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15 YEARS OF EXPERIENCE IN THE SURGICAL TREATMENT OF VESICOURETERAL REFLUX IN CHILDREN*

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For nearly 30 years a relationship has been recognized between vesicoureteral reflux, urinary infection and renal scarring in children. The medical management of vesicoureteral reflux has proved to be reliable and applicable to the majority of children. A review of a recently reported large series of children undergoing antireflux surgery also confirms that the procedure continues to have excellent results [1-3].

The purpose of this paper is to discuss the results of the surgical management of 89 children with vesicoureteral reflux, treated in the Hacettepe University Department of Urology between 1969 and 1984.

Material and Methods

Our series of vesicoureteral reflux comprises 89 children who underwent ureteroneocystostomy between the years 1969 and 1984. There were 47 girls and 42 boys; ages ranged from 6 months to 15 years, with an average age of 6.49 ± 2.06 years.

A urine culture, blood chemistry tests, renal function tests, an excretory urography, a micturating cystourethrography and a cystoscopy were performed on all patients. Surgical management was indicated for our patients when one or more of the following conditions was present:

I. Deterioration of renal function or renal growth arrest.
II. Poor compliance under medical management.
III. Reflux due to developmental abnormalities.
IV. Breakthrough bacteriuria while on antibiotic therapy.
V. Severe reflux with renal scarring.

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Azotemic children are defined arbitrarily in this paper as those having BUN≥ 20 mg/dl and/or a blood creatinine level ≥ 2.0 mg/dl. According to the afore mentioned criteria 28% of the children underwent antireflux surgery with at best borderline renal function.

The findings of the excretory urograms performed are listed in Table I. The striking features of our group are that in 12.36% of the cases IVP could not be obtained due to elevated BUN levels and that in 47.39% of the cases urograms revealed hydroureteronephrosis. Excretory urograms also showed that 12.2% of the cases had associated urinary tract disorders (Table II).

TABLE I

Results of Excretory Urograms

	%
Hydroureteronephrosis	47.39
Chronic pyelonephritic changes	20.24
Insufficient IVP due to high BUN levels	12.36
Caliectasis	11.23
Non-functioning kidney	8.98

TABLE II

Associated Disorders

	%
Urolithiasis	4.4
Hypoplastic kidney	5.6
Duplication anomaly	2.2

TABLE III

Grades of Reflux of Operated Patients

	%
Grade I	2.0
Grade II	3.67
Grade III	25.18
Grade IV	69.15

Micturating cystourethrograms revealed that 94.33% of all affected ureteral units exhibited grade III and IV reflux on the Dwoskin-Perlmutter scale[4]. In 52 patients (58.4%) reflux was present bilaterally (Table III).

Urine cultures were positive on presentation in 60.97% of the patients, E.coli being the most common infective agent.

A slightly modified Politano-Leadbetter procedure was performed on 143 ureters of 89 patients[5]. The bladder was approached by a transverse or vertical suprapubic incision and was opened by vertical cystotomy. A 5 or 8 F catheter inserted into the ureter facilitated its identification in the extravesical space. The ureter was mobilized down to the bladder-with maximal care being taken to preserve its blood supply. After placing a stay suture on its anterior wall it was trimmed away with fine scissors. The ureter was then mobilized proximally to obtain adequate length. The ureter was brought into the bladder from a new cranio-medial hiatus and was reattached to the trigonal muscle after being tunneled submucosally, with a tunnel length to external diameter ratio of 5:1. Cystostomy was used in 43 patients, while a urethral catheter was inserted in the remaining. Follow-up has included physical examination, urinalysis, urine culture, excretory urogram, voiding cystourethrogram and renal function studies. These children have been followed for from 1 to 11 years with an average of 4.24 $\pm$ 1.23 years. To classify the surgical procedure as successful, it had to meet all of the following criteria: the intravenous urogram showed significant improvement; there was no evidence of reflux; renal function did not deteriorate. If any of these criteria were not met the surgical treatment was classified as unsuccessful.

Results

The results were considered successful in 73 patients or 118 ureters (82.09%). Success was defined as no reflux and no obstruction at the involved ureterovesical junction together with improvement in renal function as mentioned above.

Two children died in the hospital after the operation giving a mortality rate of 2.24%. Both died of sepsis electrolyte imbalance, and both of them were in the azotemic group preoperatively.

Fourteen patients were in the failure group because of obstruction in the operative area, deteriorating renal function or persistent reflux. Of these 5 underwent repeat antireflux surgery. The results of all were considered to be successful, thus yielding a secondary success rate of 87.14%.

Urinary diversion, being mostly cutaneous ureterostomy, was performed on the remaining 9 patients. All of these patients have been well for from 1 to 4 years.

60.97% of the patients had documented urinary tract infection on presentation. According to the results of urine cultures performed at the 1 year follow-up, 36 patients had evidence of recurrent or persistent infection (41 %).

Hospitalization lasted for an average of 13.94 days. The hospitalization period was shorter for patients who had a urethral catheter than for those with cystostomy (11.56 days versus 15.29 days).

Discussion

Ureteral reimplantation is a highly reliable and efficient procedure for the correction of vesicoureteral reflux. Timely antireflux surgery protects the renal parenchyma and prevents the morbidity of chronic pyelonephritis and reflux nephropathy.

When the results of ureteral reimplantation since 1970 are reviewed, the failure rate is more than 10% in 2 series, between 5 and 10% in two series, between 3 and 5% in 6 series and between 1 and 3% in 3 series. If these series are individualized, however, it is to be noted that most of the patients in these series exhibited grade I, II or III reflux[6-11], and it is known that this specific operation is highly successful in grades I, II and III as opposed to grade IV. Wachman et al reported their success rates in grades I, II, III and IV as 100%, 97%, 96% and 53% respectively[12].

Modification of the classical technique was mandatory in our series because in the presence of severe lateral displacement of the ureteral orifice and gross dilatation of the ureter, there is insufficient length on the trigone to provide a tunnel length adequate to prevent reflux, and therefore alteration of the original hiatus becomes inevitable. But we are aware of the fact that the selection of the new hiatus is of the utmost importance in order to prevent obstruction at the ureterovesical junction.

Another notable feature of our present series was the high percentage of patients with chronic renal failure: 28% of the cases had serum creatinine levels of more than 2 mg/dl, and in 12.36% of the cases IVP could not be obtained due to high BUN levels. Such patients are usually anemic, poorly nourished and chronically ill. These factors, as well as the impaired immunologic responses and their poor wound healing may have affected the overall results of our present series[13]. In view of this, the 82.09% success rate in our group seems to be comparable to other series published recently.

Urinary tract infection was found in 41% of our cases on follow-up. The incidence is reported as between 21% and 50% in most publications[12,14,15], but it must be mentioned that urinary tract infection is not a complication *per se.*

The hospitalization period is longer in our patients with a suprapubic catheter than in those with a urethral catheter only. Our experience of 15 years seems to suggest that routine omission of vesical catheters following ureteroneocystostomy is safe and reliable.

Summary

A study carried out on 89 children who underwent ureteroneocystostomy for vesicoureteral reflux in the Department of Urology of Hacettepe University from 1969 to 1984, is described. The overall success rate was 87.10% as opposed to the 90 - 95% reported in other series. This low success rate can perhaps be attributed to the heterogenous characteristics of the group.

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