Primary Obstructive Megaureter: Initial Experience with Endoscopic Dilatation

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ABSTRACT

Background and Purpose: Primary obstructive megaureter (POM) without vesicoureteral reflux has classically been managed by open surgery with ureteral reimplantation. We present seven patients with POM who were treated endoscopically with balloon dilatation of the distal ureter.

Patients and Methods: Six boys and one girl with POM were treated from June 2000 through July 2004. Six of the cases were diagnosed prenatally when ectasia of the urinary tract was seen on ultrasound scans. The postnatal diagnosis was also achieved by ultrasonography, along with a diuretic isotopic renogram with MAG-3, intravenous urography, and filling cystography. The age at surgery was 1 to 3 years. In all cases, a compact 10F infant cystoscope with a 5F working channel was used. Dilatation of the stenotic area was performed under fluoroscopic monitoring. A 4F dilating balloon was used, which was insufflated to between 12 and 14 atm for 3 to 5 minutes, and disappearance of the narrowed ring was verified. A Double-J catheter was positioned and withdrawn 2 months after the procedure. Clinical, analytical, and imaging follow-up was carried out with ultrasonography and MAG-3 renography.

Results: The mean follow-up of the patients is 31 months (range 12–56 months). Their clinical progress was highly satisfactory. Five patients exhibited reduced obstruction at MAG-3. One patient needed a second dilatation, and the obstructive curve improved after this additional procedure. One of the patients presented with a febrile urinary infection after the dilatation, but there were no other complications.

Conclusions: Endoscopic management of POM by balloon dilatation has yielded very good results in the short term. Longer follow-up will enable us to determine the final indications for this treatment.

INTRODUCTION

ETYMOLOGICALLY, THE WORD “MEGAURETER” designates a wide ureter. In children, the usual ureteral diameter is no greater than 5 mm, and when it exceeds 7 mm, it is considered a megaureter. The dilated ureter or megaureter may be categorized into four groups, depending on its origin: (1) secondary to reflux; (2) obstructive (subdivided into primary and secondary); (3) attributable to reflux and obstruction; and (4) with neither reflux nor obstruction.

Primary obstructive megaureter (POM) is a congenital dilatation of the ureter secondary to an adynamic segment at its terminal portion as the result of an intrinsic disturbance. It is uncommon and is most frequently seen in boys. It is predominantly left-sided but is bilateral in 15% to 25% of cases. The pathogenesis is disturbed development of the prevesical portion of the ureter. Ureteral dilation usually is observed on the prenatal ultrasound scan and confirmed after birth by ultrasound, MAG-3 renography with diuretic stimulation, and contrast instillation cystography.1-3

There is no specific symptomatology. Infants may have urinary infection, vomiting, and diarrhea. An older child may complain of abdominal pain. Most cases are diagnosed by prenatal ultrasonography and are asymptomatic after birth.1

Classically, POM has been managed by open surgery with ureteral reimplantation and remodeling.4 We present seven patients who were treated endoscopically by balloon dilatation, as well as their subsequent evolution.

PATIENTS AND METHODS

Six boys and one girl with POM were treated from June 2000 to July 2004. Prenatal ultrasound diagnosis of urinary-tract ectasia was made in six cases, five of them during the last quar-
## Table 1. Disease Characteristics and Outcomes

