Pre- and Postoperative Urographic Findings in Posterior Urethral Valves*

O. Eklöf and H. Ringertz

Department of Pediatric Radiology, Karolinska Sjukhuset, Stockholm, Sweden

Date of final acceptance: April 4, 1975

Abstract. In a series of 65 male infants and children, all with the diagnosis of posterior urethral valves, pre- and postoperative urographic findings were reviewed. In addition changes occurring in the bladder, and the implication of vesico-ureteral reflux were assessed. -- Preoperatively diagnosed impairment of kidney function and concomitant dilatation of the upper urinary tract, with some exceptions, remained fairly unchanged at postoperative examinations. In the case of marked vesico-ureteral reflux, permanent kidney function annihilation was significantly commoner than with slight or no reflux. -- Although, as a rule, both the upper urinary tract and the bladder were affected, there were cases of posterior urethral valves with a normal appearing bladder. As the intravenous urography do not exclude the urethral abnormality, voiding cysto-urethrography has to be included in the primary radiological exploration of all cases with urological problems.

Key words: Intravenous urography, non-functioning kidney, upper urinary tract dilatation, voiding cysto-urethrography, posterior urethral valve, bladder outflow obstruction.

According to recent statements in the literature, posterior urethral valves must be regarded as the most serious lower urinary tract abnormality of the male infant and child. Depending upon age at presentation primary mortality rates of 17--50% are reported [3, 5, 7, 8].

In the past radiologists seem principally to have focused their interest on different aspects of the diagnostically critical voiding cysto-urethrography, more or less leaving the findings disclosed at intravenous urography out of discussion. Even so the degree of impaired kidney function to a great extent determines the long term prognosis of the condition.

It therefore appeared important to analyze the influence of treatment on the evolution of kidney function as evaluated on the base of available intravenous urograms. In addition, changes occurring in bladder appearance and the implication of vesico-ureteral reflux will be briefly discussed.

Material and Methods

The series consisted of 65 boys with a mean age of 3.4 years at the first voiding study, the occasion at which the diagnosis was made. The median age was just above 1 year. Eligible for study were only cases with the characteristic finding of an obstructive sail just below the verumontanum (Figs. 1a and b). Elongation and dilatation of the posterior urethra were other constant features. At the level of the valve urethral lumen was restricted to a narrow dorsal slit. The size of this slit is one of the main factors determining urethral flow. In advanced cases the obstructive mechanism frequently becomes accentuated from compression caused by the dilated prostatic urethra on the segment below the valve [1].

Treatment

Primary treatment consisted throughout the series of transurethral electroresection of the valve. In 13 cases the operation was repeated one or several times because of persisting obstructive valvular remnants. In 23 cases resection of the bladder neck was performed in the same session or secondarily because of bladder neck obstruction. As therapy consistently aimed at correction of the abnormality proper and not at relieving secondary symptoms, there was no need for nephrostomies or other diverging procedures. Correction of occurring electrolyte disturbances and treatment with antibiotics supplemented the operative measures.

Results of Treatment

Two out of the 65 patients died in connection with the primary operation at 4 days and 8 months of age, respectively. All other patients recovered and were in a fair condition, generally in good health at later follow-ups.

Radiological Techniques and Findings

Intravenous urography and voiding cysto-urethrography were carried out in all patients regardless of their condition at admission. High doses of contrast medium at urography and prolongation of the examination [2], whenever necessary, were the most important isolated measures used in the efforts to achieve maximal information.

The voiding cysto-urethrograms were performed by use of single full size films exposed in the true lateral and frontal...
Projections. In selected cases, oblique views provided further important information.

Preoperative urograms revealed impaired kidney function in 31% of the series. In a further 19% of cases, one kidney was non-functioning. 46% of all patients had a moderate dilatation of the upper urinary tract, 39% a marked one (Table 1).

In most cases parallel with the changes of the upper urinary tract, however, in 12% as an isolated occurrence, bladder alterations were noted. Reduced bladder capacity, increased tonus and thickness of the wall, an irregular mucosal membrane pattern, frequently together with trabeculation of the bladder or with diverticula formation, was registered alone or in different combinations (Figs. 1a, 1b, 4a). Unilateral vesico-ureteral reflux was present in 29% of patients, bilateral in 18%. The reflux was frequently marked (Fig. 5) and associated with significant dilatation of the affected upper urinary tract (Table 1).

The radiological follow-up time was 4.3 years in average. Postoperatively the kidney function, as evaluated by excretory urography improved in quite a number of cases. Sometimes the improvement was rather remarkable (Figs. 2a, b and c). Nevertheless, permanently impaired kidney function was demonstrated in other patients (Table 1). Thus 17% of cases had a severe renal damage with one kidney non-functioning. Although decreasing width occasionally could be noted, the upper urinary tract remained more or less dilated in 76% of cases (Figs. 3a and b). The vesico-ureteral reflux was hardly affected by treatment. 13 patients had obstructive valvular remnants (Figs. 1c and d) and 19 secondary bladder neck obstruction calling for repeated operations.

**Discussion**

Analysis of radiological findings of prognostic significance, for the future kidney function, revealed marked vesico-ureteral reflux to be of crucial importance. In 17% of patients with this feature complete and permanent abolition of kidney function was noted on the most affected side. As a rule there was impaired excretory capacity on the contralateral side too. Conversely, none or only moderate reflux resulted as an average in less severe functional disturbances; no single case of complete kidney function annihilation was encountered in these later patients (Fig. 5).

Our observation diverges from the conclusion made by Williams et al. (8) who considered reflux “a less serious complication”. The reflux, however, stopped spontaneously in only 22 out of 86 of their refluxing ureters. Their remaining patients were either operated upon, had persistent reflux or were never reexamined. Johnston et al. (3) found spontaneous cure and persistent reflux in roughly on third each of their reflux cases. The remaining third of the series was never reassessed on this point.

Persistent dilatation of non-refluxing ureters, another common feature of the present material, is

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<th>Kidney function</th>
<th>Preoperative</th>
<th>Postoperative</th>
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<tr>
<td>Impaired</td>
<td>31%</td>
<td>19%</td>
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<td>One kidney silent</td>
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<table>
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<tr>
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<tbody>
<tr>
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<td>46%</td>
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</tr>
<tr>
<td>Marked</td>
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<td>23%</td>
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Fig. 1. Typical posterior urethral valve in a 3 day old boy with clinical urosepsis. a and b) Reduced bladder capacity, increased tonus, swollen bladder mucosa and moderate right sided reflux. The bladder neck and the elongated posterior urethra are wide. c and d) 3 months after electroresection of the valve. Minor, slightly obstructive valvular remnants are seen. Normalisation of the bladder's appearance.