

HERNIA OF URINARY BLADDER:

NOTES OF CASES, WITH REMARKS ON STRANGULATION OF FEMORAL HERNIÆ AND ITS TREATMENT.

BY H. BLAKEWAY, M.S. LOND., F.R.C.S. ENG.,

SURGICAL REGISTRAR AND ACTING ASSISTANT SURGEON, ST. BARTHOLOMEW'S HOSPITAL; ASSISTANT SURGEON, CITY OF LONDON TRUSS SOCIETY.

HERNIAL protrusion of the urinary bladder is a comparatively uncommon complication of inguinal and femoral herniæ. It is stated to be associated in most instances with large scrotal herniæ of long standing and to be generally on the right side; and while protrusion of an extra-peritoneal portion of the bladder by the side of the sac is the variety usually seen, the superior (i.e., peritoneum-covered) surface may occasionally be found bulging within the hernial sac; indeed, it is on record that the whole of the viscus and the prostate as well may be herniated.

It is well known that the diagnosis of hernia of the bladder cannot usually be made before operation, but rarely the patient may volunteer the statement, or the fact may be otherwise elicited, that an over-full condition of the bladder has led to descent or difficulty in reduction of the hernia, or that pressure upon the hernia has caused the desire to micturate or has even expelled urine along the urethra.

This difficulty in diagnosis, together with the fact that the condition is rare enough to have been often unsuspected, has led in many cases to injury to the bladder during the incision or the removal of the hernial sac; where the wound has been detected, and at once sutured, no harm has usually followed; but in less fortunate cases hæmaturia with or without leakage of urine from the wound has occurred, or even leakage into the peritoneum with perhaps a fatal result.

The Present Series of Cases.

It has been my fortune to operate within two years and a half upon five cases of hernia in which the bladder was protruded.

Three of the patients were males, and two were females; their ages varied between 48 and 71. All the herniæ were of long standing, and in four of the cases strangulation was present; in all the hernia of the bladder was on the right side, of the direct inguinal variety in two of the males, and of the femoral sort in the other three cases.

The tendency to acquired hernia in these five patients is seen from the fact that two of them—Cases 2 and 5—(and possibly a third—Case 1) had previously undergone operations for other herniæ; these two, and another—Case 3—in addition, when they came for treatment had other herniæ as well as that for which I operated.

As I have also had under my care at the City of London Truss Society a sixth patient, in whom hernia of the bladder was diagnosed without operation, it may be that the condition is less uncommon than is generally supposed, and, in particular, that its frequency in females and those with femoral herniæ has been underestimated.

This latter patient, a woman of 58, had had for 11 years a large right femoral hernia, which was partially irreducible. She complained of frequency and great pain in micturition when the hernia was down; attempts to effect reduction caused the desire to micturate, and after urine had been passed the hernia was more easily reduced. Operation was strongly advised, but was declined.

As in all the cases operated upon, whether inguinal or femoral, the relative positions of the sac and of the herniated process of the bladder were similar, their relations are shown, in the case of one of the femoral herniæ, in the accompanying diagram.

It will be seen from this that the bladder protrusion was not a sacculus or hernia of the mucosa and submucous coat between the muscle fibres, but that in all the cases it involved the whole thickness of the bladder wall. It was closely applied to the inner side of the neck of the sac, from which it was separable, with or without difficulty; its size in each case was about the same, so that, at a guess, if distended it would about have equalled a walnut, or rather less. As it was always found collapsed at the time of operation it was by no means a conspicuous structure and might easily have been accidentally wounded or ligatured.

It follows from this that any thickening about the inner side of the sac of an inguinal or femoral hernia, especially if the hernia has long existed, in an elderly subject, should excite suspicion.

I have more than once, in operating upon femoral herniæ (and see also Case 2), seen another structure adherent to the neck of the sac on its inner side, a fibrous cord which I think to have been the obliterated hypogastric artery.

This structure normally lies close to the crural ring, and is closely related and somewhat attached to the parietal peritoneum; it is not surprising, therefore, that a hernial sac in this situation should sometimes carry with it the obliterated hypogastric artery; the latter is seen in the adult as the continuation of the superior vesical artery, after this vessel has supplied its branches to the bladder wall; it may be that the connexion here between peritoneum, hypogastric artery, and bladder wall is not without influence in predisposing to vesical hernia.

