

## TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

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*Stated Meeting, December 4, 1899.*

The President, RICHARD H. HARTE, in the Chair.

### EXTENSION APPARATUS FOR FRACTURED PATELLÆ.

DR. W. BARTON HOPKINS exhibited patients showing results of fracture of the patella treated by a special extension apparatus which consisted of a series of adhesive straps applied to the thigh in an intersecting diagonal form, each strap terminating in a ring at the knee, one-half of the series being attached at the outer side and the other half at the inner side. The ordinary extension cords connect the rings with the pulley-cord over the foot of the bed. It acts like the familiarly known Indian finger puzzle, which, slipping readily on the finger, tightens as traction is made on it and is difficult to pull off. Traction upon the rings exerts two distinct forces upon the thigh, the force of extension downward and the force of constriction. The former draws down the integument of the thigh and, by means of a bridle placed across it, the upper fragment of the patella. The latter, by exerting a continuous unremitting constriction, paralyzes the muscles of the thigh in a remarkable manner, without causing the distal portion of the limb to swell at all from impediment to its circulation. In this respect it acts quite unlike a snug bandage similarly applied. The apparatus does not control the knee-joint, but its disabling effect on the flexors as well as on the extensors of the thigh noticeably prevents any tendency on the part of the patient to flex his leg; the muscular relaxation becomes especially apparent when passive movement of the leg within ten or fifteen degrees is made. Such movement has been made in all these cases almost from the first, and it is readily conducted without at all disturbing the fragments, by simply elevating the knee from the bed. The ultimate

restoration of complete motion at the knee-joint obtained in these cases is largely attributable to this early and continuous passive movement, and partly, too, to the entire freedom from tissue irritation and infiltration following the concentrated pressure of straps, compresses, or other retaining appliances immediately about the joint. The apparatus is usually kept on for seven weeks, and is apt to require one renewal during that time. It is an extremely comfortable one for the patient, which, on account of the long course of treatment required, is a matter of no small importance.

It has been usually applied on the fifth day, after the first inflammatory reaction has begun to subside. Eight pounds' weight is generally sufficient, but there is no disadvantage in adding more, if necessary. It is a matter of common observation that the lower fragment seldom requires any attention; and so it has been found in the cases treated by this apparatus, seldom so much as a steadyng strap being used to keep the lower fragment in place.

Dr. Hopkins presented cases in which the injury had occurred from one to five years before, in which the separation of the fragments at the time of the accident varied from three-quarters of an inch to an inch. In all there was very close union of the fragments of the patella, and the restoration to normal function was found to be very perfect. The occupations of the several subjects required severe exertion, including stevedore and athlete. The latter performed some manœuvres requiring great muscular effort and extraordinary activity.

DR. JOHN H. BRINTON presented a man who had received a compound fracture of the patella about twenty-three years ago. He was treated by adhesive strips, extension, and elevation, without any operative procedure; and after twelve weeks the wound and fracture healed with ligamentary union. He was then so unfortunate as to jump from a car and refracture the patella, or rather the fragments separated for an inch or more. He was careful afterwards, and ultimately made a very good recovery.

The separation after healing in this case was nearly a half inch; perhaps it gradually got a little less. There has been some bony union, but as far as the function of the wound is concerned, his motions have not been materially impaired. There is one noticeable occurrence here, and that is, that within the last three

or four years a slight ossific deposit has taken place between the old fragments of bone. The power of the limb has been perfect, and he has been enabled to carry on his usual avocations. In fact, the injury has in no way interfered with his life work.

Dr. Brinton also exhibited two specimens, casts which, he said, presented an almost historic interest. Some twenty years ago, when he was on duty at the Blockley Hospital, he had a patient in the surgical ward, who, before he left, showed him the leg from which these casts were taken, which show, in the extended position, a separation of the fragments of the patella of three and one-half to four inches.

The man recalled to Dr. Brinton's mind where he had seen him in Washington during the days of the Rebellion. He said: "I was a Rebel mail-carrier, and I carried the Southern mail between Point of Rocks and Washington, some twenty-five miles. I travelled sometimes on foot, sometimes mounted, and generally made one trip daily to or fro." He said that such and such a beer saloon was the Southern post-office in the city of Washington, and letters were there received or mailed for delivery. That man at that time was encumbered with this knee, and yet, as he said, he walked twenty-five or thirty miles daily. This bears out the observation of Dr. Hopkins as to the possible usefulness of a broken knee, and in this case the value of the man's limb did not appear to have been much interfered with.

The fracture of this patella had occurred ten or twelve years before the war, in his early life.

