TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

Stated Meeting held November 3, 1919

The President, DR. GEORGE C. ROSS, in the Chair

BONE TRANSPLANTATION FOR OLD UNUNITED FRACTURE

DR. A. B. GILL presented L. T., a girl ten years of age, from South Carolina, admitted to the Orthopædic Hospital June 5, 1917. The brief history that was sent with her stated that she had a fracture of both bones of the leg above the ankle at the time of birth, that the fractures had never united, and that the patient had never walked on her foot but had always gone on crutches. Examination showed an ununited fracture of both bones of the leg above the ankle (Fig. 1). The foot could be placed in apposition with the leg in any direction. There is a shortening of four inches.

June 18, 1917: First operation. The tibia was exposed and an inlay bone graft from the same tibia was placed to span the fracture. The graft was taken from the upper fragment of the tibia, and was turned around so that the upper portion of the graft was embedded in the internal malleolus. This was done in order that the normal bone from the upper portion of the tibia should bridge the gap between the fragments (Fig. 2).

The leg was dressed in plaster for twelve weeks. On October 8, 1917, the case was removed. It was found (Fig. 3) that the graft was broken at the site of the fracture. A second case was applied for another month at the end of which time non-union was still present (Fig. 4).

November 16, 1917: Second operation. On exposure of the tibia it was found that the first graft had healed in, but had not been large enough; therefore, at the second operation another bone inlay of the entire width of the tibia was placed in a manner similar to that employed at the first operation.

Three months later it was found that no union had occurred. Radiograph examination showed a complete absorption of the graft and thinning of the tibia with an absorption of the lime salts. Patient was fed on bone marrow and had daily treatment by baking and massage to increase the nutrition of the leg.

April 12, 1918: Third operation. Tibia was exposed and tunnel drilled in the head of the tibia, and a second one in the inner malleolus. The surface of the shaft of the tibia of both fragments was planed off with osteotome, so that there might be fresh bleeding bone the entire length of the tibia. A large transplant was then

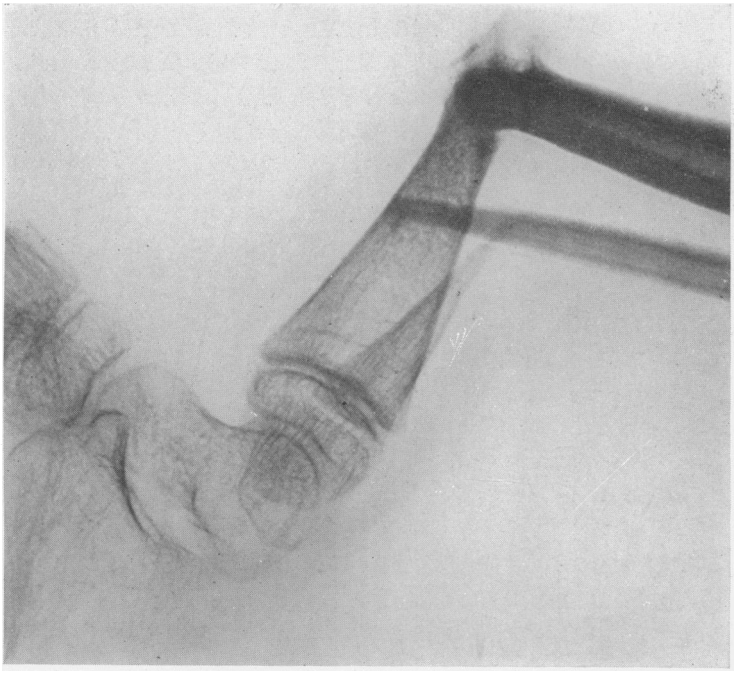

FIG. 1.—Before operation.

