almost entirely, though not completely, the risk of peritonitis, but I regard it as more difficult to perform, as inflicting a more severe traumatism on the patient, and as more likely to fail from want of speedy union between ureter and bowel.

With these thoughts in my mind, I determined to adopt the intraperitoneal method. One other point had to be considered: Should both ureters be implanted at one operation? Argument seemed to me to be strongly in favour of dividing the proceeding into two separate operations. The patient was a feeble subject; if both ureters were simultaneously implanted and infection spread up both sides, a successful result could hardly be hoped for, whereas, if one ureter only were implanted, should its kidney become infected, the other kidney would be carrying on excretion. When the first organ dealt with had settled down, the second operation could be performed with less anxiety.

Operation.

The method of operation was as follows: An incision was made through the sheath of the rectus over the line of the ureter, where it crosses the bifurcation of the common iliac artery; the layer of peritoneum over the artery was divided and the ureter sought. (If there is any doubt or difficulty in recognizing the ureter, useful assistance may be gained by lightly prodding the tube with forceps or dissector; if it be the ureter which is touched, a wave of peristalsis will be seen to pass along it where it is stimulated.) The ureter was found with little difficulty, and was lifted out of its bed for about an inch and a half, was divided low down, the lower end ligatured and pushed under the peritoneum, whilst the upper end was held lightly between finger and thumb to prevent leaking. The portion of bowel to be used was selected, and a puncture barely one-third of an inch long made on its inner side, the utmost care being observed to prevent any faecal soiling. The upper end of the ureter was threaded with a fine catgut suture, the needle attached to which was passed into the opening in the colon, across the bowel and through its opposite wall. By means of this suture the ureter was drawn inside the bowel, and held in position whilst a first row of interrupted sutures fixed the outer coats of the ureter to the margins of the incision in the intestine, and narrowed this opening up to the walls of the ureter, but without constriction. A second row of sutures approximated the peritoneal covering of the bowel to the outer coat of the ureter, and so secured rapid adhesion and seclusion. The suture through the wall of the colon to retain the ureter, whilst suturing fixed it, was now cut short and its point of exit secured by a single mattress suture. The colon was displaced somewhat towards the middle line, which relieved the ureter from tension and tended to return it to the bed of subperitoneal fat from which it had been disturbed, whilst finally the inner edge of the divided posterior peritoneum was sutured to the inner margin of the colon, thus giving further security against leaking. The wound was closed except for a small gauze drain.

The operation on the right side was rather more difficult than that on the left, as the small intestine was not so easily pushed out of the way and the common iliac vein obtruded a good deal into the wound when the posterior peritoneum was divided. On the whole, however, neither operation can be described as really difficult.

If I have occasion to again perform this operation I shall adopt a small device to prevent what is certainly a possible contingency, namely, the cicatrization of the ureteral opening. This, I believe, can best be met by slitting the opening of the ureter into two small flaps of equal size, folding the flaps backwards and suturing them in that position. If union were thus secured it would be an absolute bar to future stricture of the ureteral orifice.

To return to the patient, the first operation on the left side was performed on July 23rd, 1906, the ureter being implanted into the sigmoid, and though well borne was followed by vomiting which persisted for several days and a quick pulse which remained over 100 for ten days, but there was no local pain or tenderness suggesting infection of the left kidney, and the temperature after the first three days was normal. The second operation, on the right side, was performed on October 1st and was well borne, though again vomiting was troublesome for two days and the pulse remained quick for a week.

Since the second operation the patient has improved greatly in his general condition, and now looks fit and well. His bowels act almost every four hours when he is up, but at somewhat longer intervals when he is in bed. Above the pubes a sinus from the bladder discharges about a drachm of fluid daily. The temperature is normal; there is no complaint of pain over the kidney; neither kidney can be palpated. The patient's future is, of course, one of great uncertainty, owing to the ever-present risk of an ascending nephritis by infection from the bowel, and because of the possibility that either, or

both, ureteral orifices may become partly or completely closed by scar tissue.

