Intracorporeal Tapering of the Ureter for Distal Ureteral Stricture Before Laparoscopic Ureteral Reimplantation

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Purpose: To present our experience of laparoscopic ureteral reimplantation using intracorporeal ureteral tapering for management of distal ureteral stricture.

Materials and Methods: Between April 2005 and October 2008, six patients, including 3 children and 3 adults, underwent laparoscopic modified Lich-Gregoir type extravesical ureteral reimplantation for distal ureteral stricture. Significant dilatations of proximal segment in these patients were repaired with intracorporeal ureteral tapering. Stricture etiologies were congenital ureterovesical megaureter and iatrogenic gynecologic injury in 4 and 2 patients, respectively.

Results: Mean age of the patients was 29.3 years (range, 2 to 62 years). Mean operation time and hospital stay was 185 minutes (range, 150 to 240 minutes) and 4 days (range, 2 to 6 days), respectively. No significant complications were noted intra-operatively. Surgical procedure was performed in all the subjects laparoscopically and no conversion to open surgery happened. Postoperatively, 2 patients were complicated with febrile urinary tract infection that were managed medically. No urinary leakage occurred in early postoperative period. All the patients had patent ureterovesical junction anastomosis in follow-up imaging and recurrence of obstruction was noted in no cases. Two patients (33.3%) developed grade II vesicoureteral reflux.

Conclusion: Laparoscopic ureteral reimplantation with intracorporeal tapering of distal segment may be performed safely in management of patients with distal ureteral stricture and severe dilatation of proximal segment.

Keywords: laparoscopy, reimplantation, ureter, ureteral obstruction, instrumentation

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INTRODUCTION

Ischemia, iatrogenic injury from previous abdominal or pelvic surgery, endometriosis, malignancy, radiation, ureteral calculus, endoscopic instrumentation, infections such as tuberculosis and schistosomiasis, and congenital disorders are considered as common causes of ureteral stricture.[1,2] Proper evaluation and treatment of a ureteral stricture is essential to preserve renal function.[3,4] Indications for intervention in ureteral stricture include the need to rule out malignancy, compromised renal function, recurrent pyelonephritis, and pain associated with functional obstruction.[5] Depending on the location and length of the stricture, different reconstructive

procedures such as end to end anastomosis, ureteroneocystostomy with or without psoas hitch, Boari flap, ileal substitution, or autotransplantation can be performed. [6] Recently, laparoscopic procedure has been introduced as a suitable alternative to open surgery in the management of patients with ureterovesical junction obstruction. Agarwal and colleagues demonstrated feasibility of laparoscopic intracorporeal excisional tailoring of megaureter and reimplantation in three subjects. [7] In this study, we present a novel technique of intracorporeal tapering of the ureter for management of distal ureteral stricture before laparoscopic ureteral reimplantation in six patients during a short-term follow-up.

MATERIALS AND METHODS

From April 2005 to October 2008, six patients with ureteral stricture have undergone laparoscopic ureteral reimplantation with intracorporeal ureteral tapering in Shahid Labbafinejad Medical Center, which is a referral urologic center.

All surgical operations were performed by the same surgical team. The main symptom of the stricture was pain in 5 subjects and urinary tract infection in a 2-year-old boy. Pre-operative laboratory assessments included serum level of hemoglobin, creatinine, and urine culture. Abdominopelvic ultrasonography, intravenous pyelography, and voiding cystourethrography were performed in all the patients. Operative time, length of hospital stay, renal function, and intra-operative and early postoperative complications were recorded.

Surgical Technique

After general anesthesia in supine position, a Foley catheter was inserted in the bladder under sterile condition. The 4-port transperitoneal technique was performed (two 5-mm ports in the left and right lateral rectus abdominalis muscles, one 5-mm port in midline 5 centimeters infraumblical region, and one 10-mm umbilical camera port). After incision along the ipsilateral line of Toldt, the colon was reflected medially. The ureter was identified and with attention to preservation of the adventitia, it was isolated above the level of stricture and divided just proximal to the stenotic portion. Because of significantly dilated ureteral portion proximal to the obstruction, intracorporeal tapering was done over 8Fr Feeding tube in children and 10Fr Nelaton catheter in adults. After defining vascular support, an atraumatic clamp was placed over the catheter, and excess ureter was excised. A running locking 4-0 vicryl suture was used for reapproximation of proximal two-thirds of the tapered ureter, and interrupted sutures completed the repair in distal part to allow any shortening that might be necessary (Figures 1 and 2).