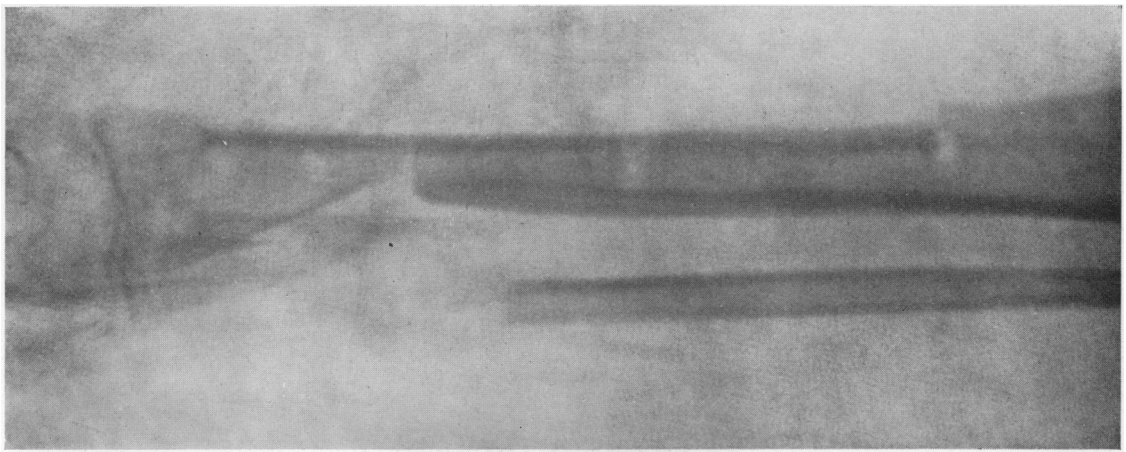

FIG. 2.—Transplant bridging gap between the fragments.

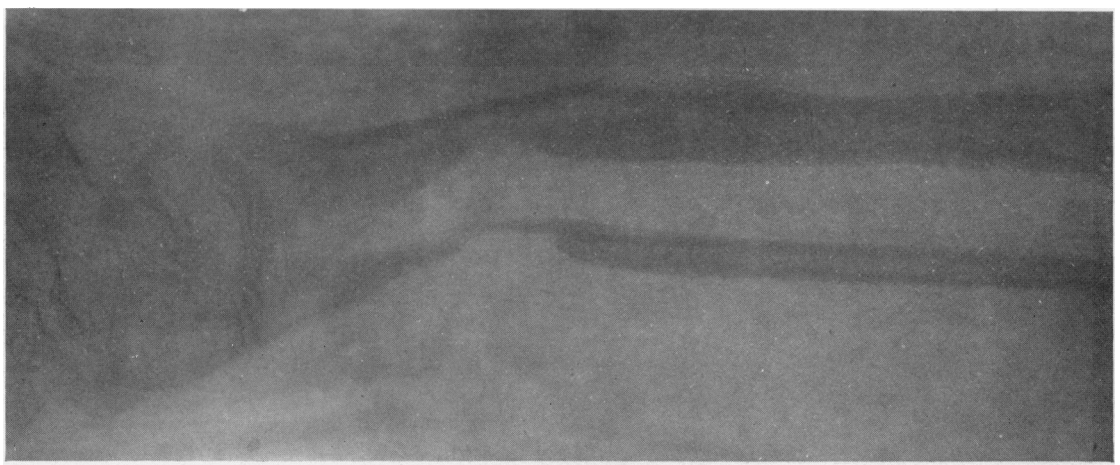

FIG. 3.—Showing fracture of the transplant.

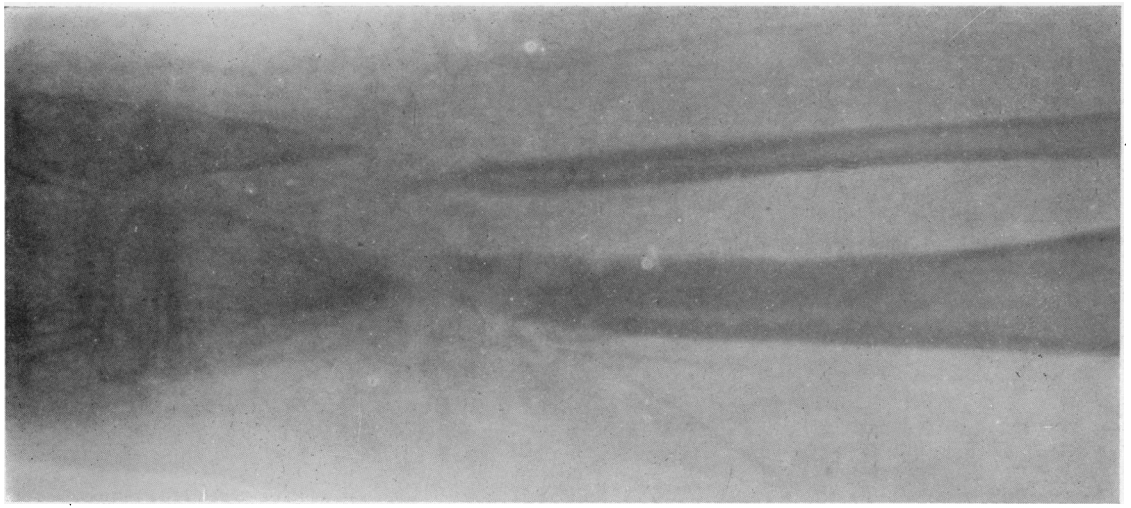

FIG. 4.—Showing non-union still present.