Whatever his future, his present state is an enormous improvement on his past, for he not only lives in comfort now but is capable of earning his living.

The method employed for this boy's relief was suggested to my mind by two interesting papers in the *BRITISH MEDICAL JOURNAL* of April 28th, 1906.¹ The extra-peritoneal operation was adopted in the cases described in these papers, and any one contemplating the relief of extroverted bladder by ureteral implantation would do well to study the methods described in that issue of the *JOURNAL*.

REFERENCE.

¹ On Extroversion of the Bladder, with Special Reference to Extra-peritoneal Transplantation of the Ureters into the Rectum, by Alfred London, M.D. Extroversion of the Bladder: Its Treatment by Extra-peritoneal Implantation of the Ureters into the Rectum, by H. Simpson Newland, M.B., M.S.

TRANSPLANTATION OF THE URETER INTO THE BLADDER FOR URETERO-VAGINAL FISTULA.

By E. PERCY PATON, M.D., M.S., F.R.C.S.,

SURGEON IN CHARGE OF OUT-PATIENTS, WESTMINSTER HOSPITAL; HONORARY SURGEON, MILDMAY HOSPITAL, BETHNAL GREEN.

DAMAGE of one of the ureters in the course of an operation is always an unfortunate accident. In cases in which a ureteral fistula has resulted, a not unusual method of treatment in the past has been the removal of the kidney to which the damaged ureter belongs. There are clearly very great objections to such a procedure, and in a case such as that described below there would in addition have been a very considerable risk, owing to the fact that the opposite kidney does not seem to have been doing its work very efficiently, as indicated by the small average quantity of urine passed per diem, though it is true that no estimate of the urea was made. The mode of operating adopted was that described by Hammerschlag,¹ and which he has successfully carried out in a case in which a uretero-cervical fistula had resulted from prolonged pressure, during parturition, in a case of protracted transverse presentation.

E. S., a married woman aged 37, was admitted into the Mildmay Hospital on October 25th, 1905, suffering from carcinoma of the cervix uteri.

Vaginal Hysterectomy.

The growth was of the ulcerating variety, and had extended somewhat on to the vaginal wall; but as the broad ligaments did not appear to be involved to any appreciable extent and the uterus could be well drawn down, vaginal hysterectomy was performed on October 26th. Three pairs of forceps were placed on each broad ligament and left on. Except for the fact that, owing to some involvement of the vaginal wall, these forceps were placed rather more laterally than might have been wished, especially at the lower part of the broad ligaments, there was nothing special to note about the operation. The forceps were removed on the 28th, and, apart from some pain and a little rise of temperature, the progress of the patient was perfectly satisfactory.

After-history.

A day or two later it was noticed that some urine was being passed involuntarily, but it was thought to come from the urethra and not from the vagina. On November 6th a small slough came away per vaginam, and on November 9th a much larger slough—evidently the part of one of the broad ligaments which had been compressed by the forceps—was passed. Urine still continued to come away involuntarily, and it now was noted to come from the vagina and not from the urethra.

As the incontinence still continued, an anaesthetic was given on November 30th, and a careful examination made. The bladder was found to be perfectly watertight, but the vagina was continually wet with urine, which came from a raw surface occupying the whole of its vault; it could not be determined from which side the leakage occurred, but it was quite clear that one of the ureters had been damaged, either by being included in one of the forceps at the time of the operation, or by subsequent extension of sloughing. Owing to a large area in the vagina still remaining unhealed, it was decided to postpone the consideration of any further operation until this raw surface should be covered in.

In the early part of December the patient complained of some pain in the right loin, and it was found possible to feel the right kidney, which was a little enlarged and somewhat tender; this trouble, however, soon passed off. The amount of urine passed per vaginam continued to be very considerable, and the average amount passed per diem from the bladder was

13 oz.; that passed per vaginam could not be satisfactorily collected for testing purposes, but the bladder urine was normal. On December 22nd a fresh examination was made under anaesthesia to endeavour to determine from which ureter the leakage was occurring; it was found that the raw area at the vaginal vault was much smaller, though not yet healed, but it was not possible to determine from which side the urine escaped. A Luys urinary separator was then passed, and urine was obtained from the left side of the bladder only, but in very small quantity, and this in spite of the fact that the patient had been given about a pint of water to drink an hour before the observation, which was therefore not considered conclusive that it was the right ureter which had been injured. As the patient was anxious to go out, she was sent home for a time until the vaginal wound should be quite healed.

