TWO CASES OF DOUBLE URETER

BY

ERIC I. LLOYD, M.B., B.Ch., F.R.C.S.

Surgeon to the Hospital for Sick Children, Great Ormond Street,

and

WILFRID SHELDON, M.D., M.R.C.P.,

Out-Patient Medical Registrar, the Hospital for Sick Children, Great Ormond Street.

Pyuria in childhood has been the subject of a good deal of recent attention. The older conception of acute pyelitis as an inflammatory condition confined to the pelvis of the kidney has been questioned by Chown and others, who have brought forward evidence to show that in such patients the kidney substance is involved at least as much as its pelvis. Congenital abnormalities of the urinary tract are now recognized to be frequent causes of continued pyuria in childhood and recourse to cystoscopy, pyelography and intravenous urography is quite properly advised when there is a failure to respond to medical treatment. Co-operation between physician and surgeon is never more necessary than in the unravelling of the causes of chronic pyuria in children. Abnormalities of the urinary tract may preclude independent existence or limit it to a matter of days. Occasionally, an abnormality defies even the precise methods of present-day urology and is only discovered post mortem.

Case reports.

The two following cases illustrate some of the difficulties. In both children the deformity was of the same kind. In the first patient death occurred at the age of 25 days; in the second, pyuria lasted from the age of three months to three years but, in spite of previous investigation, its cause was only determined after three hours of dissection post mortem.

Case 1.—The first patient was a male aged ten days who was admitted to hospital for enlargement of the abdomen which had been noticed at birth and had even caused difficulty during labour. Physical examination showed a large, firm swelling occupying the right loin, while a smaller mass was palpable in the left iliac fossa. The urine contained albumin and pus. The infant was so weak that further investigation was impossible and, after a short downhill course. He died at the age of twenty-five days. The illness was not accompanied by fever, vomiting or convulsions.

At post-mortem examination the only abnormality was in the urinary tract. The right kidney consisted of a large hydronephrotic sac the size of a foetal head and the kidney tissue was only one to two millimetres thick (see Figure 1). The right renal pelvis consisted of two portions, each draining into its own ureter; the right ureter was thus double. One of these ureters was straight and opened into the bladder in the usual position. The other was dilated and twisted: the lower end was prolapsed into the bladder with the orifice of the ureter placed at the summit

of the prolapsed portion. The left ureter was normal and opened normally into the bladder. The left kidney was slightly swollen and an early pyonephrosis was thought to be present. The bladder was displaced into the left iliac fossa by the huge right kidney and accounted for the tumour palpated in that position during life. The urethra was normal.

Case 2.—The second case was a girl (shown at the Children's Section of the Royal Society of Medicine, for Dr. J. H. Thursfield¹) who first came under observation in May, 1930, at the age of three years. At three monthly intervals since the age of twelve weeks she had had attacks of fever accompanied by the passage of turbid urine.

On examination at the age of three years she weighed 27 lb. and appeared fairly healthy. The urine was cloudy, alkaline, and containing much pus; bacillus coli was grown from it. The blood urea was 44 mgrm. per 100 c.cm. Cystoscopy showed the presence of severe cystitis but

FIG. 1. Case 1. Double right ureter and pelvis from a boy aged ten days. The two right ureters are labelled A and B. C is the vesical orifice of the normal left ureter. (Half natural size).

no other bladder abnormality. A ureteric catheter entered the left ureter without difficulty, and the pyelogram showed a greatly dilated and somewhat tortuous ureter. Several attempts to catheterize the right ureter failed, the catheter buckling each time after entering two or three centimetres. Eventually a successful passage was made and the resulting pyelogram showed a normal right ureter and renal pelvis. 35 ccm. of 40 per cent. uroselectan was then given intravenously and could be seen by X-ray examination to have entered the left renal pelvis and left ureter. It was not, however, visible in the right pelvis or ureter. A cystogram was then taken by filling the bladder with sodium iodide solution (13.5 per cent.) and raising the buttocks. The opaque solution ran upwards into the left ureter and clearly outlined it: none entered the right ureter.

