Endoscopic Management and the Role of Double Stenting for Primary Obstructive Megaureters

Matthew S. Christman, Sanjay Kasturi, Sarah M. Lambert, R. Caleb Kovell and Pasquale Casale

From the Children's Hospital of Philadelphia (MSC, SML, PC) and Perelman School of Medicine at the University of Pennsylvania (SK, RCK), Philadelphia, Pennsylvania

Abbreviations and Acronyms

MRU = magnetic resonance urography

POM = primary obstructive megaureter

RBUS = renal and bladder ultrasound

VCUG = voiding cystourethrography

VUR = vesicoureteral reflux

Submitted for publication July 7, 2011.

Study received institutional review board approval.

Purpose: We determined the efficacy and potential complications of endoscopic incision and balloon dilation with double stenting for the treatment of primary obstructive megaureter in children.

Materials and Methods: We prospectively reviewed cases of primary obstructive megaureter requiring repair due to pyelonephritis, renal calculi and/or loss of renal function. A total of 17 patients were identified as candidates for endoscopy. Infants were excluded from study. All patients underwent cystoscopy and retrograde ureteropyelography to start the procedure. In segments less than 2 cm balloon dilation was performed, and for those 2 to 3 cm laser incision was added. Two ureteral stents were placed within the ureter simultaneously and left indwelling for 8 weeks. Imaging was performed 3 months after stent removal and repeated 2 years following intervention.

Results: Mean patient age was 7.0 years (range 3 to 12). Of the patients 12 had marked improvement of hydroureteronephrosis on renal and bladder ultrasound. The remaining 5 patients had some improvement on renal and bladder ultrasound, and underwent magnetic resonance urography revealing no evidence of obstruction. All patients were followed for at least 2 years postoperatively and were noted to be symptom-free with stable imaging during the observation period.

Conclusions: Endoscopic management appears to be an alternative to reimplantation for primary obstructive megaureter with a narrowed segment shorter than 3 cm. Double stenting seems to be effective in maintaining patency of the neo-orifice. Followup into adolescence is needed.

Key Words: endoscopy, pediatrics, stents, ureter

For decades ureteral tapering and reimplantation has been an established treatment for progressive or persistent primary obstructive megaureter associated with significant obstruction and/or infection.[1] More recently endoscopic treatment has been described by Angulo et al.[2] Since this initial description, various techniques of endoscopic ureterotomy and balloon dilation have been described for management of this entity in children.[2–4]

Endoscopic management of benign ureteral strictures has been described in the adult literature with success rates of 62% to 88%.[5,6] Razdan et al have shown that double stenting may increase the likelihood of success when encountering a difficult stricture with previously failed intervention.[7] We hypothesized that endoscopic balloon dilation with or without incision, in conjunction with double stenting of the operated ureter, can

0022-5347/12/1873-1018/0
THE JOURNAL OF UROLOGY®

Vol. 187, 1018-1023, March 2012
Printed in U.S.A.
DOI:10.1016/j.juro.2011.10.168

lead to successful outcomes in children who require treatment of POM.

MATERIALS AND METHODS

An institutional review board approved, prospective database of patients undergoing a minimally invasive surgical procedure was reviewed. Patients are consented for inclusion in the database before the minimally invasive intervention. To be included in this study, patients must have been diagnosed with POM based on preoperative anatomical and functional imaging, which in this series was MRU. Indications for surgical repair of POM included loss of renal function, febrile urinary tract infection and stone formation ipsilateral to the POM. Loss of renal function was determined by ipsilateral differential function 40% or less. Urinary tract infection was defined as bacterial growth on urine culture in conjunction with symptoms.

Parents were counseled that if the endoscopic approach was not possible, the child would undergo formal repair (robot-assisted laparoscopic vs open ureteral reimplantation) at the same setting. Patients with a narrowed distal ureteral segment longer than 3 cm were ineligible for endoscopic treatment. We do not typically perform ureteral reimplantation in children younger than 1 year due to the smaller bladder size and, therefore, infants were excluded from participation in the study.