<table>
<thead>
<tr>
<th>No.</th>
<th>Prenatal dx</th>
<th>Sex</th>
<th>Ultrasound</th>
<th>MAG 3</th>
<th>T1/2 renal function</th>
<th>VCUG</th>
<th>Signs &amp; sympt.</th>
<th>Age at surgery (months)</th>
<th>MAG 3 control</th>
<th>T1/2 renal function</th>
<th>Reoper.</th>
<th>Follow-up (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>F</td>
<td>Bilateral</td>
<td>L</td>
<td>45' 37%</td>
<td>No</td>
<td>No reflux</td>
<td>5</td>
<td>No obstruction</td>
<td>20' 40%</td>
<td>No</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>M</td>
<td>Rectasia</td>
<td>R</td>
<td>50' 25%</td>
<td>No</td>
<td>No reflux</td>
<td>8</td>
<td>No improvement</td>
<td>24% 86'</td>
<td>Yes; improvement</td>
<td>53</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td>M</td>
<td>Rectasia</td>
<td>L</td>
<td>89' 25%</td>
<td>No</td>
<td>No reflux</td>
<td>34</td>
<td>No improvement;</td>
<td>10% 86'</td>
<td>No</td>
<td>31</td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>M</td>
<td>Rectasia</td>
<td>L</td>
<td>38' 42%</td>
<td>No</td>
<td>No reflux</td>
<td>5</td>
<td>No obstruction</td>
<td>47% 13'</td>
<td>No</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>M</td>
<td>Rectasia</td>
<td>L</td>
<td>61' 42%</td>
<td>No</td>
<td>No reflux</td>
<td>19</td>
<td>No obstruction</td>
<td>48% 15'</td>
<td>No</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>M</td>
<td>Rectasia</td>
<td>L</td>
<td>51' 39%</td>
<td>No</td>
<td>UTI</td>
<td>18</td>
<td>No obstruction</td>
<td>40% 12'</td>
<td>No</td>
<td>19</td>
</tr>
<tr>
<td>7</td>
<td>Yes</td>
<td>M</td>
<td>Rectasia</td>
<td>L</td>
<td>53' 43%</td>
<td>R</td>
<td>No reflux</td>
<td>12</td>
<td>No obstruction</td>
<td>55% 16'</td>
<td>No</td>
<td>12</td>
</tr>
</tbody>
</table>
ter of gestation. In the remaining case, the pelvic dilation was observed during the second quarter. In this patient, the diagnosis was bilateral pyeloureteral ectasia. On one side, there was POM, whereas contralaterally, there was a nonobstructive and nonrefluxing megaureter. After birth, the diagnosis of POM was confirmed by ultrasonography, MAG-3 renography with diuretic stimulation, voiding cystourethrography (VCUG), and intravenous urography (IVU) (Fig. 1). In all cases, the ultrasound scan showed pyeloureteral dilation, with a dilated ureter down to the ureterovesical junction. In the seventh child, febrile urinary infections led to the diagnosis. In one patient, the suspected prenatal diagnosis of multicystic kidney proved wrong. All patients were operated on before their fourth birthdays (Table 1).

Endoscopic treatment under general anesthesia was applied to all cases; antibiotic prophylaxis was administered with single-dose cefonicid, and a Storz® 10.5F infant cystoscope with a 5F working channel was used. The ureterovesical stenosis was bypassed with a flexible guidewire introduced up to the renal pelvis. The ureterovesical junction was dilated with a 3F to 5F balloon catheter, which was passed over the guidewire to the problem area and filled with radiologic contrast medium (Triology Hydro Plus, Boston Scientific®, and Grifols Balones PTA®). The stenotic ring was dilated at 8 to 14 atm for 3 to 5 minutes under endoscopic and fluoroscopic control. Disappearance of the stenotic notch was verified radiologically, and the ureteral meatus could then be bypassed using the same cystoscope in a distal ureteroscopy mode (Figs. 3 and 4).

After dilatation, a 7F Double-J catheter was placed through a ureteral bridge between the urethral and the ureteral meatuses to facilitate positioning of the stent, as this urologic procedure is quite complicated because of the great tortuosity of the ureter after a long-standing obstruction. The bladder catheter was withdrawn 24 hours after surgery, and the patient was discharged after 48 hours.

In all cases, the Double-J stent was removed 2 months after surgery with the patient under general anesthesia. The dilated area was again passed through with a compact cystoscope in order to verify its caliber.

Follow-up was performed with renovesical ultrasonography the first and sixth month and MAG-3 diuretic isotopic renography the third month (Fig. 2).

**RESULTS**

The anteroposterior diameter of the renal pelvis, measured in millimeters, was taken as a reference to evaluate urinary-tract...
changes by ultrasonography. Despite diuretic stimulation, the MAG-3 diuretic isotopic renogram showed an obstructive pattern secondary to obstruction at the ureterovesical junction; however, no alteration was observed at the ureteropelvic junction. For this study, the diuretic was administered to two patients 15 minutes after the start of the renogram (F15) and concurrently with initiation of the radiotracer (F0) in five patients. In all cases, the VCUG showed absence of vesicoureteral reflux in the occluded ureter, but there was one case of vesicoureteral reflux in the contralateral ureter. All causes of obstruction other than POM were ruled out. Surgery was performed because of worsening of differential renal function, together with the clearly obstructive pattern of the excretory phase of the renogram, associated with either worsening of the renal pelvic dilation or repeated urinary-tract infection in spite of antibiotic prophylaxis.