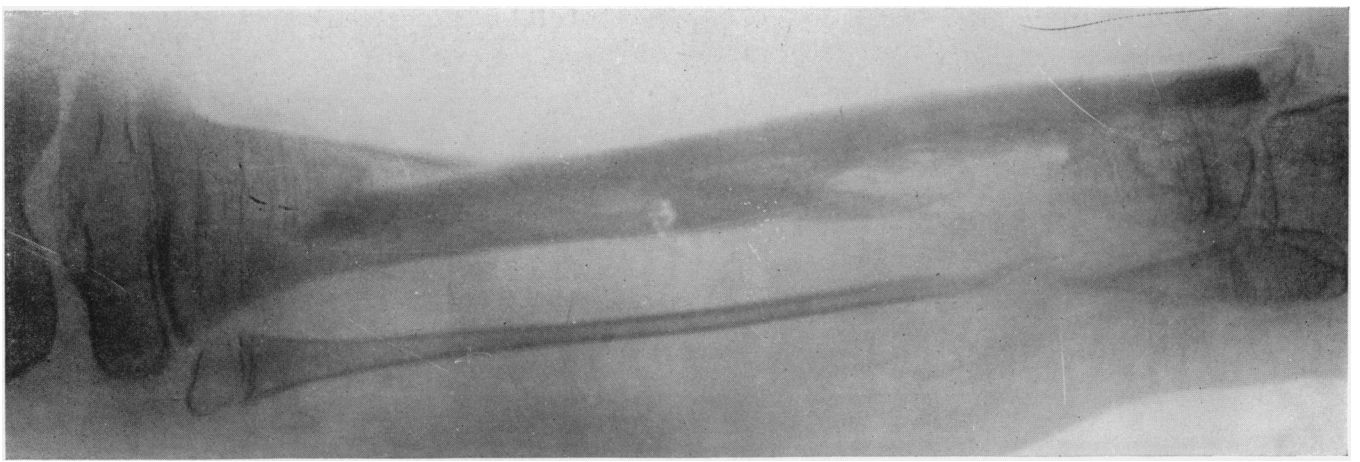

FIG. 5.—Five months after third operation, showing union between transplant and fragments, and growth of transplant.

taken from the other tibia. Its ends were buried in the tunnels already prepared, and the medullary surface was held in contact with the shaft of the tibia by means of catgut ligatures. The leg was dressed in plaster. A new case was applied on the first of June. It was found that fairly firm union was present. A high shoe was fitted to the case and the patient permitted to walk and bear her weight on the case. When the second case was removed six weeks later firm union was present. The patient was fitted with a brace and a high shoe. September 25, 1918, patient was discharged. She had good union (Fig. 5) and she was walking well by means of the brace and the high shoe.

This case is of interest because it demonstrates that union may be secured in an ununited fracture after a lapse of almost any number of years, and second, because it shows the futility of using too small a transplant. This patient would have been saved two operations if a large transplant had been taken from the other tibia at the first operation. This child has a shortening of four inches in her extremity which can never be made up. This shortening is due to the lack of development of the extremity because she did not bear weight on it. Had union with the fracture been secured earlier she would not have so much of a deformity and would not be so severely handicapped.

SPRENGEL'S DEFORMITY (CONGENITAL ELEVATION OF THE SCAPULA)

DR. A. B. GILL also showed R. T., a girl three years of age, who was born with a congenital elevation of the scapula. There is no history of similar deformity elsewhere in the family.

Examination on admission: The left scapula is elevated about 1½ inches with only ¼ inch motion up and down, and with but slight motion on rotation. The upper angle lies in the posterior cervical region 1¼ inches below the mastoid process. The upper angle and the upper margin are distinctly hooked forward. The posterior margin has a marked angulation at its centre and forms an angle at this point of almost 90 degrees. From this point of angulation a distinct firm band can be felt extending to the sixth cervical vertebra. The scapula rotates about this angle where the band is attached. The child is unable to elevate her arm above her head, nor can the arm be placed in this position passively. The hand cannot be placed behind the neck.

