propriety be termed typhoidal appendicitis. Then there are cases of typhoid fever in which appendicitis occurs from pyogenic infection, just as it may in healthy persons. Kelly and Hurdon discuss these conditions with great fullness. Deaver also devotes much attention to appendicitis coincident with, and caused by, typhoid infection.

In the matter of treatment these authorities are practically in accord. They believe that appendicitis developing in the course of typhoid fever does not call for operative treatment

unless the symptoms are urgent. The access of symptoms of perforation or other grave accident demands prompt surgical interference, in their opinion, but otherwise an expectant policy under surgical supervision is advocated. When surgical intervention is evidently needed, it is to be adopted promptly and carried out with celerity.

VOLVULUS OF THE SMALL INTESTINE IN TYPHOID FEVER, SIMULATING PERFORATION.

BY JOHN B. ROBERTS, M.D.,

OF PHILADELPHIA.

Surgeon to the Methodist and to the Jewish Hospitals.

A GIRL, aged 19 years, in the Polyclinic Hospital, under the care of Dr. David Riesman for typhoid fever, had been admitted on February 9th, and showed the usual symptoms of that disease.

At 9 P.M. on the 22d of the month she began to complain of abdominal pain of a severe character, which persisted throughout the night. On the next morning the patient was listless, with contracted pupils and parted lips; and had a temperature at 2 A.M. of 103.4°; at 8 A.M. of 102.4°. The pulse had not varied much from what it was before the pain occurred, but her respiration was increased. The breathing was mostly abdominal in type. There was slight fulness in the lower right quadrant of the abdomen and extreme tenderness in that region, with marked rigidity and some dulness and impaired resonance. The pain was most marked at McBurney's point. At intervals the resistance lessened. There was no tenderness in the right flank posteriorly. The pulse was of good volume but dicrotic. The liver dulness was preserved and extended to the costal margins. The heart sounds had good tone and were normal. The tongue was dry and could not be readily protruded. At 11 o'clock in the morning of the 23d, tenderness and rigidity were more marked than at 10 o'clock.

When I saw her on the 23d at 11.30 A.M. the whole abdomen was rigid, but the rigidity was much more marked in the right iliac region. There had been no sudden drop in temperature, though in the preceding thirty-six hours the temperature had come down about three degrees and there had been a slight increase in pulse and respiration. At the time of the examination, however, the condition of pulse, respiration and temperature was about that which had existed prior to this gradual fall in the temperature. The patient was crying out at intervals from pain, and gave evidence of great pain when the skin over the right iliac region was even lightly touched. This occurred

even if her attention were distracted from her abdomen, by asking her to put out her tongue. The general symptoms of perforation were not present, but the pain, tenderness and rigidity seemed to indicate some intra-abdominal lesion.

An incision, about three inches in length, was made over the ileocæcal region. No pus or serum was found in the abdomen. There was great difficulty in drawing up the cæcal portion of the ileum, which seemed to be imprisoned in the pelvis and was collapsed. The ileum, above the portion held in the pelvis, was moderately distended, freely movable, and easily delivered through the wound. The appendix was short and bound, throughout its whole length, to the cæcum by a web-like attachment, and pointed upwards. It was not swollen nor inflamed externally, and no concretion could be felt within it. The condition of the appendix seemed to me to be more like a congenital anomaly than a condition due to old inflammatory adhesions. There was no perforation in the appendix or cæcum. After a good deal of difficulty the lower portion of the ileum was pulled up from the pelvis and drawn out of the wound, when it became normally distended. There were no evidences of its having been held by adhesions. About two feet of the ileum, from the cæcum upward, were examined and no perforation found. There was no discoloration of the serosa to indicate the presence of internal ulceration. The gall-bladder was examined, but found normal to touch. It was moderately distended and contained no calculus. The incision was closed, and subsequently healed by first intention.

The patient's pain and the rigidity of the abdomen disappeared after the operation. She went through the remainder of the typhoid fever without abdominal symptoms other than such occasional pain as might be seen in ordinary cases. There was no later evidence that there had been an appendicitis to have been the cause of the pain and rigidity. The slight rigidity and pain, which were subsequently complained of, seemed to be very different from what was present at the time of the operation, and could readily be accounted for by the ordinary nervous condition of the patient. When convalescence seemed almost complete, the patient had a relapse, with comparatively high temperature and an enlarged spleen. From this condition, she gradually recovered.

Consideration of this case seems to show that there was either a volvulus causing constriction of the lower portion of the ileum, or a mild appendicitis, due probably to a typhoid inflammation of the mucous membrane. Because of the critical condition of the patient from typhoid fever, the absence of definite symptoms of appendicitis and the possibility of the condition of the appendix being congenital, the appendix was not removed.

I have come to the conclusion that the symptoms were due to a sudden twist of the ileum, which was finally disentangled, when I turned the coils over and over, in my endeavor to bring the cæcal end of the small intestine up from the pelvis, in which it was imprisoned.

Dr. Riesman writes me that " taken all in all, I agree with you that volvulus or perhaps a localized spasm of the intestine was the cause of the girl's symptoms, which brought her to the operating-table."

The situation of the appendix was very like that shown in Figure 252 of Kelly and Hurden on The Vermiform Appendix and Its Diseases. It is labeled by those authors, " Embryonic Displacement of the Appendix." In this instance, which I am considering, the appendix was much shorter, but it pointed upwards and was similarly adherent to the cæcum.

Had I not found the bowel held down in the pelvis so firmly, I should have been driven to the conclusion that the symptoms were due to an attack of mild appendicitis, which promptly subsided, as not infrequently happens in that disease unassociated with typhoid fever. The woman states that she never had a similar attack of pain or other evidences of appendicitis. I have watched her carefully since operation, and have found no reason to believe that an appendicitis has been present. The operation seemed to exert no influence on the course of the typhoid fever; except to relieve the abdominal pain and rigidity. Intestinal obstruction in typhoid fever from volvulus or other cause appears to be unusual. At all events its occurrence has not attracted the attention in literature that its importance demands. This may be due to the fact that many

cases have been considered to be fatal perforations of the bowel. If no operation or necropsy was performed, the true condition would remain unrevealed.

Dr. Allan Eustis,[1] in a paper read March 11, 1905, before the Orleans Parish Medical Society, records two cases of fatal volvulus of the small intestine, occurring in typhoid fever. He believes that cases occur which are mistaken for perforation of, or hæmorrhage into, the bowel. In his cases the diagnosis was only made by autopsy, and it is probable that in both instances prompt operation would have saved life. The symptoms, according to Dr. Eustis, closely simulated those of perforation, excepting that the leucocytosis was not so high. He says that a localized paresis of the bowels favors the occurrence of volvulus, as does also absence of mesentery in the lower end of the intestine. He thinks that volvulus might occur in cases recovering from typhoid fever, on account of the localized peritonitis so often seen in this disease; and quotes Mayo Robson as mentioning the occasional occurrence of volvulus during colic from cholelithiasis.

DR. EUSTIS'S CASES.

Case I.—A colored woman, aged 22 years, with typical symptoms of typhoid fever, for six and a-half weeks, was seized with violent abdominal pains, referred to the umbilical region, followed by violent and persistent vomiting. The morning temperature had been normal for 15 days, while the afternoon temperature reached 99° or 99.5°. The pain was accompanied by extreme collapse, subnormal temperature and imperceptible pulse. When seen by Dr. Eustis a few hours later her temperature was 97°, the skin cold and clammy, and the pulse imperceptible. She was vomiting almost incessantly and passing loose green stools with an offensive odor. The abdominal walls were rigid and palpation was extremely painful. There was very little tympanites. No mass could be felt through the abdominal walls, on account of their rigidity. The leucocytes numbered 15,000. She died within a few hours, notwithstanding the use of stimulants and external heat.

Post-mortem examination of the abdominal cavity disclosed a volvulus of the middle of the jejunum. The intestine here was intensely congested and almost gangrenous, and was matted down at the site of the volvulus. The mucous membrane from the ileocæcal valve to beyond

[1] New Orleans Medical and Surgical Journal, 1904–1905, vol. lvii, p. 816.

the region of the volvulus showed ulcerations of the Peyer's patches. In some places the ulceration had almost extended to the serous coat of the intestine.

Case II.—About ten days later a similar case was seen by him. It presented the following history: A colored girl, aged 15 years, was admitted to the Charity Hospital on July 22, 1903, in a delirious condition, which prevented the obtaining of a definite history. There was severe abdominal pain which persisted until death. The abdomen was moderately distended, tympanitic and extremely tender to pressure. The extreme prostration of the patient was overcome to some extent by stimulation until three days after admission, when she was seized with excruciating pain in the abdomen, accompanied by subnormal temperature. Vomiting occurred immediately and soon became stercoraceous. Diarrhœa with offensive stools succeeded the constipation which had been present for some days after admission. Cold, clammy skin, imperceptible pulse, and subnormal temperature occurred, and she died on July 27th without rallying from the initial symptoms of shock.

The intestines were found congested, and the solitary follicles and a few Peyer's patches were ulcerated. No perforation was found, but the intestines were matted together by recent adhesions. Four feet above the ileocæcal valve the adhesions formed a flexion about four inches in length producing an obstruction at this site, and there was distinct twisting of the involved intestine. Dr. Eustis believed it probable that both patients could have been saved by prompt surgical interference.

Duliscöuet reports a case of laparotomy for the treatment of intestinal perforation, occurring during convalescence from typhoid fever, in which four days later a second abdominal section was required because of twisting of an intestinal loop.[1]

I have not been able to obtain the original article in time for incorporation in this paper. The double operation was followed by recovery of the patient.

J. Vincent reports a case of intestinal invagination during convalescence from typhoid fever.[2] At the end of nearly seven weeks the man was suddenly seized with abdominal pain and vomiting. Up to that time the typhoid fever had shown nothing unusual, and was of moderate severity and devoid of special symptoms. The diarrhœa had disappeared, and the patient had been free from fever for about two weeks. The man showed depression and complained of a little dull and

[1] Anjou méd. Angers, 1899, vi., 193.
[2] Archives de médicine et de pharmacie militaires, 1895, xxv., 400.

diffused abdominal pain, with occasional colicky attacks. Below the navel and especially above the pubes marked pain on pressure was present.

Vincent was uncertain whether intestinal obstruction or perforation existed. Necropsy disclosed an invagination of the jejunum about 30 centimetres below the duodenum, which completely obliterated the lumen. The invagination was downwards and about 5 to 6 centimetres of bowel were engaged. At a point below, a second invagination was found, but here the obliteration of the calibre was not complete. The typhoid lesions were cured and showed no trace of cicatricial contraction or ulceration.

In Dunglison's College and Clinical Record [1] is mentioned a case of chronic obstruction of the bowel occurring in a man who had had typhoid fever seven years previously. He suffered at the time of the fever with peritonitis and seemed to recover perfectly, but a year later he was seized with an attack of obstinate constipation. Dr. James C. Wilson, who showed the man at his clinic in Jefferson Medical College, stated that such attacks had continued to happen at intervals of eight or ten weeks. Vomiting would occur, and finally the throwing up of great quantities of food mixed with fæces relieved the symptoms until a similar attack took place a few weeks later. The voided matter was a large, irregular mass, showing the appearance of having come through a small aperture and then being coiled upon itself to form a large accumulation. Surgical operation was advised.

G. Harrison Young [2] reports an extensive chronic contraction of the ileum due to typhoid ulceration occurring two and a half years before. It had caused no symptoms until sudden obstruction occurred after a jolt on horseback. The patient died eighteen days later with symptoms suggestive of a second attack of typhoid fever. Examination showed great contraction of the lower twenty-two inches of the ileum, with enormous dilatation above this region. The stricture was due

[2] Medical Press and Circular, December 1, 1886, p. 471.
[1] Philadelphia, 1898, xix., 219.

to two bands, in the submucous tissue, believed to be due to old typhoid ulcerations. There were old cicatrices of the mucous membrane; and four recent ulcers in the ileum, one of which had perforated. There was also a perforation in the cæcum. The reporter did not believe the fatal ulcerations to be typhoid in origin.

Drs. R. H. Harte and A. P. C. Ashhurt mention [1] a case of peritonitis in typhoid fever due to intussusception.

August Hölscher, of Wiesbaden, in a study of the complications in 2000 cases of fatal typhoid fever examined in the Pathological Institute in Munich, mentions that ileus, or twisting of the intestines, was found in three cases.

It is probable that an extended search would show other reported cases of intestinal obstruction, happening in connection with typhoid fever and being responsible for its fatal termination. Enough has been said, however, to convince the thoughtful that acute abdominal crises in this fever should be sufficient warrant for prompt exploratory incision. The innocuousness of such operations skillfully performed, even in the course of this debilitating disease, has been fully established.

Dr. Gwilym G. Davis took exception to Dr. Roberts's statement that perforation of the appendix is more fatal than is perforation of the intestine in typhoid fever; the mortality of the former is generally placed at 50 per cent.; that of the latter, 75 to 80 per cent. One would naturally expect this difference, because if there is a typhoid ulcer of the appendix the patient is very sick of typhoid *per se;* if the appendicitis is separate, then the patient so far as the typhoid is concerned may be in good condition. Then again the appendix is situated at one side of the abdomen and toward the posterior wall, and is at least partly covered by intestines. For these reasons extravasated material from this organ is less apt to extend widely. In typhoid fever the perforation is usually at least a few inches or a foot from the ileocæcal valve, if not in the middle of the abdomen. The fæcal material passes out among the coils of the intestine, adhesions do not form, and general peritonitis is the

[1] Annals of Surgery, January, 1904, p. 23.

result. Intestinal contents are more often poured out from typhoid perforation, as fæces are not commonly found in the cæcum.

Dr. John B. Deaver said he had had some experience with perforation of the appendix during typhoid fever and had successfully operated on cases of this type. Recently he saw a case in which perforation of the appendix and of the intestine both occurred. The condition of the patient was such that operation was not advised, and death soon followed. Autopsy showed a perforation of the appendix and also one of the ileum at a point six inches above the ileocæcal junction. It is generally proved bacteriologically in these cases that the appendicitis is typhoidal in origin. Dr. Deaver has seen but little of intestinal obstruction during typhoid fever. Recently he operated on a case of intsussusception, the diagnosis of which was made by an observant resident physician (Dr. Becker) at the German Hospital. The patient was a woman in the third week of typhoid fever, in whom there developed abdominal pain, shock and fall of temperature. She had not the pronounced rigidity which is so characteristic of perforation. Operation revealed an intussusception of the ileocolic variety, including the ileum for four inches above the ileocæcal valve. It was easily reduced, and in so doing there was exposed an ulcer the size of a quarter. There were also ulcers in the ileum. The patient is now convalescing. Dr. Deaver regards the second case of Dr. Roberts as one of volvulus which was reduced by manipulation.

Dr. John H. Gibbon said the cases reported by Dr. Roberts emphasize the fact that one should operate during typhoid fever if the symptoms warrant it, even though the condition does not suggest perforation. Medical men want the surgeon to assure them that perforation has occurred before they consent to operation. This assurance cannot in all cases be given. The point is that in all cases with pronounced symptoms operation is warranted; if perforation be not found, usually some condition demanding interference, as in the cases of Dr. Roberts, will be present. Dr. Gibbon has operated on two cases of appendicitis during typhoid fever. In one, three ulcers were present, blocking the appendix and causing all the symptoms of appendicitis with an abdominal crisis. The physician asked if he was sure of perforation, and was told no. Operation was then refused,

but permission was finally obtained after insisting that the symptoms warranted opening the abdomen. Dr. Roberts's cases show that one should open the abdomen if the symptoms warrant it, even with the lack of a definite diagnosis.

Dr. William J. Taylor has operated on two cases of appendicitis occurring during typhoid fever, but operated before the appendix perforated; both patients recovered. He believes that when abdominal symptoms in cases of typhoid fever lead one reasonably to suppose there is appendicitis, then he should operate. Both of his patients were benefited by the operation. He intends continuing the use of this method of treatment.

Dr. Gwilym G. Davis said that he did not mean to suggest that Dr. Roberts's case was one of typhoid perforation of the appendix. He has operated on one case of perforation of the appendix during typhoid in which there was also an additional intestinal perforation present.

Dr. Richard H. Harte regards Dr. Roberts's experience as emphasizing the old statement, "When in doubt, operate." There are so many complications during and after typhoid fever that we are led to regard numerous cases as doubtful; this is because no one can tell what is going on within the abdominal cavity. In many cases distinction is not possible, and the surgeon really can only guess what is the lesion; in all these cases operation should be performed. It is a wonder that there are not more cases of volvulus during typhoid fever than are reported, but it is not a common condition. By his colleagues present at this meeting at least one hundred cases of typhoid perforation have been operated upon, the greater number of which were diagnosed before operation, yet Dr. Harte ventures the assertion that among them was no case of volvulus. There are many curious conditions in typhoid fever. In some cases there is a great deal of abdominal rigidity, though in many of these there is no perforation. Cases in which there is sudden onset of abdominal pain, with tenderness and rigidity and a peculiar facial expression, are very important as indicating perforation. In all doubtful cases it is wise to open the abdomen, as this procedure does not materially affect convalescence. Of the 26 cases Dr. Harte had thus treated, two had no perforation, but both patients made satisfactory recoveries. As a sequel of typhoid fever, some cases present, a few months or a year after-

ward, marked peritoneal irritation, probably due to cicatricial contractions. Where the intestine has been studded with ulcers there must necessarily be a great deal of contraction. As a rule these patients die, but a few recover, and these later present curious symptoms of partial obstruction, which is frequently relieved by the intelligent use of purgatives.

Dr. George Erety Shoemaker said that definite localizing symptoms indicating the presence of an acute disabling lesion call for operation during typhoid fever just the same as at any other time. He has operated for appendicitis in one case during typhoid and the patient recovered.

Dr. Francis T. Stewart has operated on several clear cases of appendicitis during the course of typhoid fever, and upon three other cases illustrating the possible findings in cases of like character. One was regarded as typhoid perforation of the appendix, there being in that organ a punched-out ulcer from which fæces were oozing. Recovery. In the second a diagnosis of perforation was made, but operation showed suppurative peritonitis and no perforation. The patient recovered. The third case was diagnosed appendiceal abscess in the course of typhoid fever; operation revealed an enormous mass of mesenteric glands below the cæcum. The peritoneum was clean, and there was no pus in the gland. The patient died of typhoid toxemia at a later period.

Dr. Astley P. C. Ashhurst said that there appeared to be no question that appendicitis is a much less severe condition during typhoid fever than is intestinal perforation. Some patients recover from the appendiceal lesion without operation, and practically all with unoperated intestinal perforation die. Patients who develop appendiceal symptoms during the early stages of typhoid fever usually recover whether operation is performed or not; but during the height of the typhoid fever both statistics and experience show that it is best to postpone operative interference unless it is very certain that the appendix is perforated or that peritonitis has occurred without actual perforation. Dr. Ashhurst had in mind now the case of a child, recently seen, who was suddenly seized with abdominal pain and vomiting. No clear history was obtainable, but in addition to extreme tenderness over the appendix there was high fever and slow pulse. The fever was too high and the pulse too slow

to be typical of appendicitis, so the girl was sent to the Pennsylvania Hospital with a diagnosis of typhoid fever. The course of the disease was long and severe, the child being in the hospital ten or twelve weeks, but finally recovering. It seems probable that typhoid lesions in the appendix caused early irritation, and that recovery would have followed operation early in the attack, just as it did although no operation was performed. The case of intussusception during typhoid fever, included in the statistics published by Dr. Harte and the speaker, and referred to by Dr. Roberts, was one of the Episcopal Hospital cases operated upon by Dr. Hutchinson. The intussusception was gangrenous and irreducible, and a resection of the gut was therefore done, with circular enterorrhaphy; but the patient was too ill to stand the shock of the operation and died shortly afterwards.

Dr. Robert G. Le Conte said it must be remembered that the diagnosis of an acute abdominal crisis in the course of typhoid fever is often uncertain, particularly in the third and fourth weeks of the disease, when the patient is markedly adynamic with either stupor or delirium. Under such circumstances the three cardinal symptoms of peritonitis,—namely, pain, localized tenderness and rigidity,—are often absent, and few of the secondary symptoms may be present, such as changes in temperature and pulse rate, vomiting, distention, dulness in the flanks, etc. In these cases the surgeon cannot make a diagnosis of perforation at his first visit, for the symptoms present are so masked by the toxemia of the patient, or come on so insidiously, that an exact diagnosis is not possible.

Dr. Le Conte then briefly detailed two cases.

The first, seen about two weeks ago, was a woman of twenty-five in the fourth week of typhoid fever. She was delirious, picking at the bed-clothes, and profoundly toxic. The abdomen was distended and tender, but there was no rigidity, and no pain was complained of; no change in the temperature or pulse-rate, and the ear could not detect signs of peristalsis in the abdomen. An immediate operation revealed perhaps more than a quart of pus in the abdominal cavity, which was free from adhesions.

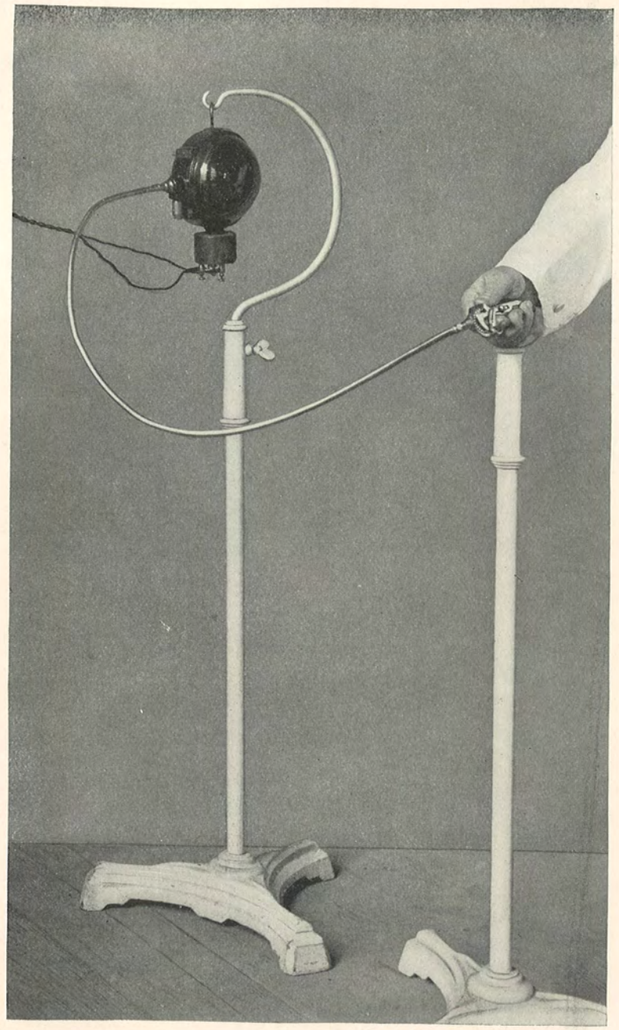
The second case, seen to-day, was a boy of seventeen, in the nineteenth day of his illness. He was profoundly stupor-

ous and toxic. The abdomen was distended and rigid, with some tenderness; no change in the temperature or pulse-rate. The attending physician had diagnosed perforation. In consultation with Dr. Harte it was agreed that an exploratory incision should be made, but that the diagnosis of perforation was doubtful. The abdomen was opened and no sign of peritonitis was present.

Both cases were markedly distended, and in neither was there any alteration in the temperature or pulse. The one with peritonitis had tenderness but no rigidity, while the other was rigid without any mark of tenderness. These cases illustrate the difficulties of an exact diagnosis at the first visit, and yet in both an immediate operation was deemed advisable.

Dr. Roberts, in closing, said he was indebted to Dr. Davis for calling attention to his erroneous verbal statement in regard to the comparative mortality of perforation in the appendix and the ileum in typhoid fever. The statement was not contained in his paper, but was made during the introductory remarks. He rather feels that appendicitis, if it be not true typhoidal appendicitis, should be operated on in typhoid patients with pretty much the same urgency as in appendicitis occurring in patients not suffering from typhoid fever. A carefully-performed operation in competent hands, with proper surroundings, will probably not influence unfavorably the course of the enteric fever. It may even be done under local anæsthesia, if general anæsthesia is considered unwise.

FIG. 1.



ON THE USE OF THE MASLAND SAW FOR OPENING THE CRANIAL VAULT.

BY H. C. MASLAND, M.D.,

OF PHILADELPHIA.

ABOUT one year ago when we first presented before The County Medical Society a new cranial saw, utilizing the power-driven circular saw principle, we felt that the ideas involved and the practical applicability were assured.

Since then we have studied carefully the details of construction so as to produce an instrument thoroughly reliable under all circumstances. The only change made in the saw itself has been to increase the diameter of the circular saw, thereby insuring ability to cut through the thickest skull that might be encountered.

The motor is a sixth horse-power, which has been demonstrated strong enough to drive the saw with perfect ease through the hardest bone.

The flexible cable has been made stronger. It is strong enough to stop the motor without injury to the physical condition of either motor or cable.

It will be seen that a motor ample for any demand of power required, and a cable strong enough to drive the saw with certainty and steadiness through the hardest bone, and yet stronger than the motor itself, secures a reliability of mechanism above every requirement.

The saw is so simple in construction that it can hardly get out of order. The chief necessity is to see that the bearing of the saw shaft is lubricated with a sterile oil. This is done by dropping, as needed, oil in the oil-hole provided at the side of the bearing.

It is appreciated that this instrument opens the skull with a smaller waste of bone-tissue than any other instrument yet devised. The width of section, but one millimeter, and the bevelled cut, permits the replacement of the bone flap on a

firm shelf with insignificant sinking of the flap; securing, in other words, a postoperative condition as substantial as before the skull was cut.

We have demonstrated that the skull can be entered with this instrument by either of two methods of operation, each of which has certain advantages which will recommend the one or the other to different operators. The plan of operation depends upon whether one prefers the inside or the outside guard.

In my former paper, I advocated the use of the outside guard. This method does not require the making of any

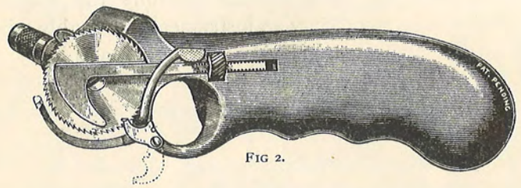


FIG 2.

FIG. 3.

preliminary openings. The osteoplastic flap is, preferably, four-sided, with the shortest side at the basal portion of the skull. This side is to be left uncut for the retention of the vitality of the flap. With a scalpel the flap is outlined in the soft tissue and the tissue cut to the bone surface.

Leaving the flap adherent to its underlying bone, the tissue on the outer side of the incision is dissected away to allow the easy access of the saw. The guard is then set for a depth that we are reasonably sure will not penetrate the thickness of the skull. The saw is always held with the cable side overhanging the flap. This permits a better observation of the section and makes more easy the bevelling of the incision through the bone. After the first cut, the incision is percussed

with a bone-sounder which I have devised for the purpose (Fig. 3). A trained ear can learn from this the relative thickness of the uncut bone. According to one's judgment the guard can then be set coarse or fine. It is possible to set the guard for a difference of one one-hundredth of an inch. Naturally the skill of the operator is called in play in making the final incision through the skull to protect the dura. Only the exercise of undue haste would result in injury to the brain-tissue. After completing the bone sections, soft-tempered steel chisels are inserted in the cut bone at opposite sides of the flap. Springing the flap up with these chisels the remaining short side is broken and the vitality of the flap thus preserved.

It will be seen that the chief problem involved in the use of this saw is to make the section without injury to the subjacent dura. The saw, rotating 1,500 or 2,000 revolutions per minute, cuts the bone with practically no pressure on the part of the operator. As to the mere cutting of the bone the question of time is eliminated. The greatest care, however, should be exercised in the final stages of the section. It is true that the tactile sense with this instrument is preserved, and surgeons have expressed the opinion that they could tell when they have entered the skull cavity without the use of the guard. I would advise, however, the taking the time with finely-graded adjustments of the guard to prevent injury to a dura intimately attached to the bone. In my judgment the chief necessity for this care is to obviate hæmorrhage by cutting a dural vessel. True it is preferable to cut the dura subsequently inside the line of the bone incision to facilitate suturing, but the only ill effect arising from simple cutting of the dura by the saw would be the more troublesome subsequent suturing. Hernia cerebri considering the perfect bony support, is impossible.

It is evident that this instrument, notwithstanding its ability to make a flap superior to all others, must still be able to cut the bone with as little or less injury to the sublying tissues than the best of the others, to entitle it to recognition as being distinctly superior.

The method just described will accomplish this better than any other instrument yet devised with the exception of the Cryer drill. I believe however that with the use of the inside guard on my saw, the dura can be protected from injury with absolute certainty. Using this method the outside guard is discarded. The skin section is made as before mentioned. At the two superior angles of the flap, preliminary openings are made about 3-16 of an inch in diameter, the guard, de-

FIG. 4.

tached, is then entered in the opening and the dura pressed away from the inner table of the skull. The saw is now used to cut two grooves in the bone chiefly to the outer side of the opening and almost through the bone (Fig. 4). These cuts are made in the lines of the intended bone sections. They permit the entry of the guard in a more oblique manner.

The shaft of the guard, now attached to the saw, occupies this groove and is supported by its sides. The idea of this groove is to give the saw more room so that it may cut the more easily the bone at the side of the opening. The guard is now kept by the pressure of the thumb on the handle arm in constant contact with the inner wall of the skull, and the incision is advanced. It will be noticed that the guard, to prevent its own destruction, does not come in immediate contact with the teeth of the saw. As a result of this, a thin section of the bone on the inner table of the skull may remain uncut. So soon as the handle-arm of the guard presses upward this condition is in all likelihood present. The advance of the saw is immediately checked, then by pressing the handle of the saw downward, practically rotating it downward with the guard-tip as the pivotal point, the guard sinks deeper and presses the dura away, the saw also sinks deeper and cuts through this remaining portion. The further progress of the incision is then pursued. Starting on a new line of incision the guard is adjusted in the opening and this side of the flap cut as before.

It is always to be borne in mind that when the handle-arm of the guard rises up against the thumb, the advance of the incision should be checked, and the reason for this movement of the guard ascertained. If we find that the bone has been cut through, then it may be an internal ridge of bone or an adherent dura giving the trouble. Should it be a ridge the only care is to have the guard advance over and past it without deflecting into the deeper tissues. This should give no special trouble. It may be that the dura resists the detachment by the guard. Should this occur it is better to detach the guard from the saw, and using it as a blunt dissector coax the dura away from the bone as far as the guard can be advanced. The saw is then attached and this portion of the bone divided. This process can be repeated as often as necessary. The essence of careful surgery would recommend this as the absolute method of preventing injury to the underlying tissues.

I am confident that the plan of operation I have outlined,

which takes longer to tell than to perform, removes with certainty the liability of injuring the dura or producing serious hæmorrhage. The bleeding that would ensue would be the usual bone bleeding that is expected.

The subsequent breaking of the undivided side of the bone-flap is performed as before, and is familiar to all.

In claiming for this instrument a superiority as to method and results over all other instruments used for the purpose, it may be well to mention some of the chief disadvantages of these instruments and show wherein this new one excels.

The hand trephine, descended to us from remote antiquity, requires but little notice. Its tendency with the best of care to injure the dura or even the brain-tissue is known to all. It destroys the vitality of the button of bone, and makes an opening restricted to the fixed diameter of the trephine in hand. It is tiresome, dirty and practically abandoned by the advanced cranial surgeons.

The Stellwagen trephine is a considerable improvement, but it is still possessed of many of the defects of the original trephine. It is very tiring to the hand and is easily capable of injuring the dura and causing serious hæmorrhage. It does not permit of a bevel edge and the sustaining shelf so desirable. There is a tendency to jam consequent upon and inseparable from its mechanical construction. This jamming is intensified as the cut becomes deeper. Subsequent enlargment of the original opening must be made with the bone forceps, with a resultant waste of bone.

The mallet and chisel are probably used by more of the best surgeons to-day than any other instruments. Yet after all such weapons are a shock to us, more to the laity and most to the unfortunate victim requiring its use. The charge has some merit that more perfect instruments should have been devised long ago. Yet we are aware that the mallet and chisel have many elements of superiority. They permit of sections of any desired shape and size, and they permit of reposition of the bone-flap upon supporting spicules of the surrounding bone, giving results possibly attained by no other instrument heretofore used. The objections to the chisel are the length of time required to make the bone-flap, the concussion that undoubtedly does add to the risks of the patient, and the great likelihood of the bone suddenly giving away and the skull contents being injured. The difficulties of the mallet and chisel increase many fold with an unusually thick or hard skull. While a surgeon with much practice may become high-master in the use of the mallet and chisel, yet all appreciate that its use generally is fraught with many perils.

The foregoing instruments have the advantage of cheapness and that they are dependent upon no mechanism restricting the wide range of their usefulness.

The Cryer instrument, devised by Dr. Cryer of this city, is a departure from the principles of its predecessors. It receives its cutting power from a mechanical source external to the operator. A side-cutting drill is used to make the section in the bone, and an inside guard is provided that protects the dura from all possible injury. The flap section is made large or small at the will of the operator. Celerity is attained, hæmorrhage is avoided, and a vital flap is secured. Some of its disadvantages are that it makes a wide incision of the bone, not permitting the shelf support so desirable. The drill is necessarily slender, to make a reasonably narrow incision. Inasmuch as the force is applied against the long diameter of the drill, the point of least resistance, the drill must not be pressed too hard against the bone or it will break.

The inside guard prevents the instrument being withdrawn till it is carried back to the original opening. This may present a very considerable disadvantage under certain circumstances. The operator's hand must constantly occupy a constrained position in keeping the guard up against the inner wall of the skull.

An instrument devised by Alfred Sykes, of Yorkshire, is a modification of the Cryer instrument having a handle at right angles to the drill-shaft. This instrument, of which I have seen the illustration only, possibly relieves this un-

comfortable position of the hand, though I would not judge it as useful as the Cryer instrument in other respects.

While the Cryer instrument can be sterilized, its structural parts cannot be dissociated by an amateur for thorough cleansing purposes.

The Doyen saw utilizes the circular saw but without an efficient guard to adequately control the depth of cut. Its construction does not permit that steadiness and fine control which is an essential in this class of instruments. I am informed by Prof. Keen that as he saw it used it was no more rapid than he found possible with his mallet and chisel.

The Doyen small saw is a Hey saw with the addition of an adjustable guard. It is subject still to practically all the disadvantages of the Hey Saw.

In the Sudeck instrument the circular saw is placed between the handles. The instrument is grasped as a woman would grasp the handles of a rolling-pin. It does not have an adjustable guard. While by no means devoid of merit, yet its construction prevents the utilization of many of the principles which are necessary to make a thoroughly practical saw. The defects of the foregoing instruments are apparently overcome by my new saw.

The osteoplastic flap can be made any size or shape.

The time required to make the cut is as short as can possibly be hoped for.

When using the outside guard, it is impossible to cut deeper than the depth set by the guard.

The likelihood of hæmorrhage, particularly with the use of the inside guard, is obviated.

The incision is but one millimeter in width, whatever the thickness of the skull.

Perfect bony support for the reposed flap is secured to a degree not heretofore obtained, giving perfect bone protection to the brain.

The instrument gives no vibration, a thoroughly comfortable grasp to the hand, and occasions no tension of the hand, permitting a full utilization of the sense of touch.

The inside guard, when used, can be detached immediately and the saw at once withdrawn from the cut.

The saw is so simply constructed that by observing a few simple rules no mishap in its working should occur. Further the construction is so simple that a nurse or an amateur can take it apart and cleanse it thoroughly, replacing the parts without trouble.

It will no doubt take time for the profession to accustom itself to this new instrument, but I firmly believe that a utilization of the principles here involved will open up a new field in successful and more perfect surgery of the brain.

Dr. M. H. Cryer said that about 1891 a circular saw was devised with various guards to regulate the depth of penetration, also with an underguard which would pass between the dura-mater and the inner plate of the bone, thus dissecting the membrane from the bone and preventing the saw from cutting it. This instrument with an upper guard was used by him in helping Dr. W. W. Keen to open the brain-case for the removal of the Gasserian ganglion on October 18, 1893. The following is a quotation from Dr. Keen's report of the case: "An omega-shaped incision was made the length of which vertically was three inches; one leg terminated in the front of the tragus, the other just in front of the junction of the anterior and middle third of the distance between the auditory meatus and the external angular process. The temporal artery was cut, and that and a few vessels required ligation. Dr. M. H. Cryer, with a surgical engine of S. S. White Co., and a circular saw one and a-half inches, with guard, then rapidly and very successfully divided the external table excepting at the two extremities."

On receiving the invitation to discuss Dr. Masland's paper, Dr. Cryer went to his instrument morgue and resurrected this instrument spoken of by Dr. Keen as doing the work "rapidly and successfully." Tied to the instrument is another upper guard so arranged that the blood would not be thrown upwards. There are also two lower guards with it, intended to dissect away the dura and at the same time prevent the saw from cutting it, all of which is quite similar in principle to those described by Dr. Masland.

Although the circular saw with its upper guard worked fairly well, Dr. Cryer was not satisfied with it, as he felt that for his use an instrument must be made that would cut any thickness of skull in straight or curved lines without withdrawing the osteotome, and with great rapidity and absolutely no damage to the dura-mater. A guard therefore must be made to work on the inner side of the skull, and must be capable of turning on a very short curve without catching or tearing the dura. As such an instrument had been thought of at the time of the Keen operation, it was but a short time afterward that the one known as the spiral osteotome, with its underguard, was devised and used by others as well as himself. This cutting instrument has been spoken of as a drill by Dr. Masland. This is quite a mistake, as a drill is known to mechanics as an instrument for drilling a hole, usually in hard substances such as stone, metal, etc. The instrument in question is not a drill, as it would be impossible to drill or even bore a hole with it. It is as absolutely a side cutting instrument as any saw could be; in fact, in one sense it is a circular saw with three teeth or spiral blades cutting in the line of its shaft instead of at right angles. The instruments were presented. There are three hand-pieces which are all interchangeable with the instruments. In one hand-piece there is a very small trephine for making the initial opening if so desired; in another a spiral osteotome with its guard which cuts a kerf about one-eighth of an inch in width. In the third a spiral osteotome which is somewhat finer and cuts a less track. A still finer one can be used. This instrument is the ideal one to the speaker for opening the brain-case. It may not be for others, as to a certain extent each one should judge for himself, as every man ought to use the instrument with which he knows he can do the best work. But apart from the advantage of having a person use the instrument to which he is most accustomed, the best appliance is undoubtedly that which is so constructed that it can be used successfully by the greatest number of men and do its work well under the greatest variety of circumstances. For this reason the younger surgeons should adopt the use of the most modern and efficient instruments that are presented to the profession.

The circular saw, driven by a light spiral cable for craniotomy, has inherent defects. The cable does not give a steady motion, it is liable to have what is known as "back-lash," and will chatter if the saw becomes the least bound or if a greater force is suddenly required. The saw cannot be used in making a curved incision when cutting the full depth of bone. It has to be lifted out for each change of direction, and will make an ugly cut at corner. It cannot be regulated by an upper guard to the varying thickness of the skull that is being cut. An underguard, if properly constructed, would allow any varying thickness to be cut, but an extra opening would have to be made by a trephine or the mallet and chisel to allow the entrance of the guard for nearly each direction cut. This would take considerable time. For these reasons he had long ago discarded the use of the ordinary circular saw with its upper and lower guards.

Dr. Thomas C. Stellwagen said he did not question the efficacy of the instruments of Drs. Masland and Cryer in their own hands, but personally he had tried them and found that special training was necessary for their use. This is especially needful to avoid injury to the brain and to the middle meningeal artery. None of these instruments can be thoroughly controlled, and to use them safely the surgeon must be trained by many operations on the cadaver and by using the instrument every day. The Masland saw is difficult of sterilization when oil is being slung from it, as is constantly done. As to beveling the edge of the bone, this is not necessary. In a number of cases the bevel is not of great advantage. Another point is that the external table and diploe should be sawed and the internal table broken with a chisel instead of being sawed through as is done with these instruments. It is impossible to saw through the inner table without injuring the dura unless the operator is perfectly trained. None of these special instruments, including the one devised by himself, is being used by surgeons, because they have not time to perfect the use of the device.

