



Laparoscopic Intravesical Detrusorrhaphy With Ureteral Plication for Megaureter: A Novel Technique

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INTRODUCTION To demonstrate the novel technique of laparoscopic intravesical detrusorrhaphy with ureteral plication for megaureter.

TECHNICAL CONSIDERATIONS From December 2012 to June 2014, 11 patients with primary unilateral megaureter underwent laparoscopic intravesical detrusorrhaphy with ureteral plication. By a transvesicoscopic approach using a 3-port technique, the ureter was mobilized and plicated with a 6F Foley catheter. After dissection of the bladder mucosa in a semilunar shape, the detrusor was incised vertically and repaired underneath the mobilized ureter to create a submucosal tunnel. The ureter was covered with bladder mucosa, and the ureteral orifice was anastomosed to its orthotopic neoureteric orifice. The mean age of the included patients at the time of surgery was 9.18 years (range, 12 months-24 years). All surgeries were successfully completed without open conversion, with a mean operation time of 214 minutes including preoperative evaluation. All patients tolerated the procedure without any complications. Within the mean follow-up duration of 12.6 months (range, 5-24 months), no complications related to the surgery were reported, and no vesicoureteral reflux was detected in the operated side on postoperative voiding cystourethrography. The distal ureteral diameter was significantly reduced (from 21.1 to 11.6 mm), and the grade of hydronephrosis was decreased on postoperative ultrasonography without deterioration of renal function.

CONCLUSION In this study, laparoscopic intravesical detrusorrhaphy with ureteral plication demonstrated successful short-term outcomes in management of megaureter in children and adults. Our technique can be an effective and feasible surgical option in the treatment of megaureter. UROLOGY 86: 187-191, 2015. © 2015 Elsevier Inc.

Megaureter is a common congenital anomaly involving the ureterovesical junction. The treatment objective is the achievement of recovery or stabilization of renal function. Traditionally, ureteral reimplantation with or without ureteral tailoring in an open technique has been the mainstay of treatment for megaureter. Since recent major advancements in minimally invasive surgeries in the field of pediatric urology, including surgeries using laparoscopic and vesicoscopic techniques, a number of studies involving laparoscopic ureteroneocystostomy with ureteral tailoring for megaureter have been reported.^{1,2} However, these techniques all use the extravesical approach and thus carry with them the risk of intestinal complications and nervous or blood supply injuries during ureter dissection.

After the initial report of successful percutaneous endoscopic trigonoplasty in children with vesicoureteral reflux (VUR),³ applications of the transvesical approach have gradually increased. This procedure has many advantages in terms of improving voiding problems, which may occur in an extravesical approach^{4,5} and provides an excellent forward intravesical view and comfortable working angle.⁶ We previously reported our successful outcomes using a modified technique of ureteral reimplantation, "intravesical detrusorrhaphy" for VUR and megaureter.⁷ This technique recreates an orthotopic neoureteric orifice and easily attains a sufficient submucosal tunnel length, even in patients with megaureter. However, this approach necessitates Pfannenstiel incision with vertical incision of the bladder and can be technically difficult in the small pelvis of an infant.

Hence, we sought to combine the best of both procedures to perform intravesical detrusorrhaphy in a transvesicoscopic manner. Here, we report our initial experience of "laparoscopic intravesical detrusorrhaphy" with ureteral plication in patients with primary megaureter.

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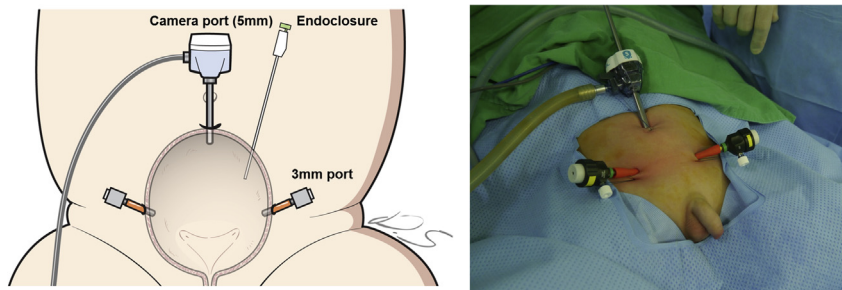


Figure 1. Port placement. A 5-mm port is placed in the midline of bladder dome, and 2 lateral trocars (3 mm) are introduced through the anterolateral wall of the bladder along the interspinous skin crease. (Color version available online.)

