TRANSPLANTATION OF URETERS FOR CONGENITAL INCONTINENCE : A FINAL RESULT.

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Recent communications (Foulds and Robertson¹, Starr²) on late results after transplantation of the ureters into the rectum for the alleviation of urinary incontinence of congenital origin appear to be sufficient justification for the publication of the clinical record of an allied type of case, together with an account of the state of affairs found post mortem.

The patient was operated upon by Professor Grey Turner at the Royal Victoria Infirmary, Newcastle-upon-Tyne. Death occurred from an independent condition three years later, and I am indebted to Professor Turner for his permission to dissect the specimen and to publish this record.

Clinical Record.

J. F., a boy, aged 10½ years, was admitted to the hospital on March 19th, 1922. He had suffered from incontinence of urine, with all its disagreeable consequences, since birth. His education had been very seriously retarded, and his life was a misery. Apart from an attack of scarlatina some few months before admission, and measles at the age of four years, there was nothing of importance in the past history. He was, however, said to have never been very strong.

On examination, the general health appeared to be fairly good. Locally there was a condition of complete epispadias, and the resulting incontinence had caused excoriation of the skin over the lower abdomen and scrotum. The child's general health, and the fact that he had successfully weathered the storms of the acute exanthemata, were taken into consideration, and the choice of operation lay between a local plastic operation and transplantation of the ureters into the rectum. Professor Turner having had greater experience of the success attendant upon the latter procedure decided to employ it in this case.

Operation No. 1.—25.3.22. General anaesthesia. Mid-line incision. The left ureter was approached by the transperitoneal route, mobilized and after division low in the pelvis was transplanted into the sigmoid colon after the oblique manner recommended by Stiles³. A small rubber drainage tube was placed down to the region of the anastomosis; in addition, a short tube was passed through the anus into the rectum to prevent distension of that organ.

The child stood the operation very well. It was followed by a fairly vigorous renal reaction as evidenced by the temperature, which reached its highest point 100.8° F. on April 4th, and tenderness over the left kidney.

Operation No. 2.—22.4.22. General anaesthesia was again employed and the old incision re-opened. The right ureter was implanted by a similar procedure into the sigmoid as was the left at the previous operation; similar drainage being employed as before. In addition it was

observed that :—(a) The previous anastomosis was well protected by the parietal peritoneum having been sutured over it ; (b) the left ureter could be felt in the bowel wall (as a thickening) reminiscent of rectal polypus ; (c) the rectum appeared to be more distended and hypertrophied than at the previous operation ; (d) on opening the bowel after the application of the clamp, clean urine escaped ; this suggested that it would have been advisable to have passed a rectal tube before commencing the operation.

A good recovery was made from this operation also, but a definite attack of renal infection again occurred with some night fever up to 100.4° F. which continued until May 1st.

By May 9th twenty-five ounces of urine were being passed from the rectum per diem. This urine had a specific gravity of 1010, a thick, dirty, yellow appearance, a ropy deposit, an ammoniacal smell and an alkaline reaction.

On May 11th, the entry in the hospital notes reads thus :—“ The patient is bright and happy. He passes his urine per rectum with perfect ease and continence about four times a day, and his bowels move comfortably about three times a day. The motion is a fluid one. His temperature and pulse are normal. He sleeps and eats well, and states that he feels better than ever he has done before in all his life. His abdominal wound is healed perfectly and there is no sign of skin irritation left over the lower abdomen and scrotum. The patient is now pleased with life and looks forward to the future with renewed hope and vigour.” On May 16th, 1922, he was discharged from hospital.

After History.—The boy remained perfectly well until May, 1925, 3 years later, when he was admitted under the care of another clinic with a history that during the previous twenty-four hours he had been having recurring attacks of colic. The child appeared to be in very good condition, and nothing abnormal was discovered on physical examination. The possibility of the attacks being renal in origin was at first considered, but after two days of fruitless observation he was sent home. A few days later, however, he was re-admitted to hospital looking very ill, and on developing, some hours afterwards, copious feculent vomiting, a laparotomy was performed.

There was found an acute obstruction of the small intestine due to a band in association with tuberculous mesenteric glands. A lateral anastomosis was performed. At the end of the operation there was a marked degree of collapse, but this was speedily overcome and for a while all appeared to be going well. Unfortunately, after two days, a change for the worse was manifest and the condition rapidly retrogressed, death occurring on the fifth day.

Post-Mortem Examination.

