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A Review of Children Operated Upon Because of Stenosis of the Pelvo-ureteral Junction

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The authors report the late results of reconstructive surgery on stenosis of the pelvo-ureteral junction in children. 68 patients had been operated during 1965–1970. The results on clinical grounds were good: the infections and pain disappeared and the renal function was normal; however, the operation had no noticeable effect on the hydronephrosis.

Most of the several obstructive anomalies of the urinary tract are confined to the pelvo-ureteral junction (PUJ). The variety of causes of obstruction of this part of the ureter is presumably wide. Stenosis of both organic and functional origin has been described. The results of surgical treatment of such stenosis have usually been regarded as good despite the very common persistence of hydronephrosis. In most of these reports the results of surgery have been judged solely on clinical grounds and from the degree of hydronephrosis and often after only a relatively short follow-up [3–5, 7–9]. This paper reports the late results of reconstructive surgery as judged mainly from a detailed comparison of the appearance of intravenous pyelograms (IVP) just before and 3 to 7 years (mean 4.5 years) after surgery.

Material and methods

Of the 68 patients operated upon during 1965–1970 at the surgical department of the Children's Hospital in Göteborg for pyeloureteric anomalies (unilateral in 63 and bilateral in 5) 35 had coexisting urologic conditions such as vesico-ureteral reflux, distal ureteral stenosis, urethral obstruction. These 35 children were excluded. In order to permit comparison between the affected side and the healthy side the 5 children with bilateral hydronephrosis were also excluded. The remaining 28 patients were selected for the present investigation.

Distribution by age, sex and side

There were 10 girls and 18 boys. Twelve were below 12 months, two were 1–3 years old, three were 3–6 years and eight were 6–14 years old. Thus almost half (43%) were in their first year of life. The condition was left-sided in 20 children and right-sided in the remaining 8.

Presenting symptoms

Fifteen of the patients had recurrent pyelonephritis or cystitis, two abdominal pain, eight abdominal pain and haematuria, one hypospadia and one enuresis. As many as sixteen (57%) of the patients had urinary tract infection (UTI) with symptoms for, on the average, 11.5 months in their history. They had all been treated on various occasions with antibacterial drugs, such as ampicillin, nitrofurantoin, and sulfonamides. Nobody had received any systematic long-term (6-month) antibiotic treatment before operation.

Preoperative X-ray findings

The hydronephrotic kidney was invariably longer and the parenchyma thinner as compared with the contralateral kidney. As is apparent from Table 1, the thickness of the parenchyma increased by about 2 mm on the unoperated as

Table 1

Comparison between thickness of renal parenchyma at intravenous pyleography before and after operation

Non-operated side		Operated side	
Preop.	Postop.	Preop.	Postop.
16 mm	18 mm	10 mm	12 mm

well as on the operated side. These parameters were measured in the way described in the Fig. 1. The PUJ was regarded as normal, i.e. funnel-shaped and not notably narrowed in 3 patients and as deformed, kinked or narrow in 11. In

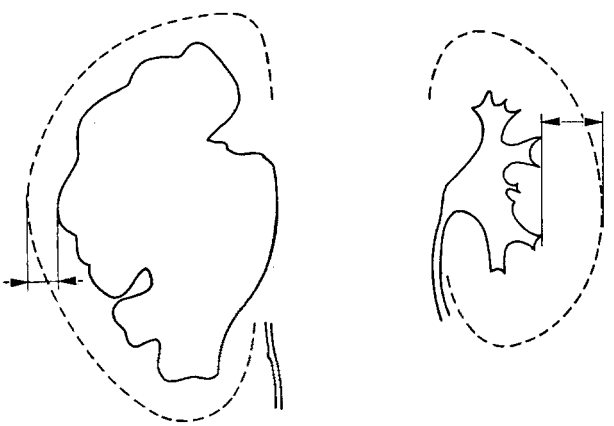

Fig. 1

the remaining 14 patients the filling obtained at IVP was at most fragmentary. Many patients had been subjected to IVP on several occasions preoperatively, which had most often revealed progression of the dilatation of the pelvis and atrophy of the renal parenchyma.

Laboratory studies

Blood urea nitrogen (BUN) was invariably normal before the operation. The concentration of the urine as measured after injection of pitressin was somewhat low in 6 patients. But 4 of these patients had or have very recently had UTI. Four patients had mild anaemia. The ESR were normal in all the patients at operation.