Dr. Gwilym G. Davis saw a year ago an instrument devised by Dr. Codivilla, of Bologna, which very closely resembled that of Dr. Stellwagen. As to the general question of surgical engines, they may be used to bore holes and they can be used with burrs, trephines and saws, as shown by the demonstrators. He became interested in the matter some years ago, and

found that for boring ordinary holes the engines are admirable. There is some difficulty in sterilization and in other points, but these give no special trouble. When it came to using burrs he found he could obtain better and quicker results with a mallet and gouge. With the trephine he used the engine in an intracranial neurectomy case. A guard was carefully applied, and he practised diligently on the dead body until he could cut just to the dura-mater without injuring that structure. On the patient, although he was more careful than with the cadaver, the trephine cut entirely through and brought up the dura with the bone. The patient died of meningitis. He then tried opening the skull with saws, but found it difficult to get saws that would work. Guards were made for the saws, but this method was finally abandoned because it was necessary first to make a trephine opening and also because the guards, in order to work, were so thin that they were liable to perforate the dura. It was desirable that the saws should cut a circle, and he had saws made for this purpose, but a guard could not be used with them and there was a tendency to jam. This latter fault is common to all these mechanical saws. His engine is now in the anatomical laboratory and he concludes they are all of little practical value except Dr. Cryer's method of first opening the skull and using his recently perfected fine cutting osteotome. In his work he prefers a gouge instead of an engine. The bevel of the gouge should be on the under side, however, instead of upper, as they are commonly made.

Dr. John B. Roberts said that he had long been interested in improvements in methods of opening the skull. Some twenty years ago he had suggested and experimented in making openings of various shapes in the skull by means of a flat burr driven by the dental engine. This was before surgeons knew that osteoplastic cranial flaps were practicable, and that pieces of bone could be replaced in the trephine opening with the probability of retaining life and closing the opening. He published a paper on this subject at that time in the Philadelphia *Medical Times*. Subsequently he had devised an aseptic trephine, which has been a good deal used, and also invented a segment trephine for removing a button when the thickness of the skull varied very much in different parts of the circle to be removed. At the present time he feels a little inclined to agree with Dr.

Davis in the opinion that many of the modern devices driven by electric motors are too complicated to be employed in occasional operations. They are, however, undoubtedly valuable in large hospitals, where they can be kept in order and where they will be frequently needed.

Dr. Cryer, in closing, stated his preference for the straight barrel trephine for making the initial opening, which, if held perpendiularly to the skull and with the hand resting upon the skull, can be accurately manipulated. It takes practice to use it properly; then one can use the instrument without injuring the dura. He showed another instrument which stops when it passes through the bone, and no amount of pressure will make it go deeper, as it is made to choke when it passes through the hard tissue. In all delicate surgical operations ne prefer's the "cord" engine, because it runs without vibration or "back-lash," the hand-piece carrying the cutting instrument can be carried in any direction without moving the engine, and if the cutting instrument is caught the cord will slip and practically no harm be done. One disadvantage with instruments of the type shown by Dr. Masland is that the hand-piece being fastened to a comparatively rigid shaft, the operator cannot cut the various sides of the flap without moving the entire engine, which would be very inconvenient, besides impracticable in actual surgical work.

Dr. Masland, in closing, said that the back-lash of the dental cable is prevented here by dispensing with the flexible wrist connection, and using a heavy cable. The attendant who has charge of the motor can at the same time gently support the cable, and so prevent any drag it might otherwise have on the saw. The cable is superior to the belt in that both cable and sheath can be sterilized, whereas with the belt we have an unsterilizable and rapidly moving belt and gear in immediate proximity to the seat of operation.

STATED MEETING, HELD MAY 7, 1906.

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

OSTEOTOMY FOR ADOLESCENT RACHITIS.

DR. JAMES K. YOUNG presented a lad, fifteen years of age, who was admitted to the Polyclinic Hospital June 10, 1905, with a well-marked genu varum of the left leg, which had developed during the preceding three months. The shortening was considerable, and he wore a high shoe until the time of the operation. He sought relief from the pain and disability caused by the deformity in the joint. The point of greatest deformity in the bone was just below the tuberosity of the tibia.

Osteotomy of the tibia and fibula was performed at the point of greatest deformity. He was dressed in a fracture-box with compresses, and the recovery was uneventful except for a consecutive hæmorrhage which occurred from the fibular wound. Dr. Young said that osteotomy at this point is exceedingly difficult, on account of the danger of wounding the anterior tibial artery, the peroneal nerve, and the posterior tibial artery, and also because the section has to be very freely made on account of being very near the joint, but the result of the osteotomy in this case is perfect.

ANASTOMOSIS OF THE EXTERNAL AND INTERNAL POPLITEAL NERVES FOR INFANTILE PARALYSIS.

DR. JAMES K. YOUNG reported the case of a girl seven years of age, who applied to the Polyclinic Hospital November 29, 1904, on account of infantile paralysis of the left leg.

When two years old a paralysis of the left leg developed, so that she could not walk for six weeks. Was taken to various hospitals and treated by electricity and massage, after which she was enabled to walk. Had had no treatment for several years. She was a well-nourished child, well developed for her years. Left leg showed shortening, and there was a limp present in left leg.

Measurements—

Right leg....Length, 23 in.	Calf....9½ in.	Thigh....12½ in.
Left leg.....Length, 22¼ in.	Calf....6½ in.	Thigh....11½ in.

The entire distribution of the motor-tract of the external popliteal was paralyzed except the extensor longus digitorum, which showed a very feeble power of extension, only to be detected by careful observation. Sensation was normal.

Operation of nerve anastomosis, suggested by Dr. Wm. G. Spiller, was performed December 8, 1904. The operation consisted in a total central peripheral transplantation of the external popliteal into the internal popliteal nerve.

The technique of this operation does not differ from that employed in nerve anastomoses of other parts. The object sought is to transplant the nerve in such a manner as to place the central nerve axis of the paralyzed nerve in the same direction as the central nerve axis of the sound nerve.

The region was exposed by an incision six inches long, beginning at the middle of the posterior aspect of the thigh and terminating at the inner side of the biceps tendon. The external popliteal was first exposed and then the internal popliteal. The external popliteal was divided and attached to an incision in the internal popliteal. It was held in place by three chromicized catgut sutures. The wound was closed with catgut sutures and dressed in a plaster-of-paris case.

Sensation in the toes over the distribution of the musculocutaneous nerves returned in twenty-four hours. For three months afterward there was no improvement in the motor power or in the growth of the limb. Growth was then resumed and has since continued uninterrupted and more rapid, and the circulation has improved. There has been no loss of power in the extensor longus digitorum, but a slight increase of function, and the limb is more useful than before the operation.

DR. WILLIAM G. SPILLER said that in this case in which only a little motion was preserved in the extensor longus digitorum before operation, the question arose as to whether the nerve in this muscle should be sacrificed. As only slight power persisted it seemed proper to sacrifice the nerve. It would not be destroyed by the operation, but its power would be distributed over the entire region of the popliteal.

DR. YOUNG, in closing, replied to a question as to whether

the operation of anastomosis was of value in cases in which distinct reactions of degeneration were present. Dr. Young was at one time extremely doubtful that benefit was derived from anastomosis in such cases. After hearing Hoffa's statements at Atlantic City a few years ago he is inclined to believe that restoration is possible even when the reactions of degeneration are present. The appearance of the muscles themselves is the best guide to prognosis in these cases. The color varies from a dark red to pink or to a yellow tinge. The last indicates that the muscle is fatty; in these the reactions of degeneration are most marked. The reactions are in all cases difficult to determine, as admitted by neurologists, and may in some instances not be obtained. One is not sure that degeneration is not present even when the reaction is lacking. As to the technic of anastomosis, some surgeons do not employ sutures in the sheaths of the nerves. Dr. Young prefers to pass the anastomosing nerve entirely through the opening in the other and then suture at three points. The nerve then falls back until the ends of the axis-cylinders are in direct apposition with the same structures in the sound nerve. The new nerve in this way grows directly into the central axis of the sound nerve. The placing of three sutures refers only to nerves large enough to accommodate so many; in small nerves two or even one will have to suffice.

THE RELATION OF THE TECHNIQUE OF NURSES AND OF HOSPITAL APPARATUS TO THE HEALING OF WOUNDS.

BY CHARLES P. NOBLE, M.D.,

OF PHILADELPHIA.

Surgeon-in-Chief to the Kensington Hospital for Women.

It is the general belief of surgeons that infection in wounds, almost without exception, occurs in the operating-room as a result of introducing pathogenic microörganisms into wounds upon the hands of the surgeon or his assistants, or by means of the instruments or suture material or dressings employed. This belief has become general since the older theory that germs usually come in contact with wounds by means of the air was disproved. This source of contagion is believed to be a possibility, but practically to play a very small rôle in infection. This belief was held by myself and served as the practical basis of my own work until from experience I became convinced that the theory was not sufficiently broad to cover all the facts in hospital practice.

Some time ago, having occasion to investigate a series of infections occurring in clean wounds, I was driven to the conclusion that the infections did not occur in the operating-room, and upon careful investigation was satisfied that they were due to errors in technique on the part of the nurses, either before or after the patients had been operated upon. This experience led me to study the question of the technique of nurses and of the apparatus supplied to nurses in hospitals with which to perform their duties. It also led me to consider the wisdom of the plan usually followed by surgeons, including myself, of giving verbal orders to the head nurse in charge, and depending upon her to maintain a proper technique on the part of the pupil nurses.

In this particular investigation I learned that the technique in use was quite different from what I believed it to be.

Verbal orders had been given for many years, modified by other verbal orders from time to time, so that it was not surprising that the result of such a method should be a lack of exactitude in detail in carrying out general principles.

As a result of this experience I determined to adopt a technique which should be printed, so that there could be no question upon the part of the head nurse as to what was required, and no possibility on the part of any pupil nurse of misunderstanding the instruction of the head nurse.

With the assistance of the hospital staff a technique was compiled which was submitted to various head nurses for suggestions, and was used for a year so that it might be corrected by practical experience before being printed and finally adopted.

The result of this experiment, which I believe is novel, has been most satisfactory to all concerned. The long-continued series of infections which led to the investigation was promptly cut short and for nearly a year primary union was obtained, without exception, in non-suppuration cases.

During this particular series of infections already referred to, the same operating-room technique was employed which had been in use for a long time, with the result of obtaining primary union without suppuration in 98 per cent. of cases. When the infections began to occur, it was naturally supposed that this was due to carelessness on the part of some one connected with the operating-room. The personnel was gone over, every one was stimulated to rigid care in every detail of asepsis, with no improvement in the results secured. The sterilizing apparatus connected with the operating-room was overhauled and put in perfect order, and the time devoted to the sterilization of instruments, dressings, etc., and the disinfection of the hands was doubled, without result. Also the preparation of the field of operation was made more rigidly. These facts led me to consider whether it was possible for the wounds to become infected elsewhere. A peculiarity of the series of infections was that as a rule they were mild. The mortality during the series, which extended over a number of months, was not increased. There were no cases of peritonitis

in a long series of abdominal sections, and the infections as a rule occurred late and were confined chiefly to the subcutaneous fat. Finally, not only celiotomy wounds, but those of Alexander operations, hernias and eventually plastic operations upon the uterovaginal canal likewise became infected.*

Upon investigating the technique in use in the wards of the hospital I found evidence that the hands of the nurses were not adequately disinfected, that the douche bags were not sterilized, sterilization being limited to the douche-nozzle; that the basins and trays employed were not systematically sterilized (dependence being placed upon the solutions they contained for their sterilization), and that the methods in use for sterilization were far from satisfactory; also that the bath-tubs, while clean in the domestic sense, were not disinfected. It seemed to me to be a rational conclusion that patients being admitted to the hospital and given two or three baths in a bath-tub presumably septic, before being operated upon, and being prepared for operation by the hands of nurses which were not sufficiently disinfected, enough pathogenic microörganisms became implanted upon the skin of the patients to explain the series of infections. In order that this theory should be tenable it was, of course, necessary that the bath-tubs and the apparatus used by the nurses should have been infected from some patient early in the series of infections. In order to test the matter, rigid regulations as to the sterilization of all the apparatus used by the nurses, the disinfection of the bath-tubs and of the nurses' hands, were at once instituted and the usual technique of sterilization formerly in use in the operating-room was reverted to; that is, the amount of sterilization in the operating-room was cut down one-half. The result was immediate. The infections disappeared and the series was at an end.

It seems to me that the demonstration was complete that

* During the time that the infections were occurring in the hospital, the same assistants, dressings and suture material were used repeatedly in operations elsewhere without infection occurring in wounds. It was this fact which finally induced me to look elsewhere than in the operating-room for the source of the difficulty.

this series of infections came about in the way suggested. It has long been known that it is impossible to sterilize a surgeon's hands infected with virulent microörganisms by any means at our command, without a period of two or three days having elapsed since the infection took place. As a concrete example of this fact, in the early days, probably every abdominal surgeon had the experience of performing a celiotomy within one or two days after having examined a woman suffering from puerperal septicæmia, or having operated upon an abscess containing streptococci and of having the unhappy experience of seeing his patient contract a virulent septic peritonitis, with a fatal termination. The conditions were entirely similar in principle. The skin of the patient was infected with pyogenic microörganisms from the bath-tub or the nurse's hands, and the subsequent efforts at disinfecting the field of operation within the next day or two days were insufficient to render the field entirely sterile. The number of germs introduced in any case was insufficient to cause a fatal peritonitis, but did bring about suppuration in the wounds.

It seems to me that this demonstration is of sufficient importance to bring it to the attention of surgeons who, in general, like myself, have been convinced that to prevent suppuration in wounds it is only necessary to maintain a rigid technique in the operating-room.

Being convinced of the facts in the case, I investigated the nature of the apparatus in use by the nurses and the facilities afforded them to sterilize the same efficiently, and also the facilities afforded them for disinfecting their hands, when it became evident that these facilities were by no means adequate to obtain the best results. I therefore determined to institute a radical change. The problem was to eliminate all apparatus which could not be sterilized by boiling, to provide proper sterilizers by means of which all apparatus could be sterilized, and to study the problem of how the hands of the nurses could be kept from contact with infected objects, and, in addition to this, to prescribe rigid regulations for the disinfection of the hands of the nurses. It required but little study to determine

that, as hospitals are usually conducted, the hands of the nurses are constantly coming in contact with infected objects; for example, bed-pans are constantly receiving infected dejecta from the bowels, douche-pans are constantly receiving infected discharges from the genitalia, pus-basins and vomit-trays likewise are constantly handled by nurses, and the provision for the systematic sterilization of these utensils is lamentably poor or entirely absent. It was at once clear that if the hands of the nurses are to be kept free from contact with septic objects all such apparatus must be systematically sterilized.

It was clear also that under the usual conditions obtaining in hospitals all the objects about the wards with which the hands of the nurses come in contact might prove sources of infection, and that all such objects must be systematically disinfected.

A sterilizing plant was installed in the bath-room upon each floor sufficiently large to contain a dozen bed-pans or douche-pans. By means of high-pressure steam these can readily be sterilized by boiling. A rule was adopted that all bed-pans and douche-pans should be sterilized once daily, and thereafter stored in a clean closet until used. After use they are washed out in the usual way and drained. This prevents the carrying over of infection from one day to another. It would, of course, be more ideal if they were sterilized each time after use, but this was deemed to be an unnecessary nicety in practice. The point was to prevent carrying over infection from time to time or from one case to another. In addition to this, the customary rule that the apparatus in use upon septic patients should be isolated, was, of course, continued. A sterilizer similar to that used in operating-rooms for the sterilization of instruments was installed in each diet-kitchen, so that all of the basins and trays, catheters and instruments used by nurses can be sterilized as efficiently as is done in the operating room.

A rule was adopted that all basins, pitchers and trays used by nurses shall be cleaned and boiled for ten minutes after use, and then stored in formaldehyde solution 1–4000; also

that this solution shall be changed daily. All bowls for solutions must be again boiled before using. A general rule was adopted that all apparatus used by nurses must be sterilized at least once daily.

A definite technique for the disinfection of the nurses' hands was adopted, as follows: The hands shall be scrubbed for three minutes with soap and water and a sterile nail-brush. The finger-nails shall then be cleaned with a sterile wooden nail-cleaner, and the hands shall be scrubbed again for three more minutes. The hands shall then be soaked in formaldehyde solution 1–500 or bichloride of mercury solution 1–1000, for two minutes.

As a further precaution against the possibility of infecting the skin of patients admitted to the hospital, in addition to preparing for the disinfection of the bath-tubs and the nurses' hands, a plan was adopted of having all patients prepared for operation during a certain period by a nurse assigned for that duty, called the preparing nurse, whose hands are thus kept from contact with septic material.

In applying the general principle of keeping the hands of the nurses free from septic material there were numerous details to be worked out, some of which have been met as follows: It is required that, after the usual daily cleaning by the ward maid, the door-knobs, window-sills, tables, chairs, bureaus, bedsteads, poles for douche-bags, and the tops of all furniture or objects in the wards or rooms, shall be wiped off with formaldehyde solution 1–500 by the nurse; also, that all shelving in the diet-kitchens and in the rooms in which the apparatus for nurses is kept, shall be washed daily; on alternate days with soap and water, and with formalydehyde solution 1–500.

Among other objects with which the hands of the nurses come in daily contact there are probably none which are more septic, if not absolutely dirty, as hospitals are usually conducted, than the rubber sheets which are used to protect mattresses. The usual method of caring for these is to wipe them off when the patient is discharged and then to put them on

another bed; and it is quite probable that even this wiping off process is often omitted. As these sheets necessarily receive discharges from the bowels, from the vagina, and from discharging wounds in many cases, from the necessities of the situation they must always be covered with pathogenic microorganisms and are, therefore, a fruitful source of infection of the hands of nurses.

Such rubber sheets are treated by washing them thoroughly after use, after which they are soaked in formalydehyde solution 1–500 for twelve hours, wiped dry and put away in a sterile cloth, rolled on a roller, until used again.

The vomit-trays and pus-basins were eliminated as sources of infection of the nurses' hands by classing them with the other basins and trays in use, and having them cleaned and sterilized and stored in formaldehyde solution each time after use.

Another source of infection of the nurses' hands are the cans which are used to receive the dressings and waste from the wards. Such cans are in constant use in all hospitals, and receiving, as they do, septic dressings, they are a prolific source of infection of the nurses' hands. This source of infection was eliminated by requiring that the lids of the cans should be permanently removed, so that it is unnecessary for the nurse to touch the cans. When the cans are taken to the engine-room in order that their contents may be burned, they are cleaned, and then boiled in apparatus installed for the purpose. This is done by the engineer force, and it requires but a few minutes when the apparatus is installed; and it eliminates one source of filth and infection with a minimum expenditure of time and effort.

In the operating-room some additional apparatus was installed to insure the absolute daily disinfection of every article in use in the operating-room. With the modern pressure-steam dressing-sterilizer and instrument-sterilizer there is no longer any difficulty in adequately sterilizing dressings, instruments, towels, gowns, etc., but for convenience a large instrument-sterilizer similar to the ones designed for the sterilization of bed-

pans, douche-pans, etc., was installed in the sterilizing-room, which will contain a sufficient number of basins, pitchers, etc., to furnish sterilized basins for a day's work.

A new apparatus was installed by means of which the hands of the surgeon and his assistants are washed in a spray of running water—the supply of water being controlled without using the hands. This apparatus eliminates the possibility of infecting the hands by washing them in septic basins.

In my judgment every hospital should install a plant which will sterilize its entire water-supply. Hospitals having a high-pressure steam plant can do this with very little expense by having the cold-water inlet-pipe pass through a cylinder sufficiently filled with copper tubes connected with the high-pressure steam plant to boil and sterilize the water on its way to the storage-tank. By regulating the size of this tank and the amount of heating surface in the copper coils to the daily amount of water used, it is a relatively simple mechanical problem to sterilize the entire supply of a hospital. An additional apparatus would be required to cool this water on its way to the storage-tank. Such an arrangement would not only assist in eliminating typhoid fever from hospitals, but would also be of material service in carrying out the principles of asepsis.

The plan so often followed in operating-rooms of using the same basins for several consecutive operations, merely washing them out between the operations, is reprehensible, and with the present facilities for sterilizing such apparatus there is no excuse for this bad custom.

The real difficulty in the sterilization of the apparatus in the operating-room was how to sterilize the irrigators, the slop-buckets, the Kelly rubber cushions, perineal pads, etc. This problem was satisfactorily solved with the assistance of a mechanical engineer. The largest slop-can, with the smaller put within it, is filled with water and by means of a metallic connection with a high-pressure steam-pipe, live steam is turned into the water and the entire apparatus is sterilized by boiling. The Kelly pads are sterilized by soaking them over-night in

formaldehyde solution 1–500; after thoroughly cleansing them. The problem of how to deal with irrigators was solved by using large rubber douche-bags, which are boiled each day before being used.

The points to which I would direct attention are:

1. Whether surgeons should be satisfied with the policy of giving verbal directions to head nurses about the disinfection of hospital apparatus and the technique of nurses as applied to the treatment of wounds; or, whether each hospital should adopt a routine technique which should prescribe the methods which are to be followed, thus avoiding any possibility of error on the part of the head nurse and pupil nurses.

2. The importance of preventing the infection of the hands of nurses by the elimination of all possible sources of contamination, through proper regulations as to the cleansing and disinfection of wards, rooms, furniture and apparatus employed by the nurses.

3. The adoption of a proper technique for the disinfection of nurses' hands.

4. The installation of proper sterilizers, which will enable nurses to sterilize the apparatus used by them as efficiently as is done in operating-rooms at the present time.

Dr. George Erety Shoemaker said there was possibly a needless elaboration in some of the points detailed by Dr. Noble, but at the same time there is no doubt that surgeons cannot be too careful in securing asepsis. Boiled rubber gloves for the nurse who is preparing the patient solve some of the problems. A source of infection in operative cases is the slipping of the dressing applied by the nurse after preparing the operation site. This is especially true in cases in which plastic precede abdominal operations. He believes the free use of formalin as recommended by Dr. Noble will be found to cause a dermatitis in some nurses. In the hospital where he does much of his work they put a formalin solution in the wash-basins of the operating-room one hour before using them, but the hands are washed in running water. The stationary wash-basin may be a prolific source of infection.

Dr. James K. Young remarked that nothing had been said

by Dr. Noble regarding the use of gloves. He always uses rubber gloves and thus eliminates one source of infection.

Dr. Gwilym G. Davis regards the boiling of basins as a perfectly satisfactory plan. At the Orthopedic Hospital they use a large, square, steam-heated box for this purpose. He prefers that the nurses in the operating room should wear gloves, just the same as do his assistants. As to the dirty basins for washing the hands, that feature can easily be avoided by the use of running water and the rose spray.

Dr. John B. Roberts said an important point in this question of asepsis seems to be that no one can do good surgery unless he is in absolute control of a hospital. The value of this feature is shown by the excellent suggestions of Dr. Noble. Such details as he enumerates cannot be carried out in a hospital where four or six surgeons change at intervals, as in one institution with which Dr. Roberts is connected. The preparation of the nurses is an important part of surgical technique. In this connection it may be said that practically all surgeons are guilty of hurrying the nurses and not giving them time properly to attend to aseptic technique when an operation is at hand. In addition to those already named, a source of infection is the exposure of wounds often seen during ward visits. This is particularly true of wounds about the groin or in other places difficult to bandage, the wound being uncovered by the slipping of the dressing improperly applied by the resident who dressed the case.

Dr. Noble, in closing, said he was not at first prepared to believe that infection of wounds came from infection of the skin before operation, but a series of infections had conclusively proved its possibility. As to Dr. Shoemaker's statements regarding the impracticability of formalin, all the nurses in his hospital have used it for some years. Two or three thought it caused dermatitis. They were permitted to substitute bichlorid for the formalin. There is no difficulty with its use except in cases of idiosyncrasy. Regarding sterilization of the waste-cans in the wards, if one sees how easy it is to do this he would no longer be willing to let them go without it. Dr. Noble has for years used rubber gloves. They are of great value in keeping the surgeon's skin from infection, and also for protecting the wound, thus working both ways. He wears them in all except trifling operations. The rose spray installed in the hospital as described by him is the

same type as mentioned by Dr. Davis. It can be manipulated by the feet or by the elbow of the surgeon. It works by an ordinary lever pressed in by the feet, the latter being aided by a catch which holds the lever open after it is pressed by the foot. To mix the water properly there is an ordinary valve shut-off on both hot and cold supply-pipes. In manipulating the flow of water in any way desired, the surgeon does not need to use his hands at any time.

DISLOCATION OF A VERTEBRA.

Dr. Edward Martin (and by invitation, Dr. William G. Spiller) reported the case of a boy, an athlete, who was wrestling. His opponent was holding him with his head on the ground and endeavoring to force down his shoulders. Suddenly the boy collapsed and became totally paralyzed. When he was examined there at once arose the question of operation. There was evidence of either a total transverse lesion or of a twist or stretch of the cord. It was decided to wait until this point was decided. The persistence of the paralysis for three days furnished proof of a total transverse lesion. Whether it was due to a dislocation of a vertebra or to a tear could not be determined. X-ray examination was unsatisfactory, but seemed to show a lesion of the sixth cervical vertebra. Laminectomy appeared to offer nothing, and hence it was not performed. In spite of all that is said to the contray, laminectomy is not a safe procedure. If, however, his neck was injured in this way, Dr. Martin would like the operation done. It gives a possible chance of replacing a bony fragment or of removing a clot, and at least would hasten death if it did not relieve. Dr. Martin's experience with laminectomy is that improvement after the operation is the same as occurs in cases treated without operation. The lesion in the case reported proved to be a luxation of the seventh cervical vertebra which had been spontaneously reduced, there being no fracture and yet a complete transverse lesion of the cord.

Dr. Spiller said that when he examined the young man, a few hours after the injury, there was complete paralysis of the lower extremities. Sensation was completely lost as high as the umbilicus, and there was a zone of disturbed sensation between the umbilicus and the nipple line, by the following day the area of anæsthesia had extended as high as the third rib. The reflexes were entirely absent in the lower extremities. There was volun-

tary movement of the shoulders, the elbows, and the wrists. There was no grasp in the right hand and but little in the left. The signs were those of complete transverse lesion of the cord, and the level of the lesion was easy to determine. The disturbances of sensation on the inner side of each upper limb and the loss of power in the muscles of the hands—*i.e.*, in the distribution of the first thoracic and eighth cervical roots, pointed to a lesion in the corresponding segments of the cord, and hence the case was perfectly clear. All who saw the patient agreed that operation was not advisable. The question of operating in these cases is now greatly in dispute. Dr. Spiller is conservative in this regard and doubts if laminectomy is of value in fracture of the vertebræ. Some surgeons say that the chief cause of the paralysis is pressure by displaced bone and that restoration of function will follow removal of the fragments. As a matter of fact there is not extramedullary hæmorrhage in most cases. Usually there is disturbance of the cord due to the injury that produced the fracture, and whatever damage may have been done by displaced bone has occurred at the moment the displacement occurred. When the cord is thus injured no removal of pressure, if this exists, can restore it. In most instances the cord is mashed, and often there is softening and even hæmorrhage within the cord when the cord externally appears normal. Autopsy in the case under discussion showed there was no hæmorrhage on any part of the cord, either external or internal to the dura. At the eighth cervical segment was marked compression of the cord, with swelling above and below. Microscopically marked degenerative changes are present in and above the compressed area, hæmorrhage within, and intense disintegration of the cord being shown. This same condition is found in many of the cases of similar injury to the cord. There is also some change in the sacral region in this case and Dr. Spiller is inclined to believe there was a temporary dislocation in the lumbar vertebræ, although this was not suspected before death or at the necropsy. The lower end of the cord is partly separated from the rest or reduplicated. This is possibly a congenital malformation.

Dr. William J. Taylor said that he had now under his care a man who eighteen months ago fell 42 feet, this rendering him unconscious for several hours. He was paralyzed for six weeks after the accident, when Dr. Taylor first saw him. By the X-rays

it was thought possible to detect a fracture-dislocation of the first lumbar vertebra. The patient was put on the table in preparation for laminectomy, but a careful examination before ether was given revealed slight motion in one leg. The operation was not done and a plaster jacket was applied. The patient has continued improving up to the present time. He was in the hospital from September to February. He now has perfect motion and has no difficulty in walking. The greatest trouble now is when he leans over with the knees fixed, as this gives him intense pain down both thighs. The pain is not noticed if the knees are bent at the time he stoops.

Dr. James K. Young said he had under his care for many years a girl who showed the happy results of laminectomy. She was an aeronaut who fell 100 feet and sustained a fracture in the lower dorsal region and was operated upon by laminectomy by the late Dr. Ashhurst. He took the chances of operating and removed a fragment of bone. The patient is now able to walk. There is of late years a tendency among surgeons not to operate upon cases of tuberculous paraplegia. Dr. Young does operate upon such cases. One patient referred to him by other surgeons now, as the result of operation, has the use of her limbs.

Dr. Charles H. Frazier said regarding the etiology of the injury in the case reported, Dr. McKenzie, the physical instructor, stated that at the time of the accident the boy was much fatigued from long-continued exercise and wrestling, and he believes the muscles failed to give proper support to the parts involved. Dr. McKenzie does not know of any other case of like injury.

Dr. Martin, in closing, said the possible lesion in the lumbar region would help explain one puzzling symptom. In the case of a lesion high in the cord there should be incontinence rather than retention of urine. Here there was retention, which was suggestive of a lesion in the lumbar region.

AN EXPERIMENTAL STUDY OF SUTURE OF ARTERIES WITH A DESCRIPTION OF A NEW SUTURE.

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THE methods of repair of arteries hitherto proposed are as follows:

I. MECHANICAL METHODS.—(*a*) Adhesive plaster methods, devised by Dr. G. E. Brewer. Advantage: The rapidity of application. Disadvantages: 1, A foreign substance is left in place; 2, secondary hæmorrhage occurs frequently; 3, obliteration of the vessel is common from too much pressure. (*b*) Abbe's method. The introduction of a glass tube in the lumen with suture of the artery. Advantage: Very slight chance of secondary hæmorrhage. Disadvantages: 1, The tube is a foreign body and by its presence causes irritation of the intima and produces thrombosis at the ends of the tube; 2, the tube may ulcerate its way out.

II. SUTURE METHODS.—(*a*) Invagination method devised by Dr. J. B. Murphy. Advantages: It gives a double thickness of the artery at the line of approximation. Disadvantages: 1, The artery is necessarily stretched; 2, the operative procedure difficult and long; 3, the lumen is narrowed; 4, the end of the artery allows fibrin ferment to enter the blood-stream; 5, fringes of intima hang in the blood current and assist in coagulation. (*b*) Suture of the outer two coats only. Advantages: None, over the through-and-through method. Disadvantages: 1, The blood can dissect its way between the coats of the artery and cause an aneurism; 2, fibrin ferment from the arterial walls has free access into the blood-stream; 3, fringes of intima hang in the blood-stream and assist in coagulation. (*c*) Through-and-through method. Advantage:

Easy to perform. Disadvantages: 1, The suture is exposed to the blood-stream; 2, fringes of intima hang in the lumen. In the method now to be described attention is called to advantages: 1, The suture does not protrude in the lumen of the artery; 2, fibrin ferment cannot get from the ends or cut surfaces of the artery into the blood-stream; 3, the liability to secondary hæmorrhage is lessened by the double line of suture. Disadvantages: We have not observed any.

Description of the Suture.—Pagenstecher's thread Number One is used in the finest sewing-needle the thread will pass through. The clamps used are very limber-bladed forceps, devised by us especially for this work in order to avoid crushing the intima. The blades are covered with rubber tubing. (Figure 1.) Dissecting forceps are used to hold the edges of the artery. The suture can be used for a longitudinal, oblique or transverse (complete or incomplete) cut in the artery.

Method of Suturing a Longitudinal Cut.—(Fig. 2.) The clamps are applied 2.5 cm. above and below the cut. The suture is started 1.5 mm. above the cut edge, the suture is passed through the outer two coats and tied, the end of the suture is grasped by a hæmostat, the needle is next passed through all the coats of the artery on both sides 1.5 mm. below the first suture and 1.5 mm. from the cut edge; the suture from now on is a continuous mattress with the dropping back one-half a suture length every third suture until the end of the incision is reached, then the suture is passed through the outer two coats 1.5 mm. below the lower end of the cut and a half-hitch made to tie the suture. The same suture is continued as a whip-stitch over the edges of the artery outside of the mattress suture until the starting-point is reached, when the two ends of the suture are tied. The artery is grasped in a gauze pad, the distal clamp removed, then the proximal clamp and the artery is dropped back in place and the deep fascia sutured around the line of approximation.

The method of suturing an oblique cut is practically the same as the longitudinal.

The Method of Suturing a Transverse Incision Half Way Through the Artery.—(Fig. 3.) The clamps are applied 2.5 cm. above and below the cut edges. The suture is started 1.5 mm. from the lateral end of the cut and passed through the outer two coats and tied; the end of the suture is grasped with a hæmostat. The suture is continued as a continuous-mattress suture, dropping back one-half a suture every third stitch until the opposite end of the cut is reached, then the suture is passed through the outer two coats and a half-stitch made to tie the suture; the same suture is continued back over the line of suture as an over-hand whip-stitch outside the mattress suture until the starting-point is reached, when the two ends are tied. The mattress suture should be 1.5 mm. from the cut edges at all times. The deep fascia should be sutured around the line of approximation.

The Method of Suturing a Complete Transverse Division of an Artery.—(Figs. 4, 5.) The clamps are applied as before. The cut edges of the artery are grasped with dissecting-forceps and the suture is passed through the upper edge of the artery from without in and through the lower end from within out; the needle is then reversed and brought back 1.5 mm. to one side of the former suture and tied. (This suture is really a single-mattress suture.) The suture is continued as a continuous-mattress suture, dropping back half a stitch every third suture until the starting-point is reached, then a half-stitch is made and the suture continued back as a whip-stitch until the starting-point is reached again; then the two ends are tied. The suture is started on the anterior surface near the handles of the clamps. When the suture reaches the farther side of the artery the handles of the clamps are taken from the lower portion of the wound and placed in the upper portion; in this way the surface of the artery which was anterior is now posterior, and the suture can always be kept in sight.

EXPERIMENTS.

Case I.—Black horse, aged 20. Condition was very poor. The anæsthetic was chloral internally and chloroform by inhalation. An incision 20 cm. long was made on the left side of the neck, the carotid artery was

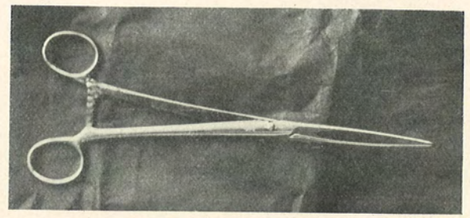


Fig. 1.—Special artery-clamp.

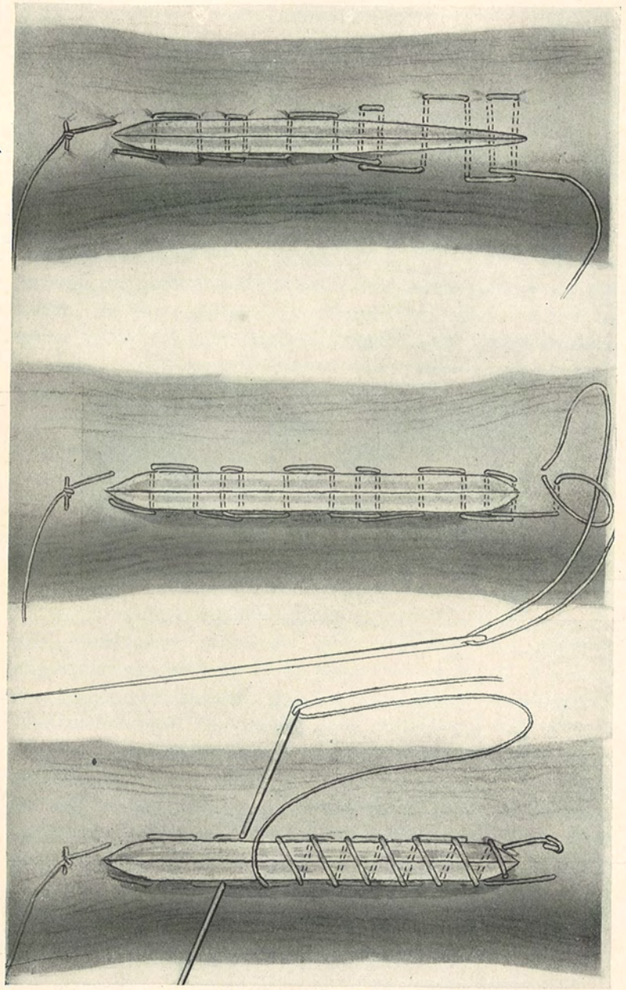


FIG. 2.—A, suture inserted and pulled tight in the lower half; B, suture inserted and pulled tight throughout; half-hitch made but not tightened; C, mattress suture pulled tight and half-hitch made, whip stitch partially inserted but not pulled tight.

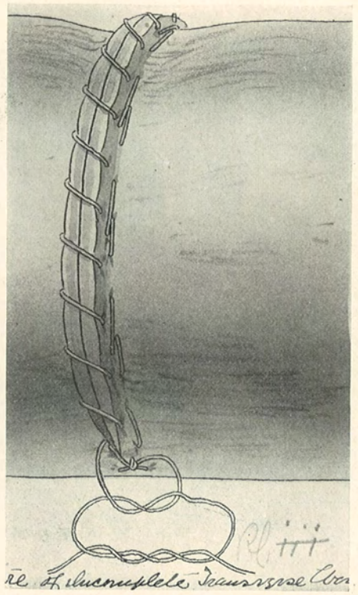


FIG. 3—Suture of incomplete transverse wound.

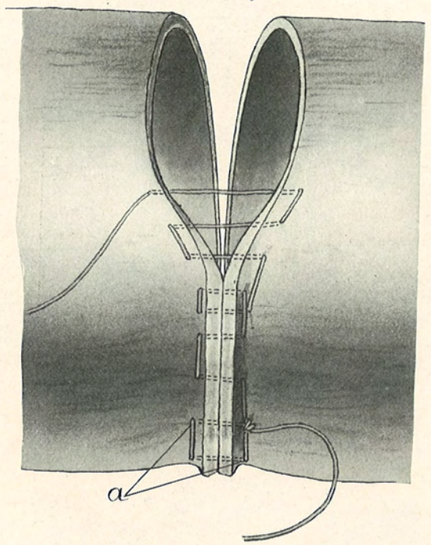


FIG. 4.—Suture of complete transverse wound ; A, mattress suture.

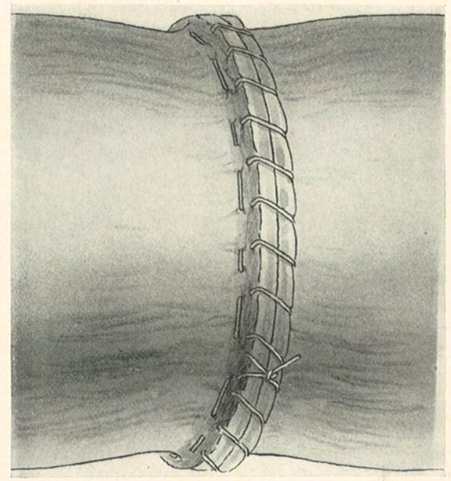


FIG. 5.—Suture of complete transverse wound, finished.

found and the clamps were applied. A small vessel arising from the under surface of the artery was clamped and ligated. A longitudinal incision 4.5 cm. long was made in the artery. The artery was sutured, the clamps were removed and no hæmorrhage occurred. After the deep fascia was sutured around the line of approximation, the artery could be seen pulsating. The wound was sutured with through-and-through sutures of silkworm-gut. The horse died from the effects of the anæsthetic three hours after the operation. Through a mistake of the attendant, the specimen was not recovered.

Case II.—Black horse, aged 20. Condition was very poor; there were several sloughing wounds and sinuses over the body. The anæsthetic was chloral and chloroform. An incision 22.5 cm. long was made on the right side of the neck; the carotid artery was found and the clamps were applied. The artery was divided transversely two-thirds the way through. The artery was sutured, the clamps were removed and no hæmorrhage occurred. After the deep fascia was sutured around the line of approximation, the artery could be seen pulsating. The superficial wound was closed with through-and-through sutures. The pulse was equal on both sides. Twenty-four hours after the operation the pulse was good and equal to that on the opposite side; the horse was unable to get up. Forty-six hours after the operation the pulse was equal on both sides; the horse was unable to get up and was killed by pithing. When the incision was opened up the wound was found to be infected; the artery was removed and examined; a very small lateral thrombus was present, but the lumen was not decreased. (Fig. 6.)

Pathological Report.—Gross specimen, preserved in a solution of formaldehyde, shows a portion of an artery dissected free from the periarterial tissues, the wall of practically normal thickness and without apparent gross trace of any marked hyperæmia. The vessel laid open shows the intima practically normal, save at site of the wound; the wound a partial transverse (slightly oblique) incision of the circumference, marked by a small clot extending in valvular fashion into the interior, and attached at the line of incision. This clot probably interfered but little, if any, with the flow of blood, and is apparently organized. The texture of the tissue of the wall shows no important gross changes.

