

Laparoscopic Ureteral Reimplant for Ureteral Stricture

Rodrigo S. Q. Soares, Rubens A. de Abreu Jr, Jose E. F. Tavora

Department of Urology, Hospital dos Servidores do Estado de Minas Gerais, IPSEMG, Belo Horizonte, Minas Gerais, Brazil

ABSTRACT

Purpose: Evaluate the initial experience of laparoscopic ureteral reimplant for ureteral stenosis.

Materials and Methods: From January 2004 to June 2008, 10 patients underwent 11 laparoscopic reconstruction surgeries for ureteral stenosis. Seven cases of stenosis of the distal ureter, two at the level of iliac vessels, a case of bilateral distal stenosis and one in the medium third. Eight ureteroneocystotomies were performed by extravesical technique with anti-reflux mechanism, two cases of vesical reimplant with Boari technique and one case using the psoas hitch technique.

Results: The average surgical time was 166 minutes (115-245 min), mean blood loss was 162 mL (100-210 mL) and the average hospital stay was 2.9 days (2-4 days). There were two complications: a lesion of the sigmoid colon identified peroperatively and treated with laparoscopic sutures with good evolution, and a case of ureteral stone obstruction at the 30th day postoperative, treated by laser ureterolithotripsy. All patients had resolution of the stenosis at an average follow-up period of 18 months (3-54 months).

Conclusion: Laparoscopic surgery represents a feasible, safe and low morbidity technique for ureteral reimplant in ureteral stenosis.

Key words: ureter; stricture; reconstruction; laparoscopy

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INTRODUCTION

The main causes for ureteral stricture are surgical traumas, impacted ureteral stones, extrinsic compression, tumor and congenital or idiopathic disorders. Ureteral stenoses are the most frequent complications observed in pelvic surgery. Currently, endourological, gynecological and laparoscopic procedures are also reasons for referral for a large number of cases (1).

Treatments focus on the anatomic aspects of stenosis, such as length of the lesion, complexity of obstruction and vascularization of the ureter. Partial and segmental stenoses can be treated by endoscopic procedures such as dilation or internal ureterotomy with placement of double J catheter with good follow-up results. Reconstruction technique procedures are needed for total complex stenosis.

In the last decades, open surgeries have been performed for these types of pathologies. With the advancement of technology, the laparoscopic ureter-vesical reimplant was introduced in 1994 by Reddy and Evans to correct vesicoureteral reflux (2). In the literature, major series have been published with similar results (3,4).

We report our experience with laparoscopic ureteral reimplant in ureteral stenoses of different etiologies.

MATERIALS AND METHODS

Ten patients (8 females and 2 males) underwent 11 laparoscopic ureteral reimplants due to ureteral stenosis, at our hospital, from January 2004 to June 2008.

Four patients had stenosis after open surgery and 4 had ureteral stenosis resulting from ureteral stone endoscopic procedure complications. The remaining two patients had an idiopathic congenital bilateral ureteral stenosis and an extrinsic ureteral compression by the ovarian vein (ovarian vein syndrome). In one patient after abdominal hysterectomy, the ureteral stricture extended to the mid ureter, caused by ischemic and inflammatory reaction. In all patients, an abdominal CT scan confirmed the localization and the length of the ureteral stricture (Figure-1).

Endoscopic treatment was carried out in all cases except in one patient with idiopathic bilateral ureteral stenosis and another with ureteral compression by the ovarian vein.

Two of these procedures were interrupted due to complete stricture lesion post hysterectomy. In four cases, the dilation with a balloon catheter was chosen, as well as the placement of a double J stent for six weeks. In two patients with stenosis post ureteral calculi, a laser ureterotomy was performed and a double-J catheter was left indwelling for 6 weeks. Table-1 shows the characteristics of these cases.

Technique

All patients underwent transperitoneal video laparoscopic surgery. The patient is placed in a flat dorsal Trendelenburg position and the surgery is performed using the four pelvic trocar technique (Figure-2). The surgery is carried out by opening the Toldt fascia, followed by the identification and dissection of the ureter in the area close to the stenosis (Figure-3).