She was readmitted to the hospital on February 10th, 1906, and on the 12th an examination showed that the vaginal wound was now reduced to a small sinus from which urine flowed almost continuously; a probe could be passed along this sinus for about an inch, but it could not be made to enter either ureter. A Luys separator was again passed, and as before urine flowed from the left side only, but, as before also, in very small quantity. It now seemed quite certain that it was the right ureter which had been damaged, and it was decided to attempt to transplant it into a new spot in the bladder wall.

Operation for Transplantation of Ureter.

On February 15th, the patient being in the Trendelenburg position, the abdomen was opened by a median incision, and the intestines packed out of the pelvis by sponges, the right ureter was found without difficulty, after incising the peritoneum immediately below the pelvic brim. In order to ensure that the right ureter was the affected one, a small incision was made into it, and a probe passed downwards could not be made to enter the bladder, nor would it go into the vagina; it was thought that the latter fact was due to the tortuous course of the sinus, and the operation was proceeded with after the small lateral opening in the ureter had been closed by a couple of fine silk stitches. The duct was now isolated for a distance of about 3 in., a silk ligature was tied round it as low down as it was found possible to free it; on the kidney side a piece of fine drainage tube was tied round it to prevent leakage when it should be cut across, it was then divided just above the silk ligature.

A sound had previously been passed into the bladder, and manipulated in such a way as to determine if the length of the ureter which remained would be sufficient to enable one to fix it into the bladder without undue tension. Two silk sutures were now fixed, one on either side of the orifice of the divided ureter, to which they were tied, their ends being left long. A spot was chosen by manipulation of the sound in the bladder, as near as possible to the cut end of the ureter, and at this spot a small oblique incision was made into the viscus, through which opening the end of a pair of long fine-bladed forceps, which had been passed into the bladder above the urethra, was made to protrude; the ends of the sutures which were attached to the ureter were grasped in these forceps, and drawn out by them through the urethra; traction on the sutures caused the end of the ureter to pass into the bladder, about a quarter of an inch being thus drawn through the opening in the bladder wall. Sutures in two rows were then passed Lembert-wise, fixing the ureter into the bladder; one or two stitches were also placed in such a manner as to fix the bladder to the adjacent part of the broad ligament, and so prevent its muscular wall when contracting from causing too great tension on the sutures between it and the ureter. The piece of rubber tubing was now removed from the ureter, which was then covered in by stitching the cut edges of the peritoneum over it. Unfortunately some enlarged glands were felt in the pelvic wall which it was not possible to remove, though there could be little doubt that they were malignant. The abdomen was closed in the usual manner. The two silks which were attached to the cut end of the ureter were fixed by a stitch to the inner side of the thigh, in this way assisting to relieve the tension on the sutures fixing the bladder to the ureter.

After-history.

The subsequent progress of the case was at first satisfactory, the urine was drawn off for the first day or two at short intervals, and none came from the vagina, the patient suffered a good deal of pain, but this was relieved by morphine and belladonna suppositories. On the eighth, ninth, and tenth days, however, she had a rigor, and the temperature on each occasion rose to almost 103°; on the tenth day a little traction on the silks which still lay in the urethra brought them away, they were found, although the urine was acid, to be encrusted with phosphatic deposit. There was only a slight rise of temperature the next day, after which it fell permanently to normal. A considerable amount of pain still continued, especially during the act of micturition, which occurred unduly frequently. As it was thought that the trouble might be due to some of the sutures coming through into the bladder, and so causing trouble (as I have seen in other cases in which the bladder has been sutured), on March 22nd the urethra was dilated and a digital examination made. The interior of the bladder felt in every respect normal, and the spot where the ureter had been implanted could not be identified. Subse-

quent to this examination the pain gradually improved, and when seen on April 20th the patient expressed herself as being perfectly well.