At operation October 8, 1919: A curved incision about three inches in length was made just behind the posterior border of the left scapula with the lower end of the incision slightly below the middle of the scapula. Skin and fascia were divided. A plate of bone was found extending from the point of angulation at the middle of the posterior border of the scapula obliquely upward to the sixth cervical vertebra. The scapula in the region of this posterior angulation was cartilaginous. The angle of the scapula was excised with the plate of bone attached. A distinct articulation occurred at this

point. It was then found that the bony plate could be moved freely through an articulation with the spine. It was detached from the vertebra.

The scapula could not be brought down to a normal position. The trapezius muscle was separated from the posterior portion of the spine and the two rhomboids and the levator anguli scapulæ were also detached from the scapula. It was found that the supraspinatus was made tense on attempting to move the scapula downward. It was therefore loosened from its posterior attachment. The angle and the upper portion of the scapula as far as the suprascapular notch was found to be sharply hooked forward. This portion of the scapula was excised. The scapula could then be brought down into almost normal position and there seemed to be no tendency for it to return. Wound closed. Child was put to bed on a Bradford frame with the left hand fastened to the upper part of the bed to maintain the arm in extreme abduction, and to rotate the scapula and hold the posterior border down.

November 3, 1919: Wound is healed, and the scapula is in almost normal position, the lower angle being but very slightly above the lower angle of the opposite scapula. The child's arm can be held above her head, and placed behind her neck. There is free rotation and up and down motion of the scapula. Daily active and passive exercises must now be given in order to develop and maintain free motion of the scapula and the upper extremity.

Dr. J. Torrance Rugh presented three specimens from cases of Sprengel's deformity upon which he had operated and all of which had the same characteristics as shown in Doctor Gill's case. He had operated on four cases in twenty-seven years. Three had had the extra piece of bone running in from the top or from the side of the spinous process, usually of the seventh cervical vertebra, and attached to the posterior superior angle or the posterior border of the scapula. The most recent one had been done that morning in a child three years of age in the Methodist Hospital. The long bony process coming from the side of the spine of the cervical vertebra or from the side of the lamina (the posterior aspect) extended down along the posterior border of the scapula. It was attached to the scapula about one inch above the lower angle; that is, it was on the ventral side of the scapula. The scapula was deformed much as the one Doctor Gill has shown, there being no posterior superior angle. It was necessary in this case, because of hooking over of the posterior border of the scapula, to separate all muscular attachments and then cut off the upper border of the scapula. After this it was easy to draw the scapula well down over the chest wall.

The specimen shows a large piece of bone running from the spine down to the scapula and shows a reversion to one of the primitive types of the lower animals. There have been a number of operations advised for correction of this deformity, but each case must be cared for in

accordance with the conditions present. Recently, one operator advised cutting a V-shaped piece up into the body of the trapezius muscle and drawing the scapula down. That would be absolutely useless in a case such as Doctor Gill's, because the attachment or elevation is not due to shortening of the trapezius muscle, but due to the attachment between this bony growth and the scapula.

DOCTOR GILL, in closing, stated that he detached the trapezius from the posterior portion of the spinous process of the scapula and did not notice whether there was any accessory process of the muscle or not. He did not dissect out the muscle as he wanted to do as little injury to the parts as possible.

The etiology of this deformity as mentioned by Doctor Rugh is interesting. It is known that the upper extremity develops in the cervical region, and during fœtal life descends to the position which it occupies at birth. In Sprengel's deformity there has been an arrest of the normal descent of the upper extremity. The cause of its failure to descend is not absolutely clear, but in cases such as the one shown to-night it is possible that the presence of the suprascapular bone will account for it.

TREATMENT OF NON-UNION IN COMPOUND FRACTURES

DR. DE FOREST P. WILLARD read a paper with the above title, for which see page 182.