Microscopic.—Section longitudinal, transverse to the line of operative wound. As seen in the section there extends from the line of closure of the incision a flap-like (valvular) thrombus into the lumen of the vessel, granular and fibrinous in structure, containing numerous scattered polynuclear leucocytes and a few eosinophilic cells. The wall of the artery is slightly thickened, its outer coat thickly infiltrated with polynuclear leucocytes, a smaller degree of the same type also existing in the other coats (prominent in part of the intima). The tissues in the line of enclosure (compressed by the sutures) are dense, more or less hyaline and staining without definition, and irregularly electing the hæmatoxylin and eosin tints. These tissues do not show any leucocytic infiltration. Especially in the outer coat the lymph-spaces are distended and contain a fibrinous coagulate, in which are seen scattered leucocytes. The

endothelium of these spaces is swollen and occasionally desquamated. Throughout the wall but little cellular proliferation is evident.

CASE III.—Dog; Irish setter. Condition was good. The anæsthetic was morphine hypodermatically and ether by inhalation. The abdomen was opened and the abdominal aorta exposed 5 cm. above the common iliac artery; the clamps were applied and a longitudinal incision 2.5 cm. long was made in the artery. Bleeding occurred from the lumbar branches of the aorta, which were clamped and ligated. The artery was sutured with difficulty on account of the depth of the wound and the bleeding of the small veins. After the clamps were removed, the artery could be seen pulsating. Twenty-four hours after the operation the dog was in a weak condition, but the pulse was equal in both femoral arteries. Forty-eight hours after the operation the pulse could be felt in the femoral arteries, but was very rapid and weak; suppurative peritonitis was apparently present. Ninety-six hours after the operation the pulse could be felt in the femoral arteries; peritonitis was present, and as the dog was suffering acutely he was killed by chloroform. Post-mortem findings: Suppurative peritonitis was present; the artery was removed and opened up; a slight lateral thrombus caused by an infected suture was found. (Fig. 7.)

Pathological Report.—Gross specimen, a short length of abdominal aorta with its bifurcation, preserved in a solution of formaldehyde, shows the vascular wall with surrounding tissue closely adherent, and with discoloration from hyperæmia persisting. Laid open, the general intima shows no gross change. Over the line of longitudinal incision is a slight ridge of thrombosis apparently but little changed. The walls of the vessel, especially a little away from the line of closure (which is the thinnest part of the circumference), are thickened, hyperæmic and apparently the seat of inflammatory infiltration, but without gross appearance indicating suppuration.

Microscopic.—Section made transversely, at right angles with the line of operative wound. Over the incision in the lumen of the vessel lies a fibrinous thrombus, showing no organization as yet, with a rich polynuclear leucocytic infiltration along its base, and containing numerous hæmatoxylin-stained fragments (fragments of leucocytic nuclei). The line of incision shows a distinct mass of polynuclear leucocytes extending from the base of the clot to the exterior of the vessel. Tissue along the line of closure of the wound shows embedded suture, and it is densely hyaline in character, electing the eosin stain, being evidently necrotic. The general wall of the artery is deeply congested, at places infiltrated with blood; shows marked proliferation of the connective tissue, and contains numerous polynuclear leucocytes, the latter densely infiltrating portions of the adventitia.

CASE IV.—Medium-sized dog. The anæsthetic was morphine and ether. The carotid artery was found on the right side of the neck, and the clamps were applied. A longitudinal incision 1.7 cm. long was made in the artery. The artery was sutured in the usual manner, the clamps were removed and no hæmorrhage occurred. The superficial fascia was sutured around the line of approximation, and the wound closed with

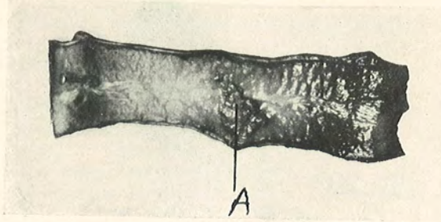
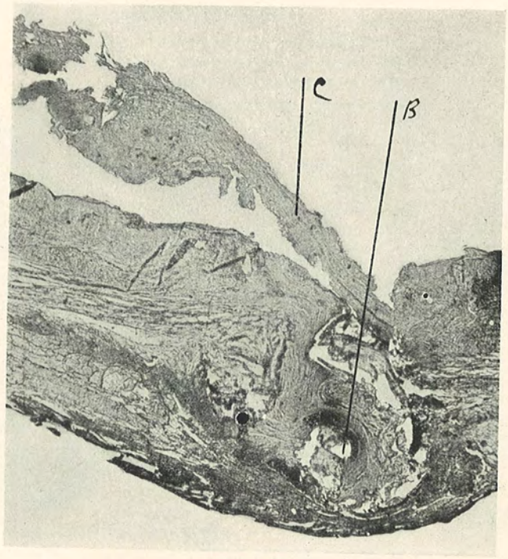


FIG. 6. CASE 2.—A, line of incision.



CASE 2.—B, remains of suture; C, small valvular thrombus.

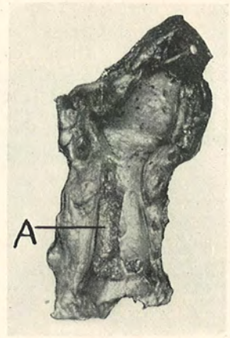
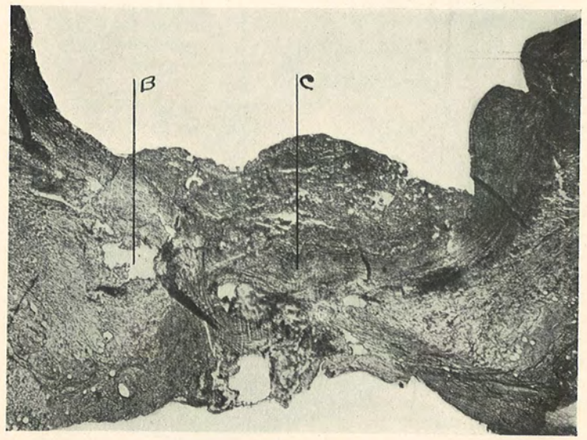


FIG. 7. CASE 3.—A, line of incision.



CASE 3.—B, remains of suture; C, line of healing.

through-and-through sutures. Twenty-four hours after the operation the dog was up and about, the pulsation was normal, but the wound was infected. Four days after the operation the pulsation in the carotid artery was normal; the wound suppurating. The dog was killed on the fourth day; the artery was removed and opened up and a lateral thrombus was found.

Pathological Report.—The section of this specimen unfortunately takes in only one margin of the injury, which is apparently not closely approximated. The whole vessel wall is diffusely involved in acute inflammatory changes, with fusion of the similarly-involved surrounding tissue to the adventitia, so that no sharp demarcation of the outer coat of the vessel exists. Inside the vessel a comparatively fresh thrombus exists, adhering along the line of the wound. These tissues close to the line of injury are necrosed, taking diffusely and with poor definition the eosin stain; they are more or less diffusely infiltrated with blood, and the seat of numerous hæmic granules. Throughout the thickness of the vessel along this line the tissues are the seat of considerable leucocytic infiltration, of infection of the vasa vasorum, and of numerous round and spindle-shaped embryonic connective-tissue cells. Examples of phagocytic leucocytes are not infrequent.

CASE V.—Black horse, aged 20. Condition was very poor. An incision 22 cm. long was made on the right side of the neck; the carotid artery was found and the clamps were applied. The artery was cut completely across and end-to-end anastomosis was performed. Some difficulty was encountered in holding the edges together on account of having only one assistant and the horse shaking with a fine tremor. The clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation. Twenty-four hours after the operation the horse was up and about, the pulse was good, full and equal on both sides. Three days after the operation the pulse was equal and the wound suppurating. Five days after the operation the pulse was good, full and equal on both sides; the wound was suppurating profusely. The horse was killed and the wound opened up; the artery was removed and incised; the lumen was not decreased, and no thrombus was present. (Fig. 8.)

Pathological Report.—Gross specimen, preserved in a solution of formaldehyde, consists of a short segment of the artery freed from the surrounding tissues, with walls of apparently normal thickness and texture. Laid open, near the site of operation the intima is slightly nodular, apparently from slight focal swellings rather than from foci or thrombosis. The line of incision, a circular one, shows as a slight (circumferential) ridge a little less glistening than the adjacent intima, and presumably the seat of a small thrombus, which must, however, be partially organized. No distinct foci of softening from suppuration seen in gross inspection of the wall in section.

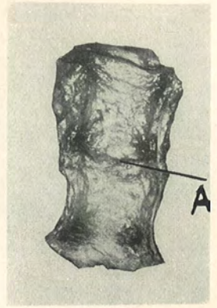
Microscopic.—Longitudinal section of artery (transverse to line of operative wound) shows a thin layer of granular clot over the site of wound; this clot is the seat of moderate leucocytic infiltration, especially

toward the base (in clot numerous nuclear fragments probably from leucocytic disintegration). In one part of the clot evidence of beginning vascularization. On the outside of the vessel are several tiny foci of suppuration shown in the section, and in the inner muscular layer and intima is a similar infiltration somewhat more diffused. Little reparative activity evident, and the general wall remains thin, showing microscopically but little embryonic cell formation present in the layers. The tissue does not show a clear line of incision; an irregular fragmented part of the wall evidently represents the wound; and in this part there is a special tendency on the part of the tissues of the muscular coat to select the hæmatoxylin.

CASE VI.—Mouse-colored horse, aged 17. Condition was very poor. An incision 20. cm. long was made on the right side of the neck, the carotid artery was found and the clamps were applied. The artery was divided completely across and end-to-end anastomosis performed. The clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation. The pulse was equal in both submaxillary arteries. Twenty-four hours after the operation the horse was up and about, the pulse was good, full and equal on both sides. Three days after the operation the pulse was equal on both sides and the wound suppurating. Five days after the operation the pulse was equal on both sides. Seven days after the operation the pulse was good, full and equal on both sides, and the wound was still suppurating profusely. The horse was then killed and the wound opened up; the artery was removed and incised; the lumen was not decreased and no thrombosis present. (Fig. 9.)

Pathological Report.—The gross specimen, preserved in a solution of formaldehyde, shows an artery with the surrounding tissues at the site of operation intimately adherent to the external part of the wall, and with traces of discoloration and hyperæmia. Laid open, the intima shows a circular, slightly depressed line of operative union, without clear evidence of thrombosis, but somewhat roughened as if from a small deposit of this type. The gross section of the wall presents just beneath the line of closure, which is apparently firm, a small focus of pale opaque appearance, its substance somewhat softer than the general tissue, and suggesting a point of suppuration about a suture. The tissue of the deeper part of the wall and the adjoining tissue have a succulent appearance suggesting inflammatory infiltration rather than dense fibrosis from complete healing.

Microscopic.—Section made longitudinally, transversely to line of operation. There exists a small definite fibrous clot upon the intima just over the line of incision. The incision has been obliterated by partial healing, but the whole wall of the vessel is much thickened by an intense exudative inflammation. The outer wall is the seat of wide distension of its spaces which are filled by a fibrinous reticulum thickly beset with polynuclear and eosinophilic leucocytes, and at several points suppuration evidently is focalizing. The muscle-layers in both coats are separated and sharply outlined by a cellular infiltration particularly rich in eosinophilic cells, and the intima is much thickened, particularly by an embryonal



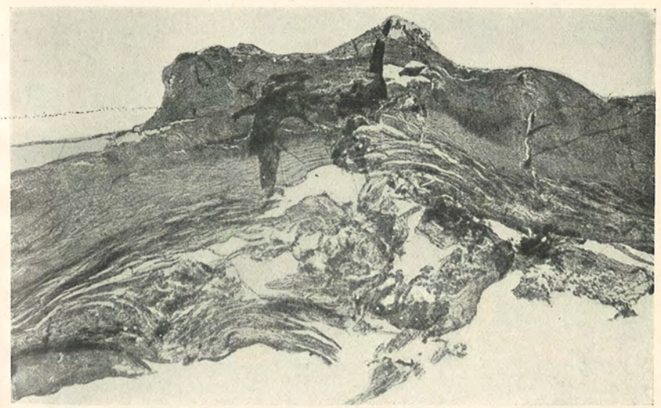


FIG. 8. CASE 5.—A, line of incision.

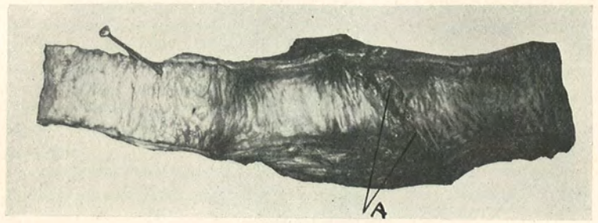
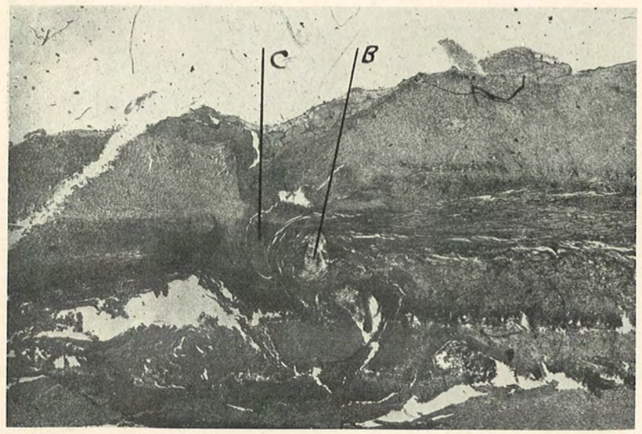


FIG. 9. CASE 6.—A, line of incision.



CASE 6.—B, remains of suture; C, line of healing.

cell infiltration, full of capillaries. Embedded in the tissue at the site of the wound is a suture about which is a marked suppurative infiltration, and in its vicinity there is more or less necrosis of the older tissue indicated by its hyaline appearance and strong election of the eosin stain. The suppuration only in a minor degree is invading the deeper part of the thickened intima, and is apparently a process implanted after healing had partially proceeded.

CASE VII.—Bay horse, aged 14. The diagnosis of thrombosis of the iliac arteries was made by Dr. John W. Adams. The horse was transferred to us through the kindness of Dr. Adams. The anæsthetic was chloral and chloroform. An incision 22. cm. long was made on the right side of the neck; the carotid artery was found and the clamps were applied. An oblique incision with ragged edges 2.5 cm. long was made in the artery. The artery was sutured, the clamps were removed and no hæmorrhage occurred. After the deep fascia was sutured around the line of approximation, the artery could be seen pulsating. The superficial wound was closed with through-and-through sutures. The pulse was equal on both sides. Twenty-four hours after the operation the pulse was good and equal on both sides; the horse was up and about. Three days after the operation the pulse was equal on both sides and the wound was suppurating. Five days after the operation the pulse was equal on both sides. Seven days after the operation the pulse was equal on both sides and the horse was in good condition. Nine days after the operation the pulse was good, full and equal on both sides; the wound was suppurating. The horse was killed and an autopsy was performed by Dr. C. Y. White. The thrombosis of the iliac arteries was found as diagnosed before operation. The incision in the neck was wide open and the artery could be felt in the bottom of the wound. The artery was removed, opened up and a slight lateral thrombus found, but the lumen was not decreased. (Fig. 10.)

Pathological Report.—Gross specimen, preserved in a solution of formaldehyde, consists of an artery with the surrounding tissue closely adhering to its outer part, and with traces of previous hyperæmia persisting. Laid open, a line of incision extending longitudinally is marked out by a thin, somewhat elevated and irregular thrombus, in places apparently partly organized, but at others still red and relatively unchanged. The general lumen of the vessel could not have been importantly impaired thereby. The intima in this part of the vessel is generally roughened, with nodules and slight ridges, which are apparently for the most part points of slight thrombus formation, and in part due to local thickenings of the intima. In cut section the thrombus is seen to be directly connected with the depression of linear closure of the arterial wound, and the intima generally seems redder than the deeper portions of the wall, the latter being, however, somewhat spongy and probably the seat of more or less inflammatory infiltration.

Microscopic.—Section made transversely to length of vessel, nearly transversely to the line of operative wound. Definite lateral thrombus overlying the line of wound shows no clear evidence of organization. Incision still to be traced through the whole thickness of the arterial wall;

the tissues included within the sutures largely necrosed, hyaline, stained diffusely with the eosin of the hæmatoxylin and eosin preparation. From the borders of this hyaline part of the wall, marking the line of the wound adaptation, there extends diffusely through all the coats of the vessel a thick polynuclear leucocytic infiltration, in places (mainly media) rich in eosinophilic cells, with numerous endothelioid and embryonic connective-tissue cells interspersed. There is but little leucocytic infiltration in the clot, which, however, contains considerable hæmatoxylin-stained detritus, probably fragments of leucocytic nuclei.

Case VIII.—Medium-sized dog. The anæsthetic was morphine hypodermatically and ether by inhalation. The carotid artery was found on the left side of the neck and the clamps were applied. An oblique incision 1.5 cm. long was made in the artery. The artery was sutured in the usual manner; the clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation, and the wound closed with through-and-through sutures. Twenty-four hours after the operation the dog was up and about, and the artery was pulsating normally. Three days after the operation pulsation was apparently normal. His condition remained normal until he was killed, on the twelfth day. Post-mortem findings: The skin wound had united by first intention; the artery was removed and opened up; no thrombus was present, and the lumen was not decreased.

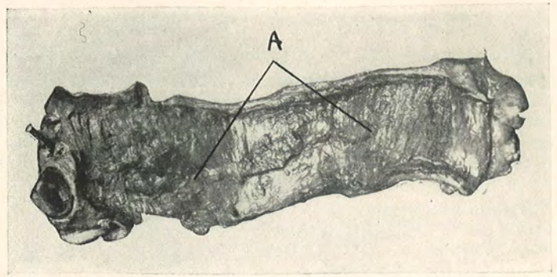
Pathological Report—Gross.—The artery is embedded in the surrounding tissues, which are closely adherent and are the seat of marked hyperæmia and inflammatory infiltration. Laid open, the vessel lumen is intact, the general intima smooth and glistening, and the line of incision marked by a small depressed linear scar.

Microscopically, there is marked hæmorrhagic infiltration in the surrounding tissues, together with numerous leucocytes and proliferated connective-tissue cells. No foci of suppuration. The whole wall of the vessel is the seat of numerous embryonic connective tissue cells, mainly as fibroblasts. The line of incision is obliterated by a young scar. No appearance of thrombosis overlies this upon the intima, which is somewhat thickened and puckered at the site of the wound, but otherwise practically normal.

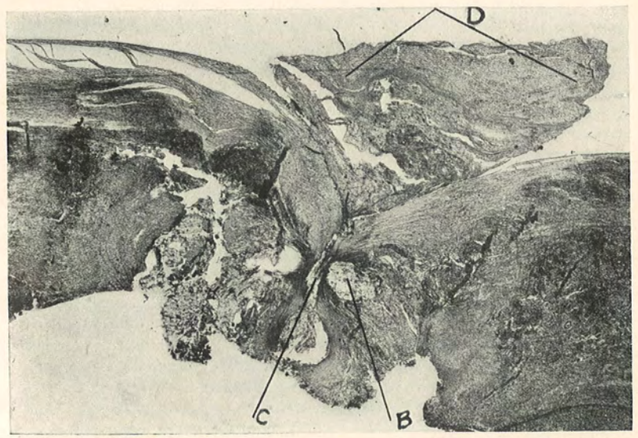
Case IX.—Mongrel dog. The anæsthetic was morphine and ether. The carotid artery was found on the left side of the neck, and the clamps were applied. A longitudinal incision 1.5 cm. long was made in the artery. The artery was sutured in the usual manner; the clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation, and the wound closed with through-and-through sutures. Twenty-four hours after the operation the dog was up and about, the pulse being apparently normal. Three days after the operation the pulsation was normal, but the wound was infected. The animal was normal until he was killed, on the fourteenth day. Post-mortem report: The artery was immediately removed and opened up; a small lateral thrombus was present.

Pathological Report.—The artery contains a thrombus composed

Fig. 10.



Case 7.—A, line of incision.



Case 7.—B, remains of suture; C, line of healing; D, lateral thrombus.

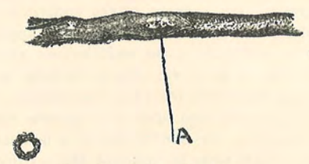
mainly of red cells and a granular fibrin, with at one place numerous polynuclear leucocytes penetrating the mass. No evidence of actual organization of thrombus; and no appearance, in sections examined, of endothelial or subendothelial proliferation in reaction to thrombus; the only changes of this type are along the line of wound of the artery-wall. In the latter line of incision, which is quite approximated and closed, the wall of the artery from without to the endothelial lining is the seat of a mass of well-formed fibroblasts, uniting the approximated surfaces; and close to the cut and over it the endothelium shows as a single (at few places double) line of pyriform cells projecting into the lumen of the vessel, but apparently quite free from the clot within. At one point, close to the cut in the adventitia, and upon the opposite side of the artery in the surrounding fat tissue, are minute foci of suppuration. Remnants of the sutures persist. Apparently in this case the healing of the wound and the thrombus are not synchronous processes; the latter is too fresh to date back to the origin of healing. Perhaps it is a thrombus occurring secondarily in connection with the suppuration which is evidently beginning in the arterial coat. The healing itself seems, even to the formation of an endothelial lining, to be progressing favorably.

Case X.—Bay horse, aged 18. His condition was very poor. The anæsthetic was chloral and chloroform. An incision 22. cm. long was made on the right side of the neck; the carotid artery was found and the clamps were applied. One of the usual clamps was lost, and in its place a heavy hysterectomy forcep was used on the proximal end of the artery. The artery was divided completely across and circular end-to-end anastomosis performed. The clamps were removed and no hæmorrhage occurred. After the deep fascia was sutured around the line of approximation the artery could be seen pulsating. The wound was closed with through-and-through sutures. The pulse was equal on both sides. Twenty-four hours after the operation the horse was in good condition and the pulse equal on both sides. Three days after the operation the pulse was not as full or as strong on the operative side. The wound was suppurating. Four days after the operation the pulse was decidedly less on the operative side. Five days after the operation the pulse was very small on the operative side and the wound was still suppurating profusely. From the fifth to the fourteenth day the pulse gradually increased in volume and strength, but was not equal to the normal side at any time. The horse was killed on the fourteenth day by bleeding from the opposite side. The artery was removed and opened; a thrombus that almost filled the artery was found, extending from the position of the heavy clamp down to the line of suture. Through a mistake of the attendant the horse was injected with formalin before the artery was removed. The thrombus was not of recent origin, so could not have been caused by the formalin.

Pathological Report.—The specimen examined grossly after preservation in a solution of formaldehyde shows an artery embedded in the surrounding tissues, and poorly defined from those about the level of operation. There is no evidence in the preserved specimen of any intense hyperæmia or hæmorrhagic infiltration of the tissues. Laid open, the

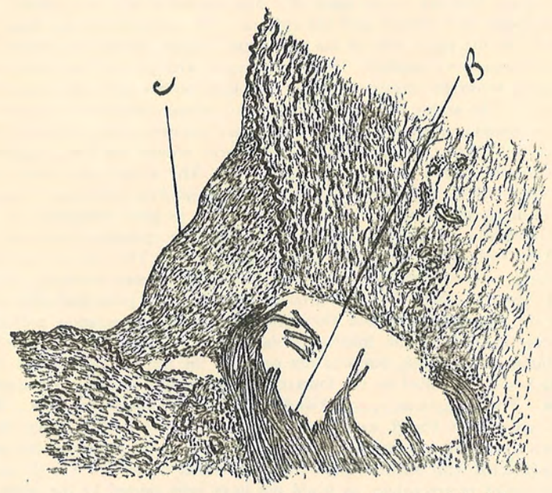
vessel shows a dark, obstructing clot, which was slightly adherent along the line of operation, and which shows a more or less lamination on cross section. The line of incision is a circular one; it is somewhat puckered and overlaid by remnants of the clot, where the latter is torn off in the

FIGS. II.



CASE II.—A, line of incision.

examination, and is superficially apparently firmly united. In section of the wall immediately beneath the slightly thickened intima at the site of closure are several points of softening apparently from suppuration and



CASE II.—B, remains of suture; C, line of wound completely healed.

seemingly about the sutures. The general tissue at this site is soft and spongy, suggesting decided inflammatory infiltration.

Microscopic.—Section at site of operative lesion shows a thin, parietal granular (plaque) thrombus almost limited to the line of incision. The

intima is thicker than normal near the lesion, but densely fibrous. Its endothelial coat is lost near the incision, and here its tissue stains with poor differentiation and strongly with the eosin of the hæmatoxylin-and-eosin preparation, giving the appearance of necrosis. Embedded beneath the intima is a loop of the suture used. This suture is surrounded by a dense infiltration of polynuclear leucocytes, and extending from this focus to the subendothelial portion of the intima on each side of the incision may be traced an infiltrating line of the same elements, along the border of the above necrosed part of the intima. The whole coat of the vessel is thickened, but definite suppuration is confined to the vicinity of the suture. The deeper coats are richly studded with round and spindle-shaped embryonic connective-tissue cells, with scattered leucocytes (numerous eosinophiles), and in the spaces of the adventitia the endothelium is swollen and often proliferated.

CASE XI.—Medium-sized dog. The anæsthetic was morphine hypodermatically and ether by inhalation. The carotid artery was found on the left side of the neck, and the clamps were applied. A longitudinal incision 1.5 cm. long was made in the artery. The artery was sutured in the usual manner; the clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation and the wound closed with through-and-through sutures. Twenty-four hours after the operation the dog was up and about; the pulsation in the carotid artery was apparently normal. The animal remained normal until he was killed, on the twenty-first day after the operation. The artery was removed and opened up, no thrombus or narrowing of the lumen being present. (Fig. 11.)

Pathological Report.—Transverse section at site of injury shows complete healing of the intima, with perfect endothelial line. Intima at this point thickened, the thickening impinging upon the deeper tissues rather than protruding into the vascular lumen. Inner elastic lamina perfect beneath the subendothelial thickening. The thickened intima is for the most part fully fibrous, but strands of embryonic cells (fibroblasts) pass into the mass along with capillary vessels. No evidence of thrombus on the intima. In the media there persist strands of the sutures with considerable young connective tissue intervening among the muscle-bundles. Here the elastic layers are somewhat broken in their continuity, but are quite apparent and show no appreciable degenerative changes. About the sutures among the young connective-tissue cells a few foreign-body giant-cells are present. The adventitia presents practically the same features as just described in the media, and is slightly thickened from the fibrosis and young connective-tissue elements.

CASE XII.—Mouse-colored polo pony, aged 17. His condition was very poor. The anæsthetic was chloral and chloroform. An incision 22. cm. long was made on the right side of the neck; the carotid artery was exposed and the clamps were applied. A longitudinal incision 3.5 cm. long was made in the artery. The artery was sutured, the clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation, and the superficial wound closed with

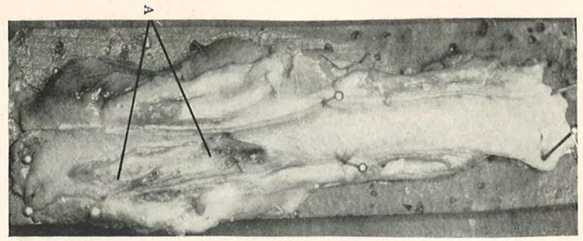
through-and-through sutures. The pulse was equal on both sides. Twenty-four hours after the operation the horse was up and about, the pulse was equal on both sides. Three days after the operation the pulse was equal on both sides and the wound was suppurating. The pulse was equal on both sides until he was killed, on the twenty-first day. Post-mortem findings: The artery could be felt at the bottom of the wound. The artery was removed and opened up; the lumen was slightly decreased, but no thrombus was present. (Fig. 12.)

Pathological Report.—The gross specimen, preserved in a solution of formaldehyde, consists of an artery closely welded with the surrounding tissue, traces of well-marked hyperæmia being present in the latter in the neighborhood of the operative wound. Laid open, the lumen is seen to have been permeable; the intima is marked by a slightly-elevated longitudinal line of about 3.5 cm. in length, thus presenting the appearance of recent scar-tissue rather than of an unorganized clot. Its irregular outline suggests, however, that it represents an organized linear thrombus rather than a direct adhesion of the applied surfaces of the intima. Transverse section inspected grossly corresponds with the above idea, the linear scar above mentioned being distinctly elevated above the surrounding surface of the intima, and below it in the wall are seen tiny foci of a softer, opaque substance suggesting points of suppuration; the deeper parts of the vessel-wall and the immediately-surrounding structures have a somewhat spongy or succulent appearance, suggesting marked inflammatory infiltration.

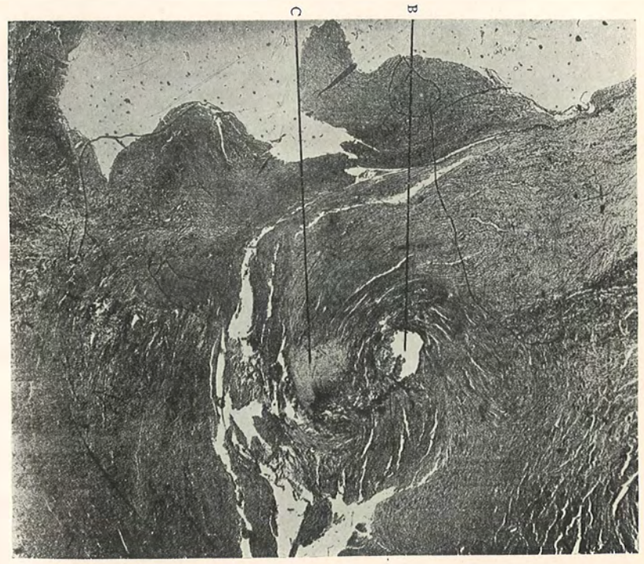
Microscopic.—Transverse section of artery, at right angles to the line of operative incision, shows over the site of operative line a small partly-organized thrombus. The organization is more perfect along the lateral borders of the clot. At its base, close to the line of the incision, there begins a polynuclear infiltration which continues outward through the intima to become especially marked about an embedded suture. The tissue between two strands of this suture (evidently section of the loop) is necrotic, almost hyaline, and poorly staining. All the coats are thickened and studded with embryonic elements, scattered leucocytes (many eosinophiles especially near the line of suppuration), and endothelioid cells (proliferated endothelium of lymph spaces). In several foci presumably near a suture giant cells are found in greater or smaller numbers. The general appearance here suggests that the clot was of earlier occurrence than the suppuration, and that the latter process is penetrating into the partly-healed wound.

Case XIII.—White horse, aged 20. The anæsthetic was chloral and chloroform. An incision 22. cm. long was made on the right side of the neck; the carotid artery was exposed and the clamps were applied. A longitudinal incision 3.7 cm. long was made in the artery. The artery was sutured, the clamps were removed and no hæmorrhage occurred. The deep fascia was sutured around the line of approximation and the superficial wound closed with through-and-through sutures. The pulse was equal on both sides. Twenty-four hours after the operation the horse was up and in good condition, the pulse being equal on both sides. Three days after the operation the pulse was equal on both sides; the

Fig. 12.



Case 12.—A, line of incision.



Case 12.—B, remains of suture; C, line of healing.

wound was suppurating. The pulse was equal on both sides until the horse died, from a small secondary hæmorrhage, on the thirty-third day. The artery was removed from the wound and examined. It opened into a pus sac which completely surrounded the artery; the lumen was not decreased, and no thrombus was present. It did not seem possible the horse could have died from the small secondary hæmorrhage, but no other cause could be found. (Fig. 13.)

Pathological Report.—The artery contains a thrombus composed mainly of red cells and a granular fibrin, with at one place numerous polynuclear leucocytes penetrating the mass. No evidence of actual organization of thrombus; and no appearance in sections examined of endothelial or subendothelial proliferation in reaction to the thrombus; the only changes of this type are along the line of wound of the arterial wall. In the latter line of incision, which is quite approximated and closed, the wall of the artery from without to the endothelial lining is the seat of a mass of well-formed fibroblasts uniting the approximated surfaces, and close to the cut and over it the endothelium shows as a single line of pyriform cells projecting into the lumen of the vessel, but apparently quite free from the clot within. At one point, close to the cut in the adventitia and upon the opposite side of the artery in the surrounding fat-tissue, are minute foci of suppuration. Remnants of the sutures persist. Apparently in this case the thrombus is too fresh to date back to the origin of healing. Perhaps it is a thrombus occurring secondarily in connection with the suppuration which is evidently beginning in the arterial coat. The healing itself seems, even to the formation of an endothelial lining, to be progressing favorably.

Case XIV.—Sorrel horse, aged 18. The anæsthetic was chloral and chloroform. An incision 22. cm. long was made in the right side of the neck; the carotid artery was exposed and the clamps were applied. The artery was divided transversely two-thirds the way through and then sutured, the clamps were removed and no hæmorrhage occurred. Some difficulty was encountered in suturing because of a very fine tremor. The deep fascia was sutured around the line of approximation, and the superficial wound closed with through-and-through sutures. The pulse was equal on both sides and the horse was in good condition. Twenty-four hours after the operation the pulse was equal on both sides. Three days after the operation the pulse was equal on both sides and the wound was infected. The pulse were equal until the tenth day, when the pulse on the operative side was slightly less. The wound was suppurating profusely. From the tenth until the eighteenth day the pulse was decidedly less on the operative side. From the eighteenth day until the forty-second day the pulse gradually increased in volume, but was not equal to the opposite artery at any time. The horse was killed on the forty-second day. The wound was suppurating profusely. The artery was removed and opened up. Complete thrombosis was found. In dissecting out the artery the vein was found very much thickened.

Pathological Report. Gross Specimen.—Two lengths of the vessel, preserved in a solution of formaldehyde, are presented for examination;

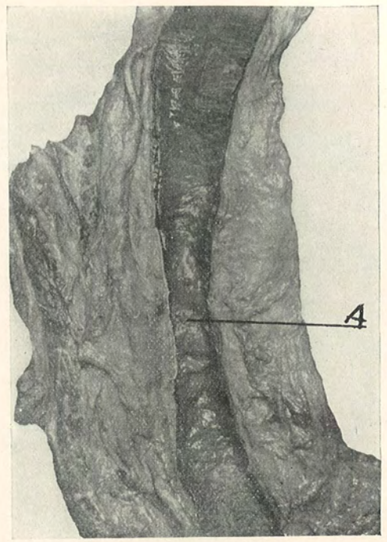
both are the seat of occluding thrombosis; the thrombi are dark in the central part and paler and more or less organized and adherent to the intima along the periphery. The general wall of the artery is thickened, pale and dense from sclerosis. No appearance of suppurative softening on gross inspection.

Microscopic.—A section made transversely to the length of the vessel contains a large thrombus with organization proceeding, the greater part of the clot being well cellularized. Phagocytic leucocytes are numerous in the interior of the clot. No evidence of suppuration present. Distinct extension of fibroblasts and young vessels from the intima. The general coat of the vessel shows no evidence of suppuration; the blood-vessels are slightly injected, their coats are unusually thick; but little embryonic cell-formation is evident; when seen it mainly exists about the vasa vasorum, in the adventitia, and between the muscle-bundles of the media.

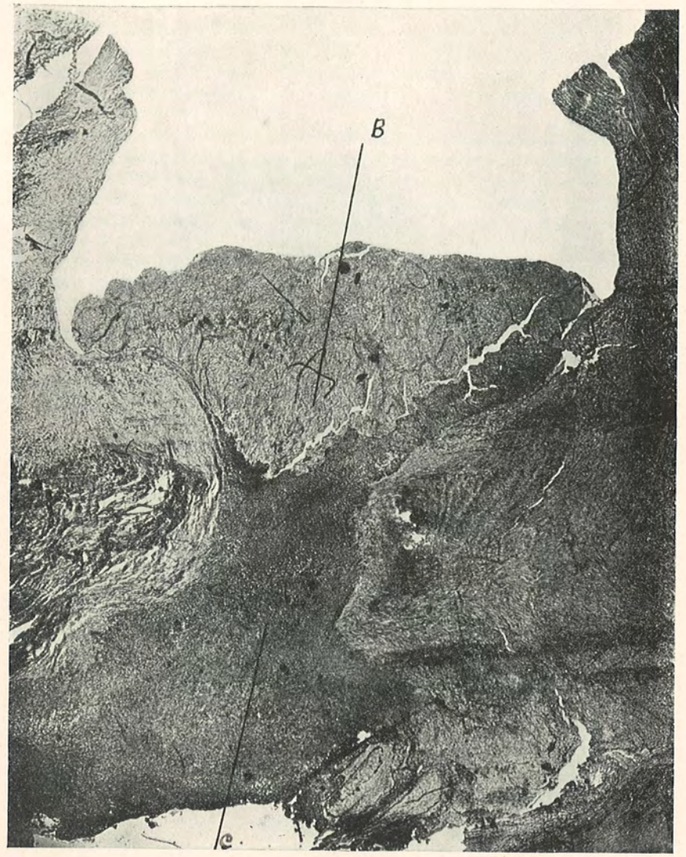
There were fourteen operations in all—nine on horses and five on dogs. The experiments on the nine horses and one dog were performed at the Veterinary Hospital of the University of Pennsylvania. The operations on the remaining four dogs were performed in the surgical operating-room of the medical laboratory. All the cases operated on at the Veterinary Hospital suppurated, and half of those at the laboratory. The operations on the horses were three complete circular, two transverse, three longitudinal and one oblique; on the dogs, four longitudinal and one oblique. When the arteries were opened up, in seven no thrombus was visible, in five a slight lateral thrombus was present; in one case we used a heavy hysterectomy forcep instead of our special clamp (clamp lost in transporting instruments), and almost complete thrombosis was present from the position of the clamp to the line of suture; in another case complete thrombosis occurred from infection around the artery. One ruptured on the thirty-third day into a pus-sac surrounding the artery, but no thrombus was present.

Conclusions.—1. Only one secondary hæmorrhage occurred, and that one was directly traceable by microscopical examination to infection from without; this alone is a distinct advantage over the older methods. 2, Under the aseptic conditions employed in human surgery the results ought to be perfect, as our thrombosis can almost always be traced to infection.

FIG. 13.



CASE 13.—A, line of incision.



B, lnteral thrombus; C, pus.

3, Whatever suture used, the principle of placing the intima to intima is absolutely essential. 4, The suture must be kept out of the blood-stream.

In closing I wish to acknowledge my indebtedness to Dr. De Forest Willard for his many valuable suggestions and for the financial aid which made it possible to perform these experiments, and to Dr. Allen J. Smith for the pathological reports. I also wish to thank the staff of the Veterinary Hospital for their many courtesies and Dr. Barnett, Resident Physician, in particular, for valuable assistance in many ways and for untiring efforts in my behalf; Mr. H. S. Hutchinson and Mr. F. Beekman, of the third-year medical class, for their assistance.

PERFORATION OF SKULL BY IRON ROD.

Dr. C. G. Ross reported the case of a man who was brought to the hospital March 20, with the history of having been struck over the leg center of the left side of the head by the end of a three-eighths-inch steel rod six-and-one-half feet long, which fell fifty feet. The pupils were dilated and did not react, and vomiting had occurred. There was doubt as to the advisability of immediate operation. The man did not develop convulsions. Operation was finally performed and showed that the iron had made a round hole in the skull as accurately as it could have been done by a trephine. The superior longitudinal sinus had been entered, but the button of bone prevented hæmorrhage. The inner table of the skull was compressing the leg center. When removal was accomplished, hæmorrhage was severe, and packing had to be kept in for seven days. When the packing was removed, motion in the leg was possible, and the man finally walked out of the hospital.

REPORT OF A CASE OF TUMOR OF THE CAROTID BODY.

BY JOHN CHALMERS DA COSTA, M.D.,

OF PHILADELPHIA.

Professor of Principles of Surgery and Professor of Clinical Surgery in the Jefferson Medical College; Surgeon to the Philadelphia Hospital.

THE first person to suspect the existence of the carotid body seems to have been the great Haller; and from his time on there has now and then been a suggestion by some anatomist of a knowledge of the presence of the structure. In 1833 Mayer gave a description of it and pointed out its common situation in the bifurcation-angle of the carotid artery. He described it as about the size of a grain of rice, and as attached to the carotid vessel; and mentioned some other facts in relation to it. Luschka, in the early 60's, made a microscopic study of the gland; and since that time, Arnold, Kölliker, and others have written about it.

One thing seems to be sure: that the carotid body is not invariably present. In fact, it is frequently absent. Funke [1] points out that it is enclosed in a fibrous capsule, and that a fibrous band comes from the capsule and divides the body into two parts, other bands from the capsule separating each half into lobules. This fibrous tissue contains a multitude of blood-vessels. Funke further points out that the lobules contain cell-collections without definite arrangement, that only rarely do they resemble the structure of a gland, and that in all parts of these lobules blood-vessels are demonstrable. The same observer believes that the lobules result from proliferation of the endothelial cells of the blood-vessels.