DR. RICHARD H. HARTE said that there are certain classes of cases that every surgeon is called upon to see where a percentage of the cases will do well, and others where an indifferent result will be obtained, no matter what method of treatment is pursued. The character of the fracture and the amount of destruction of the fibrous tissue around the patella influence to a very great extent the amount of deformity. If there is a simple fracture of the patella, without any laceration, to speak of, of the fibrous capsule of the patella, there will be little or no deformity, provided the accessory bands of the quadriceps extensor tendon are left intact. In these cases almost any treatment in which the patient is kept at rest with the leg extended will naturally have a good result. In other cases, where there is a great deal of separation of the fragments, with a corresponding laceration of the quadriceps ex-

tensor tendon, great deformity will result, and difficulty will be experienced in getting a satisfactory approximation of the fragments. Retention of the fragments is often very much complicated by having to deal with a very small portion of bone which has been torn up, especially at the upper attachment of the quadriceps extensor tendon. As to treatment, he had tried almost every known method, including extension, counter-extension, with adhesive plasters, with weights and the Agnew splint. He had used hooks and sutures. In some he had obtained most excellent results, and in some the results had been indifferent. He had used in late years, simply as a matter of convenience, Malgaigne's hooks, which he thought, on the whole, to be one of the most satisfactory means of dealing with these conditions. He had never had any bad results, and he thought the unfavorable accidents which had occurred from the use of the hooks had resulted before the proper introduction of modern surgical asepsis. To illustrate how simply some of these cases can be treated, he detailed the case of a fracture occurring in the person of a bar-tender, who refused to go to bed and remain there, but who, after his physician's visit, got up, and, taking the bung-stave of a barrel, which conformed pretty accurately to the contour of the leg slightly flexed, and, padding the bung-hole carefully, inserted the two fragments of the patella through the hole, and then bandaged it on the anterior portion of the leg. On the return of the physician the next day he was found in this position, attending to his work, and refused to have any further surgical interference. The case ultimately resulted most satisfactorily. Dr. Harte was a firm believer that in all cases of fracture of the patella, after the removal of no matter what dressing that had been used for the retention of the fragments, the leg should be kept in the extended position for many months, allowing no strain upon the new fibrous tissue which is thrown out between the fragments, as in a great percentage of these cases, no matter how satisfactory the result may be, the bond of union may nevertheless be of a fibrous character, and if tension is made upon this new tissue, it is in time bound to stretch, and the deformity will be progressive.

DR. GWILYM G. DAVIS said that the two cases here presented are both accompanied by statements of good functional use of the limbs. It depends upon what one considers "good functional results." A child may have a paralyzed leg and may walk far

and get around well, but still one would hardly characterize it as being a *normal leg*, and he thought that these cases resemble those of paralysis. He presumed both of these had practically flail-legs; they would throw the limb out and it would come down with a thump.. They may have been able to continue that all day long, but he doubted whether people in the ordinary walks of life would be satisfied with such a result, even though they could manage to get along. He would not call that "good functional results;" it rather goes to what extent persons can accommodate themselves to disabilities.

In regard to the cases that Dr. Hopkins had shown, he thought they were among the best illustrations of the conservative studies of the subject that he had had his attention called to. They certainly were a strong argument for conservative treatment. He had operated in these cases many times, and he had never had any trouble, except on one occasion, when, after wiring the patella, a small sinus persisted and necessitated the removal of the wire. This was not accompanied by any disturbance of the joint, and there was never any occasion for alarm. The main object of operating on recent fractures—not compound—is that of saving time to the patient. He had a patient, after he had the patella sewn together, leave the hospital in good condition, and in a comparatively short time rebreak it; and he had come to the conclusion that, as far as his own cases were concerned, he would like them to wear some retaining apparatus for about a year after the reception of the injury, whether their patellas had been wired or whether they had been treated conservatively. In other words, after a patella has healed, it stands in great danger of being refractured; and if it is best to take this precaution for so long after the reception of the injury, one might as well treat it conservatively from the start, rather than subject it to operation.

DR. DE-FOREST WILLARD presented a patella removed some eight or ten years after fracture in a woman seventy years old. It has been sawn longitudinally, and on looking at the cancellated structure no evidence of lesion is visible; but upon the posterior and anterior surfaces there is a distinct transverse line marking the seat of fracture. There has been perfect bony union. He attributed the perfect result in this case to the fact that he saw the old lady within five minutes after she fell and she had not attempted to get up. She lay on the floor, had not used her leg,

had not separated the fragments, as there had been no muscular action, and he immediately had her under treatment. The thigh was first placed in a flexed position to relax the quadriceps, and later he applied the Agnew splint, which fixed the fragments and drew them together. There was one-quarter of an inch separation when he first examined her, and the fragments were perfectly movable.

#### CARCINOMA OF THE RECTUM.

DR. JOHN B. DEAVER presented two patients to show the type of result he had had to follow the modified Kraske operation. The first patient has complete sphincteric action. In the second case the control over the bowel is only partial. In neither of these cases is there much to be seen other than the presence of the scar. In the patient first presented, in addition to the scar, there is still an ulcerated surface at the extreme lower end of the wound, the result of an unhealed faecal fistula. In the case of this patient he excised three inches of the bowel and made an end-to-end union. Fortunately, the growth was far enough within the verge of the anus to allow the external sphincter muscle to be undisturbed. The faecal fistula is the result of breaking down of the line of union at the site of the fistula. In his experience, these fistulae ultimately close. In the case of the present patient, it was necessary to dilate the sphincter muscle some three weeks after the operation to favor the rectum emptying by the natural way.