The procedure followed in this case is much facilitated by the fact that, as the ureter receives its blood supply almost entirely from the renal and spermatic or ovarian arteries, and its vessels run down in the muscular wall of the duct, there is little danger of sloughing occurring even when a considerable length of it is isolated from the subperitoneal bed in which it lies.

Should it be found impossible to obtain a sufficient length of ureter to reach the bladder, the same method might have been adopted for transplanting the duct into the rectum, as was proposed in my case if necessity had arisen. The wisdom of leaving the silk sutures attached to the ureter and hanging out of the urethra after the operation, when they might easily have been removed by dilating the urethra may perhaps be questioned, and it seems not improbable that the rigors and rise of temperature at the commencement of the second week after the operation were due to the contamination occurring along these sutures; on the other hand, there was no doubt at the time of the operation that they very materially assisted in preventing dragging on the sutures between the bladder and ureter.

REFERENCE.

Hammerschlag, *Monatsheft für Geburt. und Gyn.*, August, 1905, and BRITISH MEDICAL JOURNAL, EPITOME, January 20th, 1906, p. 11.

TRAUMATIC RECTO-VESICAL FISTULA.

By H. TEMPLE MURSELL, M.B., M.C., F.R.C.S.E.,
ASSISTANT SURGEON, JOHANNESBURG HOSPITAL.

RECTO-VESICAL fistula of inflammatory, neoplastic or specific-infective origin is comparatively common, but the recorded traumatic cases are relatively rare. The following case may therefore be of some interest:

Condition on Admission.

A Kaffir "boy," aged about 30, was admitted to hospital with the history that two months before he had sat upon a spike. This was his own statement, and was not corroborated in any way by any witness of the occurrence. He had great pain and difficulty in micturition, the urine being extremely foul and full of muco-pus. More than half his urine was passed per rectum.

He was anaesthetized, and a cystoscopic examination made. The trigone was covered with muco-pus, and at one point a large trembling slough covered with phosphates could be seen occluding the opening into the rectum. The condition of the bladder generally, and of the trigone particularly, was one of acute cystitis. The local and general condition negatived any immediate operation. The bladder was washed out daily for a few days, the patient carefully fed, with a view to improving his miserable general condition, and urotropin, 5 gr., given thrice daily.

Operation.

He was again anaesthetized, the sphincter dilated, and a probe passed through the rectal opening into the bladder. This opening was situated at a point 4 in. from the anus in the middle line, and was apparently about $\frac{1}{4}$ in. in diameter. A steel bougie was passed by the urethra into the bladder. With the patient in an elevated lithotomy position, a horseshoe incision was made through the central point of the perineum, and careful dissection made between the urethra and rectum, till the probe could be isolated at a point well above the prostate in the middle line. The rectum was now everted through the anus, and a purse-string suture of catgut made to close the rectal mucous membrane. The muscular wall of the rectum was closed in a similar manner from the wound surface.

The bladder opening just admitted the tip of the index finger. The phosphate-covered slough previously seen with the cystoscope was removed, and proved to be the size of a small marble. A hard substance was now felt, and on introducing an artery forceps three pieces of stick covered with phosphates were removed. Owing to their being covered with a thick layer of muco-pus, they had not been detected with the cystoscope. They resembled fragments of ordinary firewood as used in England. Two of them were splintered and broken, showing that much force must have been exercised at the time of their introduction. They measured $2\frac{1}{2}$ in. by $\frac{1}{2}$ in., $1\frac{1}{2}$ in., and $1\frac{1}{2}$ in. respectively. The bladder wound was closed by a purse-string catgut stitch and the perineal wound, drained by two tubes, was closed. A soft catheter was tied into the bladder. Recovery was uninterrupted, and the patient left hospital well at the end of four weeks, passing a perfectly clear urine without pain.

The probability is that the stick was maliciously inserted by some one, though I could obtain no history of this. I