To-day, we should describe the carotid body as a structure placed in the bifurcation of the common carotid artery; to the inner side of this vessel, on a lower level than the bifurcation; or on the posterior surface of either the external or the internal

[1] Am. Med. July 16, 1904.

carotid. It probably always takes origin from the sheath of the internal carotid. In human beings, it is frequently absent. At least it is frequently absent in those beyond puberty. It is encapsuled in fibrous tissue, is fastened to the sheath of the internal carotid, and the gland with its capsule is embedded in a considerable amount of fat. In shape, it is oval; in color, reddish brown. Its size when not enlarged is about that of a grain of corn. The septa from the capsule divide the organ into folicles, or cell-balls; and these cell-balls are composed of numbers of endothelial cells and capillary blood-vessels. A small branch, several branches, or many branches from the carotid pass into the carotid body; and the carotid plexus of the sympathetic nerve is in very close relation with the body. This structure has been studied, of late, by John Funke, Paltauf, Reclus, Marchand, and others. Its function is unknown.

Occasionally tumors arise in this structure; and Dr. Funke, in the previously-quoted article, has collected fifteen cases. In his series, it is shown that the tumors may occur in adolescents or in adults, and in either sex. He quotes the observation of Heinleth that the carotid body undergoes development until puberty, when it ought to atrophy; but that if it fails to atrophy, but continues to grow, a tumor forms. Such a tumor grows very slowly, requiring years to reach any considerable size, and never becoming very large. Sooner or later, however, rapid growth is liable to begin; and it is usually only after years of growth, and when this sudden rapidity of growth has alarmed the patient, that a surgeon is called in.

Early in the case the growth is entirely free from pain, but in the later stages there may be pain in the tumor, pain radiating into the ear, dysphagia, and—as has been pointed out—perhaps pupillary contraction of the same side and facial vasomotor disturbance. In a large majority of the reported cases, there has been distinct transmitted pulsation in the tumor. The skin is movable over the growth; the tumor may be moved from side to side, but not up and down; and there is usually a systolic murmur over the tumor.

I have recently had, in the Jefferson College Hospital, a

case of this rare and interesting trouble, and a diagnosis was made before operation. The record of the case is as follows:

The man was 52 years of age. Over twenty years ago he noticed a very small lump on the right side of his neck. He said that when he first found it this lump was not larger than a grain of corn. During many years it slowly but certainly increased in size. A few months ago it began to grow rapidly, and within less than a year of rapid growth it attained the size of a small egg of a hen. He also began to have some difficulty in swallowing, had attacks of redness of that side of the face, and occasionally suffered from pricking pain in and around the tumor. The rapid growth alarmed him, and he decided to consult a surgeon.

An examination showed the tumor to be in the superior carotid triangle, having its lower border on a level with the upper margin of the thyroid cartilage, and its upper border passing to about the level of the angle of the jaw. The external jugular vein was distinctly visible passing over it. The skin was freely movable over the tumor; and the tumor itself was movable from side to side as though on a hinge, but was not movable from above downward or from below upward. The growth was not tender on handling, but was the seat of very marked pulsation, which investigation demonstrated not to be expansile pulsation, but a lifting of the growth by the pulse of the carotid. The tumor was hard, but somewhat elastic, being, however, softer at some points than at others. It was smooth, but apparently lobulated on the surface. On listening with the stethoscope, a systolic murmur could be made out when the stethoscope was pressed firmly upon it; but this was not more manifest than it was on the carotid artery itself, when the same maneuver was executed.

It was evident that this tumor was not an aneurysm, from its long history, from its hardness, from the absence of genuine bruit and expansile pulsation, and from the fact that pressure on the artery did not cause the mass to diminish in size. It was not a cyst, because it was evidently a solid body. The question of a misplaced fragment of thyroid tissue was considered; but the density, the history, and the vascular phenomena led to the rejection of this idea. It was too hard and too deep for a fatty tumor. Its movability, its long history, and the phenomena of pulsation were against sarcoma; and the long history, without

any change in consistency and without the involvement of the overlying parts, was considered to rule out lymphatic glandular trouble.

I advised operation, on account of the rapid growth then taking place and the apparently inevitable disaster, if this rapid growth were permitted to continue unchecked.

After having exposed the tumor by an incision at the anterior margin of the strenocleidomastoid, and while endeavoring to free it, I was greatly embarrassed by the profuse bleeding. The fatty tissue about the tumor and the capsule of the tumor oozed continuously from numberless places. The bleeding was both arterial and venus. Forty ligatures failed to arrest the bleeding.

After exposing the tumor thoroughly, the growth was found to be in and around the angle of bifurcation of the common carotid; and it embraced the vessels so completely that it was out of the question to free the growth from them as I had hoped to do and as was done in 3 reported cases. It was equally impossible to abandon the operation, because the persistent hæmorrhage barred such a road to retreat. Consequently, the operation was proceeded with.

The common carotid artery was tied with two ligatures below the growth, and was divided between the ligatures. The distal stump of the divided artery was grasped with forceps, and used as a handle in lifting the tumor while the growth was being separated. The tumor, with the beginnings of the internal and external carotid arteries, was freed from its attachments. During this separation the internal jugular vein was badly torn; and it was necessary to ligate it. When the portion of the external carotid artery above the tumor was reached this vessel was tied and divided. Between the upper border of the tumor and the base of the skull there was barely room to ligate the internal carotid; it was with great difficutly that it was ligated and divided, and I barely escaped the accident met with by Mikulicz, who found the tumor had entered the bony foramen and was obliged to cut away bone to stop bleeding. The wound was closed with drainage.

The man had lost much blood and was considerably shocked. He reacted but slowly from the anæsthetic. Eight hours after the operation he developed a weakness just short of complete paralysis of the left arm and leg, the face escaping. He was also found

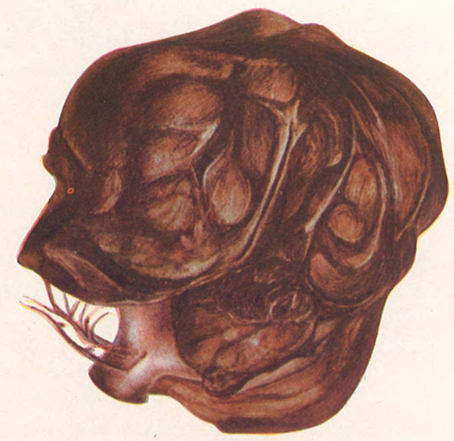
to have a very low and extremely hoarse voice. The day after the operation, the voice continuing low and hoarse, the throat was examined; and relaxation and œdema of the right vocal cord were observed by Dr. J. Leslie Davis to exist. These conditions were due to paralysis of the cricothyroid muscle from injury of the superior laryngeal nerve.

For many days there was a copious flow of mucus from the larynx and the bronchi; and, owing to the anæsthesia of the mucous membrane, the patient had great difficulty in expelling this mucus. For some time there was considerable difficulty in swallowing, probably also due to injury of the superior laryngeal nerve, which, it will be remembered, also goes to the inferior constrictor of the pharynx. For the first few days after the operation there was a copious flow of lymph from the wound, showing that large lymphatic vessels had been divided. This ceased about the end of the first week.

On the eighth day after operation complete hemiplegia suddenly developed. The left arm and leg were completely paralyzed; the face was much drawn; and the man was dull, drowsy, and sometimes stuporous, but never unconscious. It was the opinion of Dr. Alfred Gordon that this attack was due to embolism, in all probability in the internal capsule; and the first and milder attack was thought to have been due to thrombosis in the cortical vessels.

The day after the onset of the hemiplegia, the man was found to be suffering severely with dyspnœa and repeated choking fits, in some of which it seemed that he must strangle. Great quantities of mucus passed into the throat, and there was the greatest possible difficulty in ejecting it. Examination of the left lung, made by Dr. John C. DaCosta, Jr., developed the fact that at least half of the lung was in a state of complete collapse, containing no air whatever. The right lung was entirely normal. The patient stated that he had had an exactly similar pulmonary condition a number of months before. This had come on from an unknown cause, and had almost killed him. The atelectasis produced great discomfort for a number of days, but was gradually recovered from; and the lung is now normal, so far as physical signs indicate. It seems probable that the laryngeal anæsthesia was responsible for this condition, and that either plugs of mucus had passed into the lung and

FIG. 1.



CASE XXVI.

blocked the bronchi, or that some elements from the food had passed the larynx.

Present Condition (8 weeks after the operation).—A marked, but fading, left hemiplegia exists. The man can move the leg, and can stand upon his legs, if he supports himself with a cane or a crutch. He can move the elbow, the shoulder, and the wrist, and can flex the hand; but the extremity is still very weak. He has occasional paroxysms of violent shooting pain in the arm and in the leg. The wound is completely healed and not tender. The voice is hoarse and low, and the right vocal cord is œdematous and relaxed; and Dr. Davis is of the opinion that this is due to injury of the superior laryngeal nerve.

Conclusions.—It is thus seen that the operation of removing a tumor of the carotid body is a very formidable one. The surgeon may have to tie all the carotid arteries; and he may damage a nerve or nerves, with subsequent unfortunate results. The ligation of the common carotid artery is an extremely dangerous procedure; and it is one of the few operations in which the mortality does not seem to have been greatly diminished since the days of Sir Astley Cooper, who did the first successful ligation of the common carotid, in 1808. Mr. Richard Barwell, in his article on Aneurysm in "Ashhurst's International Encyclopedia of Surgery," published in 1889, gives the mortality of 107 cases of ligation of the common carotid for aneurysm as 25.23 per cent. Some more modern authors estimate the death-rate as in the neighborhood of, or over, 30 per cent.; and it is thus seen what a responsibility it is, even at the present time, to tie this vessel.

The danger of death is, however, not the only danger in ligating the common carotid. My case shows that hemiplegia may follow the operation. It has long been known that a considerable percentage of those on whom ligation has been performed suffer subsequently with cerebral symptoms. In some of the cases, these symptoms have been produced by thrombosis; in others, by embolism; and in still others, by cerebral softening. Pilz has pointed out that 32 per cent. of the cases in which the common carotid has been ligated exhibit brain

symptoms, and that 56 per cent. of the cases that show brain symptoms die. Zimmermann says that in 11 per cent. of the cases there is softening of the brain, and that 26 per cent. of the cases show brain symptoms. There is much greater danger of brain symptoms when the operation is performed on the elderly or middle-aged than when it is done on the young. In older subjects, arterial atheroma may interfere with the distension of certain vessels whose integrity is necessary to bring sufficient blood from the vertebrals, from the other internal carotid, and from the terminations of the external carotids. Failure in a satisfactory restoration of circulation is most liable to occur when profuse bleeding greatly lowers the blood-pressure, as it did in this case. When such cerebral change ensues, it does not necessarily mean death. In fact, it may be recovered from, partially or completely. Usually, however, the condition is permanent and progressive, and finally results in death. In Funke's series of 15 cases of tumor of the carotid body, there were but two deaths; one from bronchopneumonia, and one from secondary hæmorrhage. There may be added to this, Keen's unreported case, which makes three deaths in 16 cases. In Funke's series, there was but one case of hemiplegia. In Dr. Hearn's case, however, which is not recorded in the table as one of hemiplegia, the patient died two months later; and Dr. Hearn tells me that, although he did not see the case, he believes from what he has learned that the man died of cerebral softening. So, out of 13 recoveries in Funke's cases, to which my cases may be added, making 14 recoveries, there were two cases of hemiplegia and one of cerebral softening.

Owing to the great danger in ligating the common carotid, surgeons have sought to avoid it in removing carotid tumors. The reported cases show that almost always all the carotids must be ligated. Albert, in his case, was obliged to ligate only the external carotid, being able to remove the growth from the carotid sheath. In his case the growth recurred within one year. In Heinleth's case and in that of Cuneo, no ligations were necessary, owing to the free separability of the tumor. Out of Funke's 15 cases, only three are recorded as not requir-

FIG. 2.

CASE XXVI.—Section.

ing ligations of all the carotids; and when Keen's case and mine are added to this list, they make 17 cases, in 14 of which ligation of all the carotids was necessary.

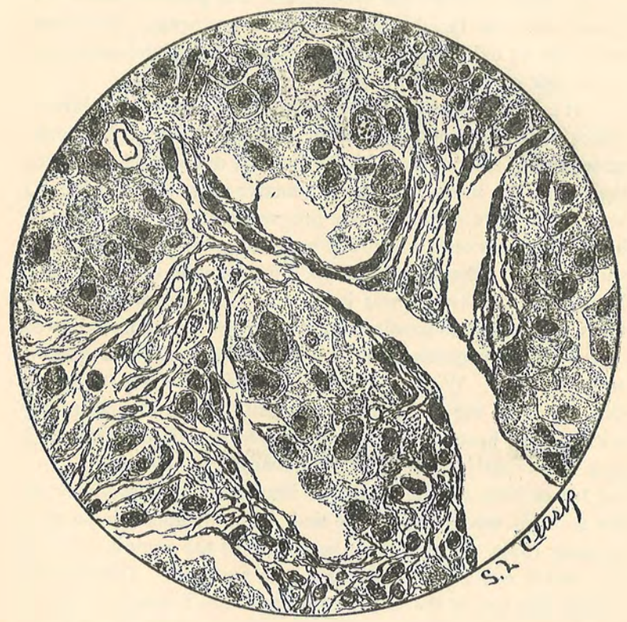
Another danger of the operation is nerve-injury. In my case, the superior laryngeal was injured. In all probability, it is a piece of this nerve that we find incorporated in the specimen. In Funke's 15 cases, there were six cases in which the nerves were injured—the sympathetic, the pneumogastric, the hypoglossal, the facial, or the recurrent laryngeal. Two cases out of the 15 exhibited postoperative paralysis of the vocal cord of the side operated upon.

It is thus evident that the operation of removing a carotid tumor is an extremely dangerous one, and is not to be lightly undertaken. We agree with Reclus that one should not touch these growths, unless they are productive of danger to life. So long as they are merely slowly progressing, they had better be let alone. It is only when they begin to grow rapidly that one should remove them, and then he must, in spite of the danger. In my case, the tumor was infiltrating the surrounding structures, and would unquestionably have killed the man, if allowed to remain. Surgeons must be wide awake to the existence of such growths. Without carefully examining every tumor in this region of the neck, one could easily be led into operating with a light heart for some supposedly trivial condition, and then find oneself suddenly so far advanced in attacking a carotid tumor that retreat would be impossible, and probably all the carotids would have to be tied. The diagnosis is possible in many cases. It was made in several of the cases in Funke's list, and it was made in the case now reported. The pictures exhibit the tumor that I removed, and Dr. Funke's report of the specimens follows:

Macroscopic Description.—The specimen is a lobulated mass, measuring 5 by 5 by 4 cm.; weight 104 gmm. It is dark red in color, encapsulated, distinctly elastic in consistency at some places and flabby at other places. The mass is irregular; it is composed of three large nodules, each being 2.5 cm. in one diameter and 2 cm. in the other. The smaller nodules present do not attain a diameter of 0.5 cm.; they are especially seen on the anterior surface. This surface contains many depressions

varying from 0.5 to 1 cm. in depth; these depressions are incident to the pulling of the capsule into the tumor substance. The lacerated tissue present adds to the irregularity of the anterior surface. The posterior surface is less irregular; it is lobulated, however, and the nodules are more conspicuous here than upon the anterior aspect. Laceration and fragmentation of the capsule is marked. Lying upon this surface, not more than 2 cm. from the margin, is a greyish-pink cord-like piece of tissue apparently made up of smaller cords; the consistency and the

FIG. 3.



architecture of this structure resemble a nerve. It is not firmly attached to the tumor-mass. Lying upon this surface, but only near one end, is a large vessel which from its general structure appears like the common carotid artery and which contains, 0.5 cm. from the free margin, a ligature. One centimeter above the ligature the vessel divides; one branch curves slightly toward what was described as the anterior surface and then tunnels the mass between two of the nodules described. Only 0.5 cm. of this branch is visible, but upon dissection it is found to traverse the mass

nearly parallel with the anterior surface and but 0.7 cm. from it. The other vessel curves slightly backward and then tunnels the mass near the opposite side of the specimen, but runs parallel and very close to the posterior surface. Both vessels are easily indentified at what is presumed to be the superior portion of the tumor, and both vessels as well as the common carotid artery are firmly attached to the tumor mass. The first vessel described in all probability was the external carotid, since it gave off a small branch near its point of severance.

FIG. 4.

Dissection showed that the three larger nodules mentioned are firmly united at a point posterior to the bifurcation of the vessel mentioned. The one nodule is united to the other two at this point and along the entire margin of but one nodule by means of a pedicle; the internal carotid passes between these nodules and is anterior to the pedicle. The other two nodules are for the most part situated in the fork formed by the branching vessel. Dissection also reveals that the smaller nodules are produced by the septa which penetrate from the capsule into the underlying tumor mass.

The cut surface has a lobulated appearance; it is granular, reddish-brown in color, but traversed by greyish bands; some of these bands are dense and comparatively broad. The cut surface as well as the capsule contains many small opened-mouthed blood-vessels; so numerous are they the surface has a porous appearance.

Portions of the tumor were fixed in Zenker's fluid and the remainder was preserved in Kaiserling's fluid. Sections were made and stained with hæmatoxylin and Van Gieson's method for connective tissue, by Mallory's reticulum stain and with polychrome-methylene blue.

Histology.—One margin of the sections is covered by a dense capsule composed by wavy fibrous connective tissue, in which are few lymphoid and spindle-shaped cells and few strands of elastica, together with many blood-vessels. From the capsule fibrous septa penetrate the underlying tumor-mass and divide it into lobules, which are again divided into alveoli. The fibrous septa are very broad and are found in cross and in longitudinal sections; they contain few lymphoid and spindle-shaped cells and large and small blood-vessels. Many of the last-named structures contain erythrocytes, and possess well-formed and thick walls.

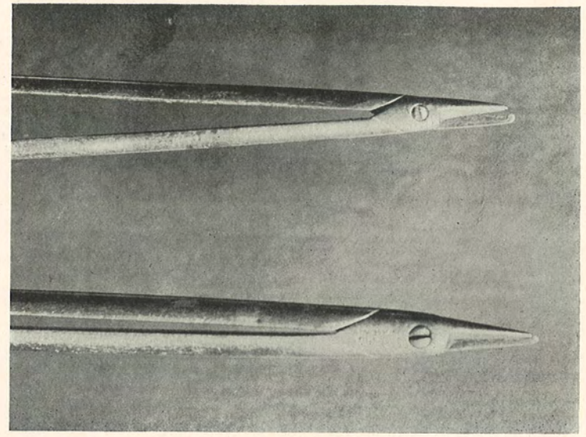
The walls of the alveoli are in some instances formed by delicate connective-tissue strands, evidently constituents of the septa already mentioned; the greater number, however, are formed by delicate capillaries, branches of the vessels found in the septa. Occasionally these capillaries are composed of a single layer of endothelial cells; in other instances the endothelial lining is supported by a few strands of fibrous connective tissue. The alveoli are fairly uniform in size and very difficult to outline in many places, owing to the number of contained cells. The cells in the alveoli vary somewhat in size, ranging from 15 to 25 microns in diameter; they are irregular in outline, many are polyhedral and few are oval. The protoplasm contains no cell membrane; it is finely granular and acidophylic. The nuclei are comparatively large and intensely basophilic. The nuclear membrane is conspicuous. Occasionally few red blood-cells are found among the tumor-cells. In not a few alveoli the tumor-cells show degenerative changes. Few chromaffine cells are present.

Diagnosis.—Endothelioma; this is the type of tumor to which most writers on the neoplasms of the carotid gland apply the term "perithelioma." From the fact that the growth has invaded the vessels and the surrounding tissues it should be looked upon as malignant.

SCISSORS FOR THE REMOVAL OF SUTURES.

Dr. George Erety Shoemaker exhibited scissors (Fig. 1) for the removal of deep-seated invisible sutures. He said that the suture or ligature which passes through dense structures in the lower part of its path is apt to bury its superficial portion with the knot, especially when tied upon mucous surfaces. There are certain localities, such as the rectum, the upper portion of the vagina, certain deeper parts of the wound in operations for gall-bladder drainage, and after vaginal hysterectomy, where ligatures or

Fig. 1.



Scissors with one blade blunt pointed and hooked for removal of invisible or deep sutures.

sutures may be almost or quite invisible and, because of distance from the operation, difficult to remove. The inside sutures of a properly-conducted Emmett operation for perineal repair are difficult to reach without such stretching of the parts as will imperil the recent union. For a number of years he had used scissors which safely remove such sutures, without laceration or over distention of the parts. These differ essentially from others having a hook on one or both blades, and may be described as follows: One blade has a blunt or probe point turned up not more than a twelfth of an inch, or to a point in a line with the back of the other blade when closed. The second blade is so much shorter than the first that there is just room for a silkwormgut suture to lie in the grasp of the hook, without being thrown out as the scissors are opened. The entire length of the instrument should be at least six-and-a-half inches. In order to use these scissors successfully, one end of the suture only should be left long after tying, the other being cut off close to the knot. For removal this long suture end is grasped and put upon the stretch, thereby furnishing a guide for the point of the scissors down to the loop to be cut in the depths of the part. The scissors, being slid along this guide, are introduced closed like a probe into the loop of suture, which is readily found when under the tension described. The suture is engaged in the hooked blade with the scissors still closed. The latter are then moved a little to one side to avoid cutting a knot. The tension is now removed from the long suture end previously held taut, and if the hook does not at once become disengaged it is evident that it is within the real loop of the suture. The scissors may now be confidently opened and shut, as the short blade does not throw out the suture, which will now slip between the blades and the entire suture may be drawn out by the long end above referred to.

The important points are, that the scissors should be introduced closed, that no part of the hook should be sharpened, and that all edges be somewhat dull, in order that the suture may not be prematurely cut while feeling for the proper adjustment of the loop.

These scissors were made for him by Mr. Gemrig about ten years ago and have been used with great satisfaction ever since, particularly after vaginal hysterectomy and perineal operations.

STATED MEETING HELD JUNE 4, 1906.

The Vice-President, ROBERT G. LE CONTE, M.D., in the Chair.

GENERAL PURULENT PERITONITIS.

DR. GEORGE G. ROSS reported eight cases of generalized peritonitis, as follows:

CASE I.—Miss Alice H., aged twenty-one, was admitted to the German Hospital, August 18, 1905, with the history that for twenty-four hours before admission she had suffered with severe abdominal cramps, starting in the right iliac fossa, later becoming general, and accompanied with nausea and vomiting; bowels open. On admission, her abdomen was distended and moderately rigid. There was general abdominal tenderness, with the greatest intensity over the appendix region. By the following day, the distention, rigidity, and tenderness were markedly lessened, the bowels had moved, and flatus was passed freely. On the second day, the symptoms had become localized to the right iliac fossa, and on the following day, the third after admission, she was operated. The leucocyte count on the day of admission was 16,200; and on the day of operation, 14,800.

On opening the peritoneum, a thin, blood-streaked pus was found to the outer side of the cæcum and in the pelvis. The abscess cavity was not confined, however, to these localities; as there was infection of the greater part of the general peritoneal cavity.

No attempt was made to remove the appendix. She was thoroughly drained by a glass tube in the pelvis, a rubber tube in the loin, and gauze wicks. She lived sixteen days. On the fifteenth day, the leucocyte count showed 13,400. On the day of her death, she expectorated a large quantity of fetid pus.

Post-Mortem Report.—Plastic peritonitis about the site of the appendix; a large abscess between the right lobe of the liver and the diaphragm, which had ruptured into the right pleural cavity, and thence into the right lung. The pathological diagnosis was septic bronchopneumonia.

CASE II.—Miss Annie C., twenty years of age, was admitted

to the German Hospital September 27, 1905, with an acute attack of appendicitis of twenty-four hours' duration. There was some general distention and tenderness. The point of greatest tenderness was over the right iliac fossa, extending outward to the crest of the ilium. Vomiting and pain were severe and persistent. The leucocyte count was 24,800.

Operation was performed on the day of admission. On opening the peritoneum, free pus escaped. The peritoneal cavity was walled off with gauze-pads, in the hope that the peritonitis was diffused, but not general. When the gauze was removed it was saturated with pus, proving that the general cavity had been invaded. The appendix was removed, and the peritoneal cavity drained with a glass tube in the pelvis and three pieces of gauze. It was not irrigated. Fowler's position and rectal transfusion were used. There was an uninterrupted recovery.

CASE III.—Mrs. Ida A., twenty-eight years of age, was admitted to the German Hospital August 12, 1905, with an attack of acute appendicitis that had begun three days before, but had become severe only the day before admission. The abdomen was distended, tender, and rigid, the tenderness being exquisite over the right iliac fossa, and the rigidity most marked in the lower quadrant of the abdominal walls. There was no palpable mass. The leucocytes amounted to 5,650.

Operation was performed on the day of admission. An incision was made through the right rectus. There was free pus in the peritoneal cavity, in large quantity. The appendix was removed, and found to have perforated, liberating a fecal concretion and pus. The peritoneal cavity was thoroughly washed with sterile salt-solution, and glass drainage was introduced into the pelvis. A counter opening, to the outer side of the rectum, was made for gauze drainage to the bed of the appendix. Fowler's position was used, together with salt-solution by the bowels, every four hours, a pint being used each time. The patient made an uninterrupted recovery.

CASE IV.—Mr. K., twenty-six years of age, was admitted to the German Hospital August 17, 1906. He had been sick two days with an acute attack of appendicitis exhibiting the classical symptoms and signs.

On admission, his abdomen was moderately distended, with

bilateral rigidity and tenderness—most marked, however, over the appendix. On the following day, the abdomen had become softer and less distended, and a mass could be mapped out toward the right iliac crest. The leucocyte count was 16,100. The man was operated upon on the fourth day after admission.

The peritoneal cavity, which was infected, was packed with gauze. A localized abscess to the outer side of the cæcum was opened. The appendix, which was gangrenous, had perforated, liberating three concretions. It occupied a position behind the cæcum, running upward toward the liver. It was removed. There was about 250 c.c. of foul-smelling pus in the pelvis, yellowish-white in appearance, and thin in consistency. Drainage was secured with a glass tube and gauze.

The patient lived but twenty-four hours after the operation, profound and continuous sepsis being the cause of death. The postmortem showed a secondary abscess beneath the liver, and fibrinopurulent peritonitis.

Case V.—Miss A. B., twenty-four years of age, was admitted to the German Hospital August 29, 1905. She had been ill for five days. The attack began with pain in the right iliac fossa, becoming general. Vomiting began on the third day of the attack. The bowels moved freely.

On admission, her abdomen was moderately distended and rigid. There was dulness on each side below the umbilicus. The flanks were tympanitic and very tender, the greatest tenderness being over McBurney's point. The leucocyte count was 24,000.

The patient was operated upon on the day of admission. On opening the peritoneum, about 750 c.c. of yellowish-gray pus escaped. The intestines were injected, and in places covered with plastic exudate. The appendix was perforated one centimeter from its base. Through this perforation a fecal concretion, pus, and fecal matter had escaped. The pelvis was full of pus.

The pelvis was drained with a glass tube and gauze, four pieces being used. The following day, the woman's temperature was 99.4°; pulse, 116; abdomen, soft. The bowels were moved in forty-eight hours, and gas passed freely. The patient was discharged one month after the operation, with a granulating wound of the abdomen.

Case VI.—Llewellyn B., sixteen years of age, was admitted to the Germantown Hospital January 18, 1906, complaining of

pain in the right iliac region. The attack had come on twelve days before, with some pain and vomiting. The patient felt better after this, but was not entirely well; although he went to school regularly. Tuesday night, two days before admission, he had a second attack of pain and vomiting. A nearby physician made a diagnosis of indigestion and gave some peppermint preparation. The next day the patient went to school.

The same day, the regular family physician was called, and found the boy suffering but little. The abdomen was soft; the temperature was but slightly elevated; and there was some pain in the appendiceal region. The diagnosis of probable appendicitis was made. Salts were given in repeated doses; and the parents were instructed to notify the physician at once, if the patient showed any symptoms of getting worse. At ten o'clock the patient vomited; but he slept the greater part of the night, according to the statement of his father, who did not consider him very sick. He tossed about some, but this was thought to be due to the salts.

Early on Thursday, the family physician saw the patient again, and a diagnosis of appendicitis was made.

The boy was admitted to the Germantown Hospital the same day. On admission, he complained of pain in the right iliac region, but he could not definitely put his hand upon the spot. The rectus was rigid; tongue, slightly coated; mental condition, dull. He was slow to answer questions, and was apparently somewhat excited by the examination. He did not know about his bowel-movements lately, but told about his attending school.

Immediate operation was advised. A lateral incision was made through the right semilunar line. Pus oozed from the wound. The area was thoroughly packed in every direction with large gauze sponges. The omentum was tied down in the region of the appendix; the lowered end was thickened, and a dark mass of it was found surrounding the appendix. This was tied off and amputated. The appendix on being lifted up, was found to be perforated and dark. Out of the perforation rolled a large concretion. The appendix was ligated and removed; and the stump was inverted and closed over with Lembert sutures. Removal of the gauze pads showed creamy pus in every direction. A glass tube, packed around with iodoform-gauze, was placed

in the pelvis. A rubber tube was inserted through a lumbar incision to drain the region of the stump. Three pieces of iodoform-gauze were placed to drain the abdomen; and a fourth piece was used as a cofferdam. Morphin sulphate was given before the patient came out of the ether.

The patient was discharged February 17, with a strip of gauze in the lumbar wound. The fascia was brought together with sutures two weeks before discharge.

Case VII.—Robert A., twenty-six years of age, was admitted to the Germantown Hospital October 16, 1905, service of Dr. A. D. Whiting, complaining of pain in the lower abdomen, which was tense, rigid, and tender to palpation. Rectal examination showed a fluctuating mass in the right side of the pelvis.

The patient was etherized. A small incision was made through the right rectus. In the right side of the pelvis was an immense abscess, containing a large quantity of greenish-yellow, foul-smelling pus. This was allowed to run out; and the cavity was then sponged and irrigated with normal salt-solution. The appendix was not removed. A glass drainage-tube was inserted into the pelvis. Iodoform drains were placed at the side of the tube, running into the pus-cavity. The patient recovered from the attack, and was sent home.

He was readmitted March 6, 1906, service of author, for appendiceal abscess with intestinal obstruction; pulse 104, respirations 28, and temperature 99.6°. There was severe aching pain in the lower abdomen, which had lasted three or four days, during which time the patient had had no bowel-movements, notwithstanding that purgatives in heroic doses had been given him. The pulse, temperature, and respiration remained normal until after the operation. The abdomen was distended, and had a saggy, doughy feel. There was very slight tenderness in the lower abdomen. The patient had vomited several times but there was no fecal vomiting. The general condition, with the history, was strikingly suggestive of obstruction of the bowel; and the patient was operated on, March 7, for that condition.

An incision was made, cutting out the scar of the previous operation. Numerous adhesions, binding the bowel down, were found. These were broken loose, and in doing so an abscess was found in the right pelvis. This was opened and drained, pus flowing freely. The general peritoneal cavity was involved in

the infectious process, giving rise to the obstructive symptoms. Four strips of iodoform-gauze were left in as drains, and pushed up toward the liver and spleen; and others, into the right and left pelvis, respectively. A glass drainage-tube was pushed to the bottom of the pelvis. The patient made a satisfactory recovery, after a prolonged convalescence.

Case VIII.—M. W. was admitted to the Germantown Hospital on February 12, 1906, evidently in the second week of typhoid fever. His previous history is of no importance. Twelve days after admission he complained of a sudden severe, cutting pain in the abdomen, in the region of the appendix. The right rectus was rigid, there was tenderness, and the patient was sweating profusely. The pulse jumped from 98 to 104; the respirations, from 24 to 34. The temperature dropped from 101° to 99.6°.

Operation was performed seven hours after perforation had occurred. The perforation was six inches from the cæcal junction, completely sealed off by omental graft. There was diffused peritonitis. A glass tube and gauze drainage were inserted. The tube was removed in five days, and was replaced by a rubber tube. Fecal fistula occurred on the seventh day. Diarrhœa was the only bad symptom. Death occurred on the 26th, and was preceded by abdominal pain and tenderness, but no vomiting. The temperature rose to 108°; the pulse was uncountable. Perforation took place through the original opening, which had been closed by omental graft. The gut around the opening was gangrenous, as was the gut in touch with the area of the drainage-tube. The peritoneum of the pelvic walls and the parietal peritoneum were gangrenous. General peritonitis was present, and death took place fourteen days after the operation.

Dr. Ross, remarking upon these cases, said that it is evident that general purulent peritonitis is not necessarily fatal. Murphy claims thirty-three cases of perforative peritonitis with one death. The statistics of other operators show various rates, from 50 per cent. to 70 per cent. of recoveries. In this short series, two out of seven cases due to appendicitis died—a death-rate of about 30 per cent.

The outcome of a case of general purulent peritonitis depends on the character of the infection, the quantity of the infection, and the area involved, rather than on the treatment

instituted; although this treatment is a necessary adjunct to recovery in the majority of cases.

Operation should be performed early, and should be minimized to essentials,—*i.e.*, the abdomen should be opened rapidly, the focus of infection at once located and removed, the cavity of the pelvis and the area of original infection thoroughly and rapidly drained, and the wound dressed. The average time for these maneuvers should not exceed ten minutes. Time and the amount of anæsthetic are of great importance. These cases do not stand prolonged anæsthesia and handling of the viscera.

These are some cases in which irrigation is indicated—the cases of late operation, when the pus is thick and creamy. When irrigation is used, it should be thorough. His method was to place one hand in the cavity of the peritoneum, and have an assistant pour salt-solution from a pitcher as fast as it will run into the incision. The hand in the cavity is constantly working and agitating gently the abdominal viscera. This requires an extra five minutes, but is justifiable in these circumstances.

Fowler's position; rectal transfusion, continuous or periodical; and morphin, are important adjuncts to the treatment after operation.

The class of appendix cases most to be dreaded are those in which the organ occupies a retrocæcal position, toward the outer side and behind the cæcum, with the tip of the organ in proximity to the liver. These are the cases that die of sepsis. They develop symptoms early; the symptoms of general infection are severe, rapid, and out of all proportion to the local signs; the organ is so deeply placed that the signs are obscured; and drainage and removal of the appendix does not seem to reach the avenue by which the infection is traveling toward the liver. Even drainage of the retroperitoneal space does not prove satisfactory in all cases.

Dr. Francis T. Stewart, although he agreed with Murphy, Le Conte, and others regarding the principles of the so-called Murphy treatment of general peritonitis, in his own experience results before its adoption were just as good as those since it has been employed. Such results may, however, be accidental and not to be attributed entirely to treatment.

Dr. Robert G. Le Conte differed with Dr. Stewart as to the value of the Murphy treatment. He (Le Conte) has had a small

series of cases of general peritonitis and has obtained a vastly better percentage of recoveries since adopting the Murphy treatment, the increase being 50 per cent. or greater. In the previous cases he did not employ any one method. Sometimes he irrigated, sometimes he sponged, and consequently the treatment varied. Formerly his mortality at the Pennsylvania Hospital was 70 to 80 per cent. His results now are not so good as those of Murphy but they are at least twice as good as they were previously. Whether or not this showing is accidental he cannot say. He is not prepared to state positively, but he believes the results are due to the treatment. The rationale of the method appeals to him very strongly, and he regards Murphy's method as the ideal way to treat cases of diffuse septic peritonitis.

Dr. Ross agreed with Dr. Le Conte as to the value of the Murphy treatment; it is founded on good surgical principles. It is true that of his seven cases he irrigated two and both recovered, but in them the character of the pus was different. It was thick and creamy, like that found in ulcers. Such cases are not to be feared as are those with thin, blood-streaked pus. The character of the infection is consequently of great importance in cases of peritonitis. In a class of cases mentioned, namely those with the appendix posteriorly and high up, the circulation carries the infection through the liver and the mortality is very high; no method of treatment can save most of these cases. When Dr. Ross is operating and sees free pus he at once puts in ten or twelve gauze pads around the site. These absorb pus while he is removing the appendix and thus save time by withdrawing the pus when later they are taken out.

CONGENITAL FISTULA IN TONGUE.

Dr. George G. Ross exhibited a man who since birth has had a fistula two inches deep in the median line of the tongue. From this can be pressed pus-like material containing no epithelial cells nor special bacteria. The cavity holds two drachms of pus. It has been suggested by Dr. Jopson that the condition is one of lingual fistula due to the congenital presence of thyroid tissue at the base of the tongue.

Dr. Robert G. Le Conte thought the condition to be one of congenital thyroglossal duct and that misplaced thyroid tissue may be at the end of the sinus. His procedure would be

to inject the fistula with colored fluid and then dissect toward it from the submental region until the sinus is reached. This can be followed to its base and the entire affected area removed. Within the past six weeks Dr. Le Conte has seen at the Pennsylvania Hospital a case of different origin but of somewhat similar character. It was a case of complete, branchial fistula. The external opening was at the anterior border of the right sternocleidomastoid muscle and the internal at the posterior part of the right tonsil. The case was treated by injecting the sinus with methyl blue through the skin opening, which was about the size of a hypodermic needle. The sinus was dissected out parallel to the sternomastoid muscle and the duct ligated one-fourth inch from the mucous membrane of the pharynx. Two weeks after the operation the patient was again seen; the wound had healed, and there was no sign of a return of the condition. Dr. McCoy examined the throat of the patient before the operation to see if the internal opening could be detected; the mirror failed to reveal it. That the fistula was complete, however, was shown by the fact that material passed through it when the child swallowed.

NORMAL PYLORUS SEVEN YEARS AFTER A SIMPLE PYLOROPLASTY FOR STRICTURE.

Dr. John B. Roberts reported the case of a man fifty-five years of age who was admitted to the Polyclinic Hospital on February 27, 1899, complaining of gastric symptoms for fifteen or eighteen years. He had pain after eating, which continued until the stomach was emptied by vomiting. He was weak, emaciated and anæmic. Investigation of the stomach by lavage and other clinical methods caused a diagnosis of stricture of the pylorus with gastric dilatation to be made. On April 4, 1899, Dr. Roberts did an ordinary pyloroplasty by making a horizontal incision through the pylorus and uniting the wound in a vertical direction. There was no tumor of the pylorus and the condition was considered to be a fibrous contraction. The patient immediately had relief from the pain and vomiting and gained greatly in weight. He was discharged cured about six weeks after operation.

During the next six years he consulted the reporter on two occasions complaining of some gastric distress, which was attributed to a recurrence of the contraction, and it was suggested that he return for investigation, treatment and probable repetition of the operation. After each of these conferences, he, however, disappeared from view. He was a man of limited intelligence.

In April, 1906, he entered the Polyclinic Hospital for the relief of dysuria, under the care of Dr. F. T. Stewart. At the Hospital he complained of no gastric trouble and was able to eat and digest even meat. Dr. Stewart found a mass in the pelvis, which interfered with the voiding of urine, and made an exploratory abdominal incision on May 18. He found a mass, probably carcinomatous, involving the rectum, sigmoid colon and bladder, which was inoperable. The patient died two days later unexpectedly, probably from uræmia.

At the autopsy there were found a few old adhesions between the old celiotomy wound and the anterior wall of the stomach. The adhesions were in some parts quite dense, though most of them were easily broken up. The pylorus, according to Dr. John M. Swan, the pathologist, showed no sign of the former operation, except that the pyloric ring was not as distinct as usual. There was no thickening in this region and the pylorus admitted several fingers. There was some evidence of chronic gastritis with moderate dilatation. The specimen was not preserved for presentation with this report.

Dr. Roberts said that he presented this report to the Academy because it seemed to him to be interesting to have an opportunity to examine a simple pyloroplasty seven years after operation and to find that the mechanical effect of the operation continued to be all that was desired. There has been some discussion as to the value of this procedure, but, in the case under consideration, it certainly was the means of saving the patient's life. It is possible that the condition, for which the operation was done, was a spasm of the pylorus rather than a fibrous constriction. The latter condition was the lesion however which he believed to be present at the time he examined the pylorus and operated upon it.