The ureter is transected near the area of the stenosis and spatulated. The vesical dome is fixed to the wall with a stitch for a better exposition. The detrusor muscle is opened lengthwise for approximately 3 cm to expose the vesical mucosa. The vesical mucosa is opened and the posterior ureterovesical anastomosis is performed with separated vicryl 4.0 sutures (Figure-4).

A double J catheter is placed through one of the trocars. The anastomosis is completed and the detrusor muscle is closed by a continuous suture for anti-reflux tunnel.



Figure 1 – Abdominal CT scan of a 44 year old woman showing a left distal ureteral stenosis after an endoscopic ureterolithotripsy for a impacted ureteral stone.

In cases of tension due to the high ureteral stenosis, the ureteroneocystostomy with a psoas hitch muscle or Boari Flap technique is carried out. In the middle of this opening, a stitch with vicryl 4.0 is tightened, pulling the bladder to facilitate the anastomosis to the edge of the ureteral stump. Anastomosis is completed with simple stitches and the bladder is



Figure 2 – Immediate postoperative abdominal view of a young female patient after a right laparoscopic uretero-vesical reimplant. A 4 trocar technique was performed with 10 mm trocar for the optic and for the surgeon's right hand and 2 others for the 5 mm trocars. The suction drain is inserted in the 5 mm left port.

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Table 1 – Patient demographic and clinical data.

Patient	Sex	Age	Etiology	Side	Place
1	F	36	Ileocelectomy / Crohn's disease	R	Distal
2	F	44	Urolithiasis / ureteroscopy	L	Distal
3	F	40	Extrinsic compression	R	Distal
4	M	50	Open external bilateral reimplant	RL	Distal
5	F	62	Urolithiasis / ureteroscopy	R	Distal
6	F	45	Total abdominal hysterectomy	L	Medium
7	F	65	Total vaginal hysterectomy	L	Distal
8	F	32	Urolithiasis / ureteroscopy	R	Medium
9	M	13	Idiopathic stenosis	R/L	Distal
10	F	50	Urolithiasis / ureteroscopy	L	Medium

sewn lengthwise. The fixation of the vesical part in the greater psoas muscle is also performed with vicryl 3-0 sutures. As soon as the detrusor closing is completed,

the bladder is filled with 200 mL of physiologic serum to evaluate overflowing. The cavity is drained with either a Penrose or a tubular suction drain (Figure-2).

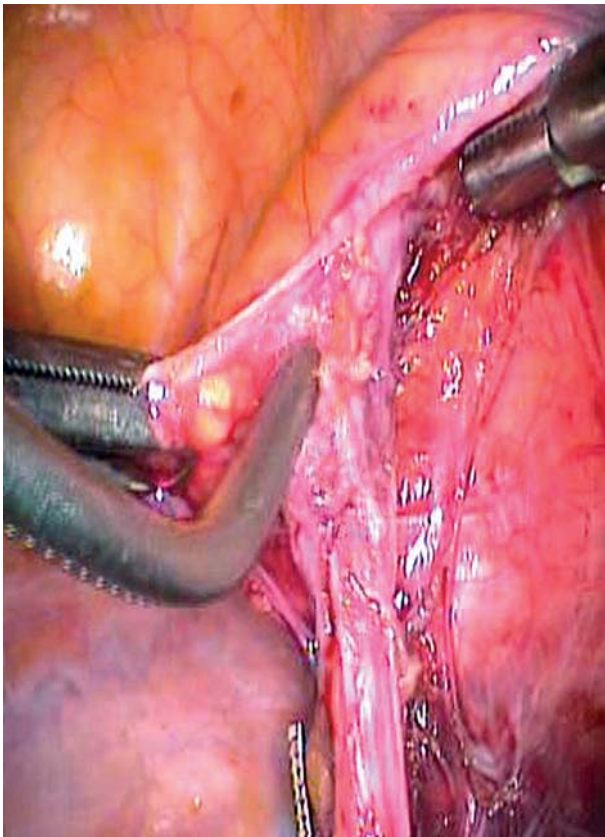


Figure 3 – Operative view of a right ureteral laparoscopic dissection showing the region of the ureteral stricture.