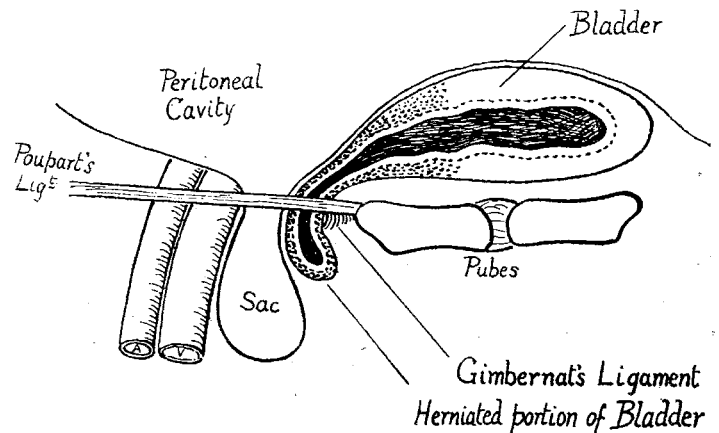


Diagram of an oblique section, showing position of herniated portion of bladder in relation to hernial sac and surrounding parts in Cases 1, 4, and 5.

Strangulation of Femoral Herniæ: An Important Point.

Consideration of the relations of the neck of a femoral hernial sac leads me to refer here to a point of importance in connexion with strangulation of femoral herniæ.

This common and dangerous condition does not yet receive in most text-books all the accurate attention that it deserves. It is still the usual teaching that the main cause of constriction is the free edge of Gimbernat's ligament, and that this structure must be cut in one or more places to relieve the strangulation. This opinion had its origin in the days when surgeons, when operating for strangulated femoral hernia, always avoided opening the sac if they could, and so were led to concentrate attention on anatomical structures outside the sac.

It is easy to convince oneself, when the sac has been laid open, that the chief cause of strangulation is the intrinsic narrowness of its neck, and the condition is best relieved by division of the neck of the sac *from within its lumen*, and not by inserting the hernia knife between the neck of the sac and the base of Gimbernat's ligament. If the knife is directed inwards it should not be because it is wished to divide the base of the ligament, but because in the inward direction lies no risk to any blood-vessel.

It may generally be observed that even those who believe Gimbernat's ligament to be the cause of strangulation attempt its division, during an operation, from within the sac, and it is noteworthy that the Key's hernia director in common use is intended to be employed in this way, the breadth of its blade being designed to prevent the intestine from curling round into contact with the knife. After such an operation has been performed, and the sac has been removed, it can without difficulty be demonstrated that the base of the ligament is still intact.

The matter is of more than academic importance.

Not only is it unnecessary to divide the edge of Gimbernat's ligament, but it is highly undesirable to do so, both to avoid unnecessary enlargement of the crural canal and to avoid also a wound of an abnormal obturator artery. The obturator artery is abnormal in its origin (i.e., arises from the deep epigastric) on one or both sides of the body in about 30 per cent. of subjects, and 10 per cent. of abnormal obturator arteries pass to the obturator foramen by way of the inner side of the femoral ring—i.e., behind the free edge of Gimbernat's ligament; here, if the ligament be divided, the artery may be cut across. The reason why the vessel is nowadays very rarely wounded lies chiefly in this—that the operator's knife, as pointed out above, has usually not reached the ligament even when his intention has been to divide it.

Clearly, in the two cases of strangulated femoral hernia described below, in which the bladder protruded through the crural canal on the inner side of the neck of the hernial sac, the bladder wall must have been cut through in two places if the knife has been carried, from within the sac, so far inwards as to reach Gimbernat's ligament; yet in neither case was the bladder injured.

The stricture at the sac's neck appears in some cases to have been acquired, and the generally smooth interior of the sac is replaced at its neck by a localised thickening, as of scar tissue. When the constriction here is divided the necessary incision is so small that even if it is not closed by the ligature applied to the sac it is of no consequence.

Notes of Cases.

Right Femoral Hernia, Reducible.

CASE 1.—Woman, aged 48; in 1902 operation by a German surgeon for right-sided hernia; scar of incision parallel to Poupart's ligament; uncertain whether hernia was inguinal or femoral. Three months after leaving hospital swelling again noticed in right groin. Since 1905 she had attended at City of London Truss Society with large right femoral enterocoele, which, although reducible, was difficult to retain

with truss. The truss at length being of little use operation was advised.

Operation (Oct. 29th, 1915).—Vertical incision; sac exposed; easily separated except at neck, where it was much adherent. In order to separate it here sac was opened, contained small bowel reduced, and finger used as guide. But for this precaution bladder would probably have been ligatured with sac, for a protrusion of this viscus, loosely adherent to inner side of neck of sac, was then recognised by its muscular wall and by vessels on surface; it was separated and pushed back. Sac tied and removed.