Dr. Charles F. Nassau gave the detail of a similar operation he performed five years ago. The patient was a woman who suffered from constant vomiting until she had become markedly emaciated. She was in the Presbyterian Hospital for six weeks, where she was seen by Dr. Hughes. She grew progressively worse, the vomiting being uncontrollable by any method of treat-

ment, and rectal feeding became necessary. No mass was felt in the abdomen and repeated stomach examinations were practically negative. Finally Dr. Hughes thought he felt nodular thickening along the right ureter, though there were no symptoms referable to the kidney. Exploratory laparotomy was performed and no explanation for the condition of the patient was at first found. A peculiar condition of the small intestine was that every three or four inches were fecal balls. These were not scybalous, being easily indented, and between them the intestine was collapsed, giving it a bead-like appearance. The little finger could not be passed through the pylorus and the operation as described by Dr. Roberts was performed. After a stormy convalescence the patient improved very greatly, gaining twenty-five pounds in a relatively short time. Her present condition is good. At certain times if she hurries after a meal she vomits, but she is in very good health for a nervous woman. In the absence of over-exertion the stomach functionates satisfactorily. It is difficult to say what the real condition in this case was, but relief by operation was fully demonstrated. This operation gives a mortality far lower than that of gastro-enterostomy, particularly when there is no dilatation of the stomach to justify the latter procedure.

PERITONEAL EFFUSIONS RESEMBLING BILE IN COLOR.

Dr. Gwylym G. Davis said that four cases had recently come under his notice bearing on the question of the origin and character of wound and peritoneal effusions resembling bile in color.

The first case occurred in a man about twenty-eight years of age while under treatment for gonorrhœal arthritis of the knee in a chronic stage. He was suddenly seized with severe pain in the abdomen about twenty-four hours before Dr. Davis saw him. It became rapidly worse and when seen by the reporter his abdomen was distended, evident peritonitis, slightly more tender at McBurney's point than elsewhere, but with no mass or dulness to indicate that the trouble was mainly at that point. Through a transverse incision over the appendix it was found to be somewhat hardened and injected, but not gangrenous nor perforated and apparently not sufficiently diseased to be the cause of such a widespread peritonitis. There was a

large amount of dark, grumous peritoneal fluid and only a slight amount of lymph, but the sponges used (gauze) were stained by the fluid a golden yellow color. Thinking this color might be due to bile, after removing the appendix, the wound was closed and another made over the gall-bladder along the edge of the ribs. The gall-bladder was found bathed in the same dark effusion but healthy. The incision was then prolonged toward the median line and the anterior wall of the stomach examined, with a negative result. An opening was then made through the gastrocolic omentum and the posterior wall of the stomach and pancreas, with the cavity of the lesser omentum, were explored, but nothing was found. The wounds were closed and the patient made a perfect recovery and was soon as well as ever.

The second case was in a young boy with a compound separation of the lower epiphysis of the femur. Several days after the injury the white gauze dressings showed the same golden yellow color as in the first case. He progressed favorably.

The third case was in a man about fifty years old who was brought to the hospital almost *in extremis* with diffuse general peritonitis. An examination showed an injected appendix otherwise apparently healthy. Purulent lymph through the intestines and a large amount of grumous, dark, peritoneal effusion staining the gauze sponges golden yellow. A hasty examination of the gall-bladder showed it to contain bile and it had a patch of purulent lymph on it. It was not at all thickened by inflammatory action but entirely normal in consistency. The stomach was normal. Both wounds were drained but the man died some hours later.

The questions arise as to what causes the peritonitis and why was the effusion golden yellow in color? In the first case the appendix was almost certainly the cause of the disease, as its removal and cleansing of the abdomen cured him. In the third case either the appendix or gall-bladder could be possible causes but neither was perforated; and it seemed more likely that here again the appendix was the primary focus. The pancreas was not the source in either case. Both cases lead one to think that the most virulent types of peritonitis can be produced by a diseased appendix with no adhesions, no perforation, and only showing a slight injection.

As regards the peculiar color of the effusion it was due to disorganization of the coloring matter of the blood. That it was not due to bile in the first case was shown by its absence being demonstrated by a chemical examination of the effusion. In the second case, as it was one of compound separation of the epiphysis of the femur, it was evident that bile could have had nothing to do with it. In the third case the gall-bladder was found to contain bile which did not exude through any perforation of its walls when subjected to pressure, hence it was probably not the source of the bile-colored effusion.

These facts should teach us to be chary about attributing to effusions which stain gauze sponges a golden yellow color a biliary origin.

In a case recently of rupture of the liver, as soon as the abdomen was opened black liquid and clotted blood poured out; when this was rapidly cleansed away the intestines were seen stained over a large area a dirty yellowish-brown color. They were positively stained and not, as in the former cases, of a red color and bathed in a dirty liquid.

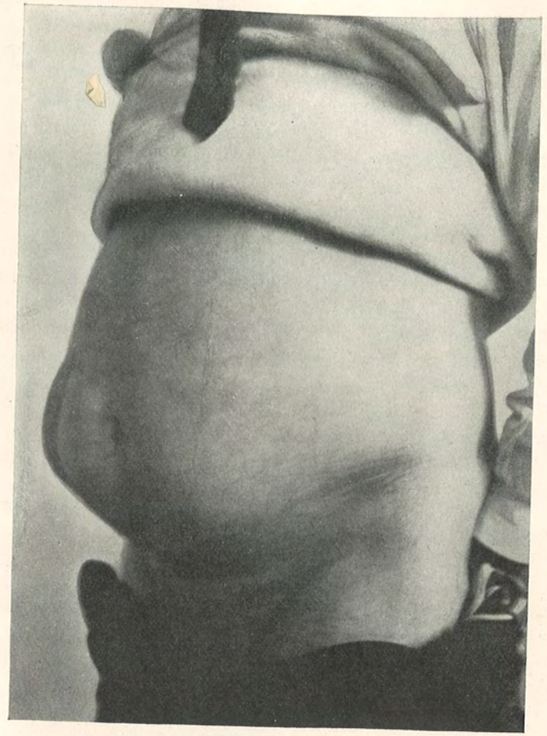
On examining the liver a deep rent was seen to the right of the gall-bladder, extending completely through its substance from the transverse fissure on its lower surface up through the free edge to the coronary ligament on top. This man died four days later, possibly of biliary toxæmia but not of hæmorrhage or peritonitis.

THE WEAKENING EFFECT OF A LONGITUDINAL INCISION THROUGH THE RECTUS MUSCLE.

Dr. Gwilym G. Davis reported the case of a man about forty-six years of age, who had been operated on for appendicitis about a year previously. It was a suppurative case, with drainage, and the incision was made through the right rectus muscle about an inch from its outer border. It extended from an inch and a-half above the umbilicus to three inches below. He was a stout man and wore an abdominal belt After recovery the rectus muscle in the region of the wound began to protrude and particularly when the belt was off gave him considerable discomfort. He applied for treatment because during the past two months the protrusion had markedly increased.

On examination the scar was found firm in its full extent;

Fig. 1.



there was no parting of the muscle with hernial protrusion through the line of incision. There was no ventral hernia but the whole rectus muscle opposite the level of the incision bulged forward. The line of the incision can be distinctly seen in the photograph (Fig. 1), not as a protrusion but as a depression with the bulging of the paralyzed muscle alongside. In this case it is probable the tenth, eleventh, and twelfth thoracic nerves were divided. The patient was treated by widely excising the scar and sewing the anterior and posterior layers of the sheath of the rectus and the muscular fibres together in separate layers.

In the January 1906 issue of the ANNALS OF SURGERY he had published a paper in which he had advocated a transverse incision for the operation of appendicitis and gave as one reason the avoidance of injuring the nerve supply to the rectus muscle. This case is illustrative of that point. The popularity of the incision through the rectus can only be accounted for by the belief that the amount of paralysis of the rectus which is produced is unimportant.

That this is so, at least to a considerable extent, when the incision is quite small, may be admitted, but frequently what are expected to be easy cases prove to be more difficult. The desirability of additional room causes the incision to be enlarged and also sometimes pus necessitates drainage and then the incision is not so innocuous and conditions such as shown in this case occur as sequelæ.

DR. CHARLES F. NASSAU said he had a great deal of interest in the subject of abdominal incisions as during the past eight years he had studied the effects of many rectus incisions in his gynæcological work at the German Hospital. He has become convinced that a large percentage of abdominal cases are followed by paralysis of the abdominal wall or by hernia. We say that if wounds heal by first intention there will be few hernias, and this has been well shown by Maurice Richardson. But while it is true that primary suppuration of a wound exercises a great influence on the subsequent occurrence of hernia, at the same time we often see hernias when the appearance of the scar indicates that union by first intention had occurred. The appearance of the scar may be misleading, but when this is reinforced by questioning the patient as to the length of time in bed and the

number of times the wound was dressed, the conclusion must be reached that hernia occurs even in wounds that heal by first intention. Unquestionably these cases are due to paralysis of the inner side of the rectus muscle which has been deprived of its nerve supply. Analogous cases are those known as crutch paralysis, wrist drop, etc., which follow interference with nerves, and prove that paralysis may be due to such injury. If the nerve supplying a muscle be cut, the muscle becomes valueless and gradually gives way with resultant hernia. All surgeons who have performed kidney operations necessitating extensive incisions have noted that afterward the entire side of the abdominal wall hangs pendulous. When Dr. Nassau makes a median incision he cuts the sheath of the rectus muscle and then pulls the muscle from the median line and avoids cutting it if possible. He began using the method advised by Dr. Davis before his paper appeared and has become convinced that if one employs this method or a modified McBurney, going toward the median line and downward when it is necessary to get into the pelvis, that paralysis will not follow. He operated on a patient last fall and through the incision determined there was no tubal or ovarian disease and also that there was no distention of the gall-bladder and there has been absolutely no paralysis since. When surgeons used the incision known as Sonnenburg's they recognized that the farther out it was made the less danger there was of hernia. This was due to the fact that in the latter instances none of the nerves supplying the internal oblique were cut. One can make the wound by the Davis method large enough to allow of any reasonable manipulation and yet by suturing layer to layer secure a firm wall if there be healing by first intention. If such incision be used in bad cases of appendicitis, not of the desperate type but those in which there is a question of drainage, the wound may be completely closed after a small wick is placed under and passed out posteriorly in the loin. Surgeons will find this incision more satisfactory the oftener it is employed. A second incision is of course necessary when the gall-bladder is diseased. An advantage of the Davis incision is that one can go down to the rectus muscle, pull it to the inside, and thus secure a great deal of room. Then if it be necessary to go into the pelvis the incision can be prolonged along the rectus because this will be below the nerves. On account of the frequency

with which this is necessary in women, Bloodgood often starts with a U-shaped or boomerang-shaped incision in the skin. One of course should not employ the incision if suspicious of pelvic disease in women, but in men it serves every possible purpose.

Dr. Robert G. Le Conte said he did not like to disagree with the proposition of Dr. Davis, but that he had performed hundreds of operations through the right rectus muscle, with and without drainage, and with perhaps two exceptions he has no knowledge of subsequent hernia. It is true that the patients at the Pennsylvania Hospital belong to a nomadic class and the statement does not mean that hernia has not occurred more frequently but that he has no knowledge of it. He incises the fascia fully and then tears the muscle fibres apart with his fingers. In tearing through the muscle the nerves are usually stretched but not lacerated. If the incision is more than three inches in length one or two nerves may be seen as white flaccid cords, traversing the incision. He frequently separates the muscle bundles above or below these little threads in the wound. There is no paralysis of the rectus from this incision. He is of the opinion that the incision recommended by Dr. Davis does not give much more room than does the McBurney incision unless muscle fibres are cut across.

ACUTE HÆMORRHAGIC PANCREATITIS.

Dr. Francis T. Stewart reported two cases of acute hæmorrhagic pancreatitis. For the privilege of operating upon and reporting Case I he was indebted to Dr. Robert G. Le Conte, and for Case II to Dr. T. G. Morton.

Case I.—J. H., female, aged forty-eight was admitted to the Pennsylvania Hospital May 1, 1906. About sixteen years ago she had an attack of jaundice, which left as a legacy a severe indigestion characterized by more or less continuous epigastric pain, worse after eating, and attacks of vomiting. There has never been any blood in the vomitus or in the feces. The patient has lost considerable weight and has become a morphin habitué. During the past few years she has also had several attacks of "kidney trouble," *i.e.*, the lower extremities would become œdematous and the urine dark and reddish. Two days

before admission the pain became agonizing and the vomiting continuous.

On admission the temperature was 99 F., pulse 92, the respiration 36, and the expression anxious. There was excruciating pain in the epigastrium reflected to the back and to the left shoulder. The whole epigastrium was tender and the muscles moderately rigid. Beneath the muscles could be felt a mass stretching across the epigastrium. An incision through the right rectus muscle revealed scattered areas of fat necrosis on the great omentum and one spot on the jejunum. The pancreas was exposed by tearing through the gastrocolic omentum; it was twice the normal size, indurated, inflated with blood, and covered with areas of fat necrosis, one of which was excised and proven to be necrotic fat on miscroscopic examination.

There was no free blood in the lesser peritoneal cavity. A horizontal incision about four inches long and about one-quarter of an inch in depth was made into the pancreas and packed with gauze for the purpose of drainage; there was very little bleeding from this incision. The gall-bladder, which was tensely distended with bark bile, was drained, it being fastened in the upper angle of the wound. No stones could be found. Cultures from the pancreas and gall-bladder made at the time of operation were sterile. No pathological lesion could be detected in the stomach. Urine yellowish red, cloudy, whitish sediment, acid, S. G. 1022, considerable amount of albumin, no sugar, many hyaline and rather coarsely granular casts and leucocytes, and a few epithelial cells. Hewitt's test for lipose negative. Several subsequent urinary examinations were made with practically identical results.

Subsequent to operation the pain was markedly relieved but did not wholly disappear for three weeks. The gall-bladder fistula closed in three weeks, but there is still a small sinus at the lower angle of the wound marking the site of the pancreatic drain; pus from this sinus shows the ordinary pyogenic bacteria but no necrotic fat.

Case II.—C. W. female, aged fifty years, was admitted to the Pennsylvania Hospital November 25, 1899. She had never been ill before. The present illness began three days ago with sudden sharp pain in the epigastrium and vomiting. Previous to this the bowels moved regularly each day but since there has been absolute constipation. Purgatives and enemata were given each day without result. On the second day of illness the pain shifted from the epigastrium to the left iliac fossa and the vomitus became black and foul-smelling. On admission the temperature was 99 F., pulse 120, and weak, and the respiration 36. The countenance was pinched and covered with perspiration, the tongue red with a white strip down each side, and the breath fecal. The abdomen was distended and most tender in the left iliac fossa. Vaginal and rectal examinations were negative. Diagnosis, intestinal obstruction, Immediate operation, Median incision below the umbilicus revealed disseminated fat necrosis.

The patient's condition at this time was so serious that the wound was hurriedly sutured. Death at the completion of operation.

Postmortem made through the abdominal wound by Dr. J. A. Scott. Omentum speckled with round, yellowish white, slightly raised areas varying in diameter from one eighth to one-fourth of an inch. The mesentery but not the intestine showed the same spots seemingly following the blood-vessels. On microscopic examination these areas are found to be composed of fat droplets, granular material and many crystals. The pancreas is covered by a bloody plastic exudate, is indurated and about three times its normal size. The peripancreatic fat is necrotic in numerous places. The pancreas itself is deep red in color and shows numerous necrotic areas; it is infiltrated with blood, the hæmorrhages being most marked in the body and tail.

Urinary examination revealed albumin and casts, but no sugar.

Dr. Stewart stated that one point was worthy of discussion. The general advice in textbooks is to open and drain, but they do not say whether the pancreas should be punctured or incised, or if the lesser peritoneal cavity alone should be drained. Laboratory workers say to avoid incising the pancreas because the secretion exerts an untoward effect upon adhesions, the surrounding fat, and even upon other tissues. In the case reported he incised the pancreas. Is this the proper procedure? It did no harm in this instance, at least.

He recalled a case of gunshot injury of the pancreas, the bullet going also through both walls of the stomach. It occurred

soon after Park advised posterior drainage in such cases, but the wound was so clean and the peritoneum in such good condition that he did not drain, even after reading Mikulicz's statements on the subject. The patient recovered, hence leakage could not have been great. Park, Körte, and others advise posterior incision below the lower pole of the left kidney for drainage after the first incision has been made in front, the latter being usually done in order to make the diagnosis. In some instances they close the anterior wound after draining posteriorly. In his case he drained anteriorly.

STATED MEETING, HELD OCTOBER 1, 1906.

The Vice-President, ROBERT G. LE CONTE, M.D., in the Chair.

LYMPHANGEIOMA OF THE CHEEK

DR. FRANCIS T. STEWART reported the case of an infant, who was seen by him with Dr. Robert Pitfield soon after birth. The whole right side of the face was occupied by a soft semifluctuating mass which extended from the mid-line of the upper lip back over the parotid, and from the orbit down over the lower jaw (Fig. 1), and which bulged into the mouth. The right eye was

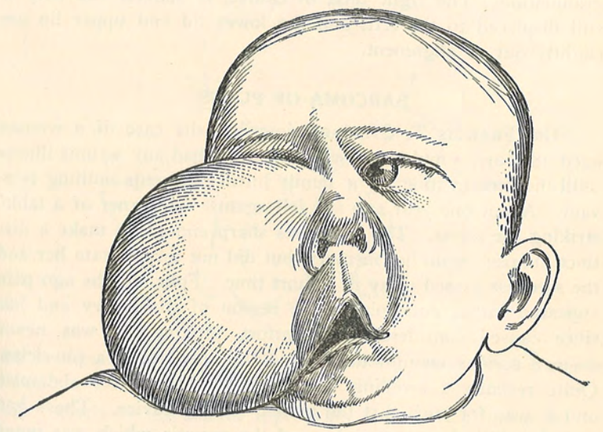


FIG. 1.—Lymphangeioma of cheek.

closed, the nose displaced to the left, and the mouth distorted. A hollow needle passed into the cheek withdrew a small quantity of straw-colored fluid. The skin was exceedingly thin and contained a few dilated veins but was not adherent. It was thought advisable to postpone operation as long as possible in order to give the infant a firmer hold on life. At the end of four months, however, the swelling had distinctly increased in size and there

was evidence of pressure effects on the upper jaw. Immediate operation was therefore advised. The skin was reflected by an incision similar to that employed by Weber for resection of the upper jaw, and the growth, which had also extended backwards along the floor of the orbit for about one-half inch, enucleated with but little loss of blood. There were apparently no muscle fibres in the cheek and at the completion of operation nothing remained but bone and very thin skin. After resecting the redundant portion of the flap, the mucous membrane was sutured to the jaw with catgut and the cutaneous incision closed with horsehair. Just as the operation was completed the baby ceased to breathe (ether had been employed) and artificial respiration was needed for some minutes. Primary union was secured except at a point corresponding to the inner canthus, which healed by granulation. The right face, of course, is sunken, the nose is still displaced to the left, and the lower lid and upper lip are slightly out of alignment.

SARCOMA OF PUBES.

Dr. Francis T. Stewart described the case of a woman aged 38 years, a multipara, who had never had any serious illness until the present time. The family history presents nothing relevant. About one year ago she fell against the corner of a table, striking the pubes. The blow was sharp enough to make a distinct impression on her memory, but did not incapacitate her and the soreness passed away in a short time. Four months ago pain appeared rather suddenly in the region of the injury and has since caused considerable discomfort, although it was never deemed serious enough to demand the services of a physician. Quite recently a swelling was noticed in the lower abdomen, and it was for such that the patient sought advice. There had been but little loss in weight, and the anæmia which was noted was said to have been present for many years. The tumor extended from the right anterior superior spine of the ilium to the left for 7½ inches, and rose about 2½ above the pubes, to the posterior surface of which it was firmly attached. The lateral extension on the right was moderately movable. The skin was at no place adherent. The growth was smooth, slightly lobulated, a little tender, and as hard as cartilage. The superficial veins were distended but no other pressure symptoms were

in evidence. The growth could be felt by vaginal examination but did not invade the uterus or appendages.

Operation was performed September 15, 1906, in the Pennsylvania Hospital. A long curved incision was made from the right anterior superior spine downwards and inwards across the abdomen to the extreme limit of the growth on the left. As the abdominal muscles were invaded, they were severed above the growth, thus exposing the peritoneum which was peeled from the mass except at three points where it was so firmly adherent that it tore, necessitating the use of catgut sutures. The bladder was not involved but the growth had displaced the right external

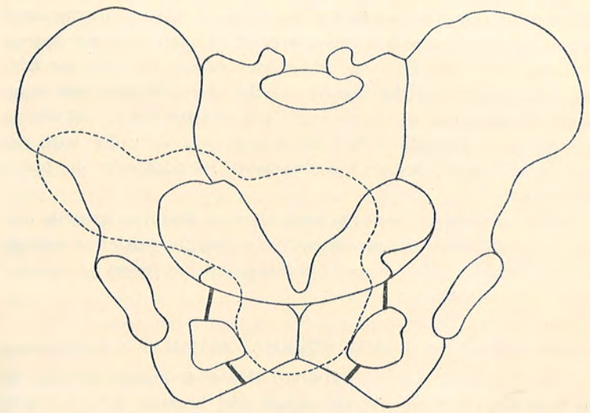


Fig. 2.—Sarcoma of pubes. Dotted line showing limits of tumor. Dark lines showing points at which bone was cut.

iliac vessels outwards and appropriated about two inches of the vein, which was therefore tied and severed above and below. Both round ligaments were cut and the remaining superficial soft structures separated or divided. The lower margin of the wound was then reflected downward, and both pubic bones separated from their fellows by the chisel, the amount of bone removed measuring four inches transversely (Fig. 2). The obturator vessels on the left were preserved, those on the right were sacrificed. Beginning on the left, the bone was elevated after some difficulty and forcibly turned to the right as the muscular

and ligamentous attachments were severed. It was possible to suture a portion of the lateral muscles on the right to Poupart's ligament, but the recti had retracted to the umbilicus and, as the operation had already consumed about two hours, no plastic work was attempted. The skin-wound was simply sutured except at the middle and the right end, where gauze drains were placed. Intravenous infusion was necessary towards the close of the operation but subsequently reaction progressed unaided. The following day the right leg was somewhat bluish in color and was evidently larger than the left but there was no œdema; there was, however, a sensation of "pins and needles" in the foot and the whole limb was moved with difficulty. On the second day the drains were removed but had to be replaced because of the large amount of lymph which was discharged. Œdema did not appear until the third day and has never been excessive. On the fifth day pus appeared in the wound but the infection has been comparatively benign and will probably not mar the result. It should also be noted that there has never been any difficulty with the bladder or bowels, despite the absence of muscles over the lower abdomen.

Examination of the specimen showed that the growth evidently sprung from the periosteum covering the posterior surface of the pubes. Microscopic investigation revealed a typical spindle-celled sarcoma.

STAB WOUND OF THE INTERNAL MAMMARY ARTERY.

Dr. John H. Jopson reported this case mainly because of the comparative rarity of the lesion and because it is the only instance he has encountered. The important vessels of the chest-wall that are liable to injury are the intercostals and the internal mammary. Only 15 cases of wound of the intercostals were recorded during the Civil War. In 1892 Schwartz collected 52 cases of injury of the internal mammary artery which had been reported during the past century. Among these were seven in which the artery had been opened during operation and these he excluded, leaving 45 cases of wounds proper. Surgically the internal mammary are more important than are the intercostal arteries.

Dr. Jopson's case was that of a man of 50 years who was brought to the hospital at 10 A.M. with a history of having been

stabbed a short time before. The man's clothing was saturated with blood and he was in a state of collapse, being practically exsanguinated. He was also under the influence of liquor. The wound was an inch in length, two and one-half inches to the right of the sternum in the second interspace, passing obliquely upward and inward; it was not bleeding. The resident physician applied a dressing and administered stimulants. At 1 P.M. Dr. Jopson saw the man. The wound was not bleeding, but though the man had reacted to stimulation the pulse was still of poor quality. At 4 P.M. the wound was examined and was not bleeding, but in a few minutes Dr. Jopson was called from the operating-room and found that severe hæmorrhage had begun. Compression was applied and the patient was at once prepared for operation. At this time he was not certain that the heart was not wounded. An anæsthetic was given and the wound enlarged. The internal mammary was found divided in the second interspace and both ends were bleeding. Both were tied with catgut sutures which included the surrounding muscle. Salt solution was infused, an iodoform gauze drain inserted into the pleura, and a dressing applied and the patient sent to the ward. The pulse reacted but soon went down and the man died that night. Autopsy by the coroner's physician showed atheromatous vessels. The pleura was full of blood but there had been no leakage from the ligated vessel. No other organs were injured.

Dr. Jopson said that the subject of wounds of the internal mammary artery had been specially investigated by Schwartz in his Königsburg dissertation, in which he analyzes 45 cases, as previously mentioned. Of the 45, nine died of acute hæmorrhage, which in four came from a wounded lung, heart or other neighboring structure, in 4 from the artery itself, and in 1 from an undetermined source. Of the 36 who survived the immediate effects, the wound became infected in 24, of whom 18 died and six recovered. Of the 12 with uninfected wounds, 8 recovered and 4 died. There were 21 cases of secondary hæmorrhage, 16 in the infected group, 5 in the uninfected group. In Dr. Jopson's case the consecutive hæmorrhage was brought about by strain during vomiting. In the reported cases, secondary hæmorrhage was due in some to vomiting, in others to straining at stool, or other muscular exertion. Schwartz concluded that ligature of the vessel is not an infallible means of preventing secondary hæmorrhage. He

believes that immediate ligature is not necessary, it being better to seal the wound primarily and raise the intrathoracic tension. The pleura is wounded in a large number of cases and this favors the continuation of hæmorrhage. Dr. Jopson believes that primary ligature is advisable. He also believes it would be better if we were more radical in our treatment of all penetrating wounds of the chest. Often we are too conservative in the presence of hæmorrhage, and even in the case of penetrating wounds of the chest in general. A year ago he reported a successful case of suture of the lung for hæmorrhage, and discussed the question of inserting a drainage-tube and controlling bleeding by establishing a pneumothorax as recommended by Le Conte. It is better to resort to a ligature of the bleeding vessel if it can be applied; if this cannot be done, then the establishment of a pneumothorax may be tried in hæmorrhage from the lung. In any case, even if the bleeding has ceased, infection is apt to occur. Two cases of chest wound he has had to treat in the past twelve months as empyema because of the consequent infection.

Dr. Edward Martin, speaking on the general subject of penetrating wounds of the chest, put on record a case bearing on the question of hæmorrhage. A negro climbing into a window was shot in the third interspace one-half inch to the right of the sternum. When seen later he exhibited the symptoms of hæmopneumothorax and progressive bleeding. An osteoplastic flap was turned back, revealing a cut internal mammary artery which was not bleeding. The man was turned on his side and three pints of blood poured out of the pleura. A bullet-wound of the lung, though not bleeding, was sutured and the lung sutured to the parietes. Though there was evidence of use of the lung afterward, the man died in ten hours from progressive bleeding. Autopsy showed that the internal mammary had not bled but that hæmorrhage had occurred from an intercostal artery which had been cut one and one-half inches from its origin by the bullet which had broken a rib close to the vertebral articulation. Had the X-rays been in use at that time the man might possibly have been saved. The case is recorded as an instance of a wounded internal mammary artery not bleeding and an intercostal bleeding which caused death.

Dr. George G. Ross cited a case in which he is not able to say whether or not the internal mammary artery was wounded.

The subject was an obese colored woman who was shot in the right side, the bullet going across into the left side also. The patient was in shock and there were indications of hæmorrhage. She reacted, however, and as there was no external hæmorrhage operation was not performed. Ten days later Dr. Ross evacuated two quarts of foul pus from the left pleura. As the woman recovered he does not know what internal organ was injured.

Dr. Robert G. Le Conte said that he had carried out experiments on the cadaver to determine the frequency of injury to intercostal vessels in wounds of the chest. His results appeared to demonstrate that the intercostal artery at the lower border of a rib would not be injured unless the rib showed marks of violence. The internal mammary artery is half an inch from the border of the sternum, and in case of a wound in this locality there is always the probability of injury of that vessel, and exploration should be made. If the artery is wounded as low as the fourth or fifth interspace it is questionable if the hæmorrhage will be severe enough to cause death, while if the wound is in the second interspace the resulting hæmorrhage will be fatal unless controlled. Should the vessel be injured below the third interspace—that is, below the origin of the triangularis sterni muscle—hæmorrhage may be controlled by packing against the muscle. Dr. Le Conte has seen this done in one case. Above this point the pleura alone is beneath the vessel, and packing cannot be employed, hence resection of a costal cartilage or enlarging the wound sufficiently to expose the artery must be done. The greatest danger of hæmorrhage is of course from a vessel that has not been completely severed.

Dr. Le Conte's experience with hæmorrhage from the lung is limited, but in his few cases of severe hæmorrhage he has simply made an opening in the pleura and allowed air to be drawn in. The rapidity of the formation of complete pneumothorax can be graded as desired. If alarming symptoms supervene the opening can be temporarily closed, followed later by the insertion of a smaller tube. He has seen no instance of this expedient failing to control hæmorrhage, and consequently has never had to seek a bleeding vessel in the lung. It is the ideal treatment, but where the patient fails to improve resection of one or more ribs becomes necessary, with a search for and direct control of the bleeding point.

DR. JOPSON, in closing, said that Schwartz's experiments on animals had shown the rapidity of bleeding from the internal mammary. A small vessel cut a short distance from the large one of which it is a branch will bleed almost as profusely as will a similar opening in the trunk itself. When the internal mammary is cut in the second interspace it is practically equivalent to making an opening the size of that vessel in the subclavian.

SURGICAL TREATMENT OF PERFORATING GASTRIC ULCER.

WITH REPORT OF THREE CASES, TWO ACUTE AND ONE CHRONIC.

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

OF PHILADELPHIA.

Surgeon to the Pennsylvania, to the Children's and to the Bryn Mawr Hospitals.

CASE I.—H. K., aged 26, white, laborer, single, born in Philadelphia, admitted to the Pennsylvania Hospital March 6, 1906.

Previous History.—Strong and healthy, but during the past six months has had more or less frequent attacks of indigestion, with pain and occasional vomiting; on two or three occasions the vomitus contained blood. Half an hour before admission the patient was standing on a box about two feet high, lifting a sack of oysters from the ground. He suddenly felt a sharp, cutting pain in the abdomen, and fell off the box, striking his left side. In a few moments this pain was intense. On examination there were no marks of contusion on the body. The abdomen was very rigid, particularly over the epigastrium, and there was exquisite tenderness in the region. He complained that the abdominal pain was agonizing. The pulse was good, but the temperature subnormal; sweating profuse; countenance drawn and pinched. He vomited once a small quantity of stringy mucus. The last meal was taken about five hours before the onset of the attack.

Diagnosis, acute, perforating gastric ulcer.

Operation was begun three hours and a half after the onset of the first symptom; anæsthesia with ethyl chlorid, followed by ether. A four-inch incision was made in the median line between the ensiform and umbilicus, and on opening the peritoneum a frothy fluid of pale green color was found free in the abdomen. The stomach, which was flaccid and empty, was immediately explored, and a hard, indurated mass found half an inch from the pylorus on the lesser curvature. The pylorus was brought into the wound and walled off with gauze. The thickened area was partially covered with lymph, with a distinct dimple at one point from which white scar-tissue radiated, evidently the cicatrix of

an old ulcer. No fluid was escaping, nor was an opening visible until the lymph was removed, when a thin pale fluid flowed out of a perforation about the size of a match head. This was inverted with a double row of Lembert sutures of Pagenstecher thread, and a piece of omentum tacked over the line of suture. A cigarette drain was carried down to the region of the ulcer and the abdominal wound closed with through-and-through silkworm gut sutures, the rectus fascia being united with a running catgut stitch. A buttonhole incision was made just above the pubis and a glass drainage tube inserted to the bottom of the pelvis. The abdomen was not flushed and the region of the ulcer alone was sponged. The patient was placed in bed in almost a sitting position and continuous enteroclysis used after the method of Murphy.

March 7.—The patient's condition is excellent. There is no pain; the water by bowel is well retained; temperature 100; pulse 80; bowels have moved once; very little drainage from the suprapubic opening.

March 8.—The patient has developed a bronchitis, with considerable cough and yellowish expectoration. The temperature is 100; abdomen slightly tender; bowels have moved once; no drainage from the suprapubic incision. The drainage tube was found to be entirely surrounded by omentum, which had penetrated the small openings and completely blocked up the tube. It was necessary to give the patient ethyl chlorid and to ligate and cut away a portion of the omentum before the tube could be removed. Water was given in drachm doses every 15 minutes. The convalescence from this time was uninterrupted. By the end of a week he was on a soft diet of eggs, custards, etc., which was gradually increased to the ordinary house diet. Cultures taken from the peritoneal cavity at the time of operation were entirely negative.

Case II.—D. L. B., aged 27, white, single, bartender, born in New York; admitted to the Pennsylvania Hospital April 21, 1906.

Previous History.—Has always been healthy, though given to slight excesses induced by his occupation. For a week previous to admission he had been feeling out of sorts, with some indigestion and general malaise. There was no vomiting and no previous history of indigestion.

While straining at stool he was suddenly seized with sharp

epigastric pain, which rapidly became agonizing. He was admitted to the hospital within half an hour of the onset of the symptoms. The epigastric region was found to be of board-like rigidity, with exquisite tenderness. The pulse was good; temperature subnormal; countenance anxious.

Diagnosis, acute perforating gastric ulcer.

Operation was begun within an hour of the onset of the first symptoms. Anæsthesia, ethyl chlorid, followed by ether. A four-inch incision was made through the inner border of the right rectus between the ensiform and umbilicus. There was no soiling of the general peritoneal cavity, although it contained a slight excess of fluid. The stomach, upon examination, was empty, and an indurated area was felt on the posterior wall near the pylorus, very close to the greater curvature. The gastro-colic omentum was torn through and the lesser peritoneal cavity found moderately soiled by gastric fluids. The indurated area on the posterior wall showed a perforation a little larger than a pin's head, which was partially covered with lymph. This opening was inverted with Pagenstecher thread and then whipped over with catgut. The lesser peritoneal cavity was sponged dry, but as it was feared that some of the fluid which it contained had found its way into the general peritoneal cavity during the operation, it was deemed advisable to drain the general cavity through a suprapubic incision with a glass tube. The upper abdominal wound was closed with a small cigarette drain leading to the lesser peritoneal cavity. The patient was placed in bed in a nearly upright position and continuous enterocylsis given.

April 22.—Condition remarkably good; free drainage from the suprapubic wound. Placed on drachm doses of water every 15 minutes.

April 23.—All drainage removed; enterocylsis discontinued; bowels freely moved. The convalescence was uneventful.

The night of the Fourth of July, after spending the day down the river with some companions, and having partaken of 14 or 15 bottles of beer and a large amount of cold indigestible food, he was seized with severe pain in the region of the stomach, with active emesis. Vomiting brought relief but was followed by a few hours of epigastric tenderness. At the end of 24 hours he was as well as ever. After such a test of overloading the stomach there is little doubt that the healing of this ulcer was complete.

These two cases are types of acute perforating gastric ulcer in which rupture takes place without warning, and where the patient is in apparent health and leading his normal life. In both, muscular effort was the exciting cause of the rupture, and in neither were there any peritoneal adhesions, although lymph had been thrown out in the first case in sufficient amount to temporarily close the opening.

The points in these cases to which I would invite discussion are, first, the question of drainage; and, second, whether gastro-enterostomy should or should not have been done.

1. *Drainage.*—In Case I the abdomen was opened three hours and a-half after the onset of the first symptom. Soiling of the peritoneum with a greenish fluid was moderate and general as far as the eye could reach. In view of the after history, as the suprapubic opening drained for 24 hours only, it seems probable that sponging or flushing the peritoneal cavity with closure of the wound without drainage would have been a safe procedure.

In the second case the lesser peritoneal cavity alone was contaminated at the time of operation, and drainage of this area with a gauze wick would perhaps have been all that was needed, although the tube leading to the bottom of the pelvis gave free drainage for 36 hours.

The reasons which led me to drain both these cases were, first, I have no fear of drainage, believing that if it does no good it is at least not a source of danger in a modern hospital. Second, I desired to use the method practised by Murphy for the treatment of general peritonitis—the exaggerated Fowler position; continuous enterocylsis, etc., and one of the essential steps in this procedure is a suprapubic opening to remove all fluids that drain into the pelvic cavity.

Granting that both these cases might have recovered without drainage, I still think their chances were slightly improved by using it.

2. *Gastro-enterostomy.*—In each of these cases the patient reached the operating-table in excellent condition. There was no necessity for hurry, and had there been any strong indication for gastro-enterostomy it could readily have been done. It was not done, first, because there was no external evidence of other ulcers being present either in the stomach or duodenum; and, second, because closing the perforation did not diminish the calibre of the pylorus.

If we consider the question of gastro-enterostomy from a mechanical standpoint only, it will be indicated when one of the three following conditions is present:

1. Multiple ulcers of the stomach or duodenum. When there are several ulcers and the one that has perforated alone is treated, *i.e.*, closed by suture, we leave the stomach in practically the same condition that it was in previous to the rupture, as nothing has been done to remove the sources of irritation which led up to the perforation. Each ulcer that remains is therefore a potential source of rupture. There is also the danger of hæmorrhage, which is ever present in a gastric ulcer.

2. Where suture of the perforation causes narrowing of the pylorus or duodenum to such an extent that the passage of food will be interfered with, gastro-enterostomy will be necessary to drain the stomach and prevent dilatation of that organ, with stagnation of food.

3. Where firm closure of the perforation cannot be accomplished through direct suture, and an omental patch has to be used, gastro-enterostomy is clearly indicated to prevent distention of the stomach and consequent strain on the patch. I say clearly indicated, but not imperatively, for I saw a case with my colleague, Dr. Gibbon, in which an omental patch was used to close an opening that could not be sutured, and recovery ensued without a gastro-enterostomy. In this case all foods and liquids were withheld from the stomach for a period of three weeks, the patient being nourished entirely by the rectum.

Unfortunately, these mechanical considerations cannot alone be our guide in the performance of a gastro-enterostomy, for the operator must carefully consider the following questions before it can be safely undertaken:

1. Is the condition of the patient sufficiently good to stand the lengthening of the operation by 20 or 25 minutes?

2. Is its performance likely to spread an already present infection or open up a new avenue for infection? For instance, the whole lesser peritoneal cavity will be open to infection when a posterior gastro-enterostomy is done for a rupture on the anterior wall of the stomach.

3. Can it be postponed to a later date when the patient's condition has improved and the peritoneal cavity is free from infection, the stomach in the meantime being placed absolutely at rest and the patient tided over by rectal alimentation?

If this last query can be answered in the affirmative the question is at once in abeyance, and its ultimate decision may be left to a more favorable time. As Mayo has suggested, a conservative and palliative operation with a living patient is better than a brilliant and completed one at a greatly enhanced risk.

I am indebted to Dr. D. E. Kercher, the attending physician, for the notes of the following case:

CASE III.—Chronic perforating gastric ulcer. Death from inanition. Mrs. L. H., aged 51; housewife; white; American. Mother died at the age of 57 of an injury; father and one brother died of tuberculosis.

Previous History.—Has always been fairly well; no children; normal menopause at 45. In June and July, 1902, she had frequent attacks of paroxysmal abdominal pain, which was not localized. Occasionally slight jaundice accompanied these attacks. They seemed to be traceable to dietary indiscretions. The abdomen was tender and there was slight rigidity in the region of the appendix. Rest with regulation of diet brought about entire relief.

September 19, 1902.—Another attack of severe abdominal pain, with tenderness, lasting several days.

December 12, 1902.—During the night she was seized with severe cramp pains in the lower abdomen, with marked tenderness and tympany. There was also slight tenderness and rigidity in the splenic region. The temperature was $100^{4}/_{5}$; pulse 110; complete anorexia. She lies on her back with knees drawn up.

This attack was treated with ice locally, and starvation. In

three days the tenderness had disappeared, except over the region of the appendix, but the temperature had risen to 102.

Pelvic examination showed a small, retroverted, adherent uterus; otherwise negative. Leucocytes 16,000.

At the end of ten days, as the tenderness still persisted over the appendix, operation was decided upon and this organ was removed by Dr. Kercher. At the same time the adhesions about the retroverted uterus were broken up and the fundus brought forward. The appendix was considerably injected, with a small hæmorrhagic area about one inch from the cæcum, and in the last three quarters of an inch the lumen was obliterated. For a week after the operation the temperature remained elevated, reaching 102, and then gradually declined. The recovery was complete. For six months she was free from pain, except for an occasional slight paroxysm in the epigastric region.