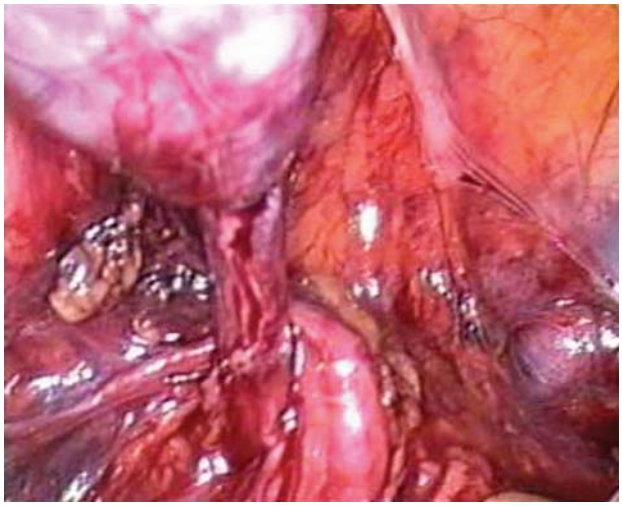

Figure 1. Dissection of the severely dilated ureter proximal to stricture segment.

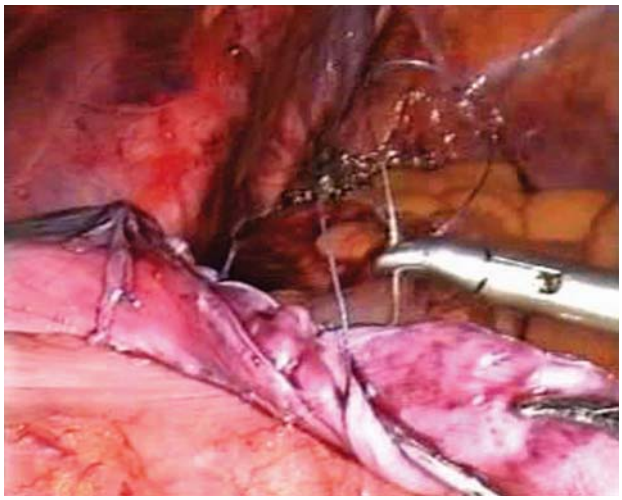

Figure 2. Laparoscopic intracorporeal tapering of dilated distal ureter.

One hundred and eighty milliliters of saline was instilled in the bladder and then, an antrolateral seromuscular incision was made down to the bulging bladder mucosa and it was incised with electrocautery. Six Fr double-J stent was passed into the ureter and advanced to the renal pelvis, and its distal end was fixed in the bladder. Tapered ureter was anastomosed to the bladder mucosa with continuous 4-0 vicryl sutures. A distal anchoring stitch suture was used to hold the ureter near the seromuscular tissue of the bladder. The seromuscular layer was then loosely closed over the tapered ureter. A 14Fr Nelaton drain was placed within the 5-mm port. Ureteral stent was removed at 6 weeks after the operation. Two months later, intravenous pyelography for evaluation of residual obstruction and voiding cystourethrography for evaluation of residual vesicoureteral reflux were performed in all the patients.

RESULTS

The mean age of the patients was 29.3 years (range, 2 to 62 years). Three patients were children with the age of 2, 5, and 11 years and the other threes were adults with the age of 38, 47, and 62 years. Stricture etiologies were congenital obstructive megaureter and iatrogenic gynecologic injury in 4 and 2 patients, respectively. Mean operation time and length of hospital stay was 185 minutes (range, 150 to 240 minutes) and 4 days (range, 2 to 6 days), respectively. No major complication occurred during the surgery. Mean blood loss was 70 mL (range, 50 to 320 mL) and no blood transfusion was required in the postoperative period. The mean hemoglobin loss was 0.5 g/dL (range, 0.2 to 0.9 g/dL). The average time to start oral intake was 16 hours (range, 12 to 36 hours).

The most primary presenting symptom was pain in 5 patients that resolved completely in 3 subjects and relatively in 2 others. Urine culture was negative in short-term follow-up of a 2-year-old boy presented with urinary tract infection. Surgical procedure was done in all the patients laparoscopically and there was not any conversion to open surgery. Two patients had fever for less than 48 hours (hospital stay, 6 days) that were

Figure 3. Intravenous pyelogram of the patient with history of gynecologic surgery revealed a severe hydroureteronephrosis up to the distal portion of the right side ureter.

Figure 4. Problem was resolved after laparoscopic ureteroneocystostomy.

managed by antibiotic therapy. Urinary leakage was noted in none of the patients in immediate postoperative period. The mean time to start the normal activity in three adults was 2.9 weeks.

