UROLOGICAL PROBLEMS OF CHILDHOOD

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In urology, as in all other branches of paediatric surgery, congenital malformations are assuming a greater and greater importance as the advances in medicine and hygiene lead to a better control of acquired disease. It is true that neoplasms are still unaffected by these advances and that nephroblastoma (Wilm's tumour) is one of the commonest malignant growths of childhood, while the 'embryomas' of the bladder and prostate, although much less often encountered, gain importance for the surgeon from the efficacy of early radical excision. With these important exceptions, it is found that congenital malformations provide the pathological background to the great majority of cases requiring urological surgery during childhood; even renal tuberculosis is now seldom observed in young children in the London area, except as a complication of orthopaedic disease or as part of a miliary spread; while urolithiasis, once a common affliction of children in many parts of England, is now rare and usually indicates an underlying abnormality of the urinary tract or of the renal excretion of various elements.

Some of the congenital abnormalities of the genito-urinary system are externally obvious, and provide a specific problem in reconstructive surgery; hypospadias, epispadias, ectopia vesicae and the intersex abnormalities are examples of this type. Another group characteristically produces obstruction of the lower urinary passages and may be responsible for chronic retention of urine; these cases have much in common with the elderly prostatic with overflow incontinence but many differences in the cause of the obstruction, and in its effects upon the upper urinary tract, make the routine procedures well established for the adult case inapplicable to the infant. Most malformations of the upper urinary tract do not produce any characteristic signs which may be recognized clinically; they can only be diagnosed by routine urological investigation of all cases with suggestive symptoms. Perhaps the commonest indication for such investigations is a recurrent or resistant urinary infection, and this problem is therefore singled out for fuller discussion.

Recurrent Urinary Infections

The Need for Investigation. Urinary infections

with the B. coli group of organisms are very frequently observed in children, particularly in infants during the first year of life. While the absence of local symptoms in the very young is apt to lead to some delay in diagnosis, once the presence of an infection is established it can usually be brought quickly under control by administration of one of the newer sulphonamides or antibiotics. When an infection resists these routine measures, or recurs after satisfactory sterilization of the urine, some abnormality of the urinary tract, either congenital or acquired, should be suspected, and full investigations undertaken. Although recurrent infection of the normal tract is not very uncommon, particularly in girls, the presence of some predisposing malformation, or of some secondary pathological changes, greatly increases the chances of progressive destruction of the renal substance of the pyelonephritic process. Even in the absence of recurrence, it is wise to investigate all cases of urinary infection in boys past the age of one year, cases in which the infecting organism is of the proteus or pseudomonas group and those in which the blood urea is raised or the kidneys or bladder become palpable during the attack. The efficacy of modern antibiotics is such that it is often possible to sterilize the urine even in the presence of severe obstruction and stasis, and unless the clinical signs indicate the urgent necessity for surgical treatment of retention, or pyonephrosis, the investigations are best postponed until the infection has been controlled.

The Investigation. After clinical examination the intravenous pyelogram will be the mainstay of the urological investigation of these cases unless there is some evidence of renal failure. The technique of this procedure deserves more attention than is usually accorded it, and when performed with care it can provide most of the information required in each case. The dosage of the commonly employed contrast media such as 35 per cent. pyelosil can be worked out on the basis of 10 cc. plus 1 cc. for each year of the child's age. Abdominal compression is applicable only to older children but can be of great value provided a film is exposed soon after release when the ureters are fully outlined. Alterations of position, and late films, taken as long as one or two hours after the

FIG. 1.—Intravenous pyelogram in a girl aged 12 years suffering from recurrent urinary infection. There are bilateral changes of pyelonephritis, advanced on the right side, with contraction of the kidney; slight, and affecting the upper middle zone on the left.

injection are of great value in cases with hydronephrosis and ureteric dilatation, and it is therefore important that the radiologist, or the doctor in charge of the case, should see the films as they are developed and suggest the necessary adjustments in routine. Intramuscular injection of the dye in the same dosage, with the addition of hyalase, can give effective pyelograms if intravenous administration is impossible.

In boys, and in girls in whom the intravenous pyelogram shows any abnormality, cystoscopy and urethroscopy will be the next investigations. Retrograde pyelograms may be required and where abnormalities of the bladder neck or urethra are suspected, great assistance may be obtained from micturating cysto-urethrograms.

The Findings. The evidence presented by the intravenous pyelogram concerns not only the state of the urinary passages but also the form and function of the kidneys themselves. Intrarenal lesions such as chronic pyelonephritis or congenital hypo-

plasia are responsible for recurrent urinary infection as often as abnormalities of the urinary passages, and are unfortunately not so amenable to surgical treatment. Pyelonephritic and hydronephrotic destruction of the renal substance will, of course, be an anticipated complication of all urinary obstructions. Almost all the known malformations may be discovered during the investigation of recurrent urinary infections, but the common findings may be briefly outlined.

The Contracted Kidney. The early pyelographic signs of pyelonephritic scarring are not always easy to detect, the renal parenchyma is affected to a greater extent than the pelvis and calyces, and it is an assistance to get films which show the outline of the kidney as well as the pelvis. Localized thinning of the renal substance in relation to a slightly clubbed calyx may be the first sign of serious involvement. In more advanced cases the whole kidney is contracted and the pelvi-calyce pattern grossly deranged. Fig. 1 illustrates the

pyelographic findings in a girl of 12 years suffering from repeated attacks of infection during four years; the right kidney is shrunken and flattened against the vertebral column, the left shows slight changes in the shape of an elongated upper middle calyx. At times the pelvis of a contracted kidney is slightly hydronephrotic and its long axis rotated from the horizontal to the vertical; in other cases the pelvis is minute and a thin rim of kidney tissue is moulded round dilated calyces. Despite many careful studies it has proved impossible to lay down any rules for distinguishing the congenitally hypoplastic kidney from the contracted pyelonephritic kidney but from the therapeutic viewpoint this distinction is not important; both lesions are equally liable to cause pain, recurrent infection and hypertension, and in both nephrectomy is the only surgical treatment likely to be helpful. The strictly unilateral case, for which nephrectomy is curative, is disappointingly uncommon, however, and in the great majority the disease is bilateral but asymmetrical in its incidence; the more severely affected kidney may sometimes be removed with benefit where it is responsible for a great deal of pain and where its function is very poor, but this procedure is of no value in the treatment of hypertension.