June 3, 1903.—At 3 A.M. she had a violent attack of stabbing pain in the right upper abdomen, which radiated to the left chest and into the bladder. The urine at this time was scanty, and on standing deposited a dense pink sediment. In a few hours constant nausea with retching developed. At the end of 24 hours there was frequent vomiting of dark brown stercoraceous material. The abdomen was greatly distended, with rigidity and tenderness in the epigastric region. For several weeks the temperature ran a distinctly septic course, ranging from 100 to 103. Epigastric tenderness was continuous, but otherwise there was little discomfort. On the 14th day pain was felt in the left lung, and an area of dulness could be mapped out in the mid-axilliary line at the level of the eighth interspace. This gradually became more distinct, and on the twenty-fifth day during a fit of coughing she felt something burst in the left chest and immediately began to expectorate foul-smelling pus. Microscopic examination showed this pus to contain streptococci and staphylococci, but no tubercle bacilli. There was prompt amelioration of all the symptoms; the purulent expectoration lasting four weeks. The appetite returned; she gained greatly in weight, and felt in better health than for many years.

This interim of comfort lasted until February, 1906, about two years and a-half. At the beginning of this month she felt stitchy pains in the base of the left lung at the site of the former trouble. On February 8, while attending a matinee, she was

seized with such pain in the epigastric and splenic region that she had to leave the theatre and be taken home in a carriage. By the time she reached home the pain was agonizing. There was considerable cough and she complained of being chilly. Temperature 100; pulse 108; respirations 28. Examination of the chest revealed only a few crackling rales over the lower left lung posteriorly. Ice was applied to the epigastrium and morphia given hypodermically. In 24 hours the entire upper abdomen was very rigid, but the pain had diminished. Leucocytes, 17,200.

There was dulness over the lower border of both lungs posteriorly, with crackling rales and bronchial breathing. The cough was severe; expectoration rather scanty, but on three or four occasions it showed a characteristic rusty appearance. This condition of the lung continued for a week, when the cough became free, the physical signs of consolidation disappeared and she was fairly comfortable. The tenderness in the epigastrium and the rigidity, however, remained, and pain was most severe when the stomach was empty and was always relieved by taking food.

February 22, 1906.—The epigastric pain again became very severe and boring in character, with nausea followed by frequent vomiting. The vomitus was black disorganized blood. The stools were also tarry.

At this time I was called in consultation. I found the patient suffering an agony of pain; abdomen distended; rigid in upper portion; exquisitely tender. The diagnosis of chronic perforating ulcer was made, and in view of her former attacks of slight jaundice and the relief of pain on taking food the ulcer was thought to be in the duodenum. Immediate operation was advised and accepted, and the patient at once removed to the Methodist Hospital.

Ether anæsthesia. A six-inch incision was made through the right rectus muscle between the ensiform and umbilicus. The right side of the upper abdomen was found free from adhesions. The gall-bladder and liver were normal, and the foramen of Winslow admitted the tip of the finger. To the left of the median line the viscera was densely matted together, and on breaking up the adhesions under the left lobe of the liver a large abscess was opened which extended posteriorly beneath the stomach. This cavity contained thick grumous pus filled with small dark blood-

clots, and on introducing the finger the tip seemed to enter the cavity of the stomach. The stomach was immovable and the adhesions were so dense that it was impossible to expose the perforation. As the condition of the patient was not very good it was deemed advisable to drain the abscess cavity with a rubber tube and gauze, the incision being closed with interrupted silkworm-gut sutures.

Reaction was prompt following the operation and there was immediate relief from pain. Slight nausea persisted but no vomiting. The drainage through the tube was very profuse, dark and flaky, with an odor of gastric contents. The patient was placed on nutritive enemata, and normal salt solution was frequently given by rectum. The discharge from the drainage-tube varied from 80 to 120 ounces in 24 hours, and it required but one minute for liquid taken by mouth to drain from the wound. Everything swallowed seemed to pass out through the drainage-tube. As nutrition could not be maintained the patient gradually sank, and died on the twelfth day of exhaustion.

Autopsy.—At the autopsy it was found impossible to expose the posterior wall of the stomach until the intestines had been removed from the abdominal cavity, the pylorus and œsophagus severed, and the firm adhesions binding the stomach to the posterior abdominal wall cut with a knife. The stomach was much contracted, the walls thick, and its posterior surface at the cardiac end contained a perforation the size of a silver dollar, with hard indurated edges. This perforation represented about one-third of the extent of the posterior wall of the stomach. The entire lower lobe of the left lung and the lower edge of the right lung showed recent consolidation.

From this history it is evident that the attack of June 3, 1903, was due to a perforation of this ulcer into a region that had been sufficiently walled off with adhesions to prevent a general infection. Slow leakage took place; a subphrenic abscess was formed, which perforated the diaphragm and discharged itself through a bronchus in the left lung.

The question comes up, Could anything else have been done at the time of operation except drainage of the abscess cavity? From the post-mortem dissection it was readily seen that an exposure of the perforation would have been impossi-

ble unless steps had been taken to remove the entire stomach. Therefore closing by suture was out of the question. In view of the density of the adhesions to the pancreas and the obliteration of all anatomical landmarks in this region, complete removal of the stomach would have been impossible during life. Our thought, therefore, was to drain the abscess with the hope that this cavity might be obliterated by adhesions and fibrous tissue, and during this time to support the patient by rectal feeding.

There was one other procedure which might have been tried had there been much improvement after operation; namely, a jejunostomy, for the purpose of feeding the patient and placing the stomach completely at rest, thus favoring the closure of the perforation by fibrous tissue. In this way the patient might have been tided over until she had gained sufficient strength to stand a more radical operation, or even a recovery might have ensued.

ACUTE GENERAL PERITONITIS WITHOUT DEMONSTRABLE LESION.

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OF PHILADELPHIA.
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CASE I.—A. L., (referred by Dr. Wilcox), aged 9 years, with a negative family and personal history, had been generally miserable for two weeks. On the day previous to her admission to the hospital she was seized suddenly with severe epigastric pain, accompanied by vomiting. The vomiting was repeated, and on the following day was accompanied by diarrhœa.

On her admission her temperature was 101.4, pulse 54, and respiration 28. She lay on the right side with her legs drawn up. The abdomen was universally tender, this symptom being perhaps more marked over McBurney's point. The muscles were rigid but not markedly so. There was absent peristalsis and repeated regurgitant vomiting. White blood-count 59,640. The diagnosis of general peritonitis was made, probably dependent upon perforative appendicitis or typhoid perforation, and immediate operation was performed. This showed the belly full of sero-pus with congested but not markedly inflamed intestines. Cultures showed a pure streptococcus infection. There were no pseudomembranes and the operation was completed in a few minutes, the belly cavity being thoroughly drained. The appendix was normal.

The patient died on the third day from septic intoxication. A searching post-mortem examination revealed no cause for the peritonitis.

CASE II.—L. L., aged 10 months; referred by Dr. Hoban; was seized with fever and constipation lasting one day and relieved by a teaspoonful of castor oil. A week later while seated in a high chair the latter tipped forward. The child was, however, caught before she struck the floor, though her abdomen struck against the guard common on such chairs. She cried for half an hour, was peevish some little time after this, and then seemed as well as ever and her accident was forgotten,—even her diet,

which contained among other things, bologna sausage, not being changed.

On the second day following the fall the child had a temperature of 104°. Calomel was given in 1/10-grain doses for three days, 3 grains in all being administered, but without result, though the mother had reinforced the doctor's efforts by syrup of figs and castor oil on her own responsibility. Because of the persistent constipation, intestinal obstruction was suspected and about two dozen enemata, some containing turpentine, were given without effect. The fever subsided, but vomiting became a more and more distressing feature of the case. During two days more large doses of castor oil, calomel and some croton oil were administered. On the fifth day of symptoms and the seventh day after the accident the child was admitted to the Howard Hospital. She was breathing 46 to the minute, with temperature of 100 2/5 and pulse imperceptible at the wrist. Vomiting was effortless and frequent, a thin, greenish material welling out from the mouth and nose. Abdominal palpation showed a rigid tympanitic belly, dull in flanks, and absent peristalsis. The child was treated by enemata, normal salt solution and whiskey being passed in slowly under very gentle pressure. The pulse improved in quality until it could be counted 144 to 154 at the wrist, but the child died in a few hours without showing reaction enough to justify any intervention which seemed to promise success. A careful autopsy was performed which failed to show any visceral lesion. The peritoneal cavity was full of extremely foul milky pus containing flakes of lymph. Bacteriological examination of this discharge was not made.

Case III.—M., aged 8 months; two or three days after a slight abdominal trauma, began to cry and vomit. Treated by purgatives to no effect. I saw her on the third day of her illness, when she presented a swollen, tympanitic belly, full in the flanks, without peristaltic sounds, a weak rapid pulse and hurried respirations and the facies of profound toxemia. There had been no bowel movement and vomiting was recurrent and regurgitant in type. The parents absolutely refused operative intervention and the child died in the course of 36 hours. Opportunity for complete autopsy was not given. The stomach and intestines were removed and most carefully examined. There was no inflammatory or perforative lesion.

These three cases occurring in my own experience suggest that we are possibly going through a period of over-reaction against the dark ages, when acute suppurative peritonitis without visceral or parietal causative lesion was regarded as common. We are now used to finding a visceral lesion in cases of acute peritonitis and our operations, even those of emergency, are so planned as to reach the cause of the inflammation. When we fail to find a definite local focus from which infection has spread we are prone to attribute this to an error in diagnosis, and an incomplete exploration usually necessitated by the profoundly septic condition in which these patients come to operation.

That there is or has been a lesion in cases of peritonitis following slight trauma cannot be doubted. It is certainly true, however, that this lesion may be beyond macroscopic detection. The indications for evacuation of pus and relief of tension are none the less absolute. It would seem advisable in cases of acute diffuse septic peritonitis in the absence of a preceding history pointing to a definite causal lesion to be content with an incision in the right lower abdominal segment, thus permitting a rapid exploration of the region from which most abdominal infections originate. If no causal lesion be found nor evidences of gastro-intestinal perforation further exploration should be omitted. This exploratory operation in the case of adults should be performed under local anæsthetics. With the majority of children the effect of fright and pain is far more depressing than that of a general anæsthetic, hence in them nitrous oxide should be used, since their struggle against it is brief and it is without serious after-effect.

Dr. John H. Gibbon regards Dr. Le Conte's first two cases as teaching the lesson that gastric ulcer is probably much more common than we think. Surgeons do not get more cases because the diagnosis is not more frequently made. In the series reported by Dr. Le Conte were two cases which gave no symptoms and in three of his own seven there was no history to lead to suspicion of ulcer. Since he reported four cases a few years ago he has met with three more as follows:

Case I was in a man of 50 with the typical history and symptoms of a gastric ulcer for a number of years. When seen by Dr. Gibbon he had been sick 36 hours and had all the evidence of general peritonitis. Operation revealed peritonitis and also a gastric ulcer but without perforation. Drainage was established but the man died next morning. At autopsy the entire alimentary tract was removed but showed no lesion except the gastric ulcer. There was a diffuse peritonitis and no adhesions to the ulcer. Dr. Gibbon believes it is possible to get infection of the peritoneum from a non-perforated gastric ulcer, just as this condition arises from the appendix, without macroscopic perforation.

Case II was a man, a typical alcoholic, who had a lead-pencil-sized perforation in the anterior wall of the stomach. The patient died five days later from delirium tremens.

Case III was the one referred to by Dr. Le Conte. There was the typical history of perforating ulcer, three-fourths grain of morphin having afforded no relief from the pain. The perforation was in the anterior wall toward the lesser curvature. It was patched up by means of omentum and the patient afterward recovered.

Of the seven cases seen by Dr. Gibbon three recovered. In two, death was due to lateness of operation, in one to delirium tremens, and in one to faulty technic. The last mentioned died on the twenty-fourth day from obstruction of the bowel and abscess of the pelvis. The insertion of a drain is the safest procedure for the majority of surgeons. He always feels more secure when a drain extends down to the point of perforation. The question of suprapubic drainage should be decided by the length of time that has elapsed after perforation and by the quantity and character of the fluid in the peritoneal cavity. Dr. Gibbon has always used suprapubic drainage. As to gastro-enterostomy when one is in doubt as to whether the pylorus has been closed in repairing the perforation, one point is to be remembered. Experience in closing typhoid and gunshot perforations of the intestine when the surgeon believes the gut is almost closed but finds later that the lumen is sufficiently open, makes one think that the pylorus will likewise stand a great deal of narrowing. Regarding secondary gastro-enterostomy Dr. Gibbon did one 18 months after operation for perforation. He agrees with Dr. Le Conte that it is a mistake to do a gastro-enterostomy

when perforation is present. It opens a new field for infection and is bad technic.

Regarding Dr. Martin's paper on peritonitis without visceral lesion, the surgeon not infrequently finds no cause to account for peritoneal infection and feels that possibly he has overlooked a lesion. It is comforting to hear that postmortem in the reported cases revealed no discoverable source of the peritonitis. Many such cases are probably due to the pneumococcus.

Dr. Gibbon is partial to local anæsthesia, but this is not satisfactory for exploring the abdomen, hence ethyl chlorid is used for this purpose. Four thousand cases of ethyl chlorid anæsthesia are now on record at the Pennsylvania Hospital. This anæsthetic is very satisfactory, especially if it is preceded by a small dose of morphin. He did a colostomy by its aid and the man was talking to him while the dressings were being applied. It is the ideal agent for short operations.

Dr. William L. Rodman is satisfied that the literature on the subject of gastric ulcer, in so far as perforation is concerned, has to be rewritten, as perforation is far more frequent than has hitherto been dreamed. During last May he spent a fortnight with Dr. Mayo, and during that time saw him operate on 12 cases of gastric and duodenal ulcer, and of these three had previously perforated; in all three the evidence was conclusive. Dr. Rodman has operated on three cases of perforated gastric ulcer which were latent, and previous to perforation presented not the slightest symptom suggestive of ulcer. In one instance one of the best medical men in the city had been in attendance and had not suspected the presence of ulcer.

As to the wisdom of drainage he agrees with Dr. Le Conte. It is not absolutely necessary in all cases but is very generally advisable. Suprapubic drainage is not necessary in the majority of instances but the necessity for such drainage must depend upon whether or not there has been gross soiling of the peritoneum and whether the extravasated material has wandered far from the site of perforation. If perforation occurs shortly after a meal, then suprapubic drainage would be indicated; if when the stomach is empty, it usually will not be needed. It must be remembered also that in a large percentage of cases of perforation, as shown especially by Cripps and English, the stomach contents are sterile, and far different from the intestinal contents.

As to performing gastro-enterostomy after dealing with a perforation, Dr. Rodman agrees with Drs. Le Conte and Gibbon that it is wholly unnecessary unless there be stenosis of the pylorus. Dr. Gibbon raised the question as to whether it is better to excise the ulcer than to do gastro-enterostomy. Both are in most instances unwise, but if the ulcer is accessible and the surrounding tissue not too necrotic, then excision is preferable to gastro-enterostomy. In regard to Dr. Martin's paper, he also has failed to find perforation in some cases and yet peritonitis was present. However, there is no reason why we may not find peritonitis without macroscopic lesion of the viscera. Infection of intra-abdominal tumors may occur because of their prolonged contact with hollow viscera; and without apparent lesion uterine fibroids have become infected through the intestine or the bladder. If then infection of tumors may occur in this way why should not peritonitis be caused in the same manner? Dr. Rodman agrees in the wisdom of using local anæsthesia, but it is unwise to attempt it in the case of children. He has several times performed laparotomy under local anæsthesia, using a weak solution of cocaine. In one case he used only carbolic acid. There was no pain except when the parietal peritoneum was cut. The patient was dull and in a semi-stupor and perhaps not so appreciative of pain as the average case.

Dr. John H. Jopson said that Dr. Martin mentioned finding the streptococcus in one of his cases of peritonitis without evident visceral lesion. In pediatric literature a constantly increasing number of cases of pneumococcus infection of the peritoneum are being reported. Clinically these cases are difficult to distinguish from those of streptococcus or other infection, and unless cultures are made a pneumococcus infection could not be excluded in the class of cases under discussion.

Dr. Francis T. Stewart has operated on seven cases of perforated gastric ulcer and in six he used drainage. Five recovered. In one he closed a perforation, did a gastro-enterostomy, and employed no drain; the patient recovered. He also omitted drainage in a case of typhoid perforation and the patient recovered. He cleans the peritoneum by irrigation with salt solution after thoroughly packing off the surrounding structures. Dr. Stewart assisted at one operation for perforated gastric ulcer in which the operator placed a drain at the site of the perforation.

Leakage occurred with a resulting gastric fistula and death of the patient from inanition. Given a recent perforation, should the patient be placed in the Fowler position? If the peritonitis is generalized, suprapubic drainage should be established and the head of the bed elevated. If, however, the soiling is confined to the upper abdomen, the foot of the bed should be raised in order to prevent dissemination of the infection. Gastro-enterostomy is in a transition stage at present and its indications and contraindications are not fixed. It should rarely be performed at the time a perforation is closed. An alarming number of cases of peptic ulcer of the jejunum have been reported as a sequel of gastro-enterostomy, a number of which have perforated. Several have been operated upon and some of these have recovered. All were foreign cases.

As to peritonitis without visceral lesion, Dr. Stewart has seen several instances in which the diagnosis was confirmed post mortem. In one case which survived, the gonococcus was found. A second case was that of a woman with a diagnosis of typhoid fever and a supposed perforation. Operation revealed peritonitis but no indication of typhoid fever and no visceral lesion. Cultures showed the pneumococcus. A third case was one of typhoid fever operated on for perforation; no perforation was found and the patient recovered. If the causative lesion be not found at once it is best to make a further careful search, as the lesion will almost always be finally located. Dr. Stewart assisted at one operation for supposed appendicitis in which suppurative peritonitis was found. Air came out of the abdomen but the operator simply removed the appendix, although that organ did not appear to be much diseased. Autopsy showed a leaking gastric ulcer which a more careful search would have located.

Local anæsthesia is often useful for exploratory purposes, but its use in these cases should be limited to the diagnosis of peritonitis. If this condition be found, general anæsthesia should be employed, as washing out of the abdomen or searching for a perforation cannot well be performed even in the adult by the use of a local anæsthetic.

Dr. John B. Roberts cited a case of traumatic ulcer of the stomach which was mistaken for a peptic ulcer. When the abdomen was opened for repeated vomiting of blood there was found a thickening of the posterior wall of the stomach near the

pylorus. Dr. Roberts did a posterior gastro-enterostomy which was followed by the vicious circle. Dr. Stewart operated later for this condition, and found two sewing needles, one in the liver and one behind the stomach, which Dr. Roberts had not left in the abdomen. The woman afterward gave a clear history of having eaten pie, some months previously, in which there was some foreign body which gave intense pain at the time of swallowing. Soon after this she had profuse vomiting of blood and applied to a dispensary for treatment. The swallowed needles were evidently the cause of the bleeding and probably caused a chronic ulcer where the thickening in the stomach-wall was felt at the time of the first operation. The case is a warning against being in too great a hurry to make the diagnosis of peptic ulcer before getting as full a history as is possible.

Dr. Charles H. Frazier alluded to a case at the University Hospital operated on by Dr. Norris for strangulated hernia. The following morning the patient showed evidence of collapse and it was thought that a ligature had slipped, giving rise to internal hæmorrhage. An exploratory laparotomy revealed a perforated gastric ulcer and the abdomen filled with blood. The perforation was closed but the patient did not react from the shock of operation and soon died.

Dr. John B. Roberts said he had lost two patients from perforation of gastric ulcer a considerable time after operation in the pelvis. One was a man upon whom he had performed suprapubic lithotomy; the other was a case of extraperitoneal rupture of the bladder, doing well after incision and drainage, in which death suddenly occurred. The abdomen was found at autopsy to be full of blood from sudden perforation of an ulcer of the stomach. There may be some definite connection between septic processes in the pelvis (one of his cases had suppurated) and duodenal or gastric ulcer, just as in the case of similar ulcers developing after severe burns of the skin.

Dr. Le Conte, in closing, made clear his position regarding drainage in cases of perforated gastric ulcer. In the majority of cases seen by the surgeon the abdomen is not opened within an an hour or two after perforation has occurred. When the extent of the soiling is as far as one can see or feel, then the case should be treated as one of general peritonitis, the patient placed in the exaggerated Fowler position, with suprapubic drainage and

employment of the other measures advised by Murphy. If one can use this procedure with success in the presence of an extensive peritonitis, why should it do harm where the peritoneal inflammation is more limited? This method of treatment does no harm and can do good.

As to peritonitis without visceral lesion, the condition is not common, yet most surgeons have seen one or more cases. In one case seen in the Children's Hospital, the attending physician and Dr. Le Conte had a long dispute, the former believing it to be one of peritonitis, the latter considering it pneumonia. After a delay of 48 hours Dr. Le Conte operated and found a diffuse peritonitis but no visceral lesion to account for it. The pneumococcus was isolated from the peritoneal contents and the autopsy showed that the infection had passed through the diaphragm from a pneumonic lung. He made this error because pain is often referred to the abdomen instead of to the chest in beginning pneumonia.

Dr. Martin, in closing, said he did not wish to be understood as advising against thorough search for a possible visceral lesion. He meant to say that in the absence of local symptoms and previous history exploratory opening may be sufficient. The Germans are the only people who can stand abdominal operations under local anæsthesia. In answer to a question by Dr. Ross, Dr. Martin said that peritonitis in the cases reported was not due to an intussusception which had been self-reduced.

STRANGULATED HERNIA OF THE OVARY IN A TWO MONTHS OLD INFANT.

Dr. Edward B. Hodge reported this case, which occurred in an Italian child. There had been a small umbilical hernia following infection of the cord at birth, but otherwise the child was healthy. Two weeks before admission a lump appeared in the right groin and four days later the child became fretful. On a Saturday the child vomited but had a stool as the result of an enema. On Sunday it vomited a number of times and on Monday was sent to the hospital. It had been in shock but condition on admission was good. It apparently had a hard strangulated hernia. Operation under chloroform showed a thick hernial sac which contained a swollen and discolored ovary, almost black, three and one-half by one and three-fourths centimeters in size.

There was no intestine in the sac. The ovary and tube were tied off and the parts repaired as well as possible. The child had good convalescence except occasional vomiting, and now appears to be well. It is a question if the condition of the ovary was not due to torsion or injury, as he is not satisfied there was constriction sufficient to cause the lesion present. To decide if there was a uterus bicornis it would have been necessary to enlarge the internal ring, and this was not considered justifiable. Hernia of the ovary is not extremely rare but appears uncommon enough to warrant the report of a case occurring at this age.

Dr. John H. Jopson believes this patient is one of the youngest subjects of operation for hernia of the ovary on record. A case of hernia of the uterus and ovary operated upon in a child of seven months has been reported by Defontaine. In cases of hernia of these organs there is frequently some congenital abnormality, as bicornate uterus, imperforate vagina, or pseudohermaphroditism. A case such as that reported by Dr. Hodge might lead to hernia of the uterus if adhesions of the ovary to the sac were present. In such cases the round ligament not infrequently is short and this aids in the production of the hernia of the uterus.

Dr. George Erety Shoemaker said he saw the patient referred to by Dr. Hodge three days before it was operated on. The mass in the groin was at first a small, painless swelling which he thought was infiltrated omentum. He advised temporizing on account of the baby's age, but at the end of three days the mass was four or five times as large as it was before and there was vomiting and subnormal temperature. He then sent the child to the hospital. The condition was no doubt congenital.

LARGE CYSTIC KIDNEY.

Dr. John H. Gibbon showed a specimen of cystic kidney in which the renal tissue had been entirely obliterated, none being demonstrable by the microscope. The question of diagnosis was interesting, the case being sent in as an ovarian cyst. In many respects it resembled that condition, but the diagnosis of cystic kidney was confirmed when the patient was put upon the operating-table. The tumor extended from the pelvis to the costal border and it would evidently have been foolish to attempt its removal posteriorly, hence it was taken out through the abdomen. It was tapped before removal and eleven pints and four ounces

of fluid withdrawn. This was accomplished as easily as any nephrectomy he has ever performed. The incision was made through the sheath of the right rectus muscle, the muscle pulled aside and the sheath opened beneath it. Five or six inches of the ureter, which was as large as the thumb, were removed, with the kidney. The remainder of the ureter was not explored, though this should have been done. This point was not considered until the ureter had been ligated, and then, as the patient was old and not in good condition, it was allowed to remain. Vaginal examination before operation revealed no stone in the lower part of the ureter. As high as 60 ounces of urine a day has been secreted by the patient since the operation. The vessels in the pelvis of the kidney were so distinct at the time of operation there was no trouble in their ligation. The vena cava was exposed for a length of six inches. Dr. Gibbon believes it is better in the case of a large growth of the kidney to go in anteriorly. Opening through the peritoneal cavity does not interfere with drainage.

Dr. Robert G. Le Conte stated that tumors of the right kidney are easy to remove under the circumstances narrated by Dr. Gibbon, the colon usually being internal to the mass. In the left kidney, however, the descending colon is often to the outer side and the tumor presents under the mesocolon. Consequently, the mesentery must be incised, and if the tumor is a large one the left colic artery must be divided before the removal can be effected. Ligature of this vessel endangers the life of the descending colon and is not infrequently followed by gangrene.

STATED MEETING, HELD NOVEMBER 5, 1906.

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

LAMINECTOMY FOR TUBERCULOSIS OF THE SPINE.

DR. JAMES K. YOUNG presented a girl, 14 years of age, who, on February 7, 1902, fell on the ice, striking the dorsal region against a step. Two months later, she was sent by her attending physician to the Orthopædic Hospital and a brace was applied. In the spring of 1903 she was admitted to the University Hospital for beginning loss of power in the lower limbs. Subsequently she was admitted to St. Joseph's Hospital and to the Polyclinic Hospital. In January, 1906, she was admitted to St. Joseph's Hospital under his care, and he performed a laminectomy the day following her admission. Throughout all this time from the date of the accident to the time of operation her condition had progressed steadily worse, with slight intervals of improvement. The 8th, 9th, and 10th vertebræ were involved; there was a marked kyphosis, and paraplegia came on early and was intermittent, but steadily growing increasingly worse. Fourteen months before the operation her limbs became spastic and she had exaggerated knee jerks, marked ankle klonus, and Babinsky reflexes on both sides, with at times crossed reflexes. There was still some motor power. The following month, November, 1904, she could walk around the bed holding on for support, but rather awkwardly. One week later she could walk alone, and there was great improvement.

She again relapsed after this, and in April, 1905, upon her admission to the Polyclinic Hospital, she was completely paralyzed and there was slight incontinence. In July, 1905, there was complete motor paralysis with slight incontinence which increased until at the time of the operation there was complete incontinence and complete motor and sensory paralysis.

On January 19, 1906, an incision five inches long was made from the third to the eleventh vertebra, the spinous processes of the ninth and tenth vertebræ were removed, and the lamina of the ninth vertebra was removed. An abscess was found beneath

this on the right side which was opened and drained. A catgut drain was inserted and the wound closed, except for the drainage.

On February 26 the sensation in the lower extremities was slightly delayed but was present on both sides, and slightly hyperesthetic. The patellar reflexes were exaggerated, ankle klonus was present on both sides, the left more marked, and Babinsky reflexes were present on both sides and were marked. There was some contraction of the right knee at this time. Thermal sensation was diminished.

She was treated with electricity and massage and sent to the seashore. The motor power has gradually improved, the abscess has closed, and she is now able to walk a short distance unassisted, and has regained perfect control of the bladder and rectum.

Dr. Young said that two points were illustrated by this case, first, the diagnosis of abscess by the intermission of symptoms, improvement and relapses; second, the possibility of recovery by means of the operation of laminectomy after complete loss of motion and sensation.

He did not share the ultra-conservative opinion expressed by some surgeons in regard to laminectomy, but believed that under certain conditions this operation is a justifiable one. For abscess pressing upon the cord and for early spastic contractions of the extremities he believed the operation should be performed earlier than is customary.

DR. HENRY R. WHARTON said the case reported by Dr. Young was eminently one for laminectomy, the presence of an abscess in the spinal canal showing that the patient's condition was hopeless without operation. Simple rest in some cases of Pott's disease results in restoration of motion and practical recovery, but in others laminectomy is the only alternative. The diagnosis of abscess is difficult; as pointed out by Dr. Young, intermissions in improvement are a valuable sign in this respect.

DR. YOUNG, in closing, said the crossed Babinsky reflex was the unusual feature of the case. Usually this sign is present on one or both sides. Here it was present on both sides and irritation of one foot caused the reflex on the opposite side.

TRUE DOUBLE LOWER LIP.

DR. JOHN B. ROBERTS presented a patient upon whom he had operated for the removal of a true second lower lip. The photo-

graph (Fig. 1), taken before operation, showed the double lip to consist of a thick outer lip and a thinner internal structure separated from the outer by a deep fossa lined with mucous membrane. In the median line of the mouth the two lips were fused together at the vermilion border and downward to the attachment of the structure to the alveolar portion of the mandible. The inner lip was dissected from the outer and incised. The raw surface was then covered by drawing flaps of mucous membrane over it. The patient's curious anomaly was corrected and his appearance much improved.

EXCISION OF HALF OF THE LOWER JAW AND HALF OF THE TONGUE FOR EPITHELIOMA.

Dr. H. S. Carmany exhibited, by invitation, a patient on whom he had operated one year previously for carcinoma of the tongue and jaw. The disease was of three months duration, and extended from the under surface of the tongue to the alveolar process of the inferior maxilla on the right side, and from a little beyond the median line to the last molar tooth. It was painful and growing rapidly, and the cervical glands were enlarging on the same side. Dr. Carmany excised the lower jaw on the right side from just below the sigmoid notch to a point a little beyond the median line, and with it the right half of the tongue, the submaxillary gland and a few small cervical lymph glands. The wound healed kindly, and the man has remained in good health. Dr. Carmany asked the opinion of the Fellows as to the advisability of applying a dental splint in these cases.

Dr. Charles F. Nassau said that one should never operate on carcinoma of the lower lip, tongue or jaw without taking out the glands of the neck. Twelve years ago Dr. Nassau operated in this manner upon two patients and five years afterward both were still free from recurrence. In any extensive growth of the jaw there is almost surely infection of the neighboring glands before they are palpable. Their removal is just as necessary as in connection with carcinoma in other portions of the body where the lymph channels are followed in the dissection. In Dr. Carmany's case life has undoubtedly thus been prolonged.

Dr. Charles H. Frazier said, in response to Dr. Carmany's inquiry regarding the use of dental splints in connection with partial resections of the lower jaw, that it had been his habit in his clinic at the University Hospital, always to consult a dentist

Fig. 1.

Double lower lip.

prior to the operation. Dr. Cryer or one of his assistants had always been kind enough to examine the case before the operation and construct a temporary splint, which was applied at the completion of the operation. A permanent splint in the meantime may be made and adjusted after the wound is healed. By adopting this method the disfigurement accompanying the removal of the lower jaw may be largely, if not altogether avoided.

Dr. John B. Roberts said that he had seen a case of this kind in which Dr. McBurney had a dental appliance made before operation. It was held in place by a spring and fitted so well there was almost no deformity of the part.

RUPTURE OF THE KIDNEY.

Dr. Morris Booth Miller, by invitation, reported the history of a man of 31, a special officer of the B. & O. Railroad, who while chasing thieves fell, striking on his left side over the lower rib. He walked a distance of fifty feet before feeling faint. He then passed by urethra what appeared to be at least a quart of blood and twenty minutes later a second quantity containing many clots. While on his way to the Polyclinic Hospital on a street car he was obliged to leave the car and again pass blood and urine. He walked into the hospital where six ounces of blood were withdrawn by catheter. Dr. Miller saw the man one and one-half hours later. There was no shock but the side was rigid and tender and an indistinct dull mass could be felt in the loin. An oblique lumbar incision was made. A mass the size of two fists was revealed and opened, showing extensive hæmorrhage and rupture of the kidney. The two poles were separated and the finger could be passed between numerous small fragments into which the middle segment of the organ had been divided. This caused severe bleeding. Wicks of gauze were placed against the kidney in front and behind, and by pressure the poles were brought approximately together The patient did well, hæmorrhage practically ceasing in five days though at two later periods blood appeared in the urine. The amount of urine passed was at first 22 ounces but soon rose to 30 and then to 40 ounces. On the seventh day the wound dressings showed the presence of urine which then leaked through the back for a period of two weeks, the quantity being estimated at 20 ounces a day. On the twelfth day the packing was all removed

and the opening finally healed. Suppuration was not present in the wound at any time. The temperature chart of the patient shows three rather sudden rises, probably due to cystitis as the bladder was frequently washed.

Dr. Henry R. Wharton stated as his personal experience that conservative surgery of an injured kidney is good surgery. He knows of several cases in which there were symptoms of ruptured kidney, including hæmorrhage from the urethra and a mass in the side, and the majority recovered. Another class of cases is formed by those in which infection occurs and abscesses form in the loin or abdominal cavity. He has also seen several of this type in which urinary fistula followed opening of the abscesses, but these sinuses all closed spontaneously.

Dr. Charles F. Nassau agreed with Dr. Wharton that it is not always necessary to operate on a ruptured kidney; this accident is probably more frequent than generally alleged. One patient, a woman, undoubtedly had a severe kidney injury, as shown by a mass in the loin and bloody urine for several days. She recovered. A second case was seen in the absence of a hospital colleague and would have been subjected to operation had he not been going to return soon. The colleague waited and did not operate for ten days. By that time the patient had bled so much he died when under operation. Some days ago a man was kicked in the back by a horse, the injury being followed by hæmaturia with free blood in the abdominal cavity, as clearly shown by physical signs. The pulse increased rapidly and the abdomen was opened. A rent in the liver four inches long was found, but in addition there was blood behind the peritoneum and the kidney was found torn in half and absolutely loose from all surrounding structures. The kidney was removed and the man did well. He passed 35 ounces of urine on the third day. He then developed pneumonia and died in two days. If in cases of kidney injury hæmorrhage continues and other conditions do not prevent it, an incision into the loin is indicated. This has not even the danger of an abdominal section and will at least get rid of a hæmatoma which might otherwise become infected.

Dr. John B. Roberts described the case of a boy of 10 or 12 who was run over by a wagon, the wheel passing over his abdomen. He was brought to the Polyclinic Hospital where nothing definite regarding his condition could be determined.

There was pain in the abdomen as though due to local peritonitis but the abdomen was not opened. In two weeks all symptoms had disappeared and the boy was discharged. Two or three weeks afterward he came in with an enormous bulging mass in the right side which was dull and tender. An incision gave vent to limpid fluid and it was supposed that there had been rupture of a ureter or that a traumatic hydronephrosis had been tapped. Examination of the fluid led to the report by the pathologist that it was from a cyst of the pancreas. This appeared to the operator to be unlikely. Later the fluid that came from the drainage tube was examined and reported to be urine. Dr. Roberts does not know whther the fluid first obtained actually came from the pancreas and the later drainage from the urinary tract or not; but the boy recovered and is now perfectly well.

Dr. Francis T. Stewart regards the time before operation as the proper time for conservatism. If operation be necessary, radical procedure is then probably the best, as often the kidney will be found badly injured and had better be removed, although, of course, one must be guided by the conditions found. The dangers are hæmorrhage and sepsis. The two early indications for operation are a progressively increasing hæmatoma and constitutional symptoms of hæmorrhage. Usually these two go together. Sepsis is at times a later indication. Hæmaturia is not necessarily an indication for operation. His chief difficulty has been to make a correct diagnosis. In one case, that of a man injured by a crush, a large amount of blood was passed by the urethra, the abdomen was rigid and there was marked shock. Rupture of the bladder was suspected by Dr. Gibbon who also saw the case and Dr. Stewart believed the condition to be a rupture of the kidney. Incision revealed intact kidneys and bladder and a ruptured liver. In this case, although the man died of hæmorrhage from the liver, the pulse never rose above 100, though it was very weak. In another case, secondary hæmorrhage after an abdominal operation, a large quantity of blood was passed by the urethra though there had been no injury of the bladder, ureter, or kidney. A third case was that of a boy who had been kicked in the abdomen. The symptoms were those of an intraperitoneal lesion and no blood was found in the urine. Operation revealed no injury to the abdominal viscera but a ruptured kidney. The kidney was removed and the case terminated

satisfactorily. In several cases of moderate bleeding he has operated and afterward been sorry that he had interfered.

Dr. John H. Gibbon said he saw the man referred to by Dr. Stewart and because of blood passed by the urethra regarded the case as one of probable rupture of the bladder. He agrees with Dr. Stewart as to conservatism in cases of injury of the kidney when hæmorrhage is not sufficiently severe to cause death. He does not agree with the statement that hæmorrhage severe enough to demand operation usually means an injury sufficiently extensive to require nephrectomy. The question of nephrectomy must be decided when the kidney is exposed. If the rupture extends into the pelvis of the organ and implicates large vessels the kidney should be removed. He has seen cases in which one-third of the kidney was separated from the remainder of the organ by blood clot terminate in good recovery after removal of the clot and insertion of packing. If suppuration does not occur in such cases one has a right to believe that function of the kidney has been restored. Removal of a kidney is so easily done that some are removed when nephrectomy is not demanded; this is also true of the spleen. Dr. Gibbon believes that a kidney which shows numerous lacerations, as did the one in Dr. Miller's case, is easier to save than is one containing a single large rent. A good working rule in rupture of the kidney is that if the bleeding can be controlled the kidney should not be removed.

Dr. Miller, in closing, said the justification for immediate operation in the case reported was the hemorrhage. Often in these cases if the surgeon waits he loses the favorable moment for operation. Dr. Miller agrees with Dr. Gibbon that only when the kidney is exposed can the surgeon determine what is the wisest procedure. In his case he decided that barring anuria or later suppuration the man might get well with a functionating kidney. It is to be remembered in deciding these cases that the patient has only two kidneys and if one be removed, loss of the other means death. So far as nephrectomy is concerned, the ruptured kidney in his case could have been removed with probably only slightly increased risk to the patient.

SARCOMA ORIGINATING IN THE ISCHIO-RECTAL FOSSA.

Dr. Geo. Erety Shoemaker said that sarcomatous growths may be found at widely distributed points in the body, as they

Fig. 2.

Sarcoma of ischio-rectal fossa. Two-thirds normal size. Age 21.

may occur wherever there is a connective tissue. It is, however, unusual to find them situated in the ischio-rectal fossa. Sarcomata are from time to time reported in the pelvis, behind the peritoneum, involving uterus or ovary, intestine, sacrum or one of the iliac bones in the pelvic basin, but such cursory search of indices and such inquiry among surgeons as he had been able to make would indicate that the perineal or ischio-rectal region is a most unusual location for this form of tumor.

In a series of 54 cases of osteosarcoma of bones of the pelvis, collected by Havage*, there were none springing from the ischium or pubis and none in the ischio-rectal region. He now reported a case in which its early stage the differential diagnosis was difficult in comparison with a low grade of connective tissue inflammation. Careful observation, however, showed a continuous growth, a complete absence of tenderness, a discreet form, no tendency to involve the rectal wall and no tendency to point externally. On extirpation of the mass it proved to be a mixed type of sarcoma, with a small central area breaking down. The case was as follows:

A well developed, strong and vigorous girl of 21, a student in typical health, resident of Kansas. Family history negative, weight 118; tuberculosis in a maternal uncle and in a grandmother. Menstruation regular and normal, no history of injury of the part. One month before being referred by her physician a lump about the size of a walnut was noticed deep in the left perineum; aching, but with neither pain, tenderness nor throbbing. No history of discharge and none of constipation. Had been unusually well for a year. Examination showed superficially to the left of the rectum and vagina and behind a line drawn from the posterior vaginal commissure to the tuberosity of the ischium, extending from the rectal wall out nearly to the ramus of the pubis and nearly to the tuber ischii, a mass three inches from front to back, two inches from right to left, against the rectal wall but not infiltrating it, firm, somewhat movable. No softening, no redness. The condition resembled a low grade of inflammation in the pararectal tissues but was too firm. As a definite increase in size occurred with a tendency to greater fixation, the diagnosis of tumor was made (Fig. 2).

*Tumors of the Pelvis. 1882.

An antero-posterior incision over the prominence was made 1¼ inches to the left of the median line, immediately opposite the center of the perineum. There was no true capsule and no sharply defined line between normal and new tissue. Small areas of hardening projected from the growth anteriorly toward the vulva. At no point was the skin or mucous membrane involved. One or two small tortuous subcutaneous veins were visible. The growth invaded all tissue up to the rectal and vaginal walls and between them and the tuber ischii including muscle and fat. Half an inch behind the edge of the ischium it appeared to be firmly attached. The fingers were used to enucleate the mass and by blunt dissection it was separated from the pubis and ischium. It did not appear to infiltrate or expose bone. A superficial portion of the sphincter ani was preserved and only the superficial portions of the left labium majus. The constrictor vagina on the left side was sacrificed and the erector clitoridis cut in two. Hæmorrhage was not severe. The trunk of the internal pubic was caught behind the tuber ischii, giving a comparatively dry field. The tumor removed was three inches in antero-posterior diameter, 2½ inches in lateral diameter and 2 inches from without inward. The deeper parts of the wound were partly drawn together with catgut and the skin united except at the center, where gauze drainage was applied. There was no secondary hæmorrhage. Marked œdema of the anterior portion of the genitalia developed, making catheterization very difficult. Union appeared at the end of the first week, except at the point of drainage. There was no lack of control of the sphincter ani, but complete anæsthesia of the rectum and vagina on one side from division of nerves. The rectum did not slough.

