

# Laparoscopic ureteroneocystostomy for mid and lower ureteric strictures: Experience from a tertiary center

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## Abstract

**Purpose:** The purpose of this study is to evaluate our experience of laparoscopic ureteroneocystostomy for mid and lower ureteral stricture in a tertiary center in North India.

**Materials and Methods:** A total of 20 laparoscopic ureteroneocystostomy were performed with or without bladder flap procedures in 20 patients (13 females and 7 males) with various etiologies such as ureteric stricture, ureterovaginal fistula, endometriosis, and distal ureteric tumor at our hospital in a time frame from August 2013 to January 2017. Eight cases each presented after laparoscopic/open hysterectomy and post-ureterorenoscopic stone removal while two cases each presented secondary to endometriosis and distal ureteric tumor. Simple laparoscopic ureteroneocystostomy in 4, psoas hitch in 9, and Boari flap was done in 7 cases.

**Results:** The mean patient age was 44.2 years (range 19–65), mean surgical time was 184.25 min (115–250 min.), mean amount of bleeding was 153.25 mL (90–250 mL), and mean hospital stay was 3.05 days (2–7 days). Female-to-male ratio was 1.3:0.7. There was one conversion to open during laparoscopic Boari reimplant because of inadvertent injury to external iliac vein. The mean follow-up was 22.35 months (6–45). All the patients were asymptomatic with the resolution of hydronephrosis on ultrasound and without any significant obstruction on renal scan.

**Conclusions:** Laparoscopic ureteroneocystostomy with or without bladder flap (Boari) provides good functional outcomes with excellent success rates and minimal morbidity comparable to open surgery in patients with ureteric stricture.

**Keywords:** Boari flap, laparoscopic ureteral reimplant, psoas hitch, ureteral stricture

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## INTRODUCTION


Laparoscopy has carved its own niche in urological surgery and is now taken as a practical and acceptable alternative to treat complex urologic surgical disease. Many studies have demonstrated that minimally invasive robotic or laparoscopic urology surgery provide similar success outcomes with less morbidity, compared to their open

counterparts.<sup>[1]</sup> With the impressive long-term success rates seen with laparoscopic pyeloplasty, it seems reasonable to expect similar results with laparoscopic management of mid and lower ureteric stricture.<sup>[2]</sup> Various management options are available for the management of ureteral strictures based on length, etiology, and location of the stricture.<sup>[3]</sup>

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With the exception of primary ureteropelvic junction obstruction, most ureteral strictures are acquired and usually are iatrogenic. The most common etiology of iatrogenic ureteral stricture disease is injury incurred during endoscopic urologic procedures and open or laparoscopic pelvic surgery.<sup>[4]</sup> The nonsurgical causes of stricture include radiation, tumor, blunt trauma, infection, and retroperitoneal fibrosis. Ureteral reimplantation by open, laparoscopic or robotic surgery is regarded as the preferred treatment in ureteric strictures. Initial endoscopic management (double-J [DJ] catheterization) should be attempted in all the patients, but even though DJ catheter placement is sometimes successful, it seldom resolves the problem permanently. When DJ catheterization is not possible, then a percutaneous nephrostomy should be placed to salvage the renal unit followed by definitive ureteral reimplant surgery. In this study, we present our experience in managing ureteral stricture cases of varied etiology by laparoscopic ureteroneocystostomy (LUR) with and without psoas hitch or Boari flap in patients who present to us in our tertiary care hospital.

## MATERIALS AND METHODS

A total of 28 patients were diagnosed as cases of either ureteric stricture or fistula at our hospital, from August 2013 to January 2017. However, eight patients of ureterovaginal fistula and stricture could be managed by only DJ stenting as after 6 weeks of DJ removal, they had no evidence of any leak and were not included in the study. Renal scan showed no evidence of any obstruction after 3 months in these patients. The data of 20 patients (13 females and 7 males) who failed initial management with DJ stent or balloon dilation and later underwent laparoscopic ureteral reimplants was included in the final analysis. Eight cases presented after laparoscopic abdominal hysterectomy out of which six patients had ureterovaginal fistula. In these subsets, most of the patients presented within 1 to 8 weeks of operation except one patient who presented after 3 years. Two patients presented with flank pain after ureteral ligation postopen abdominal hysterectomy and DJ stent could not be passed. In these patients, nephrostomy tube was placed and then antegrade study was performed to know the stricture length and location. Total eight cases presented with stricture postretroscopic stone removal, out of which four cases were our follow-up, while the rest of the four patients were referred from outside. In three cases (postretroscopic stone removal), balloon dilation and placement of a DJ stent for 6 weeks were done but obstruction persisted after DJ removal and ultimately ureteral reimplant was done. Two patients presented to us with hematuria and were diagnosed as distal uretric tumor