Crural canal very large; doubtful whether it could be efficiently closed from thigh, since, though Cooper's ligament could easily be felt, sutures could not be passed under it. The inguinal canal was therefore opened by a second incision. Not without difficulty, because of dense adhesions between arched fibres of internal oblique and Poupart's ligament—perhaps caused by old operation—Cooper's ligament was exposed, and conjoined tendon fixed down to it by two silk sutures; after several more sutures had been passed between Poupart's ligament and pectineus fascia and muscle, the inguinal canal was closed; round ligament not identified.

Uneventful recovery, patient provided with light femoral truss. Nearly two years afterwards no sign of recurrence.

Interrogated later she said that before operation she had for some months suffered with frequency of micturition (every quarter of an hour by day and four or five times at night); she had noticed no relation between this frequency and the condition, as regards descent or reduction, of hernia. Urine immediately before operation was natural; no urinary troubles afterwards.

Right Inguinal Hernia, Strangulated.

CASE 2.—Watchmaker, aged 71. Operation for left inguinal hernia 17 years before. Had worn a double inguinal truss for 10 years; but he stated that he had never had any considerable swelling on right side until April 5th, 1917, when a hernia suddenly appeared while at work. A surgical instrument-maker, from whom he sought relief, advised him to go to hospital, where he was found to have a very tense and irreducible right scrotal hernia, nearly as large as a tennis-ball, as well as a reducible inguinal hernia on left side. Patient had had slight nocturnal frequency of micturition for years, but noticed no urinary symptoms referable to appearance of hernia.

Operation.—External oblique aponeurosis was split and sac exposed and opened; it contained 3 inches of very dark-red small intestine, which was returned after constriction, which was at neck of sac, had been divided. The sac appeared to be direct, but its relation to deep epigastric vessels was not seen; it was entirely separate from spermatic cord. In separating sac (and in looking for cord, which was not seen until later) it was noticed to be thicker near its neck on inner side; here a smooth-walled cavity was opened, and a little clear fluid escaped; the finger introduced felt internal urinary meatus. Protrusion of bladder included both muscular and mucous coats, and was about size of walnut; what was thought to be the urachus (but was probably the obliterated hypogastric artery) was seen connected with it, and was divided, the better to free it from sac. The accidental opening in bladder was closed by a purse-string suture of catgut, not including mucous membrane, and reinforced by a few further sutures; the protrusion was then pushed back, sac removed, and Bassini's operation for radical cure completed, a drainage tube being passed down to bladder through inner edge of wound. No catheter was passed. Hæmaturia followed operation for a few days, but otherwise recovery was uninterrupted.

In view of direct character of hernia patient was provided with a double inguinal truss, the hernia on left side being of scrotal extent. He was well 11 months afterwards, but with the same frequency of micturition as before operation.

Right Inguinal Hernia, Strangulated.

CASE 3.—Builder's foreman, aged 55, seen on June 22nd, 1917, with irreducible right inguinal hernia, reaching neck of scrotum, and having ordinary signs of strangulation. He had had this hernia for 40 years, and wore double inguinal truss, having been ruptured on left side also for several years; but in spite of his truss his hernia had come down on previous evening while he was gardening, and all his doctor's attempts to reduce it had failed. No history of any trouble connected with micturition; urine said to contain trace of sugar, otherwise normal.

Operation.—With some difficulty, because of a large amount of congested extraperitoneal fat which covered and adhered to it, a small sac was displayed, which, as in Case 2, appeared to be direct and was free from the cord; the two inches of small bowel within it were viable; the stricture at neck of sac was divided and bowel returned. Sac was separated from its surroundings with care, suspecting hernia of bladder from fact that hernia was direct and from large amount of fat closely related to sac. A small protrusion of bladder was found adherent to inner side of neck of sac; its muscle fibres and veins on surface could be seen; it was freed and pushed back without injury. Bassini's operation was completed.

Good recovery; patient afterwards advised to wear light truss.

Right Femoral Hernia, Strangulated.

CASE 4.—Patient aged 62, a lean, wiry-looking woman, stated that she had been ruptured on right side for years; never wore a truss; hernia had usually been reducible. It had come down with signs of strangulation about 24 hours before operation; then about as large as Tangerine orange. She had not suffered from increased frequency of micturition, but for a long time the act had been attended by pain of a "bearing-down" character. If hernia had been down and painfully tense (as it often had been) micturition had sometimes made it softer and less painful.