METHODS

Patients

From December 2012 to June 2014, 11 patients underwent laparoscopic intravesical detrusorhaphy with ureteral plication by a single surgeon (Y.J.L.) as a ureteral reimplantation technique for unilateral megaureter. All patients underwent preoperative assessment with renal ultrasonography, voiding cystourethrography (VCUG), and diuretic renogram. Surgery was considered under the following conditions: deterioration of renal function, recurrent flank pain or pyelonephritis, or consistent progression of hydronephrosis on ultrasonography.

Surgical Technique

Before the endoscopic procedure, preoperative retrograde pyelography (RGP) was performed in the lithotomy position to demonstrate an obstructive distal lesion and markedly dilated ureter. The patient was positioned supine with the legs separated. Transurethral cystoscopy allowed for the placement of a 5-mm trocar into the bladder dome for the telescope, followed by suspension of the anterior bladder wall to the abdominal wall with Nylon 4-0 to prevent the trocar from slipping out (Fig. 1). The bladder was emptied and filled with CO₂ up to 10 mm Hg. A 3-mm trocar was introduced through the left anterolateral wall of the bladder, and a suspension procedure was performed in the same manner with a 5-mm trocar. Another 3-mm trocar was inserted in the right side in the same manner.⁸

Using hook electrocautery, the ureter was mobilized (Fig. 2). The diameter of the mobilized megaureter was >1.0 cm in all cases. After ureteral mobilization and resection of the distal portion, a 6F Foley catheter was inserted into the megaureter for support during plication. Extracorporeal insertion of an endoclosure helped to maintain traction of the ureter. Ureteral plication was performed with interrupted sutures using 5-0 Vicryl from the proximal to the distal ureter. The length of plicated ureter was approximately 4 cm. After making a semicircular incision in the bladder mucosa from the original orifice to the new hiatus along the course of the ureter, the overlying bladder mucosa was dissected from the detrusor layer. The dissected detrusor layer below the bladder mucosa was incised along the course of the ureter using laparoscopic scissors. While pulling the plicated ureter upward, the incised detrusor muscle was sutured below the plicated ureter with 3-0 Vicryl to allow the new ureteral hiatus to be located at a more cephalad position than the original hiatus. Then, the plicated ureter was pulled down to the original orifice site above the detrusor layer. The new orifice was formed by ureterovesical anastomosis using 5-0 Vicryl intracorporeal sutures in the location of the original

orifice. The mucosa was pulled over the plicated left ureter. The length of the newly formed submucosal tunnel was approximately 3 cm. A 5F ureteral catheter was placed in the plicated ureter through the 3-mm trocar to serve as a stent during the postoperative hospital stay and was removed 4-7 days after surgery. In adults, a double J ureteral stent was inserted instead of a ureteral catheter and removed >4 weeks after surgery.

Surgical Outcome Measurements and Follow-up

During catheterization, oxybutynin was given, and the postvoiding residual urine was measured by ultrasonography to evaluate voiding function after removal of the urethral catheter. Patients were scheduled for regular follow-up with ultrasonography, dimercaptosuccinic acid (DMSA) scan, and VCUG. The initial postoperative ultrasonography was performed 1 month after the surgery, and serial follow-ups were scheduled 3, 6, and 12 months after the surgery. A follow-up VCUG was obtained 6 months after the surgery, and a DMSA scan was performed 12 months after the surgery.

Good Clinical Practice Protocols

This study was carried out in agreement with applicable laws and regulations, good clinical practices, and ethical principles, as described in the Declaration of Helsinki. The Institutional Review Board of our hospital approved this study protocol (#4-2014-0781).

RESULTS

Among the 11 patients, 2 had refluxing megaureters, whereas the others had nonrefluxing megaureters. Surgical correction was decided because of intractable flank pain in 5 patients, recurrent pyelonephritis in 3, deterioration of renal function in 2, and progression of hydronephrosis in 1. The mean patient age at the time of surgery was 9.18 years (range, 12 months-24 years; Table 1).

All surgeries were all performed successfully without the need for open conversion. The mean operating time from skin incision until closure, including preoperative cystoscopy and RGP was 214 minutes (range, 158-305 minutes). Blood loss was minimal, and no patient needed a blood transfusion. All patients tolerated the procedure without any intraoperative or postoperative complications.

Postoperative pain was well controlled during hospitalization with intravenous patient-controlled analgesics

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