In the case of the second patient, he was not able to save the external sphincter on account of the low situation of the growth. There is, however, considerable control over the bowel, which he attributed largely to the levator ani muscle. The latter patient is only twenty-five years of age. It is comparatively rare to meet with the disease at this age. The case was believed to be one of simple stricture; digital examination revealed, however, the presence of the induration so typical of these cases. Blood count showed both anaemia and leucocytosis. In this connection he referred to a patient upon whom he operated in the early summer of 1898, doing the same operation as was done in the first patient presented. This man remains perfectly well, with perfect control of bowel. The operation as done by Dr. Deaver consists of removing the lower two or three pieces of sacrum with the coccyx. This is done by separation with the chisel or osteotome and a pair

of scissors grooved on the flat. With the bone removed, efforts are directed to the arrest of the haemorrhage. The latter, in the speaker's opinion, is one of the most important steps in the operation. The next step in the operation is freeing the bowel. It is important to preserve as much of the levator ani as is consistent with safety, also to divide the bowel at a considerable distance to either side of the growth. Where the section of bowel entails removal of more than two inches, the peritoneal cavity must be opened to allow the sigmoid to be drawn down. So soon as the latter is done to the required distance, the parietal peritoneum at the site of the incision is stitched to the serous covering of the sigmoid and a temporary packing of the gauze placed against the line of suture. This has thus far, in the speaker's experience, served to guard against peritoneal infection.

The remaining step in the operation, the bowel having been removed, consisted in apposition of the two ends with suture. The wound is now carefully and gently packed with gauze and the patient returned to bed. Stitches in the external wound are used simply to close the upper and lower angles of wound; practically all of the wound is left to heal by granulation, being packed tightly with iodoform gauze.

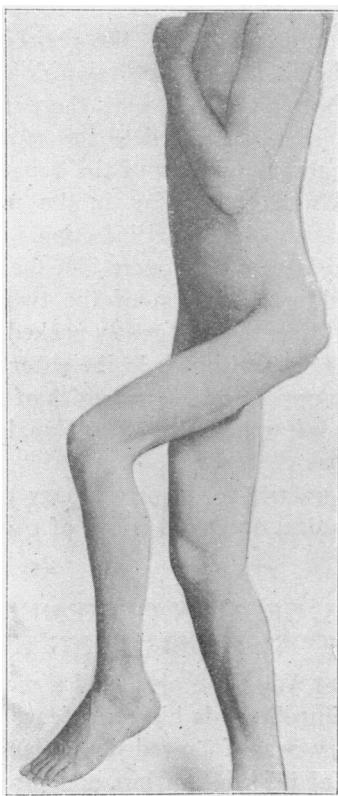
It is not his practice to do preliminary colostomy except in cases where the radical operation is out of consideration.

#### LONGITUDINAL SECTION OF FEMUR FROM PELVIS FOR ANKYLOSIS FOLLOWING HIP DISEASE.

DR. DE FOREST WILLARD presented a man, twenty-six years of age, who fell, impaling his hip on a fence, at the age of four years. The injury was followed by inflammatory symptoms, then with tubercular infection of hip, and for ten or twelve years abscess followed abscess, until the entire head and neck of the bone had apparently been destroyed. No operative interference, apparently, was instituted, and the upper end of the femur finally became ankylosed to the outer face of the pelvis for several inches, and at a right angle; it was also in the adducted position, the median line of the body falling externally to the outer condyle. To add to his difficulty in locomotion, there had also been a vertebral osteitis, which prevented the spinal column from assuming the usual condition of compensatory lordosis; and, as the spine

was rigid throughout both lumbar and also dorsal regions, he was obliged in walking to throw his trunk to almost the horizontal position at each step. In standing, the heel was eight and one-half inches from the ground; progression was therefore very laborious and painful.

Since a simple osteotomy through the shaft of the femur at



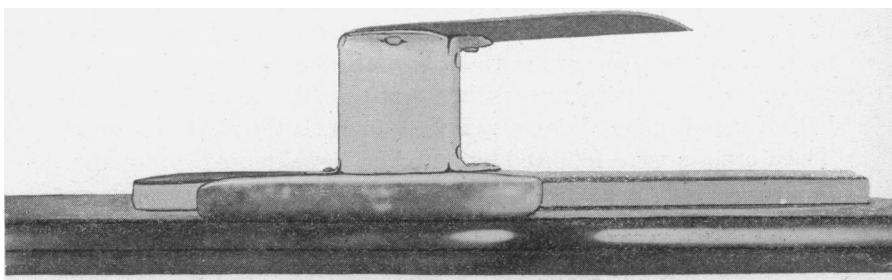
Hip disease. Ankylosis of left hip at right angle. Spine also rigid.