All seven patients had a smooth postoperative course, with no morbidity. The mean follow-up is 31 months (range 12–56 months). Five patients showed marked improvement of the obstructive pattern on the renogram performed after the first endoscopic megaureter dilatation (Table 1). One patient (patient 5) with obstructive pattern improvement presented with a febrile urinary infection 14 months after the endoscopic dilatation; VCUG ruled out vesicoureteral reflux. At the latest follow-up, this patient was asymptomatic, with no further episodes of infection and with a less significant obstructive pattern. Patient 2 required a second balloon dilatation because of persistence of the obstructive manifestations, whereupon the obstruction resolved. Patient 3 showed no improvement on the MAG-3 renogram at 3 months, and it was decided to apply watchful waiting because the differential function of the kidney involved was quite disturbed.
ENDOSCOPIC DILATATION OF POM

Improvement of the obstructive process was confirmed in six of our seven patients (85%); however, a second dilatation was required in one case, so our rate of success after the first dilatation amounted to 71%. The nonobstructive idiopathic megaureter (the one patient with bilateral ectasia) progressed satisfactorily with chemoprophylactic management.

DISCUSSION

The first megaureter classification was proposed in 1976 in Philadelphia: (1) megaureter with reflux; (2) megaureter with obstruction; and (3) megaureter with neither reflux nor obstruction. In 1980, King introduced a fourth type, megaureter with both reflux and obstruction. Only POMs are included in our patient series. Prior to the introduction of prenatal ultrasonography, megaureter usually was discovered during infancy and was found in 8% of children with a diagnosis of symptomatic pyeloureteral ectasia. Today, this pathology accounts for 23% of fetal upper urinary-tract dilation, and its incidence takes the third position either worsening of the renal pelvic dilatation or repeated urinary infection in spite of antibiotic prophylaxis. All of our patients with POM seen over the last 4 years have been treated with this technique.

Follow-up in our series is short, with a range of 12 to 56 months; however, the good results of the approach, together with the low morbidity, are prompting us to report our experience, even though we believe it is important to have a longer follow-up in order to be able to evaluate these patients better.

Endoscopic dilatation of the obstructive megaureter was first described in Spain by Angulo and coworkers in 1998. They operated on 11 patients with this technique. In six of them, the obstructive megaureters were primary, and in the remaining five, they were secondary to other pathologies. The problem was resolved with a single dilatation in six patients and with a second one in the remaining five. The excellent results obtained by those surgeons and the absence of morbidity prompted our group to start performing such endoscopic treatment. Bapat and associates10 performed endoureterectomy to treat POM in six adult patients with similar success and complication rates in a short follow-up. These are the only two papers found in literature that report endoscopic treatment of POM as an alternative to classic open surgery.

The potential de-novo onset of vesicoureteral reflux in the dilated ureter may create some controversy. Angulo et al15 perform post-dilatation VCUG, and there was reflux in 2 of the 11 patients, one of whom had megaureter secondary to neurogenic bladder that was treated successfully by Teflon STING. The other one had grade I reflux that required no treatment. We did not systematically perform VCUG, as we considered that dilatation does not significantly alter the antireflux mechanism, so we carried out VCUG only in the child with febrile urinary infection after dilatation. No vesicoureteral reflux was observed in this patient.

For endoscopic treatment, we selected only those patients with a diagnosis of POM and a clearly obstructive MAG-3 renogram curve. Six of the seven patients (85%) have improved markedly after endoscopic dilatation, and they had no added morbidity. We believe this is a surgical approach worth considering despite its short follow-up in view of its good outcome and absence of morbidity in comparison with classic surgery, namely, reimplantation with or without ureteral tailoring.

CONCLUSIONS

Endoscopic management of POM by balloon dilatation has yielded excellent short-term outcomes, namely disappearance of the obstruction and no morbidity. Long-term follow-up of these patients will enable us to establish the final indications for this treatment. Prior endoscopic surgery does not contraindicate subsequent open surgery.

REFERENCES


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ABBREVIATIONS USED
atm = atmosphere; DTPA = diethylenetriaminepentaacetic acid; IVU = intravenous urography; MAG-3 = mercaptoacetyl triglycine; POM = primary obstructive megaureter; VCUG = voiding cystourethrography.
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