DR. JOHN H. JOPSON said that non-union in gunshot fractures is, like suppuration, one of the reproaches of military surgery. We have learned much as to its prevention in the course of the war. The principles of prevention are much the same as hold true in the case of the industrial injuries of civilian life, and the knowledge we have gained is especially applicable to this class of cases. Whereas in the early years of the war widespread excisions were done in the continuity of bones, the site of gunshot fractures, with a relatively large percentage of cases of non-union, it was soon clearly demonstrated that the solution of continuity of the periosteum in these cases was seldom complete, and the old principle of removal of totally detached splinters and the preservation of those only partially separated was, when combined with careful cleansing in the course of débridement, followed by much superior results in the way of prevention of non-union. Satisfactory healing at the same time could be obtained. The introduction in modified form by Leriche of the old Ollier technic, by which a subperiosteal resection was performed of such portions of bone as required removal in the course of débridement, raising with the detached periosteum a thin layer of bone cells, was of distinct value in certain classes of cases in which the fracturing missile had penetrated or perforated the bone, carrying with it, in the case of missiles of low velocity, an infection which may or may not have been present with missiles of other types. In fractures involving the joints we also found it of advantage. With Leriche's special form

of elevator this was a simple matter. In gunshot fractures, as in compound fractures of other types, the introduction of metallic plates is fraught with risks that constitute contraindications to its adoption as a safe and acceptable procedure. In a few cases of oblique fracture, as Blake has shown, a Parham band, or in a smaller bone a silver wire, can be placed around the bone ends as a temporary splint, with the expectation of removing it later. In the latter case it may " heal in " even when the superficial wound is not closed. Compound fractures of large bones were, of course, left open until demonstrated sterilized sufficiently for suture, and treated in the meantime by the Carrel-Dakin technic. Efficient traction and fixation are the factors, in addition to the proper operative handling of the wound, in the prevention of non-union. The employment of skeletal traction has been amply demonstrated to be of great value in this connection. We used it in the form of the tongs, with much satisfaction. Where there has been a considerable loss of substance the tongs must be retained in use for a correspondingly longer time, to avoid buckling of the bone at the site of excision, which we have seen occur following their early removal. The after treatment includes the care of the muscles and the preservation of the function of neighboring joints. In the treatment of non-union itself, the bone graft, judiciously used, is, as Doctor Willard has emphasized, the most generally accepted, and apparently the ideal form of treatment. Bad results have occurred by its too early use as well as by its indiscriminate application in the hands of partly trained surgeons. Another and simpler form of fixation, the results of which were very satisfactory in the hands of Doctor Graves of the orthopædic services, was in the use of kangaroo tendon for fixation in operations for non-union. Two sutures were used, the bone ends each being drilled in two places, at right angles to each other, and the sutures being knotted in the same fashion. Satisfactory fixation was thus obtained even in the femur. Has Doctor Willard had any special experience with this method?

Dr. W. Hersey Thomas stated that he favored the Chutro graft but that at the time of treating these cases he was using intramedullary aperiosteal grafts. In one particular instance a tibial transplant had been placed in a radius to bridge a 6 cm. defect following a gunshot wound. The case did well and one month later was transferred to another general hospital where his splint was inadvertently removed almost immediately after his arrival. When next seen, two weeks later, the graft had slipped out of the lower fragment and the condition was that shown upon the plate. In a second operation (twelve weeks after the first), the upper end of the graft was so firmly incorporated with the proximal fragment that it was difficult to tell the original graft from the proximal fragment itself. The lower end of the graft was brought back to its original bed in the distal fragment but fractured while it was being laced in position with kangaroo tendon. A second graft was then taken

from the tibia and one end fixed in the distal fragment. The other end of the graft was laced to the original graft which had become incorporated in the proximal fragment. It is now three months since the second operation. The man has good union and can pronate and supinate.

The next case was that of an intramedullary bone-graft for a gunshot fracture of the upper third of the humerus. This man's wound had been healed for over a year and he had had a long course of massage and physiotherapy. Shortly after the operation the wound became infected with a hæmolytic streptococcus. The wound was laid open at once and Carrel-Dakin treatment instituted. Despite the infection and open treatment, this patient speedily gained a firm union and a good strong arm. Several sinuses remained for a few months, but he has now been solidly healed for six months and is enjoying the most active use of his upper extremity.

DOCTOR WILLARD, in closing, said that regarding the use of the kangaroo tendon in the femur cases, he had seen the cases of Doctor Graves at the Aberdeen Hospital in Scotland and they seemed to be healing remarkably firmly. He had treated a case of malunion in which refracture of the femur was done in which the fragments were held by that method. The forearm fractures were put in plaster of Paris, with a window for six or eight weeks. The cast was then cut in two, leaving a plaster-of-Paris mould; then began the treatment of light massage on the forearm, light motion to the fingers was started immediately and further motion as soon as possible. The mould is kept on so long as the X-ray shows there is need of it, perhaps for four months. In a femur case in which the operation was done in October, the cast was not taken off until December. Yet distinct bowing in that femur occurred. In another case the cast was kept on for at least four months.