any point would have placed the lower fragment at such an angle with the upper that serviceable union was doubtful, he therefore attempted to cut away the femur longitudinally from its attachment to the pelvis, and bring it into an approximately straight position. A skiagraph assisted in determining the line of section. As the hip was surrounded with cicatricial tissue from multiple abscesses (which had, however, been entirely closed for

nearly five years), a long incision was made through the most healthy tissue, and he was able at last, with the osteotome and chisel, to free the bone; firm, powerful pressure for thirty minutes finally stretched the surrounding fasciæ and tissues until the bone was brought to within fifteen degrees of the straight line, where it was fixed with plaster-of-Paris dressing extending from thorax to toe. With the largely altered tissues and the extent of the section, Dr. Willard expected suppuration, and therefore inserted drainage; but this was very slight, and the wounds were all healed in six weeks; he was walking upon crutches in seven weeks, and now, with only three inches of cork under the foot, is able to walk without a cane, in an erect position, with no adduction, and with a thigh only fifteen degrees out of the straight line.

#### PELVIC SUPPORT FOR APPLYING GYPSUM DRESSINGS AND SPICA BANDAGES AT HIPS.

DR. DE FOREST WILLARD remarked upon the difficulty presented in applying plaster bandages to trunk and thigh, especially in a fat man or woman, without disturbing motion at the hips during its application and subsequent setting. During the process of setting of a plaster bandage, it is absolutely essential that quiet



Pelvis-supporting stool for applying dressings at the hips.

should be secured, otherwise the long leverage of the leg will certainly impair or break the case at the groin, even if metal strips are used. As a support in such cases, he showed a stool made of two boards fastened in the shape of a cross, one twelve inches, the other eight inches in length. Securely erected upon a post is a thin metal plate six inches long, three inches wide, slightly curved, to add strength and also to adapt itself to the shape of the sacrum; this plate is supported four inches from the

board by a hollow square metal pedestal, so as to give room for the hand and bandage to pass readily between the patient's pelvis and the table. The sacral supporting plate is strongly riveted to this post and projects only in one direction from this post, *i.e.*, upward towards the lumbar region, like an inverted and reversed letter L, "T." When padded with cotton, or gauze, or a towel, the plate is still so thin that it does not interfere with the application of the bandage; and, after the setting of the gypsum, the stool is easily removed by sliding it downward towards the buttocks, since all the bandages have passed above the supporting post. To secure a straight subsequent lying position, a pillow or pad should be placed beneath the shoulders during the dressing, but when ordinary spica bandages or dressings are being applied this is not necessary.

In the application of plaster dressings after the radical operation for hernia, as well as for the ordinary spica in operations about the hips or pelvis, this stool will be found most serviceable, both for children and adults, giving, as it does, a firm and continuous support as long as necessary.

#### CHOLECYSTOTOMY.

DR. DE FOREST WILLARD presented a woman, fifty-six years of age, who had suffered for eleven months with recurrent attacks of severe pain on the right side of abdomen, attacks being accompanied with rigor, vomiting, and pain throughout the right half of the abdomen, but not radiating towards the right shoulder. These attacks were followed by jaundice, light-colored stools, and tenderness below the costal margin. For several weeks these pains recurred every other day; at times, however, there would be an interval of several weeks; recently, the returns have been more severe; patient had lost flesh rapidly, giving rise to a suspicion of malignant disease.

Patient was admitted to the medical ward of the Presbyterian Hospital, under the care of Dr. Stryker, September 8, 1899. Skin and mucous membranes slightly tinged. Physical examination of chest showed healthy organs. There was tenderness in right abdomen, most marked in the lower segment, and about the umbilicus, rather than over the gall-bladder. Pressure over the appendix quite painful. Attacks of biliary colic continued with increasing severity, commencing in the region of the gall-bladder,

radiating to back, but not to shoulder; the jaundice increasing after each crisis, but yet was very slight; suffering intense. Urine contained trace of bile, and after the attacks showed hyaline casts, occasionally epithelial casts, and at intervals a trace of albumen.

Blood examination showed, September 19, lymphocytes, 22 per cent.; large mononuclear, 4 per cent.; transitional, 17 per cent.; polymorphonuclear, 56 per cent.; eosinophiles, 56 per cent.; no micro- or macrocytosis.

Blood examination, September 21: Lymphocytes, 35 per cent.; large mononuclear, 5 per cent.; transitional, 9 per cent.; polymorphonuclear, 50 per cent.; eosinophiles, 1 per cent.; no macro- or microcytosis.