Microscopical examination of the growth in the Laboratory of the Presbyterian Hospital showed sarcoma of mixed type. Although every vestige of visible or tangible disease was removed at the operation, recurrence was rapid locally and generally. The vulva and perineum of the left side were first invaded, the inguinal glands later. At the end of six months a mediastinal pressure is interfering with respiration and death is reported as imminent. Trypsin treatment has been used by her Kansas physician without benefit.

Dr. Charles F. Nassau cited a case seen three years ago which was similar to that of Dr. Shoemaker's, even to rapid recurrence and death. The patient was a young man sent to the hospital with the diagnosis of ischiorectal abscess. Suspecting malignacy, Dr. Nassau cut very wide of the lesion, taking everything to the tuberosity of the ischium. The tumor recurred in three months.

EXTREMELY VICIOUS UNION OF A FEMORAL FRACTURE SUCCESSFULLY TREATED BY OSTEOTOMY, NAILING AND VERTICAL TRACTION.

Dr. John B. Roberts showed skiagraphs of this case to illustrate, (1) an unusual displacement as the result of a fracture; (2) the result gained by the use of nails and traction, and (3) the unreliability of the X-rays. The patient was a child of three years who was thrown down in a field by a calf winding him in the coils of a rope. He was seen by Dr. Roberts at the end of eleven weeks, when the leg showed five inches shortening. Operation by Dr. Roberts showed that the femur had been fractured, the fragments crossing and also being twisted. There was solid union and great force was required to chisel apart the fragments. Contraction of the muscles could not be entirely overcome by pulling. The fragments were adjusted, but still overlapped; to prevent twisting again taking place, two fracture nails were driven into them; and horizontal traction applied by the ordinary method. At the end of a week the nails were withdrawn, the leg put in the vertical position and a weight applied to stretch the muscles. The leg is now straight, there is solid union and careful measurement shows a shortening of about one and one-half inches. The skiagraph taken shows what appears to be an overlapping of three inches. The Crookes tube was probably not carefully placed over the fracture when the exposure was made. The medical profession should now deprecate too great reliance on the X-rays. Skiagraphs, taken as they usually are by a man who is not a surgeon and who does not know the case, are apt to lead to erroneous deductions. They may lead us into errors and should not be relied upon as much as people usually think.

Dr. George G. Ross agreed with Dr. Roberts as to the danger of the X-rays in fracture work; the picture is correct, but the interpretation is wrong. As corroboration of clinical diagnoses he has used many skiagraphs. He advises against having skiagraphs of results taken, as there may clinically and functionally

be a satisfactory termination and yet the X-rays shows an amazing condition.

Dr. Roberts replying to a question as to how much was gained by traction upon the leg after removal of the nails, said that the nails were put in to prevent twisting, not overlapping, as he was afraid the original twist would recur. The nails were a temporary expedient to maintain apposition of the raw bone surfaces. As he thought that five days were sufficient to prevent twisting, the leg was then placed in the vertical position and traction with a weight and pulley applied. He does not know exactly how much was gained by this expedient but he felt that the operation had reduced the shortening from five to three inches. As the leg now is only one and one-half inches shorter than its fellow, he believes that he gained about three and one-half inches by the operation. There is, of course, the possibility that the legs were of unequal length before the fracture occurred.

BULLET WOUND PIERCING LUNG, DIAPHRAGM, AND THE SPLEEN.

Dr. R. P. McReynolds said gunshot wounds which penetrate the lungs, the diaphragm and some one or more of the abdominal viscera are not unusual but they are perhaps rare enough to justify the report of the following case which was seen in a private house in consultation with the attending physician, Dr. M. Graham Tull. A sixteen-year old boy attempted to shoot himself through the heart; but his knowledge of anatomy was not accurate and he missed his aim. The bullet entered the seventh interspace, mid-nipple line, ranged downward, passed through the diaphragm and came out posterior between the eleventh and twelfth ribs mid-scapular line.

Dr. McReynolds saw him within an hour of the accident; he had some dyspnœa, and some pain, but on the whole his general condition was good; he was but little shocked and the external hæmorrhage had been insignificant. But from the range of the bullet, the rigidity of the abdominal muscles and a marked increase in the leukocytes an immediate operation was advised. He was hurried to the Presbyterian Hospital and under general anæsthesia the abdomen was opened high up through the left rectus muscle. The spleen was found to have been almost bisected by the bullet and was bleeding freely; none of the other abdominal organs were injured. An attempt to suture the wound in the spleen was made but failed and resort was had to tamponnage —the gauze being placed so as to approximate the edges of the wound and to stop the hæmorrhage. The usual after-treatment for such cases was instituted and wound healed by granulation.

From the thoracic wound a septic pneumonia developed from which a long and severe illness followed. However, he finally made a good recovery and now, two years after the injury, is strong and healthy.

Remarking upon this case Dr. McReynolds said that there are no early physical pathognomonic signs of internal hæmorrhage; prompt surgical action will however establish the diagnosis, and in the majority of cases give the patient the best chance for his life. In abdominal injuries requiring laparotomy, the rule "when in doubt operate at once" seems to be a good one. Penetrating wounds of the lung give a high mortality and the treatment of such cases is not altogether satisfactory. Dr. Rodman, in an excellent monograph on this subject, has very aptly summed it up in two words—"masterly inactivity." This is certainly the accepted treatment of all simple penetrating wounds of the thorax, such as usually occurs when the wound of entrance is above the sixth interspace. But if the wound is below this point and there is reason to believe the diaphragm has been punctured and the abdominal viscera injured, the modern tendency is towards masterly activity. Dr. Daniel H. Williams in an article published in the Annals of Surgery, November, 1904, advocates resection of a rib, suturing the rent in the diaphragm and following the wound to the end. The success in a number of cases so treated would seem to justify this procedure, especially in cases where there is no wound of exit and therefore an uncertainty about the injury to the abdominal viscera.

Statistics show that gunshot wounds of the spleen have been most always fatal, the majority of the cases dying from hæmorrhage and generally within twenty-four hours. In dealing with a splenic wound there may be a choice of several procedures, *i.e.*, suturing with catgut and reënforcing by sewing the omentum over it, tamponnage with strips of gauze, splenectomy, cauterization. The first two are the methods of election. It would seem that the ideal procedure would be to close the wound with catgut sutures and then reinforce by sewing the omentum over it.

The spleen was first sutured by Lamarchia in 1896; his patient promptly died from hæmorrhage (he did not sew the omentum over the wound). However, others have been more successful—there are in this country two and probably more cases reported of successful splenorrhaphy. Treatment by tamponnage has given very good results. Berger in exhaustive statistics covering one hundred and twenty-seven cases of splenic wounds from various causes treated by laparotomy records ten cases treated by tamponnage with only one death. Successful cases of ruptured spleen treated by this method have been reported by Gibbon, Brewster and others. Senn from extensive experiments upon dogs concludes that marginal compression of the wound by hæmostatic forceps should precede the introduction of the catgut sutures, claiming that the compression diminishes the hæmorrhage and permits of the more easy and successful introduction of the sutures.

If the spleen has been so extensively injured that it cannot be sutured and tamponnage will not control the hæmorrhage a splenectomy is indicated; but this materially adds to the danger. The kind of the operation performed is not of so much importance as the time when it is performed. He had seen two cases of rupture of the spleen and both lost their lives, he thought because they were not operated on early enough.

PHANTOM URETERAL CALCULI.

Dr. Francis T. Stewart exhibited X-ray plates which were made from a patient in whom Dr. Dwyer suspected ureteral calculus because of pain radiating from the iliac regions to the loins, and the passing of large numbers of uric acid crystals. No blood was found in the urine. The plate, taken by Dr. Manges, shows shadows which at first were thought to be those of ureteral calculi. There were five on the left and two on the right side, one being large as a pea. More careful examination of the plate raised the suspicion that the shadows were not those of ureteral calculi, as the five on one side were not in perfect alignment and were outside the course of the ureter. Further investigation was decided upon and the bladder was inspected and both ureters catheterized, the latter appearing free. Both vaginal and rectal palpation, however, showed between the vagina and rectum extremely hard, apparently calcareous masses, five

on one side, and two on the other. They were not excised, hence their nature is unknown, but they were thought to be phleboliths. Cystoscopy showed that the orifice of the right ureter was in the middle line and that of the left further to the side than normal, so the situation of shadows out of the usual line might in some cases be regarded as due to calculi in the ureter.

The diagnosis of ureteral calculi by the X-rays is not absolutely positive, whether shadows are or are not shown. In one case ureteral colic was felt on one side, but two X-ray plates proved negative. As there was a little blood in the urine and colic persisted it was concluded that the X-rays were wrong. Catheterization of the ureter showed no obstruction, but as no urine came through the catheter for ten hours salt solution was injected. Aspiration then brought away many uric acid crystals which may have caused the obstruction. Dr. DaCosta has reported a case of calcareous lymphatic gland supposed to be a ureteral calculus. He operated in this case upon a perforated gastric ulcer which was followed by a long-persisting sinus. Incision finally showed at the bottom of the sinus a fecal and calcareous concretion. It is not known if this mass came from the stomach. Foreign bodies in the intestine may deceive the skiagrapher, though careful operators see that the bowels are well opened before taking the picture.

Dr. John B. Roberts said the possibility of erroneous showing of the X-rays is an interesting topic. In one instance under his observation they did reveal that a resident physician was not giving his patient proper attention and reporting all that he should. The patient had diarrhœa and had been given bismuth by the resident without reporting the matter to the surgeon. A skiagraph, taken for a lesion of the hip, incidentally showed by reason of the bismuth an impacted rectum, to which the diarrhœa was due.

Dr. Willis T. Manges, who had taken the skiagraphs exhibited by Dr. Stewart, said the X-ray makes no mistake but man makes the mistakes. Its character is shown by the fact that by it a foreign body in the eye or other part of the body can be localized and its position determined with absolute accuracy. The average hospital skiagrapher has too many cases to examine to do careful work. Dr. Manges has noticed in other cases shadows similar to those in Dr. Stewart's plates. In one case with

symptoms referable to the genito-urinary tract, the kidney region showed no evidence of stone, but on skiagraphing the pelvis there was shown two or three small, perfectly round bodies on either side, apparently calcareous or other hard masses. These bodies in the pelvis have been noticed only in cases examined for calculi. At times it is difficult to distinguish them from calculi, but ureteral calculi are rarely round. Among the skiagraphs exhibited by Dr. Manges was one of a patient who had ureteral or renal colic. There was no tenderness of the ureters and catheterization showed no obstruction; there was no blood in the urine. Dr. Manges made the diagnosis of ureteral calculus. The patient refused operation and improved. He is undetermined as to the exact condition present. The shadows are in the position of ureteral calculi, but they are perfectly round. Now in such a case, instead of insisting on operation he would say that calculi were not present. In another case of renal colic, blood in the urine, tenderness, but no obstruction to the catheter, the skiagraph showed small shadows which were not round. Two weeks later the patient had another attack of colic and a skiagraph then showed no bodies. In still another case of Dr. Stewart's the skiagraph agreed with the clinical diagnosis, but the patient refused operation. One year later a skiagraph showed a ureteral calculus still present. There was no obstruction to a catheter though the calculus was large as the end of a finger. The question is what are the small perfectly round bodies in the pelvis at times in the position of calculi or at other times near the brim of the pelvis where they clearly are not calculi? Dr. Manges intends to experiment upon cadavers for the purpose of determining what these bodies are.

Dr. John H. Gibbon, referring to the case mentioned by Dr. Manges in which skiagraphs were taken one year apart, said he examined three plates, each showing the presence of a body. Clinically there were attacks of renal colic. A catheter was passed, but that does not rule out the diagnosis of ureteral calculus, as he believes it possible to pass a catheter when a calculus is present. He believes the man has a calculus. Dr. Gibbon showed two plates, one of a case of ureteral calculus and one in which none was present. The one proved to be no calculus though there was blood in the urine and tenderness over the ureter. The skiagraph shows what appears to be a large stone.

The case was very deceptive, but after going over it several times the diagnosis of stone was made. When the abdomen was opened there was found a large hard body, but it was situated in the broad ligament instead of in the ureter. When removing it the mass ruptured, allowing the escape of material resembling white lead. The capsule was tense and it was finally decided the mass was tuberculous. The pathologist has not yet given an opinion as to its nature. This body had cast a shadow in the position of the ureter. The plate that does show a calculus was made from the patient from whom Dr. Gibbon removed the large cystic kidney shown at the previous meeting of the Academy. The calculus was removed by the extraperitoneal method. The patient is making a good recovery.

Dr. George Erety Shoemaker said he frequently turns phleboliths out of the pelvic veins during operations upon women. He has seen a loose calcareous body the size of a pigeon egg free in the peritoneum. Very small dense masses of dermoid material must also be reckoned with forming either the whole or part of dermoid tumors. He has seen one entire dermoid the size of a bantam's egg and one smaller. In one girl a calcareous mass was found against the bladder on the peritoneal side. Cheesy bodies in the pelvis are common. That day he had with difficulty turned out back of the broad ligament a sac with thick organized wall and cheesy contents resembling an ovary. This mass was the result of inflammatory and retrograde changes and would have given an X-ray picture in the line of the ureter.

Dr. Kelly, who examined the bodies removed from the frimbria by Dr. Stewart, said there were five bodies about twice the size of the head of a pin and were round and smooth. They were composed of fibrin with calcareous material in the center.

Dr. Stewart, in closing, said that in addition to phleboliths, foreign bodies in the intestine, calcareous glands, defective X-ray plates and dermoids, two other conditions are to be remembered in this connection. First, atheromatous plates in a blood vessel. Second, small, hard, calcareous masses in the end of the Fallopian tubes. The latter seem to be composed of fibrin and calcareous matter. During the past week he found several calcareous masses of this character apparently spring from the fimbriæ of the tubes. These were in the line of the ureter and would have suggested ureteral calculi had an X-ray plate been made.

STATED MEETING, HELD DECEMBER 3, 1906.

Vice-President, ROBERT G. LE CONTE, M.D., in the Chair.

SUBPHRENIC ABSCESS FOLLOWING APPENDICITIS.

DR. JOHN H. JOPSON presented a man who had walked into the Presbyterian Hospital, three months previously, suffering from acute appendicitis. Operation was performed at once and revealed a generalized peritoneal inflammation with much free pus and a perforated and gangrenous appendix. The appendix was removed and the abdominal cavity freely drained, the patient treated by a modified Murphy treatment,—that is, frequent rectal injections of salt solution and the exaggerated Fowler position. The condition of the man after the first day or two caused no anxiety until several days later when a persistence of temperature of 100° to 102°, without apparent cause, attracted attention. The wound was explored, without revealing a pocket of pus and there was no pelvic collection. Finally, dulness could be demonstrated posteriorly over the lower portion of the right chest, but all other signs typical of a subphrenic collection were lacking. There appeared no other cause for the symptoms, but the man was not physically depressed, and Dr. Jopson was loath to believe that subphrenic abscess was present. At the end of two weeks the chest was tapped without obtaining any fluid. The fever continued and after persisting for four weeks it was decided that there must be a subphrenic abscess. Dr. W. E. Hughes, who also saw the patient at this time, gave as his opinion that there was pus somewhere between the upper surface of the liver and the lower portion of the lung. Before operation could be performed the patient expectorated a large quantity of foul pus, the temperature rose to 104°, respiration and pulse became more rapid and the patient showed evidences of shock and sepsis. There evidently had been rupture into the lung. Dr. Jopson thought the pus had first gone into the general pleural cavity. He decided on account of the shocked condition of the patient to wait 24 hours before operating, but again aspirated, this time in the tenth interspace posteriorly, and obtained several ounces of fetid pus.

He intended operating the next day but the patient suddenly became worse, with dyspnœa and very rapid pulse, there evidently being an acute effusion in the right pleura. Operation was performed the same day under local infiltration anæsthesia, an intercostal incision being made posteriorly between the tenth and eleventh ribs. A pint of cloudy serum was evacuated from the pleura and the opening made in the diaphragm by the needle observed. This was dilated by the finger, and the subphrenic collection drained. Rubber drainage was inserted into both the pleura and the abscess cavity. The drainage furnished by this incision was not considered satisfactory but the patient's condition was bad and it was made to suffice. The man did well after the operation and now only a small sinus remains. The pleura has closed and there is resonance down to the site of incision.

Appendicitis, the etiological factor here, is probably the commonest cause of subphrenic abscess, and this is especially true in children, as Dr. Jopson had emphasized in an analysis of 23 cases of subphrenic abscess in children which he had made several years ago. The diagnosis was obscured by the absence of constitutional symptoms except fever, and the indefinite nature of the physical signs. The pleura was infected at the time of the second operation, possibly by leakage from the point of aspiration, and it was not necessary to protect it by suture or packing, and this rendered drainage of the abscess feasible by local anæsthesia. The experiments of Noetzel apparently show that the pleura is more resistant to infection than muscle or skin, but this resistance is broken in the presence of a pneumothorax. Clinically, the pleura seems to be very susceptible of infection.

DR. WILLIAM L. RODMAN said Dr. Jopson was correct in saying that the majority of subphrenic abscesses are found in connection with suppurating appendicitis. Formerly it was regarded as most frequently caused by perforating gastric ulcer, but Körte, in his masterly review of the subject, showed that the vast majority were due to suppurative lesions of the appendix. He prefers to employ the transpleural route in evacuating the abscesses, and undoubtedly that was the better method in Dr. Jopson's case.

DIFFUSE CAVERNOUS ANGEIOMA OF THE UPPER EXTREMITY.

BY ASTLEY PASTON COOPER ASHHURST, M.D.,

OF PHILADELPHIA.

MAMIE McC., 12 years of age, applied to the Out-Patient Department of the Episcopal Hospital on October 16, 1906. She complained of disability of the right arm. On drawing up the patient's sleeve a cystic swelling was seen on the *extensor* surface of the forearm, just above the wrist. This was thought at first to be a tuberculous cyst, but when the whole upper extremity and thorax were exposed, the following condition was found: The front of the thorax on the right side is the seat of a nævoid formation composed of dilated capillaries or venules, giving the whole right pectoral region a distinctly bluish tinge. The discoloration is abruptly limited at about the mid-sternal line, and below by a line passing transversely through the tip of the ensiform process. The area affected is not raised above the surrounding healthy skin. Posteriorly the nævoid condition is not so marked; but below the angle of the right scapula a mass, about the size of a walnut, can be palpated. It feels like a lipoma. Just over the middle of the right clavicle is an angeiomatous mass, somewhat larger than a split pea, dark blue, protruding, and quite hard. Another similar phlebolith may be felt in the anterior axillary fold. In the right supraspinous fossa, at a point corresponding to the free margin of the trapezius muscle, is a somewhat larger bluish mass, which protrudes distinctly from the surface of the skin in this region, is compressible, and is evidently composed of cavernous tissue. An area of bluish discoloration, not raised above the surrounding skin, may be seen below the point of the shoulder, over the deltoid muscle.

The skin of the arm, forearm, and hand presents no abnormalities in structure, but the whole upper extremity is slightly livid, and there is œdema of the fingers and hand. On the extensor surface of the forearm, as already noted, there is a cystic, compressible swelling, not circumscribed, about the size of an egg. The flexor surface of the forearm in its upper half is

FIG. 1.—Showing increase in swelling when hand is down.

FIG. 2.—Showing decrease in swelling when hand is elevated.

also somewhat enlarged, and is indistinctly cystic. Elevation of the hand above the head causes an almost total disappearance of these swellings in the forearm, while they quickly reappear when the hand is lowered. By compressing the arm below the shoulder the hand and forearm quickly become alarmingly distended, the cystic swelling becomes bluish and very tense, and pain produced.

The circumference of the forearm above the wrist, when the hand is down, is 14 cm., but is only 11.5 cm. when the hand is elevated above the head. The circumference of the forearm below the elbow is 20.5 cm. when the hand is down, 18 cm. when it is raised. The circumference of the arm above the elbow is 19.5 cm. when the hand is down, only 17.5 cm. when it is raised. The measurements of the corresponding parts of the left upper extremity are: Above the wrist, 13 cm.; below the elbow, 19 cm.; above the elbow, 20 cm.

The length of the right upper extremity from the acromion to the tip of the styloid process of the ulna, the elbow being extended, is 41 cm.; that of the left is 43 cm.

The superficial veins of the affected forearm are not visble, even when the hand has been hanging down for some time.

The heart appears to be normal both in location and action. No abnormality in the other thoracic structures has been detected. The axillary, brachial, radial and ulnar arteries pulsate with fair regularity in their normal situations. The radial pulse, synchronous in both arms, varies from 90 to 100 per minute when the angeiomatous arm is raised; and is about 120 per minute when it is dependent.

The cystic swelling above the wrist may be partly lipomatous in character, as it does not entirely disappear when the hand is elevated, some palpable irregularities persisting in the subcutaneous tissues. It is impossible to detect the extensor tendons by palpation.

Skiagraphs were made of the clavicular and cervical regions, and of the forearm. The former was entirely negative; the latter possibly shows some atrophy of the bones of the forearm.

Although the condition in this patient is congenital, it is only within the last few months that she has been disabled. Her family and her previous personal histories are negative. Her arm was always weak, and it was known that there was something wrong with it, but no particular attention was paid to it.

She attended school regularly, and until the close of the session last summer was able to write and figure with her right hand. Of late the fingers and even the hand have become numb; the grasp is so feeble as to be practically absent,* and though she has resumed her school this autumn, she is no longer able to hold a pencil. There is present almost constantly a dull aching pain, which is considerably relieved by firm bandaging. A flannel bandage is applied with the hand elevated well above the head, and the arm is carried in a sling. General health good.

The following classification of angeiomata, taken from Mauclaire and de Bovis, considerably simplifies their description:

- External
  - Superficial
    - Skin and external mucous membrane.
    - Subcutaneous and submucous tissues.
  - Deep
    - Intermuscular tissues.
    - Muscles.
    - Orbit and antrum of Highmore.
    - Periosteum and bones.
    - Subsynovial tissues.
    - Glands.
- Internal
  - Subserous: meninges, peritoneum, etc.
  - Visceral: liver, spleen, etc.

These tumors are further classified as circumscribed and diffuse. The angeiomatous condition in the present patient appears therefore to be chiefly of the diffuse subcutaneous cavernous variety; although, as is not unfrequently the case, the neoplasm is really of mixed character, being cutaneous in small areas, as in the supraspinous fossa; and in the pectoral region is of the telangiectatic cutaneous variety, while in the forearm the growth undoubtedly involves the intermuscular planes, and has probably destroyed most of the muscular tissue.

Duplay and Cazin remark that subcutaneous angeiomata

* At present (February) the grasp is noticeably stronger.

closely resemble cold abscesses in appearance, and it will be remembered that in the present case the swelling on the dorsum of the forearm was at first sight thought to be of tuberculous origin. The best clinical description of the cavernous angioma that I have been able to find is that given by Weinlechner, in Gerhardt's system.

Angeiomata of the extremities are rather unusual, and those of the diffuse cavernous type appear to be quite rare. Of all forms of angioma, including the ordinary mother's mark, the usual location is the head, and the least usual the limbs, as may be seen from the following table:

Head and neck.....	57 per cent. (Kramer), 79 per cent. (Gessler).
Trunk	28 per cent. (Kramer), 11 per cent. (Gessler).
Extremities 12.5	per cent. (Kramer), 9 per cent. (Gessler).

The question of treatment in these cases is as unsatisfactory as their pathology is obscure. Excision is scarcely possible in the diffuse form, though in cases of circumscribed cavernous angeiomata, whether cutaneous or subcutaneous, it is sometimes feasible, and is usually followed by permanent cure. Amputation at the shoulder joint, the most radical form of treatment available in the present case, might prove a remedy more serious than the disease itself; and in view of the implication of the pectoral and scapular regions might be followed by increase of the angeiomatous condition in the parts that were not removed. The injection of boiling water or other fluids, is a method neither invariably successful, nor entirely safe. Boiling water is much less dangerous than caustic or coagulating fluids, and in the hands of Dr. Wyeth, the originator of the method, has not, I believe, been attended by untoward effects. Other surgeons, however, without his experience, have been less fortunate. Payr has reported eight or nine cases of angeioma treated successfully by the introduction of magnesium darts in the growth. The little darts, or tacks, as they have been called, are soon absorbed, but they induce the formation of compact connective tissue with thrombosis and obliteration of the blood spaces. Heide has quite

recently treated a patient afflicted with a diffuse cavernous subcutaneous angeioma of the lower extremity by means of electrolysis, and has obtained results which he considered satisfactory. He used a current of from 30 to 40 milliampères, for 3 or 4 minutes at each sitting. He began in the gluteal region, and gradually worked down to the foot; but the foot itself was not benefitted by the treatment, as the angeiomatous swelling could no longer be made to disappear when the foot was elevated. Another result of the obliteration of the cavernous spaces and of the connective-tissue formation was that during the last sittings the hæmorrhage became considerably diminished in amount.

A brief abstract of all the similar cases it has been possible to find in a somewhat extensive search of the literature is appended.

(1) ABBE reported the case of a young man with an angeiomatous condition apparently more cutaneous than subcutaneous, involving the whole right upper extremity. The skin was very thin, and the slightest scratch was liable to cause profuse hæmorrhage.

(2) AUDRY.—A female, aged 20 years, whose left upper extremity had always been larger than her right, had been troubled with its more rapid growth since the age of 8 or 9 years. The left hand and forearm to lower third of arm were very œdematous, spongy and compressible to touch. Ulcers formed in fingers, and arm was amputated through upper third of humerus, to hinder further infection. Dissection showed that the skin was thickened and elephantiasis-like in character. Beneath skin was a diffuse cavernous angeioma, extending to bones, eroding them and destroying muscles and smaller nerves. The arteries were normal. The left scapular region was also affected, but it was more lipomatous in character than the forearm. The skin was nowhere nævoid throughout the upper extremity.

(3) COLEY recorded the case of a girl of nineteen years, whose fingers and the extensor surface of whose left forearm above the wrist were the seat of an angeioma cavernosum, apparently diffuse and subcutaneous, although this is not stated. The swelling of the forearm was the size of an egg. Over the left scapula was a lipogenous angeioma, the size of a cocoanut. All these swellings were adherent to the skin. The hand and forearm were bluish in color. The scapular growth was excised, and found to be an extremely vascular lipoma. An attempt was made to excise the growths from the fingers, but the operation was abandoned on account of hæmorrhage. Good illustrations accompany the report.

(4) CRUVEILHIER.—Female, 75 years, paralytic, demented, blind, no history. Left hemiplegia. The left upper extremity was flexed, rigid,

and covered with varicose cutaneous and subcutaneous tumors. Autopsy showed that the subcutaneous tissues and muscles were the seat of a diffuse cavernous angeioma; the skin was invaded in some parts, and in these regions bluish masses of varicose veins protruded. Several phleboliths were present.

(5) HEIDE.—Boy of 12 years, presented a diffuse angeioma of the left lower extremity, involving buttock, back of thigh, popliteal space, fibular surface of leg, and dorsum of the foot. The skin was bluish, and prominent in places (cutaneous), although the main growth was subcutaneous and muscular. The circumference of the limb when dependent was 3 to 4 cm. greater than when elevated above level of trunk. Muscular power was very weak. A small piece of tumor was excised for examination; after cutting through the subcutaneous tissues, the deep fascia was seen, dark blue in color; on excising it the underlying tissue bulged out hernia-like, and looked like a mass of extremely thin walled veins, blackish blue in color. No trace of muscular tissue was visible macroscopically, but under the microscope were observed a few atrophic muscle fibres, their place being taken by fatty and connective tissue. The cavernous spaces were lined with endothelium. The treatment adopted has already been described.

(6) LAMORIER.—Man, aged 70 years, the whole right upper extremity being affected, including the pectoral and scapular regions. The skin was bluish black, the angeioma was diffuse, and on elevation of the hand the swelling rapidly disappeared from the hand, forearm and arm, and a larger swelling appeared in the pectoral and scapular regions. The condition was congenital, not painful; and autopsy showed all the muscles converted into a splenoid or placenta-like tissue.

(7) LICHTENSTEIN.—Man of 36 years, with diffuse subcutaneous cavernous angeioma of right hand and forearm. At birth a small nodule was present on finger, and this was operated on in childhood. The angeioma gradually extended up the forearm. The hand was œdematous and the forearm was the seat of a distinct swelling. The skin was not discolored except at scar of old operation. A few phleboliths were palpable. Superficial veins were not noticeable. The pulsation in the arteries was normal. There was no pulsation in the tumors. The patient was directed to wear an elastic bandage.

(8) LICHTENSTEIN.—A boy aged 7 years. At birth the left upper thoracic region and the left arm were somewhat blue; soon a lump the size of a small pea was noticed on the nipple, and another on the knuckle of the fourth finger. Four weeks before examination these lumps reached the size of large peas, and developed the characteristics of cavernous angeiomata. The left upper extremity was shorter than the right by 3.5 cm. The superficial veins were not prominent, but there was present a diffuse cavernous angeioma of the hand, forearm and arm; the axilla was full, no axillary folds being present. The pectoral region was bluish, and one small mass was palpable. Above the cavicle there was a bluish line of veins. The skin of arm and forearm was distended when the hand was down, but became flaccid when it was elevated. The

skin was involved, the angeiomatous condition having started apparently as subcutaneous in character, and later involving the cutaneous tissues. The arteries were normal, but the pulse was 80 when the arm was dependent, and only 64 when it was raised. No treatment is mentioned.

(9) RICHET.—A boy of 11 years, with a diffuse cavernous angeioma of the subcutaneous variety on the lower two-thirds of the flexor surface of the forearm, involving also, by extension under the annular ligament at the wrist, part of the thenar eminence, in which latter situation the growth was rather of the cutaneous variety. The flexor tendons could not be palpated. The tumor was painful on pressure, and pressure caused it almost to disappear. Elevation of the hand rendered the color of the overlying skin nearly normal, and allowing the arm to hang down made it a deep violet blue, and on the thenar eminence a few varicose veins then became visible. The swelling of the forearm had neither pulsation nor bruit. This condition had lasted only 20 months. Treatment by injections of perchloride of iron was instituted, and when the patient was seen one year later, the swelling on the forearm was firm in consistency, little nodules being palpable wherever injections had been made. The tumor could no longer be made to disappear by pressure, and in the upper part of the forearm there was still evidence of the persistence of the cavernous condition. The skin had become even whiter than on the sound arm.

(10) ROKITANSKY.—Male adult, subcutaneous diffuse cavernous angeioma, involving whole right upper extremity, and extending past axilla on to thorax. In certain regions soft bluish masses, feeling like lung tissue, projected from the surface of the limb.

(11) SCHUH.—Young man, subcutaneous diffuse cavernous angeioma of anterior aspect of foot, extending up to knee. The growth had extended through everything down to the bone. Skin was scarcely at all affected, but was livid when limb was dependent. Many phleboliths. If the patient stood up the limb grew to an enormous thickness, and became blue and tense; but no varicose veins were visible. All the tissues between skin and bone seemed to have been destroyed by the tumor. It had not increased in the last 12 years, and with an elastic stocking patient was able to walk and even swim.

(12) SCHUH.—Young man, without known cause, suddenly developed growth on hand which rapidly extended up to middle of forearm. The skin was nævoid in places, and very thin. Elevation of limb caused skin to lie in loose folds, and outlines of bones could be easily felt. Phleboliths were palpable. No enlarged superficial veins could be detected. Amputation was refused, and the patient died a year later of phthisis.

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DR. RICHARD H. HARTE said that in a worse case than that shown by Dr. Ashhurst he had used hot water injections after the method of Wyeth, but this produced no effect. He thought at first there was some improvement but the final result was no gain.

DR. WILLIAM L. RODMAN has used hot water injections in four or five well-marked cases of cavernous angeioma with improvement in one or two but no cure. He considers the procedure dangerous, as embolism may result, and it does not promise satisfactory effects. His preference is for excision. If one keep well out in the healthy tissue there is no more trouble than in removing a solid tumor.

FRACTURE OF THE CORACOID PROCESS OF THE SCAPULA CAUSED BY MUSCULAR ACTION.

WITH REPORT OF CASE.

BY ORLANDO H. PETTY, M.D.,

OF PHILADELPHIA.

THE following is my record of the case:

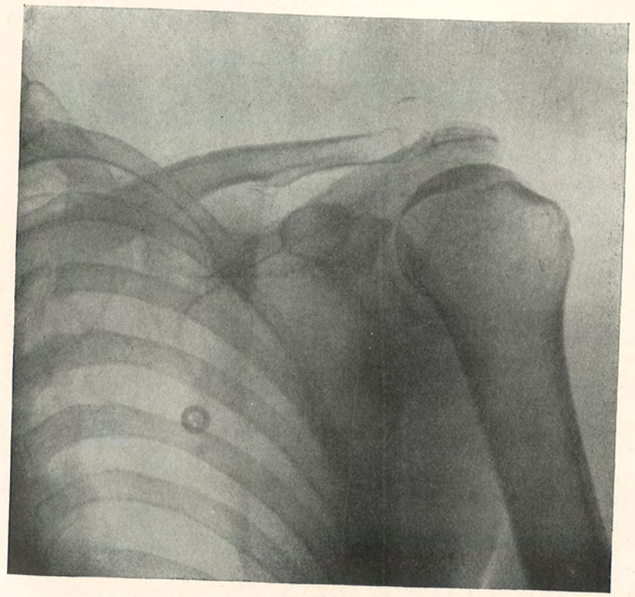
A man, 57 years of age, a trolley car conductor by occupation, while trying to forcibly put a drunken man off of his car, experienced a sudden and severe pain in his right shoulder, which practically rendered his right arm useless. He is sure that he neither fell, nor that his shoulder was struck in any manner. At the onset of the sudden and severe pain he was steadying himself by holding to the hand rod on the rear platform of the car with his left hand, the passenger being on the same level as the conductor, and was pulling with all his strength through his right arm trying to expel the disorderly passenger. During the several hours following the accident that he remained at work, he experienced severe pain in the right shoulder and an inability to use his right arm in ringing up fares or signalling the motorman.

The patient is a well developed, powerfully muscled man. When he presented himself to me, October 15, 1906, he was unable to raise his right arm from his side. He could elevate his shoulder but could not shrug it forward, although he could, with little discomfort, throw his shoulder backward, after it had been pushed forward.

The function of his forearm and hand was unimpaired. Examination revealed nothing wrong in the shoulder joint, clavicle, or acromion process, but severe pain was induced when pressure was applied over the coracoid process, and bony crepitus was elicited in this area.

A fracture of the coracoid process being evident, the right arm was dressed in the Velpeau position, and later in the evening Dr. Fussell saw the case with me and confirmed the diagnosis. As the patient experienced great inconvenience from the Velpeau

FIG. 1.



Fracture of coracoid process of scapula. Tip tilted inward.

position, the dressing was changed, binding the right arm to his side, and leaving his forearm free.

Two or three days later, Dr. Pancoast of the University of Pennsylvania Hospital, took a skiagraph of the injured shoulder, and it revealed a fracture at the middle portion of the coracoid process, with a tipping downward and inward of the distal portion of the process. Dr. Pancoast said there had been many patients referred to him with a clinical diagnosis of uncomplicated fractured coracoid, but that this was the first case to be confirmed by the X-ray findings.

Result.—About the middle of the sixth week, crepitus having disappeared and the fracture apparently firmly united, the shoulder was treated by light massage and passive motion. He returned to work at the end of the seventh week. He is still unable to raise his right arm high above his head.

Fracture of the coracoid process of the scapula is not common, and an uncomplicated fracture of this process is a rare condition, while of its fracture by muscular force I could find but three cases mentioned. One of these was evidently discovered in the cadaver during dissection, another observed by Hulme, and the third a brief reference to a case of Stimson. These reports will be fully referred to later in this paper.

It is interesting to note the opinions of the earlier authors upon this fracture.

Malgaigne says: "This fracture is excessively rare, and does not occur except in company with other fractures and enormous contusion of the soft parts, so the case is generally of the gravest nature."

In S. D. Gross's System of Surgery, 1864, we find the following comment: "The coracoid process is sometimes broken in consequence of a severe fall or blow, generally a short distance from its tip, the fracture being usually accompanied with great contusion of the soft parts."

Ashhurst, in Erichsen's "Science and Anatomy of Surgery in 1869," says: "The coracoid process is seldom broken, there not being more than ten or twelve unequivocal cases of this accident on record. It cannot happen except by direct violence." And even in a work as late as Scudder's "Treatment of Fractures," second edition, the coracoid process of the scapula is not mentioned as ever being the seat of a fracture.

Prof. Edward Bennett of Trinity College, Dublin, in 1873, in reporting a case of epiphyseal separation of the coracoid process in a child of

6 years of age, caused by a crushing force, concluded with the following: "This specimen is of particular interest in as far as it completes the series of coracoid fractures in our collection, which contains already several specimens of the fracture associated with the dislocation of the humerus, a specimen of fracture from muscular action and fractures from direct injury in the adult."

J. Wellington Byers, of North Carolina, reviewed the fractures of the coracoid process up to 1885, and collected a score and a half of authentic cases of coracoid fracture but found none caused by muscular action. The following are his remarks on the etiology of the condition: "To class these injuries according to the manner of causation, it will be found that nearly half of them result from falls upon the shoulder, the others resulting from direct blows."

Byers either discredited or overlooked a case of fracture of the coracoid process by muscular action, reported in the *Lancet* in November, 1873, and thus described by HULME:

"T. H., æt. 57, miner. Three weeks previously he was on a bank in the act of passing through a wire fence when he slipped and in falling his left arm caught in one of the wires. He instantly felt a severe pain in the fingers, followed by loss of power in the arm and inability to raise the arm from the side. On examination it was found that the coracoid process of the left scapula was fractured and drawn downward."

R. CLEMENT LUCAS in Guys Hospital Reports, 1890, gives five methods of fracture of the coracoid process of the scapula.

(1) Direct violence. (2) By dislocation of the humerus. (3) By extreme flexion of the shoulder joint, when the coracoid process is thrown into forcible contact with the under surface of the clavicle. (4) By downward crushing of the clavicle upon it. (5) By sudden muscular action.

Mr. ARBUTHNOT LANE in 1887 first called attention to the extreme flexion of the shoulder joint as a probable cause of fracture of the coracoid and cited as instances two cases quoted by HULKE in Holme's System of Surgery. They are thus described:

"Two cases of fracture of the coracoid process have come under my notice. In both the fracture was caused by a fall forward from a slight height, with the arms stretched forward. There was mobility of the tip of the process with crepitus and pain, but not displacement."

The comments of LUCAS are: "If this account be correct, Mr. Lane's explanation would appear to be the only possible one."

If the opinion of Mr. Lucas explains the two cases observed by Hulke, I think the theory of Lane, that extreme flexion may be the cause of the fracture, applies equally as forcibly to the case I have just quoted, which Hulme attributes to muscular action, for Hulme says that in falling the patient caught his left hand in one of the wires of the fence; this it seems to me would cause extreme flexion of the shoulder. The specimen referred to by Bennett, as being caused by muscular action, is in the museum of Trinity College, Dublin. There being no record of an examination at the time of accident and no history of the case, its etiology can hardly be considered unequivocal.

Stimson, in his work on fractures and dislocations, speaks of the fracture of the coracoid process of the scapula in this manner:

"This may be caused by muscular action or by direct or indirect violence. In the former the causative effort is sometimes comparatively slight, wringing of wet clothes in one case, but more often is a powerful effort made with the arm.

In reviewing the literature I have carefully read all the reports and reviews of the cases that I could find and found no case caused by muscular action, that had a full history of the accident and physical examination confirmed by skiagraph.

DR. GWILYM G. DAVIS said there is evidence to show that almost any bone in the body may be broken by direct violence, and so may the coracoid process. Dr Allis has produced this fracture by manipulation of the humerus; the break may possibly be caused by tension of the muscles inserted into the process, the coracobrachialis and short head of the biceps. The injury is probably often overlooked in dislocation of the humerus on

account of the greater injury to the joint. The progress of the head of the humerus upward is stopped by the coracoid process, hence one would expect to find fractures of the process in these cases of dislocation.