Operative procedures and findings

Twenty-five patients were operated on according to Hynes and 3 by the Foley Y to V plasty. The surgical technique used was as atraumatic as possible. The pelvo-ureteral anastomosis was made with 4/0 or 5/0 interrupted chromic catgut stitches. At operation it was difficult to assess the severity of stenosis. In most cases the PUJ appeared narrow but in some it was normal. Three patients had aberrant vessels that had probably caused the hydronephrosis. In 1 patient the ureter was spiral-like at the PUJ.

Postoperative drainage

The drain was renal-transanastomotic in 19, from the renal pelvis alone in 2 and no drain was used in the remaining 7 cases.

Histologic findings

In all of the patients except one there was a deficiency of elastic fibres in the PUJ and in most patients there was also a larger amount of fibrous tissue at the PUJ than in the ureter distal to the stenosis.

Postoperative course

All the patients were treated with nitrofurantoin, 3 mg/kg body weight/day, for the first 3 weeks after operation. During the first month after operation urine leaked through the operative wound in 7 of the children. The leakage ceased spontaneously in 4 of them but required recatheterization in the remaining 3. The later course in these 7 cases did not differ from that in the other 21. Four patients were reoperated upon because of re-stenosis. The stenosis was apparently not related to the patients' ages or the type of drainage used.

In those patients reoperated upon because of recurrent pyelonephritis nitrofuradantin treatment, 1.5 mg/kg body weight/day, was continued for 4 months.

Postoperative review

All the patients were re-examined 3, 6 and 12 months after the operation and later once a year. The mean duration of follow-up was 4.5 years (range 2–7 years). Each follow-up comprised general clinical examination as well as IVP, culture of the urine, concentration tests and BUN.

Of the 16 patients who had had recurrent UTI before the operation the infection had disappeared in all except 1 by the time of the 6-month review. At the 1-year review none of the patients was infected. All the children who had had abdominal pain before the operation were free of symptoms at the 6-month review.

BUN and the results of the concentration test were invariably normal at the 3-month examination. The findings at the IVP just before operation and at the last examination, i.e. on the average 4.5 years after operation, were compared and the results are given in Tables 1, 2 and 3. It is clear from Table 2 that the operation had relatively little effect on the hydronephrosis.

Table 2

Comparison between the pre- and postoperative dilatation of renal pelvis and calyces at intravenous pyelography

Complete regression of dilatation	2
Still dilated but somewhat less	14
Unchanged	12

Table 3

Appearance of pelvo-ureteral junction before and after operation

	Preoperative		Postoperative	
	No.	%	No.	%
Normal	3	11	24	85
Deformed or kinked	11	39	3	11
Not evaluable	14	50	1	5

It is clear from Table 3 that reconstructive surgery of the PUJ is very rewarding.

Discussion

The lack of objective measuring methods makes it difficult to assess the result of reconstructive surgery of the pelvoureteric junction and particularly the effect of the operation on renal function.

The results of plastic surgery on the pelvoureteric junction judged on clinical grounds were good: all urinary tract infections and all abdominal pain disappeared and the results of renal function tests were normal.

Relief does not necessarily mean control of the underlying lesion and is therefore not a reliable indicator of the result of reconstruction of the pelvoureteric junction. Simple function tests such as concentration ability after injection of pitressin or blood bound nitrogen are not accurate indicators of the total renal function and are thereby only poor mirrors of the recovery of the operated kidney. Since the possibility of separate clearance studies because of technical difficulties is limited in children, it would appear that IVP-day is the best method for assessing the results of reconstruction of the pelvoureteric junction. Refinement of isotope methods may prove to be a valuable assistance.

Judging from the IVP, in most cases in the present series, plastic surgery produced a PUJ of normal appearance. All patients got rid of their presenting symptoms. However, the operation had no noticeable effect on the hydronephrosis. This lack of effect did not appear essentially to affect the further course since the preoperative progressive reduction of the renal parenchyma was not only arrested but reversed. In fact the parenchyma after operation increased at the same rate on both sides.

In the present investigation it was difficult to evaluate the degree of obstruction in the PUJ. This has been earlier stressed by Jonathan and Magri [3]. Both obstructive and non-obstructive hydronephrosis are described by Shopfner [6] and Johnston [2]. These facts point to the importance of better preoperative evaluation of pelvoureteric resistance.

As reported in a preliminary paper [1], such a preoperative evaluation seems possible to perform by percutaneous function of the pelvis and pressure recording during simultaneous infusion.

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