after workup. These patients underwent distal ureterectomy and reimplantation. Two patients with endometriosis were found to have hydroureteronephrosis during the workup of infertility. These cases underwent medical management along with stricture repair. In all patients, either intravenous pyelogram/computed tomography urogram was done to confirm the localization and the length of the ureteral stricture. Retrograde pyelography (RGP) was done in all patients preoperatively to confirm the findings [Figure 1]. In addition, functional studies were obtained if there was a question of decreased renal function.

## Procedure

After doing a diagnostic cystoscopy and RGP under general anesthesia in lithotomy position, the patient is placed in supine decubitus Trendelenburg position for transperitoneal laparoscopy. Foley catheter is placed with the sterile technique before the procedure. The pneumoperitoneum is created through the open Hasson's method, and a 10 mm trocar for the 0° lens laparoscope is placed at the level of the umbilicus. Four 5 mm ports, two each on the left and right side of umbilical port are placed. After freeing the adhesions in the abdominal cavity if present, the dissection of the ureter is begun. It is freed from above the intersection of the iliac vessels to its entrance into the bladder. Ureteral dissection must be gentle so that no healthy tissue is devascularized. The ureter is dissected distally up to the point where it is surrounded by scar tissue. The bladder is totally freed and a completely open space of Retzius is observed. This step provides sufficient bladder mobility. The proximal end of the stricture is spatulated. The detrusor muscle is opened lengthwise for approximately 3 cm to expose the vesical mucosa. The vesical mucosa is then opened, and posterior ureterovesical anastomosis is done [Figure 2]. Then a DJ stent is placed, and anterior layer of ureterovesical anastomosis is done with interrupted vicryl 4.0 sutures [Figure 3]. In cases of tension due to the high ureteral stenosis, the ureteroneocystostomy with a psoas hitch muscle or Boari Flap technique is carried out. For a psoas hitch procedure, interrupted polydioxanone sutures are used to approximate the bladder dome to the psoas tendon to allow a tension-free vesicoureteral anastomosis. Contralateral vesicle pedicle is sacrificed if needed (it was done in only 4 cases). For the Boari technique, on anterolateral bladder wall, a flap was raised with the base and tip being 4 and 3 cm in width, respectively. The tip of the flap was localized just proximal to the bladder neck and its base at dome. Tension-free anastomosis of spatulated ureter and bladder flap was then performed with 4-0 polyglactin sutures over a 6Fr/26 cm DJ stent. Bladder was closed in a single layer with continuous sutures.

A soft silastic tube drain was inserted into the pelvis at the end of the procedure. Drain was removed after 48 h, per urethral catheter after 7 days and DJ stent after 6 weeks. A laparoscopic ureteroneocystostomy (DTPA) renal scan

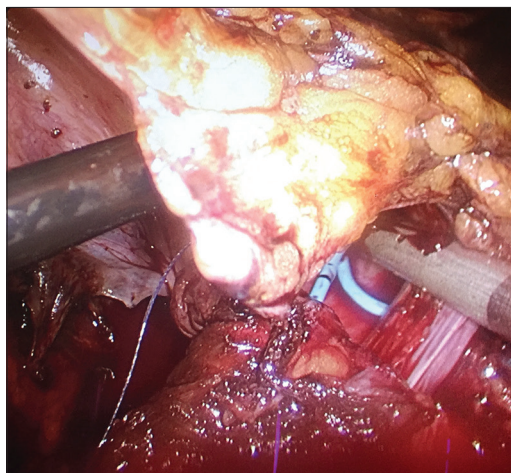
and/or excretory urogram was carried out 3 months after DJ catheter removal to rule out any obstruction. Follow-up was done every 6 months for at least 2 years with a renal scan.



