SKILL AND TALENT

Totally laparoscopic repair of primary obstructive megaureter with pyeloplasty, complete excisional tailoring and nonrefluxing ureteral reimplantation

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Abstract
Objective: To describe a new surgical technique of the first case of totally laparoscopic repair of primary obstructive congenital megaureter with pyeloplasty, intracorporeal excisional tailoring of the ureter and nonrefluxing ureteroneocystostomy.
Methods: A 15-year-old male presented with obstructive megaureter. The standard three-port transperitoneal pyeloplasty technique and an additional 5-mm port for dynamic traction were used. Pelvic and ureteral dissection, pyeloplasty, intracorporeal excisional ureteral tailoring and nonrefluxing ureteroneocystostomy were all completed laparoscopically. A double-J stent was used to calibrate the ureter.
Results: Operative time was 240 min. No intra and postoperative complications were observed, and the discharge was made on postoperative day 2. The patient was pain-free and without urinary tract infection during the 4-month period after surgery. Follow-up revealed complete resolution of the ureteral obstruction and adequate pelvic and ureteral caliber.
Conclusion: Laparoscopic pyeloplasty, intracorporeal excisional tailoring, and non-refluxing reimplantation are safe and effective for the treatment of obstructive congenital megaureter. The totally laparoscopic approach is reproducible and provides low morbidity with inherent cosmetic advantages.

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Introduction

Congenital megau réter is an uncommon anomaly of the urinary tract. In primary obstructive megau réter, abnormal development of the musculature of the distal portion of the ureter is believed to be responsible for an adynamic segment closed to the bladder, resulting in altered peri stasis and functional obstruction. It may require more active surgical intervention when recurrent pyelonephritis compromises renal function and pain associated with functional obstruction is present. With increasing experience, technical advances, and documented advantages, laparoscopic surgery is gaining acceptance for various ablative and reconstructive urologic applications. However, laparoscopic ureteral reimplantation requires advanced laparoscopic skills and remains technically challenging, even in experienced hands, limiting its widespread accessibility. Laparoscopic ureteral reconstructive surgery, non-refluxing ureteral reimplantation, and tailoring for megau réter are rarely reported. Recently, Mitre at al. described the first case of laparoscopic ureteral reimplantation with intracorporeal tailoring of the distal ureter for an obstructive megaureter in an adult patient.

We present the first description, to our knowledge, of totally laparoscopic repair of primary obstructive megau réter with pyeloplasty, intracorporeal excisional tailoring, and non-refluxing ureteral reimplantation.

Patients and methods

A 15-year-old male presented with a longstanding history of left lumbar pain and recurrent urinary tract infection. He was diagnosed with severe left ureterohydronephrosis during a screening sonography. Contrast-enhanced computed tomography (CT) demonstrated a marked left hydronephrosis with ureteral dilation and tortuosity just proximal to the ureterovesical junction, without any evidence of masses or kidney stones, consistent with the report of megau réter (Fig. 1). Renal dynamic scan showed normal function of both kidneys (relative function on the left side 45% and on the right side 55%), with retention of tracer seen in the left ureter, which a T 1/2 was 35 min identifying obstruction. There was no evidence of vesicoureteral reflux on the voiding cystourethrogram.

Given the great tortuosity of the megaureter and renal pelvis, a complex reconstruction was necessary. The patient was submitted to totally laparoscopic pyeloplasty, intracorporeal excisional tailoring (ureteroplasty), and non-refluxing ureteral reimplantation (Lich-Gregoir). Regardless of pyelo-ureteral junction, obstruction was not identified, pyeloplasty and totally ureteral tailoring were performed to provide an adequate outlet ureteral flow and to avoid a urinary stasis, which is a well-known cause of urinary tract infection post-operatively. A totally laparoscopic approach was chosen, to reduce morbidity.

Surgical technique description and equipment

Positioning and port placement

After general anesthesia in the supine position, a Foley catheter was inserted in the bladder under sterile conditions. The patient was then positioned in 30-degree right lateral decubitus; he was taped in position so that his arms,
legs, and abdomen remained securely in place. Pneumoperitoneum was created to a pressure of 12–15 mm Hg using the closed technique, and a 3-port standard transperitoneal pyeloplasty was inserted, with an additional 5-mm port for dynamic traction. The first trocar (10-mm umbilical camera port for visualization) was inserted, and the others (5-mm and 10-mm ports in the left and right lateral rectus abdominis muscles for dissection and suturing, respectively, and one 5-mm port on the left mid axillary line for dynamic traction) were inserted under direct vision.

Pelvis and ureteral preparation

The procedure was initiated incising along the ipsilateral line of Toldt and reflecting the descending colon medially. The massively dilated ureter could be visualized from the renal pelvis to the bladder right after the colon reflection. The renal pelvis and ureter were dissected proximally and distally using sharp and blunt dissection, taking care to avoid stripping the ureter of its vascular supply. A narrow 5-mm distal segment of the ureter was identified, ligated at its bladder insertion and resected. Two anchoring sutures were placed in the renal pelvis and distal ureter; and a 7Fr double-J ureteral stent was inserted through the abdominal wall to facilitate the intra-corporeal excisional tailoring and calibrate the diameter of the ureter.