The interpretation of these results was difficult and largely conjectural. The evidence seemed to show that the left ureter was more dilated than the right and that its lower end was incompetent. On the other hand, although the right kidney apparently did not secrete uroselectan, yet direct pyelography after considerable difficulty in passing the ureteric catheter showed a seemingly normal pelvis and ureter. The left kidney and ureter were thought to be primarily at fault and it was decided that an operation should be performed on that side in the hope of eliminating the area of disease.

On January 1st, 1931, the left kidney was exposed by operation. It was slightly enlarged and the ureter dilated to about half an inch in diameter. The left kidney and the first three

FIG. 2. Case 2. Urinary tract from a girl aged two years and ten months. The ureter and pelvis are double on the right side and the two portions are labelled A and B. C is the single left ureter (Half natural size).

inches of the ureter were removed, but on opening the kidney it was seen that its structure did not depart much from the normal. Microscopically, there was a slight invasion of the interstitial tissue with small round cells, but otherwise the components of the kidney were normal. The child remained well for 48 hours after operation but the temperature then rose to 102°F. A small quantity of pus was evacuated from the wound. The patient, however, remained ill, vomited and became drowsy. Partial suppression of urine followed and the child died on the fifth day after operation, apparently of uræmia.

At post-mortem examination the only abnormality lay in the urinary apparatus. It was at once obvious that, contrary to expectations, the right ureter was dilated and very tortuous.

The whole of the urinary tract was removed en bloc and the subsequent dissection proved very tedious. Eventually, it became clear that the right ureter was duplicated, both portions being bound within a common sheath. One of the ureters was considerably dilated, measuring about an inch in diameter; the other was of normal calibre but followed the tortuosities of the dilated one. The ureteric catheter had evidently entered the smaller ureter and the difficulty in passing it was no doubt due to the tortuosity. On opening the right kidney a few drachms of purulent urine escaped. The pelvis was in two separate compartments. The larger part of the kidney drained into the lower and larger pelvis which communicated with the smaller ureter (see B, Figure 2). The upper half of the pelvis consisted of a small pyonephrosis, surrounded by a narrow, tough ring of kidney tissue, and drained into the dilated right ureter (see A, Figure 2). The small right ureter opened into the bladder opposite the left ureter and in the usual situation. The dilated right ureter, however, continued down to the neck of the bladder. From a bulbous termination a minute passage turned at right angles to traverse the muscular wall of the bladder. Here it entered a chamber beneath the mucous membrane of the bladder close to the beginning of the urethra. This chamber could be distended to the size of an acorn with fluid and at its lower end there was a tiny slit-like orifice which opened into the bladder in the mid-line just proximal to the vesical sphincter. Both orifices were only large enough to admit a bristle. It is possible that the submucous chamber should be called a ureterocele of the dilated right ureter. The urethra was normal.

The right kidney on microscopic examination showed a heavy infiltration with small round cells. The glomeruli were in places adherent to their capsule and the vessels were slightly thickened. The piece of tough kidney surrounding the pyonephrosis at the upper pole of the kidney showed advanced fibrosis and disorganization. Only a few glomeruli could be made out and they were atrophic, while the few tubules that were present were dilated. The vessels in this area showed a severe degree of thickening due to endarteritis.

Figure 2 is a drawing from the case. It will be noted that the left kidney is shown in continuity with the ureter, though actually the kidney had been removed five days before death. The post-mortem examination throws some light on this case but it is uncertain whether or not the submucous chamber was dilated during life. During cystoscopy the bladder is necessarily distended with fluid and this clearly collapsed the chamber and made it invisible. Moreover, the minute mid-line orifice was so near the vesical sphincter that the cystoscope passed over it before the field became illuminated. Possibly a small cysto-urethroscope might have demonstrated the abnormality, had its exact position ever been suspected. Uroselectan might have solved the problem by indicating the double right ureter, but, for some reason not clear to us, the drug did not appear in the right kidney.

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REFERENCE

1. Hosford, B. B., *Proc. R. Soc. Med.*, Lond., 1930-31, XXIV, (*Children's Sect.*), 19.