**Figure 1:** Stricture in middle and distal ureter



**Figure 2:** Performing of uretero-vesicle anastomosis



**Figure 3:** Performing uretero-vesicle anastomosis and placement of double-J stent

## RESULTS

The demographic data of the study patients are presented in Table 1. The mean patient age was 44.2 years (range 19–65). The mean surgical time was 184.25 min (115–250 min.), the mean amount of bleeding was 153.25 mL (90–250 mL). The mean hospital stay was 3.05 days (2–7 days); female-to-male ratio was 1.3:0.7. We performed simple laparoscopic ureteroneocystostomy in 4 cases, psoas hitch in 9 cases, and Boari flap in 7 cases. Both patients of endometriosis were managed by psoas hitch while patients with distal ureteric tumor were managed by Boari flap. Four out of six patients of ureterovaginal fistula required psoas hitch while two were managed by simple ureteroneocystostomy. Similarly, all patients of postretroscopic stricture were managed by either psoas hitch (five) or Boari flap (three). Two patients with ureteral ligation postopen abdominal hysterectomy were managed by Boari flap. The postoperative clinical data are represented in Table 2. All procedures were completed laparoscopically except one in which there was an injury to external iliac vein when bladder was being dissected

**Table 1: Demographic and clinical data**

Patient	Sex	Age (years)	Etiology	Side	Site
1	Female	52	LAH	Right	Lower
2	Female	34	Endometriosis	Right	Lower
3	Female	55	LAH	Left	Lower
4	Female	43	Open AH	Right/left	Lower
5	Female	55	LAH	Left	Lower
6	Female	44	Endometriosis	Right	Lower
7	Female	29	Urolithiasis/ureteroscopy	Left	Middle
8	Female	42	LAH	Right	Lower
9	Female	38	Urolithiasis/ureteroscopy	Right	Lower
10	Female	43	Urolithiasis/ureteroscopy	Left	Middle
11	Female	42	Open AH	Right/left	Lower
12	Female	58	LAH	Left	Lower
13	Female	45	LAH	Right	Lower
14	Male	35	Urolithiasis/ureteroscopy	Left	Middle
15	Male	19	Urolithiasis/ureteroscopy	Right	Middle
16	Male	48	UT	Left	Lower
17	Male	37	Urolithiasis/ureteroscopy	Right	Lower
18	Male	65	UT	Left	Lower
19	Male	64	Urolithiasis/ureteroscopy	Right	Lower
20	Male	36	Urolithiasis/ureteroscopy	Left	Middle

LAH: Laparoscopic abdominal hysterectomy, UT: Ureteric tumor, AH: Abdominal hysterectomy



**Table 2: Postoperative clinical data**

Patient	Surgery	EBL (mL)	OR time (min)	LOS (days)	Complication	Follow up (months)
1	LUR	160	145	3	-	12
2	LUR (psoas hitch)	100	170	4	-	18
3	LUR (psoas hitch)	210	165	4	-	21
4	LUR	120	220	2	-	42
5	LUR	160	240	3	-	24
6	LUR (psoas hitch)	100	145	3	-	36
7	Boari	120	150	2	-	21
8	LUR (psoas hitch)	210	220	3	Postoperative fever	9
9	LUR (psoas hitch)	130	160	2	-	33
10	Boari	160	210	3	-	45
11	LUR	130	175	2	-	12
12	LUR (psoas hitch)	170	240	4	-	18
13	LUR (psoas hitch)	90	140	4	-	24
14	Boari	150	240	2	-	27
15	Boari	170	115	3	-	12
16	Boari	200	130	2	-	12
17	LUR (psoas hitch)	120	180	3	-	27
18	Boari	250	180	2	-	15
19	LUR (psoas hitch)	140	210	3	-	33
20	Boari	180	250	7	External iliac vein injury	6

EBL: Estimated blood loss, OR: Operating room, LOS: Length of stay, LUR: Laparoscopic ureteroneocystostomy

during Boari flap. It was immediately explored, and vein was repaired followed by open Boari flap reimplant. One patient experienced single episode of postoperative fever that was managed with conservative management. No other major intraoperative or postoperative complications occurred. Drain was removed on the second postoperative day. The DJ catheter was removed 6 weeks postsurgery. Our protocol for follow-up involves ultrasonography and DTPA renal scan at 3 months after stent removal and then 6 monthly till 2 years and yearly till 5 years. The mean follow-up was 22.35 months (6–45). All the patients were asymptomatic and without evidence of obstruction till last follow-up.