Transferred to surgical ward (Dr. Willard). Operation, October 2. Ordinary incision. Gall-bladder distended, one-third larger than normal. Large calculus palpable in the neck of the sac, and the dilated commencement of duct. A calculus the size of the last phalanx of one's little finger was removed through small incision at the neck. The duct was examined and no other calculi discovered. The wall of the gall-bladder and the lining membrane both being in good condition, the wound was closed by a row of silk sutures reinforced with a row of Lambert sutures, inverting the wound; the peritoneal abdominal muscles were separately closed by catgut stitches, without drainage; skin closed with silkworm. Patient had no attacks of colic after the operation, and, save for a slight wall abscess from an explainable cause of infection, had no further trouble. At no time was there any discharge of bile from the wound. The stools soon became natural in color and consistency, and the patient improved in health and strength.

Immediate closure of the gall-bladder is only applicable to cases where the walls of the organ are in good condition, and when the contents are not purulent. When indicated, however, this method is of decided advantage in preventing the troublesome and sometimes very tedious biliary fistula that not infrequently (one case in five) follows cholecystotomy with drainage.

Dr. Willard said that he did not intend in reporting the case to have it inferred that the ordinary gall-bladder should be sutured, but in certain cases, as in this, where the walls were perfectly healthy, where there was no suppuration whatever, where the

contents of the gall-bladder were simply bile and mucus, it was proper to insert sutures so as to close the bladder absolutely without drainage, and thus gain a good, strong, solid wound; for, in his experience, the biliary fistulae that remain after an ordinary cholecystotomy are troublesome; some remain for many months, and some for years. He had a patient now with a fistula for two years, constantly discharging bile, and it is of great annoyance to the patient. If there has been suppuration, however, he did not think it wise to trust to such closure.

DR. HENRY R. WHARTON said that he thought it to be rather unwise, in the majority of cases, to do the ideal operation as regards the immediate closure of the gall-bladder, since the obstruction in many cases is due to an inflammatory condition of the mucous membrane of the common duct as well as to the presence of a stone in the gall-bladder or duct; and that if closure without drainage, after removing the stone, is resorted to, that obstruction still persists; but in the cases in which drainage is used in the majority of cases the bile escapes from the drainage-tube or the gauze-drain for a time, and as soon as inflammation subsides—as the result of drainage—the re-establishment of flow through the duct occurs. If the surgeon is certain that the ducts are patent, of course he can consider the immediate closure of the gall-bladder. On general principles, it should not be recommended as a usual operation, but only when one is absolutely certain that the gall-ducts are in good condition to carry off the discharge.

DR. JOHN B. DEAVER said that delay in closure of the fistula does not occur when the gall-bladder is attached to the aponeurosis of the external oblique muscle, leaving the skin and superficial fascia free.

It was his custom to make the incision through the rectus muscle, for one gets better union and a greater safeguard against hernia by so doing. The superficial fascia forms an ideal bed for granulations which close the fistula.

DR. DE FOREST WILLARD said that he did not suture to the skin because, in his opinion, one secures better union by suturing to the deeper tissues, either to the aponeurosis, the peritoneum and transversalis fascia, or the muscles. All that is required is to close off from the peritoneal cavity.

## RUPTURE OF THE LIVER.

DR. WILLIAM G. PORTER presented a ruptured liver, saying that the person from whom it was removed was a patient in the Presbyterian Hospital. He was twenty-five years of age, was a railroad brakeman, and was brought into the hospital in a condition of shock, with the history that he had been thrown down and trampled on by quite a large number of men who were endeavoring to escape an approaching collision between two cars. When he was admitted, there was no evidence of any fracture or dislocation. The man was simply profoundly shocked, and had an abrasion over the thorax. He would not locate any trouble at that time. He slowly reacted from the shock, and twenty-four hours afterwards began to vomit. At no time was there any passage of blood, either in the urine or from the bowel or in the vomited matter. In the first place, the abdomen was not distended at all. It was tender, however, on pressure. Vomiting came on about twenty-four hours after his admission. The tenderness increased over his abdomen, and then there was quite considerable tympanitic distention. The temperature then rose, with a very decided difference between the temperature tracings when they were taken under the tongue and when they were taken in the rectum. That difference is almost always uniformly two or three degrees, and sometimes varied as much as four degrees. The vomiting was relieved after about forty-eight hours, when his bowels were emptied by an enema and the internal administration of calomel; but he still lay with this exalted temperature, with pain, with tympanitic distention of his belly, so that all supposed that he had a general peritonitis as the result of the trauma. He gradually declined, and on the sixth or seventh day after the injury he died. At the autopsy, when the abdomen was opened, no evidences whatever of peritoneal inflammation were found, but the whole cavity of his pelvis was filled with blood, and, on looking for its source, it was found in a ruptured liver, which is shown in the specimen.