ABSCESS OF THE PROSTATE

DR. ALEXANDER RANDALL read a paper with the above title, for which see page 172.

DR. D. B. PFEIFFER stated that it had always seemed strange to him that prostatic abscess was not more frequent than is the case. That when one examines the prostate microscopically as he had done several years ago in many cases, one is impressed with the number and narrow calibre of the glands that ramify deeply within the stroma of the prostate. Often the signs of chronic inflammation with cellular infiltrate are found, but it is seldom that the cellular deposit is within the lumen of the glands and the polymorphonuclear leucocyte is much less common than the round cell. In other words, the microscopical evidences of acute inflammation and pus formation are usually lacking. This corresponds with the relative infrequency of abscess as observed clinically, while chronic inflammation and indeed acute inflammation without abscess are commonly found. It would seem that the muscular stroma

possesses in common with muscular structures elsewhere in the body special facility in dealing with infective processes whether by rapid absorption or by its ability to keep the ducts open by intermittent contraction.

In view of the relatively uncommon character of the condition, this series reported by Doctor Randall is in reality an extensive experience. He had recently seen a report of 30 cases of prostatic abscess by two French observers which were the number encountered in 10,000 consecutive cases of genito-urinary conditions. The conclusions reached by a study of this series approximate very closely those stated in the paper we have just heard. The majority of the cases were very closely related to antecedent venereal disease, but instrumentation did not play any marked rôle in exciting the attack. The striking feature of these cases is the severity of the local and general symptoms, and there can be no difference of opinion as to the necessity of early incision and drainage.

DR. LEON HERMAN said that he was interested in the small proportion of cases of prostatic abscess in Doctor Randall's series due to specific cause. Undoubtedly, the majority of such abscesses originate as complications of gonorrhœal urethritis. He could not agree in all respects with Doctor Randall's viewpoint regarding the treatment of these cases. The mere suspicion of pus was not in his judgment sufficient justification for perineal incision. In the absence of systemic symptoms sufficient to warrant the diagnosis of the presence of pus, he believed the great majority of these cases should be treated palliatively.

If the local examination reveals the presence of abscess, however, these cases should be operated upon regardless of the absence of systemic reaction. Acute retention of urine occurring during the course of acute posterior gonorrhœal urethritis is usually considered pathognomonic of prostatic abscesses, but to this rule there are important exceptions. One case occurred which necessitated catheterization for a period of three weeks. There was in this instance an enlarged and tender prostate, but the local findings were not characteristic and the systemic symptoms were very slight. This individual recovered without operation and he felt sure that rupture of an abscess into the urethra did not occur.

Periurethral or periprostatic abscesses can be drained perineally only after traversing an approximately normal prostate gland to reach them; a procedure of doubtful propriety. True prostatic abscesses should, of course, be operated upon without delay. There is, however, little justification in my judgment for operation in cases where the symptomatology and physical findings are indefinite and inconclusive.

He agreed thoroughly with Doctor Randall that these abscesses should be drained perineally where the necessity for evacuating them arises. The majority of them can be ruptured intra-urethrally by the passage of a sound and at least 65 per cent. will rupture into the urethra spontaneously. Not only in chronic disease the aftermath of this sup-

posedly happy termination of the abscess but the danger of rupture into the other areas is too great to justify procrastination.

He had recently seen at the Pennsylvania Hospital a patient with a urinary fistula of the left inguinal canal. The left testicle had been removed for tuberculosis epididymitis, following which he developed an abscess of the prostate. This ruptured spontaneously both into the prostatic urethra and through the abdominal wall with the formation of a urethro-abdominal fistula.

Prostatic abscesses of gonorrhœal origin have been known to terminate in this same manner.

DOCTOR RANDALL, in closing, said that he felt that these cases should be operated and operated early. The important element was to save the patient from urethral rupture. It is almost a daily experience to see cystoscopically the after results of bad prostatic infections with the picture of deep sinuses leading down into the prostatic gland. Conditions are presented which on the first view tell you that you cannot rid the man of infection with its attendant symptoms. He thought, therefore, that in any case with symptoms of prostatic abscess the earlier incision was done the better.