On the day after death a necropsy was made. The lower bowel and urogenital organs were removed for preservation preparatory to further dissection (*vide infra*). In the peritoneal sac there was a suppurative peritonitis binding the coils of intestine together. Some of the sutures at the anastomosis had given way and fecal matter had escaped. The mesenteric glands were distinctly enlarged and caseous, some being definitely calcareous. These had apparently given rise to fibrous bands which had caused the intestinal obstruction.

From the preserved mass, referred to above, the kidneys, ureters and lower bowel were dissected. Fig. 1 is from Mr. Sewell's drawing of the specimen thus obtained.

The rectum appears to be distended and its muscle definitely hypertrophied. The mucosa below the level of the ureteric orifices is coated with a shaggy inflammatory exudate ; microscopically this region is the seat of a mild catarrhal inflammation, whilst above this level the mucosa is smooth and appears healthy both on naked-eye and microscopic examination. This slight degree of catarrhal inflammation could probably be explained by the irritation consequent on ammoniacal decomposition of the urine.

The right ureteric orifice is patulous ; its mucosa has prolapsed, giving it a button-like appearance, and it is the seat of inflammatory change similar to that seen in the neighbouring rectal mucosa.

The left ureteric orifice was very difficult to find and is represented by a mere slit through which a fine bristle has been passed, contrasting with its fellow which has admitted with ease a glass rod of much greater magnitude. So difficult was the orifice to find that it had to be demonstrated by squirting fluid into the ureter above and searching for the issuing stream.

Fig. 1. Dissection of specimen illustrating condition of organs three years after transplantation of ureters into the rectum.

The right kidney is markedly shrunken. Its surface is scarred. On section the organ consists mainly of the dilated pelvis and calyces. The condition is an advanced pyonephrosis. Microscopic examination of such renal tissue as remains shows extensive fibrosis, hyaline changes and round cell infiltration in the glomerular region. The tubules show cloudy swelling. Areas of necrosis with accumulation of polymorphonuclear leucocytes are also present, and in these there are a few bacteria.

The left kidney is of normal size. Its surface is also somewhat scarred. In the section some of the pyramids are much darker than the cortex. The cortex is swollen and the vascular markings stand out prominently. The pelvis and calyces are slightly distended, the former merging imperceptibly with the ureter. Histologically the cortex (Fig. 2) shows areas in which some of the glomeruli are fibrosed, others show slight lobulation, and in addition there is a round-cell infiltration. The tubules show little change apart from cloudy swelling. The areas of fibrosis represent healing after a previous acute nephritis, probably a "flare up" after a transplantation operation. The lobulated glomeruli, etc., indicate the presence of a subacute inflammation of the kidney, probably, in view of the distended ureter, of the nature of an ascending pyelonephritis. A considerable number of fields exhibited relatively normal renal tissue. It is possible that the areas of necrosis containing bacilli, etc., seen in the right kidney represent a terminal pyæmic process from the septic peritonitis.

Fig. 2. Section of Left Kidney ($\times 60$)

The ureters when opened contained a quantity of purulent fluid. Both ureters are dilated but the wall of the right is the thicker. The right ureter is also shorter, more tortuous and about its middle there is a definite annular narrowing.

Histologically there is evidence of the ureteric infection (Fig. 3).

Fig. 3. Section Right Ureter ($\times 60$).

CONCLUSIONS.

After transplantation of the ureters a life may be lived which is to all intents and purposes normal. The rectum being able to tolerate the presence of urine in its lumen, control is soon established, and voluntary evacuations are obtained at convenient intervals.

Despite the apparently advanced degree of renal infection found post mortem, this child, until a few days before the end, not only appeared healthy but actually led the ordinary life of a school child without any inconvenience.

In this, as in other similar cases, there was probably already an established ureteric infection before any operative interference was attempted. Although no mention is made in the clinical record, it is probable that in this case, as is often found, the ureters were somewhat dilated before transplanting. Despite this the reserve of renal efficiency was such as to withstand successfully not only two relatively severe operations, but even to survive the acute exacerbation of the renal infection, which occurred after each operation.

REFERENCES.

1. Foulds, G. S., and Robertson, T. A., *Brit. J. Surgery*, Bristol, 1927, XIV, 529.
2. Starr, F. N. G., *Ibid*, 1927, XV, 328.
3. Stiles, H., *Surg. Gyn. Obst.*, Chic., 1911, XIII, 127.