Dr. Addinell Hewson was inclined to disagree with some of the statements made by Dr. Davis. The capsule of the shoulder joint is thickened at the base of the coracoid process by the coracohumeral ligament and above this is the coraco-acromial, a stout ligament connecting the coracoid and acromion processes. In forcible pushing upward of the head of the humerus, the head strikes the coracohumeral ligament and is thus prevented from striking the coracoid process. The weakest point in the capsule is below the coracohumeral ligament. With the patient holding on the car by one hand and with the other pulling on a man, action on the coracoid process would be exerted by the coracobrachialis, the short head of the biceps and the pectoralis minor. The conoid and trapezoid ligaments fix the body of the process, leaving the side and top to be acted on by the muscles. The ligaments have no effect in staying the action of the muscles. If the humerus be placed at right angles to the body and force is applied from behind, the humerus would be forced against the coracoid, and the short head of the biceps and the coracobrachialis would snap off the tip of the process.

REPORT OF OPERATIONS.

PERFORMED AT THE PUBLIC CLINICS FOR STUDENTS AT THE GERMAN HOSPITAL OF PHILADELPHIA, DURING THE SESSION OF 1905 TO 1906.

BY JOHN B. DEAVER, M.D.,

OF PHILADELPHIA.

Surgeon-in-Chief to the German Hospital and the American Hospital for Diseases of the Stomach.

Twenty-six clinics were held at which there were 215 patients operated upon, with a total of 244 operations. It was found necessary to perform 52 operations on 23 patients at the same sitting. The mortality was 9 cases, or 4.2 per cent.

Appendix.—There were 64 cases of *appendicitis* operated upon, of which 39 were acute. Of the patients with acute appendicitis there were 29 males and 10 females. The appendix was found acutely diseased and removed at the same time in 4 patients operated upon for other conditions in which it was involved; of these patients 1 was a male and 3 females. In these 64 cases there was 1 death, that of an acute case in a male. The average duration of the attack for which the acute cases were operated upon, estimating from the onset of the attack up to the time of operation, was, in the 23 cases without abscess, 4 3-10 days, and in the 16 cases with abscess, 8 days. Seven of the 23 non-abscess cases were operated upon in their first attack, 9 of the 16 abscess cases had had no previous attacks.

The incision varied according to the pre-operative findings. Of these acute cases, in 12 the McBurney or gridiron incision was made; in 19 the incision was made either through or at the outer border of the right rectus, and of these, in 2 cases it was necessary to make a counter-incision in the right flank for extra drainage, and in 2 others, a small suprapubic incision for tubal drainage of the pelvis. The 8 remaining cases required extraperitoneal incisions, of which 3 were

assisted by suprapubic counter-incisions, and 1 by a counter flank-incision. In 2 cases the pelvic exudate was drained by a tube emerging from the incision in the right rectus muscle.

In 7 cases there was free pus in the pelvis at the time of operation, in 10 there was an abscess near the cæcum, and in 9 the intestines were covered with lymph or pus exudate.

The appendix was subcæcal in 16 cases, to the outer side of the cæcum in 6, in one of which the organ ran up toward the liver, to the inner side in 3, and in 5 cases to the brim of the pelvis or into the pelvis. In 4 cases the pathological condition was so severe as not to warrant searching for the organ, or removing it even when seen. (In the remaining 6 cases, the position of the appendix was not stated.) The organ was necrotic or gangrenous in 9 cases, perforated in 4, kinked in 2, and the remainder were either adherent, congested, swollen, or covered with inflammatory exudate. When possible the appendix was wholly amputated flush with the cæcum, the resulting gap being closed by two semicircular silk sutures which intertwined at each pole of the organ, and in some few cases in which stump-amputation was performed, the invagination was maintained by a silk purse-string suture. The badly diseased appendices were ligated near their bases with catgut and the stump-surface cauterized with liquified carbolic acid, no invagination being performed.

Drainage was required in 15 of the 39 acute cases, and consisted of gauze in 6 cases, glass drainage tube with gauze in 8, and glass tube alone in 1. In the remaining 19 cases, the wounds were closed with tier sutures of chromicized catgut. The majority of the leukocyte counts maintained a direct ratio with the severity of the case. In many abscess cases in which the urine was examined shortly after admission and previous to operation, there was found a marked toxic nephritis which subsided within a day or two after operation. This deleterious action of the pus upon the economy in general and the kidneys in particular, not to mention the peritoneum, we consider a strong argument against postponing operative measures.

A young woman, whose first attack was two weeks under way on the day of admission, exhibited merely slight abdominal distention and slight rigidity of both recti muscles, but tenderness over the entire lower portion of the abdomen.

On incising extraperitoneally, a large amount of pus mixed with serum was evacuated, and 3 large abscesses were located and drained: one deep in the pelvis, another in the median line, and the third at the lower margin of the liver. As the appendix was bound in the abscess wall, it was not removed.

A man, whose second attack began two days before admission, revealed, on examination, general distention and tympany of the abdomen and board-like rigidity of both recti muscles. There was marked tenderness all over the right side of the abdomen, but especially over McBurney's point. The appendix was bound by plastic exudate to the cæcum, was 9 cm. long, thickened, swollen and congested, and the seat of two perforations. In places it was gangrenous. It was necessary to make a counter-incision in the right flank to permit of additional drainage.

The death occurred in a man whose case was very similar to that just cited, except that he was admitted four days after the beginning of his second attack. Examination revealed a leaky skin and evidences of general septic infection. The abdomen showed general distention and tympany, marked rigidity of both recti but greater on the right side, and general tenderness over the entire abdomen, most marked over the right iliac fossa.

Incision opened up a large retro-cæcal abscess in the vicinity of which the intestines were bound together in a plastic exudate, and elsewhere an extensive purulent peritonitis was present. The appendix was 7 cm. in length, retro-cæcal, gangrenous in its lower third, and perforated. So, too, as in the preceding case, a counter-incision was made in the right flank to obtain free drainage. The patient lingered five days after operation. Post mortem revealed an acute fibro-purulent peritonitis, focal gangrene of the cæcum and distal 15 cm. of the ileum, with parenchymatous degeneration of the liver and kidneys. These last two cases are almost identical in every respect, with the exception that one, the fatal one, was two days further advanced in his attack than the other, but *he died,* while the other recovered. This is another forceful and convincing illustration of the oft-repeated cry that *delay* is *fatal.* And it shows actually

the damage done to the organs by retention of highly toxic pus, which was spoken of above when estimating its effect on the kidney by clinical examination of the urine.

In 25 cases of *chronic appendicitis,* 10 were in males and 15 in females, with no deaths. The appendix was found chronically diseased and removed in 8 patients at the same time the condition for which the operation was performed was relieved; of these, 1 was male and 7 were females. The time elapsing since the last attack varied from seven days to two years. In one case, that of a physician, the disease had existed for 12 years, until continual pain and soreness over the appendix when walking and after eating, which had existed since the last attack, a year previously, led him to seek relief. This same complaint was given by 8 of the 25 patients, bringing them to operation which almost invariably revealed adherent appendices. In 7 cases there was marked constipation, in 4 of which the appendices were bound down by adhesions. One patient, a female, suffered for a year with symptoms that simulated cholelithiasis, complaining of almost continual pain in the epigastrium, at times radiating to the right shoulder, frequent biliary vomiting after eating, and two distinct attacks of jaundice. Operation revealed a slender cord of omentum, 10 cm. long, between the otherwise normal gall-bladder and the chronically diseased appendix. The appendix of another woman contained 2 ascarides of the variety oxyuris vermicularis (thread worm). In a man the appendix was found anomalously placed on the ascending colon, 10 cm. above the cæcum. The other appendices were found to be thickened, kinked, congested, constricted or adherent. The lumina, usually patulous, at times were partially obliterated, or contained fæcal concretions.

The McBurney incision was made in 16 cases and in the remaining 9 the incision was carried through the right rectus muscle. The appendix was wholly extirpated by the method mentioned above in 12 cases: the stump was invaginated into the cæcum by means of a silk purse-string suture in 12 cases,

and in the remaining case the organ was simply amputated, and the stump cauterized owing to its difficult retrocæcal position. The abdominal layers were approximated with tier suture of chromicized catgut in all cases except one.

Carcinoma of the Appendix.—This was present in the case of a female, aged 23, whose appendiceal history had extended over a period of five years, in which there occurred three attacks. The appendix was kinked and curled about the cæcum, curved on itself, its lumen obliterated, and its proximal part congested and swollen. Microscopical examination revealed carcinoma.

The Stomach—*Pyloric Stenosis.*—There were 7 cases of pyloric stenosis, 5 benign and 2 malignant. The benign cases were all due to chronic gastric ulcer, and all recovered from the posterior gastrojejunostomy. There were 4 males, ages 15, 20, 25 and 53, and 1 female, age 57. All complained of chronic dyspepsia.

In addition to the thickening, induration, and cicatrization of the pyloruses, the stomachs were all markedly dilated. Five years previously the oldest male had undergone a pyloroplasty elsewhere; after a year's relief, aggravated symptoms returned. In the female, the gastric mucosa presented a markedly hæmorrhagic "weeping" appearance, and the second and third parts of the duodenum were congested. Note was made that one of these patients on discharge two weeks after operation, could eat solid food without discomfort, and had gained two pounds already during that time.

The 2 carcinomata were in males, ages 50 and 55. In both the fulminating dyspepsia symptoms—6 weeks' duration in the elder with the loss of 35 pounds, and 1 year in the younger with the loss of 30 pounds in the latter 4 months—were strictly in contrast to the chronicity of the benign cases. Posterior gastrojejunostomy relieved the elder of symptoms. The death occurred in the younger emaciated man, who in addition to the stenosis showed perigastric adhesions, secondary carcinoma of the head of the pancreas, and a distended gall-bladder. Pylorectomy,

drainage of the gall-bladder, and posterior gastrojejunostomy were performed.

Cardiac Stenosis.—There was one case of cardiac stenosis in the person of a female, aged 43, who suffered ten months from symptoms due to gradual thickening of the cardia. Operation revealed a large, diffuse mass at the cardia, extending down over the greater curvature, and infiltrating the wall sufficiently to prohibit gastrostomy. Jejunostomy, however, gave relief.

Acute Gastric Ulcer.—This occurred in a woman aged 37 years, who six months previously had been treated in the medical wards, when at one time she vomited 2,000 cc. of bright red blood; she apparently recovered and was discharged cured. Three days before admission to the surgical ward she had a recurrence of hæmorrhage, vomiting 1,500 cc. of bright blood. On the day of admission she vomited 2,000 cc. bright blood, and two hours after admission 1,500 cc. of dark blood. The patient was extremely anæmic, suffered from air-hunger, thirst and had a rapid pulse. She was treated medically with the hope that her condition would improve and warrant operative interference later; as there was no evidence of improvement and the patient was becoming weaker, gradually declining, it was thought under the circumstances best to do a posterior gastroenterostomy. The patient did not survive long. The mucosa showed multiple ulcers and a hæmorrhagic or "weeping" state.

Liver and Gall Passages.—There were 8 cases of *cholelithiasis,* all females, in 4 of whom the gall-bladder was removed. Three had had enteric fever; in 1 this disease occurred four months previous to operation; chills in 1.

Jaundice occurred in 3 cases, biliary colic in all, biliary vomiting in 4, and nausea without vomiting in another.

Adhesions existed between the gall-bladder and transverse colon (1 case); liver margin, transverse colon and pylorus (1 case); omentum adherent to gall-bladder and liver (1 case); between omentum, transverse colon and gall-bladder (1 case); no adhesions 4 cases.

Calculi, from 2 to 500 were removed from the gall-bladders in all the cases, and from the cystic duct in 3; from the common duct in one case 4, and in another, 1.

Of the excised gall-bladders, 2 were greatly thickened, 1 was extensively diseased, and the fourth was the seat of empyema. The four remaining gall-bladders were drained by rubber tube, from 20 to 300 cc. of bile of varying consistency being present. A rubber tube drained each of the 2 common ducts from which the gall-bladder and calculi had been removed. Strips of gauze and rubber dam were used in 7 cases.

In a case in which the gall-bladder was ulcerated, 200 cc. of bile-stained pus were evacuated from an abscess below the gall-bladder. The omentum was stitched across the wound in the middle, thus separating the upper wound from the gall-bladder below.

A chronically inflamed appendix was removed from one case.

Biliary Fistula.—This was present in a male, aged 23, a sufferer from enteric fever five years previously, from whose gall-bladder 200 calculi had been removed elsewhere 18 months previously, this operation being followed by a biliary fistula, to close which an unsuccessful attempt was made 4 weeks after discharge. The fistula was obliterated by invaginating the edges of the gall-bladder; drainage, 1 piece of gauze.

Cholecystitis.—Six operations for cholecystitis were performed on 3 males and 3 females, one of the latter dying 7 weeks afterwards from a pronounced myocarditis. Two patients had had enteric fever. All had been jaundiced, all had cramps or pain in the right hypochondriac region, and one had chills. Adhesions were present in one between the gall-bladder, liver and duodenum, and in another between the gall-bladder and pylorus. In no case were calculi found, and all the ducts were patulous. Drainage in each case consisted of a rubber tube sutured in the gall-bladder, beneath which was placed a gauze strip, isolated by rubber dam.

A chronically inflamed appendix was removed from one case.

Pericholecystitis.—A female aged 40 had been relieved of 25 biliary calculi elsewhere, 10 years previously, and a year later similar attacks of biliary colic recurred. A month before admission the previous drainage site opened up, discharged three cal-

culi, pus, bile later, and closed again. The attacks ceased, but discomfort persisted. Operation revealed extensive adhesions between the abdominal wall, omentum, gall-bladder and duodenum, but no calculi. The adhesions were separated and gauze drainage instituted.

Chronic Interstitial Pancreatitis.—This occurred in a man aged 55, a sufferer from indigestion with occasional severe vomiting for 21 years. Six years previously he had sudden epigastric pain and since then slight epigastric soreness had persisted, and increased a year before admission, since which time he has experienced progressive loss of strength and flesh, reducing from 200 to 166 pounds in the year's time. On admission he was emaciated and anæmic, with a firm mass in the epigastrium. Operation, consisting in gall-bladder drainage by a rubber tube aided by gauze in rubber dam adjoining the cholecystotomy, revealed a hard nodular pancreas, moderate hepatic cirrhosis, gall-bladder distended with bile but no calculi. Before operation the fæces exhibited free fat and bile pigment, but no undigested muscle fibres.

Hernia.—*Inguinal.*—There were 8 operations, 6 males and 2 females. Of these herniæ, 2 were bilateral, 3 right and 3 left, and of the right two were irreducible, 1 being strangulated. Half these patients had worn trusses. Primary union followed the 10 Bassini operations.

In one patient, a woman aged 23, the right inguinal hernia was congenital, and perineorrhaphy was performed at the same time.

Umbilical.—This woman, aged 42, the mother of 7 children, had had the hernia 10 years in addition to a left inguinal hernia. At operation, the sac of the former was adherent, and contained omentum but no gut. The recti were overlapped.

Incisional.—These 2 herniæ, both in women, followed appendiceal abscess operations that required free drainage. One was of 6 and the other of 30 months' duration.

Fæcal Fistula.—There were two cases of fæcal fistula. One developed in a student 5 days after the repair of an incisional hernia elsewhere, which in turn 3 months previously had followed an operation for acute appendicitis 3 years ago. Operation revealed a fistula in the cæcum 2 x 3 cm., and this was sutured with silk, over which was sutured an epiploic appendage.

The other patient, a male, was also operated on elsewhere 9 months previously for appendiceal abscess, and developed 9 days later, intestinal obstruction, requiring re-operation. Four days after this second operation, a fæcal fistula developed at the incision of the first operation, in which a glass tube had been used. The second incision had been sewn up, and was already healed. Operation revealed a fistula in the cæcum 1 cm. from the ileocæcal valve. The opening was closed with silk, reinforced by an epiploic appendage. The congested, swollen and adherent appendix was removed and the stump retained in invagination by a silk purse-string suture.

Urinary Organs.—*Wandering Kidney.*—There were 5 cases 1 in a male, 4 in females, all on the right side. One patient had suffered for 2 years since being thrown from a wagon, striking on her right side. This kidney, movable to the third degree, was sutured by a modified Edebohl's method.

The second case occurred in a single lady aged 43 who, 5 months previously, had experienced pain and sensation of discomfort in the right side after having lifted her invalid mother. Three months later the patient had an attack of acute appendicitis. At the operation the wandering kidney was anchored by a modified Edebohl's method, and the chronically inflamed appendix removed.

Another patient had complained for 3 years of pain below the right costal margin. The third degree kidney was hammocked with gauze.

Associated with pyonephrosis was a freely movable kidney in a female aged 36, that had existed 18 months. To the ordinary symptoms of dull aching pain in the right side were added, a month before operation, frequent, painful and scalding urination. Examination revealed a movable tumor in the right loin space, excoriation of the external urethral orifice, and retroflexion of the uterus. The Israel incision revealed an enlarged, grayish, lustreless kidney, the pelvis and parenchyma of which were the seats of multiple abscesses. The kidney, with 10 cm. of the ureter, was extirpated.

The fifth patient had been operated on at different places for various abdominal conditions, 11 times during the previous 14 years. One of these operations, 9 years before admission, consisted in anchoring the right kidney with silver wire. The patient

had an attack of Ditell's crisis 7 and another 4 months previous to operation which revealed a small cyst at the lower pole of the wandering kidney. The cyst was evacuated, and the kidney hammocked in gauze.

Ureteral Calculus.—Two cases of ureteral calculi, both of whom were females who had suffered frequently from severe attacks of renal colic for 10 years. In each case the right kidney was involved and removed. Operation revealed in one a right wandering kidney, of which the pelvis was diseased and contained a calculus. In the other patient there was a small calculus situate one inch below the pelvis, and immediately beyond it the ureter for a distance of about one inch was the seat of a fibrous stricture; microscopic examination revealed chronic pyelitis with early malignant proliferation. Both patients recovered.

Vesical Calculus.—This man, aged 56, during the past 11 years had had numerous attacks of renal colic in the left lumbar region, radiating to the groin and genitals. He had passed a number of calculi, and at one time, 3. The last attack occurred three weeks previous to operation, the patient feeling the calculus passing to the bladder. During urination the stream would stop suddenly. The calculus was removed by suprapubic lithotomy, and the bladder drained by a rubber tube. The pre-operative cystitis from self-catheterization subsided, and the urine was normal on discharge 60 days after operation.

Dorsal Neuritis.—This patient, a woman aged 30, had been operated on elsewhere 2 years previously for right wandering kidney. Since the operation the patient had suffered from griping, dragging pain in the right lumbar region in any position she assumed. The pain radiated down over the right buttock. The diagnosis of chronic neuritis of the lateral cutaneous branch of the last dorsal nerve was made. At operation, after removing the scar, this nerve was dissected out and excised for a length of 5.5 cm. The patient was discharged, cured.

BREAST.—*Carcinoma of the Breast.*—There were 8 cases of mammary carcinoma, 1 in a male, and 7 in females. The right breast was affected in 6, the left in 2. Two of the women gave a family history of cancer, and 1 a history of trauma. Halsted's operation was performed in the 4 favorable, and simple removal of the breast in the 4 unfavorable cases.

The male patient, a tailor aged 48, had had a small lump in the right breast for 10 years. This caused no disturbance until it began noticeably to grow 6 months before operation. Examination revealed a hard, irregular, non-encapsulated tumor the size of an egg, which was adherent and ulcerated. The nipple was retracted. Owing to his occupation, the breast alone was removed.

UTERUS AND APPENDAGES.—*Uterine Fibroids.*—There were 7 cases of uterine fibroids, in 6 of which abdominal and in 1 vaginal hysterectomy was performed; in 4 patients, all past the menopause, the hysterectomies were complete. Of the 2 incomplete, in 1 there was added a left intra-ligamentary cyst and a chronically inflamed appendix; in the other, the diseased right tube and ovary were removed with the uterus. The vaginal hysterectomy was performed in a patient aged 63, with Pryor's clamps. The clinical diagnosis of fibroids were all confirmed by microscopical examination.

Carcinoma of the Uterus.—There were 6 cases of carcinoma of the uterus, 2 involving the cervix and 4 the body of the organ. Complete abdominal hysterectomy was done in 5 cases, and vaginal hysterectomy, using Pryor's clamps, in one case. The youngest patient was the case of vaginal hysterectomy for squamous epithelioma occurring in a Polish woman aged 26 years.

In addition to the above cases of hysterectomy for carcinoma there were 5 cases of complete abdominal hysterectomy for infected uteri; one of which was complicated by a papilliferous adenomatous cyst of the ovary and a chronic appendicitis; the appendix was also removed.

Retro-Displacements of the Uterus.—Retroversion was present in 4 cases, and was corrected in 1 by Alexander's extraperitoneal, and in 2 by Tuffier's intraperitoneal shortening of the round ligaments, in 1 of the latter both ovaries and the left tube being diseased and removed. In another Mann's operation was performed.

A prolapsed uterus of 2 years' standing caused by a laceration of the perineum, was corrected by ventro-suspension and perineorrhaphy.

Extra-Uterine Pregnancy.—This interesting condition occurred in 6 patients, whose ages ranged from 20 to 35. Of these, 3 were primiparæ, 2 had borne children 6 years previously, and

1 had had 3 miscarriages. Two patients experienced sudden, sharp, cutting pain in the pelvis, one of whom fainted. Five of the 6 gestations were right-sided and ruptured, and the other unruptured on the left side. Five were tubal and 1 tubo-abdominal. Three of the patients were irrigated with saline solution and drained by a glass tube in the pelvis, 2 were not drained, and 1, in whom a large cyst was found on the opposite side, was drained with gauze.

Diseases of the Tubes and Ovaries.—There were 7 cases of pyosalpinx, 4 bilateral in one of which the appendix was involved; 1 right sided in which the appendix was involved, and 2 left sided. Of 3 cases of chronic right-sided salpingo-öophoritis, the appendix was involved in one; 2 other cases were on the left side. Both ovaries were cystic in 1 case, and the left in another. There were 2 cases of left-sided ovarian cyst, in 1 of which was a small dermoid.

In addition to those operations described above, the following less interesting were performed at the clinics:

Abortion (curettage)	1
Abscess, perichondrial (post-typhoidal)	1
Abscess, ischio-rectal	1
Abscess (peri-urethral)	1
Adenitis, axillary, tubercular	1
Adenitis, cervical	2
Adeno-fibroma, breast	1
Adhesions, abdominal	2
Arthritis, knee, tubercular (excision)	1
Arthritis, carpi, tubercular (amputation)	1
Atresia of cervix	1
Carcinoma of cæcum (resection, ileo-colostomy)	1
Carcinoma of sigmoid (ileo-sigmoidostomy)	1
Carcinoma of tongue (unilateral excision)	1
Cyst, suprahyoid	1
Cystotomy, suprapubic, for tuberculosis of bladder	1
Empyema	2
Endometritis (curettage)	3
Fissure-in-ano	5
Fistula-in-ano	1
Fracture of tibia and fibula, comp. and commin. (amputation)	1
Goitre, cystic (unilateral thyroidectomy)	1
Hæmorrhage, secondary following an abdominal section	1
Hæmorrhoids (clamp and cautery)	4

Hydrocele (radical)	3
Hypertrophy of cervix (amputation)	1
Lacerated cervix (trachelorrhaphy)	1
Lacerated perineum (Emmet)	3
Lipomata	2
Myxofibroma abdominal wall and ileum (enterectomy)	1
Neuralgia, tri-facial (neurectomy)	1
Retained secundines (curettage)	3
Sarcoma of back	1
Sarcoma of parotid (extirpation)	1
Stricture, urethral (dilation and perineal section)	4
Supernumerary toe	1
Ulcer of leg, traumatic (excision and curettage)	1
Urethral caruncle	1
Varicocele	2
Varicose veins of leg (phlebectomy)	2
Total	64

The deaths were: Acute appendicitis, 1; Carcinoma of cæcum, 1; Carcinoma of tongue, 1; Carcinoma of pylorus and pancreas, 1; Carcinoma of sigmoid, 1; Cholecystitis, 1; Empyema, 1; Tuberculosis of bladder, 1; Ulcer of stomach 1.

PERFORATION OF BOWEL IN TYPHOID FEVER.

Dr. Charles F. Mitchell reported eight cases of typhoid fever operated upon for perforation. He referred to the recent articles by Drs. Harte and Ashhurst on "Intestinal Perforation in Typhoid Fever" (Annals of Surgery, vol. xxxix, page 8), and the monograph by Dr. J. A. Scott, entitled "A Study of Fifty Cases of Perforation in Typhoid Fever" (*University of Pennsylvania Medical Bulletin*, May and June, 1905), which treated every phase of this subject in minute detail.

Seven of the eight cases occurred at the Pennsylvania Hospital; and he was indebted to the surgeons of that institution for the privilege of operating upon and reporting them. The other case was operated upon at the Germantown Hospital.

Three of the cases are mentioned in the article by Drs. Harte and Ashhurst and five were reported by Dr. Scott.

The history of the various cases was as follows:

Case I.—R. P., aged 28 years; colored; hospital No. 2454; admitted October 31, 1902. Perforation, operation, and death on November 6. Had chancre within two years, used alcohol freely, and had malaria several times. Admitted to medical ward after seven days illness characterized by headache, diarrhœa, and

daily chills for five days. The urine showed hyalogranular casts, and the spleen was palpable. Had moderately severe attack. On October 3, at 3 A.M., he was aroused from sleep by sudden abdominal pain (tenth day of disease) situated in both lower zones. This was the first abdominal pain complained of since his illness began. He vomited his milk; pulse became more rapid; the belly was not rigid, but generally tender. By 5.30 A.M. he vomited greenish mucus. There was moderate tympanites present, most marked in lower zones. Rigidity was now distinct, especially on the right side; slight tympanites. Doubtful movable dulness in the flanks. Breath sounds heard distinctly over abdomen as low as umbilicus. Liver dulness was absent in midclavicular line, present in axillary line. Leukocytes at 6.15 A.M., 11,360. Operation at 7.30 A.M. Perforation in ileum six inches above ileocæcal valve the size of a slate pencil. Death from general peritonitis. Autopsy.

CASE II.—A. A., aged 28 years; white; hospital number 138; admitted April 4, 1903, discharged June 25, 1903. Had malaria ten years ago, denies venereal disease. Began to feel badly three weeks ago, worked until two days before admission. Had chills, headache, cough, no epistaxis, no diarrhœa. The abdomen was soft and not tender; temperature about 103.1°. The day after admission he complained of abdominal pain; abdomen was rigid and tympanitic, but relief was obtained by the rectal tube. On April 8 he had two bloody stools and after a week the fever began to remit, while the abdomen became painless and soft. On April 10 there was evidence of rough breathing at both bases, with fine râles, and he complained of sharp pain over the left base on deep inspiration or cough. One week later the temperature touched normal, though he still complained now and then of chest pain. On April 19 (the thirty-sixth day) the temperature rose suddenly, and he had severe pain over the costal region, where an occasional friction rub could be heard. The following morning the expression was anxious, the abdomen was very rigid but not tender. There was no vomiting and the temperature was not altered. Diagnosed perforation, and operation done at noon. No perforation or peritonitis found and no pain was experienced after operation for four or five days. Distinct symptoms of consolidation of the left base subsequently appeared. The patient made a good recovery.

CASE III.—A. G., aged twenty-one years; hospital number 1602. Admitted August 25, 1903. Perforation, operation and recovery. Discharged November 2. Entered the medical ward on the tenth day of typhoid. The temperature was high at the start, but was soon controlled by baths. The abdomen was soft and not tender; spleen readily palpable and tender; active bronchitis. At 6.30 P.M. on August 31 (sixteenth day) he complained of sharp pain on the right side of the abdomen, which was very tender; the recti were somewhat rigid; he had neither chill or vomiting. By 9 P.M. all the symptoms had increased in severity; leukocytes were 9,600. Perforation diagnosed; operation; perforation in ilium found. This patient made a good surgical convalescence; the temperature fell and remained down for seven days after operation. On the thirty-third day the temperature again rose and the patient suffered a true relapse.

CASE IV.—F. P., aged eighteen years; admitted November 9, 1903. Perforation, operation and recovery. Admitted with a history of a mild typhoid of thirteen days' duration. At 12 noon on the fifteenth day of his disease he had sudden severe abdominal pain, tenderness on the right side, spasm of the right rectus, costal respiration, and complete obliteration of liver dulness. At 3.30 P.M. the leukocytes had arisen to 17,600; at 5 P.M. they were 16,500, and at 7 P.M. 13,400. The temperature, which was 100° at the time of the first pain, fell to 99.2 at 1.30 P.M., remained the same at 2.30 P.M. and by 3.30 P.M. had arisen to 103.3°. The operation was performed eight hours after perforation and showed free gas in the peritoneum, the presence of fluid, and a perforation in the ilium. This was a so-called typical case of perforation in which all the symptoms were present and the blood findings conclusive. This patient recovered.

CASE V.—H. C., aged twenty-eight years; admitted October 12, 1904. Typhoid perforation, operation, recovery. Discharged January 4, 1905. Entered ward on eighth day of typhoid, the onset of which was marked by fainting attacks and daily chills until the day of admission. He had some abdominal pain, the belly was normal, the spleen palpable. On the day of admission he had a chill followed by high temperature. No malarial parasites were discovered after a careful search. The temperature range was high, though he responded readily to tubbing, but had frequent chills after being in the water. The baths were

stopped on October 16 and sponges substituted, from which time he had no chills. On October 15, the eleventh day, he complained a great deal of abdominal pain. Nothing, however, developed. On October 25, the twenty-first day, he had a small hæmorrhage which did not seem to affect his general condition. He was delirious at times and very stupid. On October 30, the twenty-sixth day, at 5.30 P.M., he cried out with pain in the right side below the level of the umbilicus but radiating through the abdomen. No rigidity was present and a hot water-bag gave relief. Two hours later there was a slight rigidity of both recti, especially the right. He vomited greenish fluid. The pain continued at intervals and his condition remained the same until between 2 and 3 A.M. The leukocytes at this time were 5,900. At 3 A.M. he had another paroxysm of pain, the abdomen was slightly distended and tender, the liver dulness gone, the flanks clear. There was abdominal breathing, but the right rectus was distinctly more rigid than the left. Operation at 3.30 A.M. Cloudy fluid in abdominal cavity, perforation the size of a lead-pencil eighteen inches above the cæcum, in the centre of an ulcer the size of a five-cent piece found. The patient reacted well and continued to do well until the eighteenth day after operation when a fæcal fistula developed. This finally closed and he was discharged on January 4, 1905.

CASE VI.—G. A., aged twenty-six. Admitted August 22, 1906. Operation. Death August 30, 1906. Illness began about one week before admission, with headache, nose-bleed, anorexia and general malaise. The bowels were normal. On admission tongue was slightly coated, tip red, spleen enlarged, rose-colored spots, and iliac tenderness. Widal reaction positive; leukocytes count 8,070. Five days after admission had hæmorrhage of eight ounces, temperature falling to normal six hours after expelling hæmorrhage. The following day, at midnight, after taking his medicine, he vomited several times, broke out into a cold sweat, and complained of pain in right iliac region. The abdomen was tender but there was no distention. Leukocyte count 9,870. On the following morning, August 29, at 8 A.M. the belly was very tender; had cough and vomited several times. Was tender over the whole abdomen but it was more marked over the right side. The temperature at this time was 102°, pulse 128 and thready in character. Operation was done at 12 noon, abdomen opened in

right semilunar line and a perforation found the size of a pin-head in the ilium eight inches above the ilio-cæcal junction. This was closed with linen thread and abdominal cavity flushed out with normal salt solution. Gauze drains were used. The patient did fairly well for twelve hours but suddenly collapsed and died the following day, thirty hours after operation.

CASE VII.—F. M., aged twenty-eight years, admitted October 21, 1906. Perforation; operation. Died October 23. Unable to obtain full history, as patient did not speak English. Sent in with diagnosis of appendicitis; had not been feeling well for two weeks previous to admission but had not been confined to bed. Brought to hospital by ambulance at 11.35 A.M. with only the history of a sudden severe attack of abdominal pain the previous evening. On admission the temperature was 103°, the abdomen extremely rigid and tender all over, liver dulness present. The general appearance of the patient and the history of not feeling well for two weeks suggested the diagnosis of perforated typhoid ulcer instead of appendicitis. Operation was done within two hours after admission and pin-point perforation in ilium about four inches above ilio-cæcal valve found. Opening closed with silk sutures, peritoneal cavity not flushed with salt solution but merely drained with strips of gauze. Patient did fairly well for fifteen hours when a change for the worse set in and he died about thirty-six hours after operation.

CASE VIII.—J. C., twenty-eight years of age. Admitted November 17, 1906. Perforation, operation, death November 27. Family and previous history negative. Eight days before admission was seized with severe headache, complained also of feeling tired but did not go to bed until three days later. Had several attacks of vomiting, nose-bleed, cough; no diarrhœa. On admission temperature was 103.3°, patient seemed very dull, physical examination of chest negative, spleen enlarged but not palpable, abdomen distended but not rigid or tender. Urine examination showed the presence of a small amount of albumin and a considerable number of dark and pale granular and hyaline casts. Condition remained about the same until the morning of the twenty-first when, about 11 A.M., he complained of abdominal pain; there was a little more distention, and slight rigidity of the right rectus was noted. Bladder seemed distended, catheter was passed and seventeen ounces of urine were drawn off. This

seemed to relieve the pain somewhat. Leukocytes 6,450. At 2 P.M. leukocytes were 3,800, temperature 102.2°, pulse 102, breath sounds could be distinctly heard over the abdomen which was exquisitely tender, and there was considerable rigidity of the right rectus. Liver dulness was practically obliterated. At 7 P.M. temperature was 103.1°, pulse 106, respirations 42, tongue and lips dry, had not vomited but had been belching a great deal. The abdomen was greatly distended, liver dulness entirely gone, dulness in flanks, the whole abdomen was extremely tender and both sides were equally rigid. Operation. Abdomen opened in right semilunar line, immediately upon which there escaped a considerable quantity of cloudy fluid which was found to entirely fill pelvis. A perforation the size of a pin-head was found in the ilium about four inches from the cæcum. This was closed with linen thread and the whole abdominal cavity flushed with salt solution. Drains of gauze were introduced. The patient did well for five days following operation, the temperature remaining about 99, and the pulse being fairly strong. On the beginning of the sixth day after the removal of some of the drains he complained of pain in the abdomen, the temperature became elevated and he gradually grew worse, dying on the morning of the seventh day. Autopsy showed that the stitches closing the perforation had failed to hold; the presence in the pelvis of considerable pus, also a double lobar pneumonia.

Résumé.—All the cases operated upon were males; their ages ranged from eighteen to twenty-eight years; five of the eight cases being twenty-eight years old. In one case operated upon no perforation was found. This case recovered. Of the remaining seven cases, four died and three recovered, a mortality of 57.1 per cent. The first symptom of perforation appeared in three of the cases on the fifteenth day, and in the other five cases on the tenth, twelfth, twenty-first, twenty-sixth, and thirty-sixth day respectively. Hæmorrhage from the bowel preceded perforation in three of the cases, being very slight in two, while in the third it amounted only to eight fluid ounces. One of the cases that recovered had a slight hæmorrhage.

The time between perforation and operation had been reckoned from the first onset of pain; in the cases that recovered it being 4½, 8 and 10 hours, while in the four that died it was 3, 8, 12 and 15 hours.

The leukocytes were counted in all but one case, and all showed a leukocytosis except in one of the three that recovered, which had a count immediately before operation of 5,900. In the case which had the highest count there were 17,500 leukocytes three hours after the first symptom, two hours later 16,500 and two hours still later or seven hours after perforation had taken place there was a count of 13,400. In the last case, operated on November 21, 1906, at the time of the first sign of trouble the count was 6,450, three hours later it was 3,800, and just previous to operation, or eight hours after the first symptom of perforation, there were 9,000 leukocytes.

None of the cases had more than one perforation; four were pin-head size, one the size of a lead-pencil and one that of a slate pencil. In one case the size of the perforation is not mentioned in the history.

It is interesting to note that the case which had the largest perforation was one of the three that recovered. The last eighteen inches of the ilium was the seat of the seven perforations.

The various operations were done under ether anæsthesia, incision made either through the outer border of the right rectus or through the right semilunar line. Fine silk was used to close the perforations except in two instances when linen thread was used. The abdominal cavity was flushed with salt solution in two of the cases, both of which died. Gauze drainage was used in every case and the wounds left entirely open to permit free drainage.

DR. RICHARD H. HARTE said that the figures presented by Dr. Mitchell were very materially below the general mortality in typhoid perforation. Through Dr. Mitchell's large experience at the Pennsylvania Hospital he has acquired ability of high order in the diagnosis of perforation. An important point of technic following operation has been emphasized by Dr. Mitchell. It is the custom of some surgeons after closing the perforation to flush the abdominal cavity with salt solution. This Dr. Harte believes to be bad surgery as it disseminates septic material. In cases with a small perforation and in which operation is performed reasonably early, irrigation is a mistake, it being applicable only in cases in which extensive soiling of the peritoneum has taken place and where dry sponging would be out of the question. Instead, the cavity should be wiped out and packed

with large quantities of gauze, this being placed between the coils of intestine. Many deaths are due to perforation in typhoid fever and the surgical side should be presented more emphatically to medical men, that more cases may be recognized early and saved. In connection with one of Dr. Mitchell's cases, Dr. Harte mentioned a personal case in which the patient died six weeks after perforation.

Dr. John B. Deaver agreed with Dr. Harte regarding irrigation in infections of the peritoneum. In these cases the best rule is to get in quickly and get out quickly, doing as little as possible. The consensus of opinion now is that irrigation is not so good as was formerly supposed. Dr. Deaver believes that perforation and hæmorrhage in typhoid have as one of the causes cold bathing. When the patient walks to the tub his resistance is taxed; later, while in the water he is chilled, and it is reasonable to believe that hæmorrhage is thus induced. It is a good thing for country patients that tubs are not available. Dr. Muhlenberg of Reading formerly used the Bland method heroically and had many cases of hæmorrhage. Now he employs a let-alone policy and sees but little hæmorrhage. If this be true, why would there not be fewer perforations if too strenuous bathing was not employed?

Dr. W. Joseph Hearn said that he does not wash out the peritoneal cavity at all in cases of peritonitis, but simply sponges. In but few cases is peritonitis general, and these patients die. The same rule applies here as in burns. If all the skin is destroyed the person dies, if only part is burned he may get well. So in cases of general peritonitis the subjects die. Dr. Hearn has recently operated on four cases of perforative appendicitis, the perforation being near the junction of the appendix with the cæcum. In all, the abdominal cavity was simply sponged out, and he is sure that three of the patients will get well and entertains hope regarding the fourth.

Dr. William L. Rodman said that Dr. Mitchell's results were better than the average and show the value of early diagnosis and prompt operation. In the main, Dr. Rodman is in accord with what had been said about irrigation. If gross soiling of the peritoneum be present he irrigates, as in the case of gunshot wounds of the intestine. As a rule in these cases, if operation is performed before intestinal paresis and soiling of the peritoneum have occurred, irrigation is not employed. Where visible soiling is present and fæces have passed out of the intestine, irrigation is perhaps best. It is remarkable how often one finds in these cases that no soiling has occurred. Murphy in 1890 demonstrated that soiling does not take place until the intestine is handled, and this observation stands good to-day. In one case of twenty-one perforations of the intestine by a rifle ball no extravasation had occurred, though two of the perforations were large. Operation was performed an hour after the injury. In another case a great amount of extravasation was present, this including an apple core which had passed into the peritoneum. As a rule, then, there is not much extravasation if cases of perforation are operated upon promptly; if there be gross soiling of the peritoneum, irrigation is demanded.

Dr. Gwilym G. Davis has during the past year operated on eight patients with perforation and one in which the physician desired operation and no perforation was found. Six of the eight perforative cases died, though some lived quite a while after operation. Others were in extremely bad condition and lived but a short time. The non-perforative case also recovered. As to the mode of operation the transverse incision is employed and the operation begun under local anæsthesia. If perforation is found a general anæsthetic is then given. As to drainage and sponging, if the intestine is pulled out and soiling ceases, sponging is regarded as sufficient. If soiling be extensive, sponging requires too much time and causes too much shock. When fæces are spread all over the abdominal cavity, irrigation is employed. The operation requires from nine to twenty-five minutes. One must be governed by the condition of the patient. In some cases the work may be done with exactness, in others one must hurry. When perforation is not found, general anæsthesia is not necessary and the operation does not prejudice recovery. One of these patients had a second perforation some time after the first, for which an operation was done on the opposite side. He recovered. Counting this as an additional case makes 9 cases with 3 recoveries besides the recovery from the exploratory procedure.

Dr. Mitchell, in closing, said that if he had employed local anæsthesia in one case he would not have found the perforation. When the abdomen was opened it was clear and no exudate was

present; protracted search was necessary to locate the opening. In answer to a question of Dr. Rodman, Dr. Mitchell said that ten hours was the longest time between perforation and operation in the cases that ended in recovery.

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