DR. J. CHALMERS DA COSTA said that some two years ago, in the Philadelphia Hospital, he saw a case of laceration of the liver, resulting from fracture of the ribs. The man had been making an excavation. There had been a fall of earth, and he was brought into the hospital in a condition of shock. The resident physician

examined him and detected two fractured ribs; administered the ordinary restoratives for a condition of shock, and also had straps of adhesive plaster applied to his side for fracture of the ribs. The next afternoon, some twenty-four hours after the accident, it was observed that he began passing into a condition of collapse, with signs of intra-abdominal haemorrhage, shifting dulness in the flanks, collapse, feeble and rapid pulse, accompanied by abdominal pain. On opening the abdomen, a laceration of the anterior surface of the liver was found, which was bleeding furiously. Stitches were applied, but they would not hold, and the wound was packed with gauze, which controlled the haemorrhage. The incision was made anteriorly, and, as far as the operator could reach and see, no other laceration was discovered. This haemorrhage was completely arrested. He lived some forty-eight hours, his symptoms having abated for a time. He, however, became worse with great rapidity, and died forty-eight hours after the operation. The specimens are now in the Philadelphia Hospital.

An examination was made by Dr. Stengel. The bleeding from the anterior wound had not recurred. It was discovered on the posterior surface of the liver that the end of a rib, very near the spine, had inflicted another injury as grave as that inflicted by a rib on the anterior surface. The only way to have found and reached that posterior injury would have been by an extensive rib-resection. The problem is: There has been a severe injury, either a crushing force or an injury that breaks ribs, lacerating the liver on the anterior surface. When an injury is found and the haemorrhage arrested, should an extensive investigation be made to determine if there is another hepatic injury?

#### THE RADICAL CURE OF HERNIA.

DR. GWILYM G. DAVIS said that in 1895, Dr. George Tully Vaughan, United States Marine Hospital Surgeon, who was then stationed in Philadelphia, brought to his notice his method of operating for the radical cure of hernia. It was published in the *Journal of the American Medical Association* of July 25, 1896. His account is as follows: "Divide the conjoined tendon through its muscular part four or five centimetres above its insertion, including the internal pillar of the ring down to the peritoneum, avoiding the deep epigastric artery. Separate by blunt dissection

the conjoined tendon from the rectus and pyramidalis muscles down to the pubic bone, and place the cord in this position between the conjoined tendon and rectus. The cord still passes through an oblique canal at its anterior portion as the conjoined tendon overlaps the rectus and pyramidalis for 2.5 centimetres or more being inserted in front of these muscles. Unite the divided ends of the conjoined tendon and internal pillar with mattress sutures, and accurately approximate them with continuous and interrupted sutures."

This was the first time Dr. Davis's attention had been directed to transplantation of the cord inward instead of keeping it out in the neighborhood of the internal ring. He insisted on the advantages of having the hernial opening entirely closed from the spine of the pubes out, thus obviating the liability of weakening it by allowing the cord to pass through the line of union. As the recurrences which had come under Dr. Davis's notice had taken place in the line of the wound, he felt that placing the cord at the inner angle was a distinct advantage, and he had practised it with more or less regularity ever since. Being unwilling to cut the muscular portion of the internal oblique and transversalis as Dr. Vaughan had done, he at first divided the conjoined tendon near its insertion into the spine of the pubes, then placed the cord to its inner side and sewed the divided conjoined tendon again down to the pubes. This he felt, however, weakened the abdominal wall at this point, so he soon contented himself with dividing the tissues down to the pubic bone just to the outer side of the conjoined tendon, and allowing the cord to hang over the pubes at this point. Sometimes he would nick the edge of the conjoined tendon to allow a little more room for the cord. The internal oblique and transversalis muscles with the fascia beneath were then sewed to Poupart's ligament, and the external oblique closed with a continuous suture. About this time, Dr. J. Coplin Stinson published his method in the *New York Medical Record* of March, 1896; and recently, in the *ANNALS OF SURGERY* of October, 1899, he again advocates it. He uses three layers of sutures besides those of the skin. He says, "Commencing at the upper angle, bring the inner and outer borders of the transversalis fascia accurately together with continuous sutures, leaving only sufficient room at the lower angle close to the pubic bone for the cord." He then sewed the internal oblique and transversalis muscles to

Poupart's ligament, and united the cut edges of the external oblique. Dr. Ferguson, *Journal of the American Medical Association*, July, 1899, advocates practically Stinson's method as described above. Believing that the hernia is due to a deficient origin of the transversalis and internal oblique muscles at Poupart's ligament, he says he "entered the sewing (of the internal oblique and transversalis muscles) fully two-thirds down Poupart's ligament, which is the normal origin of this muscle." In the same article he states returns usually occur at the upper and outer portions of the wound. William J. Mayo, writing in the *ANNALS OF SURGERY* of January, 1899, says he has seen William T. Bull unite the deeper muscles over the cord to Poupart's ligament and then suture the external oblique. William B. Coley, *ANNALS OF SURGERY*, 1897, p. 280, states that for four years he and Dr. Bull have in some cases placed the cord inward and sutured both the deep and superficial muscles over it. He and Dr. Bull, writing together in the *ANNALS OF SURGERY*, Vol. xxviii, 1898, p. 599, say that suture of the canal without transplantation of the cord has much to commend it, the remaining steps being the same as for Bassini's operation.