Resolution of obstruction and new occurrence of vesicoureteral reflux were assessed with intravenous pyelography and voiding cystourethrography, respectively. Mean follow-up was 4 months (range, 3 to 8 months). All the patients had patent ureterovesical junction anastomosis in follow-up imaging and recurrence of obstruction was noted in no cases (Figures 3 and 4). Two patients (33.3%) developed grade II vesicoureteral reflux.

DISCUSSION

Initial experience of laparoscopic ureteral reimplantation for distal ureteral stricture described challenges with exposure of the ureter, trauma to the ureter, and difficulty in developing the extravesical tunnel without injury to the urothelium in addition to long operative time.[8] Several modifications were introduced using laparoscopic approach that have resulted in shorter operative time and similar outcomes to open surgery.[3,9]

Seideman and colleagues reported that, with long-term follow-up, this technique is a proper alternative to open surgery with comparable outcomes and advantages of a minimally invasive procedure.[9] Rassweiler and associates[10] and Kamat and Khandelwa[11] in two separated retrospective comparison of laparoscopic and open techniques revealed that mean hospital stay, analgesic requirement, and mean convalescence time for laparoscopy were significantly lower than open surgery and success rate was noticeable. Mean operative time in our study was 185 minutes (range, 150 to 240 minutes) that was slightly longer than mentioned operative time in other studies. This shortcoming reflects our learning curve in reconstructive laparoscopy, especially in early cases.

Symons and colleagues presented their experience in 6 patients, of whom 3 underwent neoureterocystostomy and the remaining underwent Boari flap technique. They reported acceptable outcomes, but mean operative time and hospital stay were not preferable.[12] Ogan and colleagues performed laparoscopic ureteral reimplantation in 5 of 6 patients with long stricture of distal ureter, using a modified dome advancement technique without requiring Boari flap.[13]

If the ureteral portion proximal to the obstruction was significantly dilated as it was in our subjects, the lower end should be tapered. Ansari and colleagues described a novel technique of extracorporeal tailoring for megaureter in 3 subjects prior to laparoscopic extravesical transperitoneal ureteral reimplantation.[1] In their report, the free ureteral end was delivered out through the ipsilateral 5-mm port. The lower end was tailored over an 8Fr Feeding tube. A 6Fr double-J stent was placed, and finally, the whole assembly was carefully replaced in the abdomen. Then, Lich-Gregoir type extravesical reimplantation was done. They concluded that extracorporeal tailoring for obstructing megaureter is an easy and a safe procedure, but more dissection of the ureter is required to be able to exteriorize and it may be concomitant with vascular support damage and possibly ischemia.

Recently, Agarwal and colleagues presented their initial experience of intracorporeal excisional tailoring of megureter before laparoscopic ureteral reimplantation with acceptable results in 3 young men.[7] We accept that operative time in this technique may be longer than extracorporeal tapering in initial experience, but more dissection of the ureter for exteriorizing from the abdominal wall is a main shortcoming; thus, with steep learning curve, the time-consuming technique will be modified and popularized. Likewise, to the best of our knowledge, this report is the first presentation of using this technique in children. Although operative time is longer than adults, but other variables, including blood loss, hospital stay, urinary leakage, and final improvement of obstruction were not statistically dependent on the age of the patients.

Mean blood loss, mean hospital stay, early postoperative complications such as excessive urinary leakage, average time for return to normal activity, ureteral stent removal time, success

rate, and complete resolution of stricture in our study may be acceptable and comparable to other previous reports, but accurate comparison of these items is not rationale; because various types of surgery and etiology of stricture as well as different diameter of stricture seriously affect the final conclusion.

The issue of refluxing versus antirefluxing anastomosis in ureteroneocystostomy in adults has been examined previously. In a retrospective review of adult patients with ureteroneocystostomy, similar to our results, no significant difference in the preservation of renal function or risk of stenosis was identified in the refluxing versus antirefluxing procedures.[14]

Although the intracorporeal tapering of distal ureter is technically accessible, but it requires a high level of laparoscopic expertise and further studies should be performed with long-term follow-up in greater number of patients to propagate this technique.[15,16]

CONCLUSION

It seems that laparoscopic ureteroneocystostomy with intracorporeal ureteral tapering for management of obstructive megaureter is a feasible and reproducible option in patients with ureterovesical junction obstruction. Longer follow-up period and larger series of patients are necessary for validation of this technique, especially in pediatric patients.

CONFLICT OF INTEREST

None declared.

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