Hydronephrosis due to Congenital Pelvi-ureteric Obstruction. This lesion, familiar to adult urology, most often presents in childhood as the cause of acute loin pains; it is less often responsible for recurrent urinary infections than hydroureter, and it is therefore important that X-rays showing the ureter should be obtained before the diagnosis is made. Late films in the intravenous series or retrograde ureterograms are required. The presence of infection need not necessarily contraindicate conservative surgery in this type of hydronephrosis, and we are becoming increasingly aware that the lesion is potentially bilateral in most cases, even though one kidney may not show signs of dilatation until many years after the other. Where hypertension complicates a unilateral hydronephrosis, however, nephrectomy should be undertaken without delay.

Hydroureter. Ureteric dilatation is probably the most frequent of all the abnormal findings in the investigation of recurrent urinary infection, yet the interpretation of its significance presents the greatest difficulties. A moderate degree of hydroureter may result from the infection and may be completely recoverable; it is apparently due to an atony of the musculature rather than to any obstruction. Where the infection is of long standing and accompanied by cystitis and incompetence of the uretero-vesical valve, recovery of the dilatation may be very slow, but is still possible. Bilateral hydroureter may result from infravesical obstruc-

tion even where retention is not clinically obvious, and all cases should be thoroughly investigated with this possibility in mind. Organic obstruction at the lower ends of the ureters is less common, but may occur in the form of ureterocele or congenital stricture. The megaureters, those cases in which no obstruction can be found, are still a numerous group and present an unsolved problem in pathology and treatment. In most bilateral cases it is becoming clear that some disorder of the bladder is involved, though its exact nature remains obscure. In many children gross dilatation is accompanied by widely gaping ureteric orifices and free reflux of bladder contents at each micturition; the bladder is of large capacity and poor sensation, so that urine is passed much less frequently than normal, perhaps only twice in 24 hours. At first micturition is effective in emptying the bladder, but after some years a residuum accumulates and the disorder is then difficult to distinguish from bladder neck obstruction. The term megaureter-megacystis syndrome has been applied to the malady (Williams, 1954) and in the early stages, at least, it appears that bladder training and chemotherapy are more effective than surgical intervention in preventing progress of the dilatation. In unilateral megaureter, without bladder dysfunction, the ureter behaves as if it were obstructed at the lower end, and re-implantation into the bladder seems the logical treatment, but the results are rather disappointing. In mild cases sterilization of the urine is all that is required, and in advanced disease, with poor renal function, nephrectomy is the operation of choice.

Double Ureters. Even in the absence of pathological complications, reduplication of the ureter does appear to predispose to urinary infection. In such an event the diagnosis can be made without difficulty from the intravenous pyelogram, but it is not possible to incriminate any one of the renal elements as the cause, and treatment must be entirely medical. Chronic dilatation of one or both of the double ureters is often seen, leading to persistent infection, and deterioration of renal function. It not infrequently happens that the function of one of the elements is so greatly depressed that no shadow is seen on the intravenous pyelogram, and difficulty of diagnosis therefore arises. Fig. 2 illustrates a case of recurrent infection in a girl of four years; the intravenous pyelogram shows a normal left kidney and the normal lower pelvis of a right double kidney. The grossly dilated upper pelvis, and its ureter, are not seen, but their presence must be deduced from the fact that the pelvis visualized has short upper calyces, not approaching the limits of the renal shadow, that the whole pelvis is displaced away from the mid-line and that its upper end is rotated out-

FIG. 2.—Intravenous pyelogram in a girl aged four years suffering from recurrent urinary infection. The left kidney is normal; on the right only the lower pelvis of a double kidney is outlined.

wards. Cystoscopy in this case was normal, and the opening of the unseen ureter was eventually localized in the upper part of the urethra. Heminephrectomy in cases of this type is curative.

Lower Urinary Tract Obstructions. The various anomalies responsible for obstructing the bladder neck or urethra are occasionally encountered in children presenting with a history of recurrent infection of urine. Where residual urine is absent, or difficult to estimate, trabeculation of the bladder will normally suggest the presence of such an obstruction; cysto-urethrograms performed during micturition, or during expression of the bladder contents under anaesthesia, are an important supplement to urethroscopy in identifying the exact nature of the lesion.

Recurrent Infection in the Normal Tract. In girls, repeated attacks of cystitis, or of cysto-

pyelitis, are not uncommon even in the absence of pathological changes in the urinary tract. The liability to such infections normally diminishes with the coming of adolescence, but as long as the attacks remain uncontrolled there is always a danger of renal involvement and permanent damage. In the management of such cases attention to the general health of the child is of great importance; housing conditions and nutrition should be looked into. Correction of constipation is of unquestionable value, removal of the tonsils sometimes worth while. Continuous treatment with small doses of a soluble sulphonamide is a great help in preventing recurrence; for instance, to a girl of eight years, gantrisin, 0.5 g. twice daily, may be given for six months or longer.

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