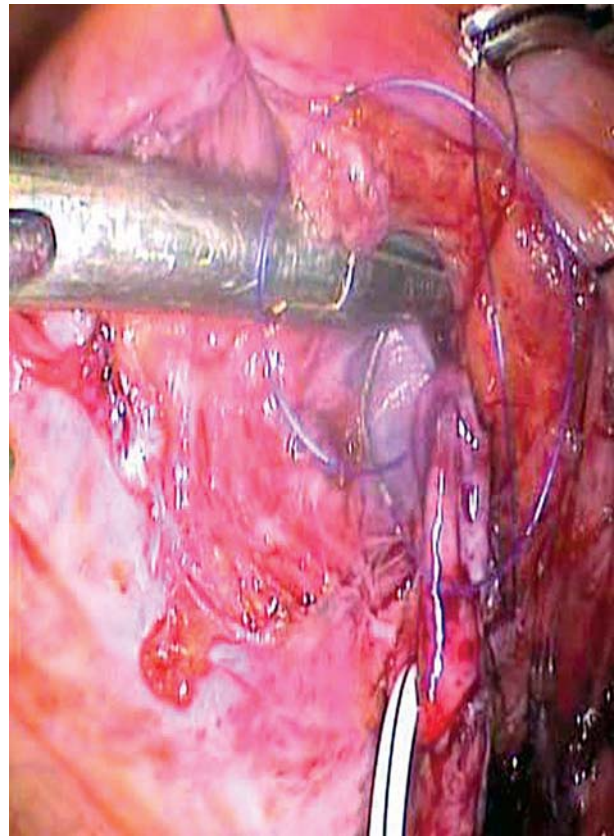


Figure 4 – Operative view of a right laparoscopic uretero-vesical anastomosis.

RESULTS

The average patient age was 44.7 years. The average surgical time was 166 min. (115-245 min.), the average amount of bleeding was 162 mL (100-210 mL) and the mean hospital stay was 2.9 days (2 - 4 days). In one of the patients, with stenosis after ureterovesical reimplant by ureteral reflux, there was a sigmoid colon lesion during dissection of the ureter and it was sutured laparoscopically, with good results. In another patient with reimplant due to a secondary stenosis, after ileocelectomy, there was a migration of a kidney stone to the ureter on the 30th day post surgery, and a transureteroscopic laser ureterolithotripsy was carried out, with good evolution (Table-2).

On average, the Penrose/tubular drain was removed on the second day post surgery. The double-J catheter was removed 4 weeks post surgery.

All patients were followed-up using ultrasonography and cystourethrography 3 months after the surgery, with a mean follow-up period of 18 months (3 - 54 months), and finally, all of them proved to be asymptomatic and without evidence of obstruction or reflux.

COMMENTS

With the improvement of the minimal invasive treatment in urological and gynecological disorders,

like laparoscopic pelvic surgery or endoscopic ureteral procedures, a large number of complications have been reported in the learning curve of these procedure such as ureteral damage (5).

Ureteral stenosis has also been described as a consequence of several etiologies. Malignancy, radiotherapy, ischemia, retroperitoneal fibrosis, endometriosis, infection (tuberculosis), congenital and idiopathic disorders are seldom attributed in the large series.

Diagnosis is rarely confirmed by using imaging procedures. When planning surgery, an excretory urography, CT scan, retrograde pyelography or magnetic resonance imaging can be performed in order to determine all the characteristics of the lesion. It is advisable to carry out an ureteroscopy with cytology and biopsy in cases of gross hematuria and suspected lesion to avoid malignancy.

The recommended approach for each ureteral lesion has to be determined following its diagnosis and localization. The endoscopic treatment by dilation or by ureterotomy represents a good alternative for segmental or partial stenosis with good results. However, reconstruction surgeries represent the main choice for complex situations or for failure in more conservative treatment.

Traditionally, ureteral lesion reconstruction is performed by open surgery. The first case of laparoscopic ureteral management of ureteral injury was first described in a woman who underwent pelvic

Table 2 – Postoperative clinical data.

Patient	Surgery	Bleeding (mL)	Time (min)	Stay (days)	Complication	Follow-up (months)
1	UCN	150	145	3	-	54
2	UCN	200	150	3	Ureterolithiasis	38
3	UCN	210	200	4	-	30
4	UCN	120	240	4	Colon lesion	24
5	UCN	130	170	3	-	12
6	Boari	100	115	2	-	9
7	UCN	150	120	2	-	4
8	Boari	180	130	2	-	3
9	UCN	200	245	3	-	3
10	Psoas	180	150	3	-	3

UCN = ureteroneocystostomy.

endometriosis treatment by Gomel and James, in 1991 (6). The first laparoscopic ureterovesical reimplant was performed in 1994, by Reddy and Evans to correct a vesicoureteral reflux (2).