Pyeloplasty, ureteral tailoring and reconstruction

After defining the vascular support, a non-traumatic clamp was placed over the catheter, and excess ureter was sharply longitudinally excised (excisional tailoring) from the renal pelvis to the distal end of the ureter. A standard laparoscopic pyeloplasty (dismembered Anderson-Hynes technique) was performed. The intra-corporeal tailoring was carried out using a running locking 4-0 Polyglactin (Vicryl; Ethicon, Johnson and Johnson) suture. The suture was initiated in the renal pelvis at the proximal end, and advanced as far as the distal end of the ureter (Fig. 2). At the distal end, the ureter was left spatulated for reimplantation.

Bladder preparation and nonrefluxing reimplantation

The bladder was then filled with saline and longitudinally opened in the left posterolateral direction. Electrocautery and blunt dissection were used to divide the perivesical fat and detrusor muscle fibers (seromuscular cystotomy) to create a detrusor tunnel with an estimated 5:1 ratio of length to ureteral diameter. Sharp dissection was used to expose and incise the bladder mucosa at the distal extent of the tunnel, creating a cystotomy. The distal coil of the ureteral stent was placed in the bladder, the ureter was positioned through the submucosal tunnel, and a mucosa–mucosa ureterovescical anastomosis was completed with 4-zero polyglactin interrupted sutures. A distal anchoring stitch suture was used to hold the ureter near the seromuscular tissue of the bladder in order to avoid ureteral retraction. The detrusor tunnel was then closed over the ureter for a length of 4–5 cm, using 3-zero Polyglactin (Vicryl; Ethicon, Johnson and Johnson), completing the nonrefluxing anastomosis. An extravesical attachment stitch between the detrusor and ureteral adventitia was applied with 4-zero polyglactin (Fig. 3). A Jackson-Pratt drain was placed through the left lateral port site and positioned in the pelvis. The fascia at the camera port was closed, and the skin incisions were reapproximated in a subcuticular manner.

Results

The total operative time was 240 min; 40 min to pelvis and ureteral preparation, 100 min to pyeloplasty and ureteral tailoring and reconstruction; 50 min to bladder preparation and non-refluxing reimplantation. Positioning, port placement, bleeding control, and ports sutures demanded 55 min.
Estimated blood loss was 200 mL. Postoperatively, orals were allowed on day 1, and pain was otherwise controlled with oral medication. No intravenous narcotic medication was necessary after the day of the procedure. The tubular vacuum drain was left in the patient for 48 h. The Foley catheter was removed on the second postoperative day, and the patient was discharged from hospital.

Four weeks after the procedure, cystoscopy was performed with removal of the ureteral stent. The postoperative evolution was uneventful. At 12 months follow-up, the patient was pain-free and there was no urinary tract infection. The CT scan (Fig. 4) and diuretic renal scan were obtained at 4 months demonstrating a significant reduction in diameter of the pelvis and ureter, no ureteral obstruction, preservation of renal function, and rapid washout of tracer on the affected side (T ½ 9 min on the left side and 7 min on the right side), respectively.

Discussion

Open surgery is still the gold standard for urological reconstruction surgeries, but an increasing number of procedures have been described by laparoscopy, with the same good results, safety, and lower morbidity. Ansari et al. recently made the first description of the use of laparoscopy for correction of a megaureter with reimplantation, but the technique of extracorporeal tailoring was used. The greatest difficulty is the extensive area of resection of the ureter and the posterior suture along the entire ureter in cases where this type of resection is indicated. Some authors report different ureteral reimplantation techniques using laparoscopy with success rates of over 90%. Recently, Mittre et al. described a reimplant in a megaureter with tailoring only of the distal portion of the ureter.
Another point to mention is the technique of dismembered pyeloplasty with bevelled ureteral reimplant, as in the conventional technique, avoiding having a single suture from the pelvis descending to the ureter. This may increase the risk of JUV stenosis, as the lateral wall would be maintained. To avoid forcing ureteropelvic anastomosis, the point of repair in the cranial segment may be transferred to the proximal segment of the ureter immediately after the pyeloplasty stage, to perform the ureteral tailoring. The repair in the caudal portion of the ureter is performed at 5 cm intervals above the point where the ureter was sectioned from the bladder, as these much dilated ureters also have increased length, and they should be left until the end of the definitive resection of the ureteral excess, to prevent over-resection. This repair exits in the iliac fossa and beside it, a double J stent is inserted percutaneously. The passage of the stent is facilitated, since all that is needed is to pull the repair distally to align the opening of the ureter with the percutaneous needle used to pass the double J guide wire.

We believe that this is the first description in the literature of a pyeloplasty with ureteral tailoring and ureteral reimplantation done totally by laparoscopy. The laparoscopic technique has proven to be safe and effective and may be a less invasive alternative to conventional surgery. It is indicated in cases of major pyeloureteral dilation caused to an obstructive megaureter. A higher number of cases is needed to determine its similarity with open surgery. Also, it has not yet been demonstrated in children, although the adolescent in the case described here was short in stature.

Conflict of interest

The authors declare that they have no conflict of interest.

References