Finally, Dr. Davis was convinced that he had read of others employing the same procedure. These facts, he submitted, were sufficient to show that the supremacy of the operation of Bassini is threatened, and a new school is arising which opposes the laying of the cord either between the superficial and deep muscles, as does Bassini, or over both, as does Halsted, and advises instead the union of both layers over the cord. Comparatively few, however, go to the length of G. R. Fowler, *ANNALS OF SURGERY*, Vol. xxvi, 1897, p. 603, who advises placing the cord within the peritoneal cavity.

A second point to which attention is called is the treatment of the transversalis fascia. Dr. J. C. Stinson and Ferguson both sew it as a separate layer. He knew of no others who do; Bassini and Halsted do not. Personally, he had sometimes found the transversalis fascia so thick as to enable one to suture it shut separately, but usually he had brought both the deep muscles together with the underlying fascia to Poupart's ligament in a single layer of sutures, and then closing the incision in the external oblique.

In dealing with the sac after ligating it as high up as possible and cutting it away, he had brought the two ends of the chromi-

cized ligature up through the muscles above the internal ring and tied them on the surface of the external oblique. The peritoneum having been somewhat separated, this procedure allows the site of ligation to be drawn up somewhat higher than it otherwise would be, and fixed in place.

In concluding, the following propositions are submitted for discussion:

- (1) Is it best to lay the cord close to the outer edge of the conjoined tendon and unite all the structures above the peritoneum over it?
- (2) Is it always possible or advisable to unite the cut edges of the transversalis fascia as a separate layer?
- (3) Is there any advantage in ligating the ends of the sac ligature on the muscles above the internal ring instead of cutting them short?

DR. JOHN B. DEAVER advocated the Bassini operation, with one modification, the MacEwen method of disposing of the sac. MacEwen's operation has two very strong points in its favor. One is the non-division of the aponeurosis of the external oblique. That is one of the weakest points of any open operation. The divided aponeurosis of the external oblique cannot be restored as nature made it. Then, the second point is the disposition of the sac. The cases of recurrence he had seen, in the majority of instances, had occurred at the upper point of the wound, at the site of the so-called internal ring,—there not being such a thing anatomically. Now, if that is the case, it would argue in favor of the open operation as far as the restitution of the lower part of the canal is concerned. It is in the majority of cases that the recurrence takes place above, which shows that the integrity of the lower part of the canal is restored by the Bassini operation.

He understood that Dr. Davis passes the ends of the ligature used to tie in the neck of the sac through the overlying abdominal walls, tying them down upon the aponeurosis at the external oblique, and in this wise fixing the neck of the sac well within the internal abdominal ring. This, to his mind, does not, however, dispose of the concavity upon the inner aspect of the abdominal wall which exists in the shape of the external inguinal fossa. That this fossa, coupled with elongation of the mesentery, accounts for the majority of cases of inguinal hernia of the small bowel, must be admitted. Dr. Davis's method, therefore, does

not dispose of this concavity. The nearest approach to it is the Fowler and Halsted method, where the peritoneum is cut off flush with the parietal peritoneum and sutured. It is Dr. Deaver's practice to invaginate the hernial sac after the manner of MacEwen, carrying it through the mouth of the hernial sac and anchoring it at this point. He knew that objections had been raised against this method of disposing of the sac, as in Coley's paper referred to by Dr. Davis. Coley takes the ground that nutrition of the sac when disposed of in this manner is in danger, and that sepsis and suppuration are more likely. This may be true, but it had never occurred in the practice of the speaker. He agreed with Dr. Davis that it is relatively better not to cut the internal oblique muscle. This is one of the strongest objections to Halsted's operation.

DR. RICHARD H. HARTE said that his own method was a modification of Halsted's, and he had no fault to find with that operation. He agreed with Dr. Deaver, and also with Dr. Davis, that when recurrences occur they start in the upper part of the incision, or the so-called internal abdominal ring, which is supported almost entirely by muscular tissue. He thought there was very little difficulty in closing what corresponds to the external ring, but pouting in the upper part of the wound is not at all uncommon in persons especially of relaxed abdominal walls, say a couple of inches from the spine of the pubis. Every surgeon who has attempted to operate the second time on cases of recurrence knows how unfavorable these cases are. The question of dealing with the sac is a most important factor in the success of all hernia operations. The method pursued consists in cutting off or tying the end of the sac, tying a purse-string around it and dropping it back or pouching it after the method of MacEwen. The other methods are faulty, as they do not obliterate the hernial pouch in the peritoneum, leaving the conditions favorable for recurrence. The MacEwen proposition to make a large plug and leave it there, is undoubtedly good, as it acts as a buffer in cases of attempted recurrence; but it is not always a safe procedure, as he recalled two fatal cases, one which he saw operated on and another in the service of a colleague. The unfavorable results were undoubtedly due to the sloughing of the sac. He had tried faithfully all of the different methods for the radical cure of hernia, and felt convinced that some modification of the Italian

operation is the best; but, nevertheless, the weak point of all operations is the failure to fortify the so-called internal abdominal ring.