Laparoscopy offers advantages of a minimum invasive procedure and a wide access to the entire urinary system. Currently, it represents an alternative in ureteral reconstruction surgery.

The ideal time to perform this reconstruction remains controversial. Some authors recommend a minimum time of 6 weeks after the injury prior to carrying out a new surgical operation in cases of lesions caused by surgical trauma, in order to allow maximum resolution of the inflammatory process. In one of our cases, characterized by ureteral lesions after vaginal hysterectomy, the laparoscopic reimplant was performed 15 days after hysterectomy without any technical difficulties and with good results. In our experience, in cases of ureteral lesions in vaginal and endoscopic surgeries, the laparoscopic access represents a good option that can be performed immediately.

The most common surgical choice for treatment of distal ureteral stenoses is ureteral reimplant (ureteroneocystostomy). It can be performed by extra or intra-vesical technique using Politano-Leadbetter, Lich-Gregoir, the Boari technique (Boari's flap) or psoas-hitch technique in cases of major stenoses. In the literature, the performance of reimplant with the Boari or psoas-hitch technique is described with favorable results and low occurrence of reflux (7-9). In these cases, the laparoscopic access offers advantages such as mobilization of the bladder, ureter and kidney, making the anastomosis easier and without tension and/or adequate size of the vesical flap. We did not experience any difficulty when performing this procedure in 3 of our patients and none of them presented vesicoureteral reflux post-surgery.

Data show similar results between an open and laparoscopic ureteroneocystostomy in cases of ureteral stenoses with low morbidity for the last laparoscopic procedure (10,11). Recently, several reported studies on robotic ureteroneocystostomy have been published showing successful results similar to those obtained with the laparoscopic technique (12,13). Ureteroneocystostomy has also been described using transumbilical endoscopic single port technique (NOTES) (14).

In the present study, an endoscopic procedure was carried out before the decision to apply the laparoscopic technique for all patients. Although the endoscopic treatment represents an attractive alternative, we believe that for the cases of complete ureteral stenosis or late diagnosis, the ureteral reimplant represents a definitive treatment. However, an attempt to perform endoscopic dilation or ureterotomy should be considered with caution for ureteral stenosis. A laparoscopic procedure is feasible, practical and cost effective for trained laparoscopic urologists.

CONCLUSION

Ureteral lesion is a common affection that has been increasing due to pelvic endourologic, laparoscopic and open procedures. Results show that the laparoscopic ureteral reimplant is an effective alternative with similar results compared to open technique, with minimum morbidity. Laparoscopic ureteral reimplant can be an excellent choice in treatments of distal ureteral stenosis.

CONFLICT OF INTEREST

None declared.

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Correspondence address:

Dr. Rodrigo S. Quintela Soares
Rua Ceará, 450, CTC São Lucas
Belo Horizonte, MG, 30150-310, Brazil
E-mail: quintelarod@yahoo.com

EDITORIAL COMMENT

Lower ureter is involved not only in primary diseases of ureter and bladder but secondarily, in diseases of colon and genital organs of the female. It is prudent to establish the pathology prior to consider for the operative approach. In this series, one patient had involvement of the ureter due to Crohn's disease and laparoscopic ureteral reimplantation was performed successfully. Inflammatory conditions often require disease control prior to subjecting patient for such surgery.

Dissection of the diseased lower segment of ureter is often difficult and vascularity could be precarious. In such circumstances, no attempt should be made to dissect deep down into the pelvis. Ureter

should be divided just above the lesion and decision of ureteral reimplantation with or without additional procedure like psoas hitch or Boari bladder flap reconstruction could be planned so that tension free anastomosis is achieved. Regular use of psoas hitch provides good intramural length of ureter into bladder giving anti-reflux mechanism.

Dr. Pranjal Modi

*Institute of Kidney Diseases & Research Center
Civil Hospital Campus
Ahmedabad, Gujarat, India.
E-mail: dr_pranjal@yahoo.com*