To start the procedure, patients underwent cystoscopy with retrograde ureteropyelography (fig. 1). Cystoscopy was performed with a Wolf 10Fr pediatric cystoscope with a 5Fr working channel and a 25-degree lens. A 3Fr ureteral catheter was used to measure the length of the narrowed segment by direct cystoscopic visualization of the graduated marks (occurring every 1 cm), in conjunction with retrograde ureteropyelography to assess when the deployed end of the ureteral catheter reached the proximal end of the narrowed segment. Guidewire access

Figure 1. Retrograde ureteropyelography is performed and segment length is accessed with aid of graduated, open ended ureteral catheter. Narrowed region of UVJ is visible, which in this case was amenable to balloon dilation alone.

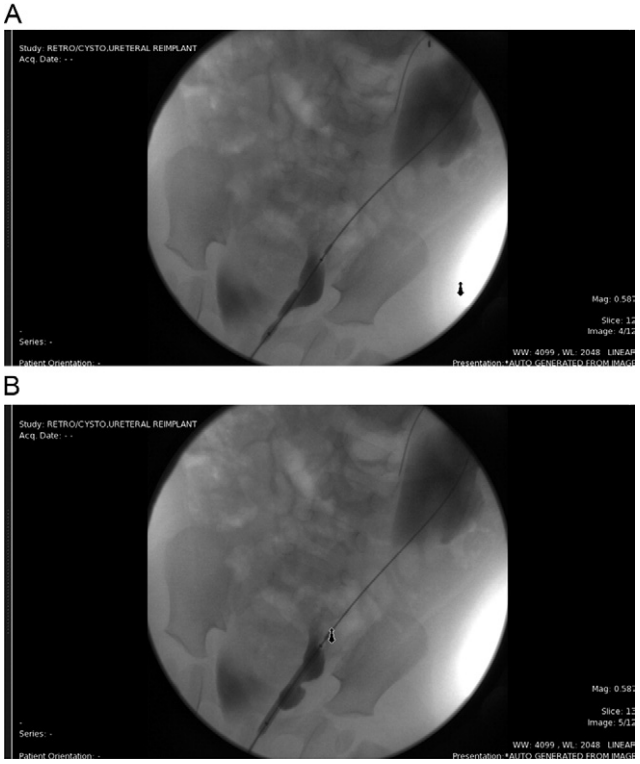

Figure 2. Balloon is inflated (*A*) until waist pops open, reflecting complete expansion of balloon (*B*).

was then obtained. If the affected segment was shorter than 2 cm, balloon dilation was performed. If the segment was 2 to 3 cm, laser incision followed by balloon dilation was conducted. Laser incision was performed along the 12 o'clock position within the ureter using a holmium:YAG laser set to 0.6 J and 6 Hz.

An X-Force® U30 ureteroscopic balloon dilation catheter (which accepts up to a 0.038 inch guidewire, 6Fr before dilation, 4 cm balloon length, 4 mm inflated balloon diameter) was threaded over the previously placed 0.035 inch guidewire such that it spanned the adynamic segment. The balloon was inflated until the waist disappeared under fluoroscopic imaging (fig. 2). The balloon dilator was removed and a 10Fr dual lumen catheter was threaded over the wire. A second guidewire was placed.

To conclude the procedure, 2 InLay® ureteral stents were placed into the treated ureter. These stents are 4.7Fr in size, accept up to a 0.035 inch guidewire and are available in lengths of 14, 20, 22, 24, 26 and 28 cm. Stents were sized according to the "age + 10" rule, rounding up to the nearest stent length available.[8] Once in the proper position, both guidewires were removed simultaneously, leaving 2 pigtail curls in the renal pelvis and the bladder. Stents were removed 8 weeks later via cystoscopy.

A prophylactic dose of antibiotics was administered intravenously within 30 minutes of starting cystoscopy. Cefazolin was typically used in a dose of 25 mg/kg unless allergies dictated choice of an alternative antibiotic. Patients were subsequently discharged home on a daily prophylactic dose of antibiotics to decrease the risk of urinary tract infection while the stents were in place. The daily