DR. W. JOSEPH HEARN said that the recurrences that he had seen took place in the upper part of the incision. For that reason he never did a Halsted operation. He did not care to cut these muscles, for more or less atrophy takes place; they are left weak. He very rarely saw a hernia occur close to the pubic bone. He had come to the conclusion that it is better to leave the cord on the pubic bone, where nature intended. He was sure that there are a great many cases of strangulated hernia where the patient's condition did not justify a radical operation for its cure. He had been in the habit of sewing up the ring with silver wire and leaving it there. He had never had infection, and he had had no return of the hernia. He simply made a barrier of silver wire.

DR. ROBERT G. LE CONTE said that he did not see that a hernia could return in any other position except the upper part of the wound, if that is the place the cord leaves the peritoneal cavity. The internal ring, where the cord leaves the peritoneum, is the point of weakness, and whether one makes this high up in the incision, as in Halsted's operation, or low down, as in Stinson's, it will be the point at which recurrence takes place. As to the radical cure of hernia in the operations spoken of,—Halsted, Bassini, and Stinson,—the principles are different. Dr. Halsted brings the cord directly out of the abdominal cavity, at a right angle to the plane of the abdominal wall, and diminishes its size by the ligation of some of its veins. In this way the intestinal pressure from gravity is removed, but the general intra-abdominal pressure is in no way combated, except by the slight diminution in the size of the cord. Dr. Stinson's operation is the opposite of Halsted's in that the cord is brought out at the lowest portion of the incision and deflected towards the median line. It does not oppose the intra-abdominal pressure or the gravity pressure, except by the angulation of the cord as it goes over the pubic bone. Here recurrence should take place always at the lower portion of the wound. Bassini's principle is to return the inguinal canal to its original condition, and so oppose the recurrence of hernia by nature's method. When a hernia takes place and has persisted for some time, the internal and external rings are approximated. The internal ring descends and approaches the external ring, and in

an old hernia the two rings will practically be together. In the normal abdomen, we have a distance of an inch and a half or two inches separating the position where the cord leaves the peritoneum and where it makes its exit through the abdominal wall. The strength of the inguinal canal in a normal abdomen is due to its oblique passage through the abdominal wall and to the muscular action of the external and internal oblique. These muscles acting, the fasciæ overlying and underlying the cord are drawn tense, and the longer the canal the greater will be the resistance to the passage of bowel. He did not see why a long mesentery or any peculiarity of the fossa should be more than a slight predisposing cause of hernia. He knew of several men who had gone through an active existence, to the age of sixty and sixty-five, who had suddenly developed hernia during a paroxysm of coughing. He did not think this was due to a sudden lengthening of the mesentery or to any changes of the fossæ inside of the abdomen, but rather to a relaxation and loss of tone in the muscular walls of the abdomen from old age. In other words, the length of the mesentery and the fossa had remained in the same condition for many years, but the muscles and fascia of the abdomen had changed from age. He therefore thought that Bassini's operation is the best in theory, and in his practice it had proved most successful in suitable cases. Any modification of it, however, is faulty, as it defeats the principle on which it is founded.

DR. GWILYM G. DAVIS said that, as far as the use of the sac as a pad goes, that has been thrashed over pretty thoroughly of recent years, and he thought the verdict of the profession was practically against it in inguinal hernia. In femoral hernia it is still open to discussion. The question that he had hoped to see discussed was that of the transversalis fascia. Is there or is there not a transversalis fascia forming a distinct layer? Dr. Deaver apparently settles the question when he says there is no internal ring, because the internal ring is commonly supposed to go through the transversalis fascia. As far as Dr. Davis's personal experience went, he believed that sometimes there is a fascia that can be sewn together separately, distinct from the muscles above and peritoneum beneath. One will sometimes find just beneath Poupart's ligament another layer of fibres, which he believes is the thickened edge of the transversalis fascia. When he found thickening of this sort, then he united it as a separate layer. But

it is evidently not there always; therefore he hardly saw the justness of Drs. Stinson and Ferguson describing uniting the transversalis fascia as a distinct layer as a routine procedure. As regards the incision of the muscles. One reason why he was induced to transplant the cord internally was that he did not believe in dividing the external oblique muscle to anything like the extent usually done in operating for these herniæ. Hernia recurs towards the outer portion. The only object of making this incision so far out is to gain access to the internal ring, and he thought this could be done without going so far up as many operators do. The only difference between the incision for this operation and that of Bassini is that in this the incision goes a trifle closer to the median line, so as to enable one to expose the spine of the pubes and carry the knife down to the bone. The cord is laid there, and one is enabled to bring the conjoined tendon and its muscles closer down to Poupart's ligament.