Operation (August 2nd, 1917).—By oblique incision a thinly covered sac was exposed, containing blood-stained fluid and some omentum adherent to sac, and later removed with it. At neck of sac was tightly constricted loop of small bowel, 1½ inches in length, very dark in colour. Neck of sac was cut inwards in two or three places, bowel found fit to be returned. The inguinal canal was then opened (with intention of performing high operation for radical cure) and sac easily drawn up from under Poupart's ligament. A process of bladder, about size of a walnut, with thick muscular wall and many vessels on surface, was found rather closely adherent to lower and inner side of neck of sac, and was returned

uninjured. Conjoined tendon was fixed to Cooper's ligament by silk sutures, after sac had been tied and removed; another suture was used to close lower end of canal, which was rather large; finally inguinal canal was closed.

Recovery uninterrupted; no truss prescribed. Seven months later patient had no recurrence, and said that since operation she had had no troubles concerned with micturition.

Right Femoral Hernia, Strangulated.

CASE 5.—Bricklayer, aged 63, was seen at City of London Truss Society in November, 1917; he had been cured of a right inguinal hernia by operation many years before; but he had scrotal hernia on left side, and had had for 10 years right femoral hernia partially irreducible. No history of any trouble connected with micturition. A double truss was prescribed, with hollow femoral pad on right side and inguinal pad on left, with rat tail. It appeared to be satisfactory; but on Feb. 22nd, 1918, patient appeared at St. Bartholomew's Hospital with femoral hernia larger than before and strangulated since previous day.

Operation.—Most of the swelling consisted of extraperitoneal fat, surrounding small sac, which contained 2 inches of tightly strangulated small intestine, which was viable. Neck of sac was cut inwards. In separating sac a thick-walled muscular protrusion of bladder was at once seen adherent to its inner side, descending well into thigh; it was easily freed and pushed back behind pubes. The inguinal canal was opened, as in Case 4, but as conjoined tendon was found firmly adherent to Poupart's ligament in front of cord, no doubt as result of old operation, it was thought inadvisable to proceed with inguinal method of cure; inguinal canal was therefore closed and lower end of crural canal obliterated by sutures binding Poupart's ligament to pectineus muscle and fascia.

The patient made a rapid recovery.

In the two last-mentioned cases, the high or inguinal operation for radical cure was only contemplated because the patient's condition was so good. In most cases of strangulated femoral hernia it is wisest to complete the operation by some method which, while it offers a good prospect of freedom from recurrence, occupies a minimum amount of time. Lockwood's operation is admirably suited to such cases; the use of the inguinal method involves a considerable prolongation of the operation.

THE EFFECT OF CONVECTION CURRENTS ON AGGLUTINATION.

(A Report to the Medical Research Committee.)

BY W. W. C. TOPLEY, M.B. CANTAB., F.R.C.P. LOND.,
BACTERIOLOGIST AND CLINICAL PATHOLOGIST, CHARING CROSS HOSPITAL;
LECTURER ON BACTERIOLOGY, CHARING CROSS HOSPITAL
MEDICAL SCHOOL;

AND

S. G. PLATTS, M.B. CANTAB.,

ASSISTANT BACTERIOLOGIST, CHARING CROSS HOSPITAL.

(From the Department of Pathology and Bacteriology,
Charing Cross Hospital.)

IN the course of an investigation which has been carried out in this laboratory during the past 18 months, and which is still proceeding, we have had occasion to test between 1000 and 2000 samples of human serum as regards their agglutinating power for *B. typhosus*, *B. paratyphosus A*, and *B. paratyphosus B*. The technique adopted has been that advocated by Dreyer and his co-workers, with unimportant modifications, employing the standard cultures issued under the auspices of the Medical Research Committee. We have found this method both rapid and reliable.

Effect of Varying Submergence of Tubes.

Certain technical points have presented themselves for consideration, and among them is one factor which seems to merit special attention, since if it be neglected it may lead to errors of considerable magnitude, and we have not seen any published reference to it with the exception of one indirect one which we refer to later.

This factor is the relation between the level of the water in the bath and the upper level of the fluid contents of the tubes.

The bath we have employed is a large copper one, holding six racks each taking 45 tubes. It is kept at 55° C. by a capsule regulator, and is fitted with a series of lids, these being kept closed except when opened for removal of the racks.

It was found that when a series of readings were taken with the bath well filled, so that the water level was approximately the same as that of the upper limit of the contents of the tubes, the results recorded were relatively low, while when the tubes were only partially submerged the readings were relatively higher, the variation often approximating to 100 per cent.

In addition it was noted that the agglutination was more rapid, and reached its maximum much sooner, when the tubes were only partially covered. This suggested that the effect was probably to increase the rate of agglutination, rather than to alter the maximum