## DISCUSSION

Although there has been a lot of improvement in minimal invasive treatment for urological and gynecological disorders, the majority of ureteral injuries isiatrogenic and the most common surgeries in which these injuries occur are pelvic laparoscopic procedures and ureteroscopy for impacted ureteric stones.<sup>[4]</sup> Ostrzenski *et al.* reported 70 instances of ureteral injury during laparoscopic pelvic surgery among 2491 cases.<sup>[5]</sup> The incidence of injury ranged from <1% to 2%. The most common procedure associated with ureteral injury was laparoscopic-assisted vaginal hysterectomy and total laparoscopic hysterectomy.<sup>[5]</sup> Urinary tract injury during gynecological surgery commonly results in medicolegal action as most injuries go undetected intraoperatively.<sup>[6]</sup> Managing such complications laparoscopically without subjecting patients to morbidity of open surgery will be very well accepted by patients. Similarly de la Rosette *et al.* reported ureteral stricture as

a late complication of ureteroscopy from 0.5% to 2.5% of cases.<sup>[7]</sup>

Urinary tract endometriosis is characterized by the presence of endometrial glands and stroma in or around the urinary bladder wall, ureters, urethra, and kidneys.<sup>[8]</sup> Some studies support the use of ureterolysis for extrinsic endometriosis as a safe and effective technique even when moderate-or-severe hydroureteronephrosis is present.<sup>[9]</sup> Others maintain that a ureteral resection should be performed in all cases of hydroureteronephrosis. In cases of intrinsic endometriosis, it is generally accepted that a ureteral resection is mandatory, along with primary ureteroureterostomy or ureteral reimplantation with or without a vesico-psoas hitch.<sup>[10]</sup> The recommended approach for each ureteral stricture has to be determined following its diagnosis and localization after appropriate radiological imaging. The endoscopic treatment by dilation or by ureterotomy represents a good alternative for segmental or partial stenosis with very short-term good results. However, reconstructive surgeries are the main choice for long or total stenosis and failed endoscopically treated cases. Conventionally, ureteral lesion reconstruction was performed by open surgery. The first case of laparoscopic ureteral management of ureteral injury was described in a woman who underwent pelvic endometriosis treatment by Gomel and James, in 1991.<sup>[11]</sup> The first laparoscopic ureterovesical reimplant was performed in 1994, by Reddy and Evans to correct a vesicoureteral reflux.<sup>[12]</sup> Lakshmanan and Fung reported 71 laparoscopic extravesical reimplantations, including 23 unilateral and 24 bilateral, with no persistent reflux or obstruction postoperatively.<sup>[13]</sup> Fergany *et al.* (2001) reported their experience with laparoscopic bladder flap

(Boari) ureteroneocystostomy in six female pigs without any intra- or post-operative complications.<sup>[14]</sup> Simmons *et al.* recently compared their series of laparoscopic and open ureteroureterostomy, ureteroneocystostomy, and Boari flap procedures for benign stricture disease.<sup>[15]</sup> These authors found that ureteral stricture cause, location, and length were equivalent between the open and laparoscopic groups. The authors reported no statistical difference in the success rates (100% vs. 96%,  $P < 0.544$ ) and complication rates (8% vs. 15%,  $P < 0.225$ ) between the laparoscopic and open groups, respectively. However, operative blood loss was greater and hospital stay was longer in the open group.<sup>[15]</sup> In the series by Modi *et al.*,<sup>[16]</sup> patients presented with ureterovaginal fistula after laparoscopic and open hysterectomy while in series by Nezhat *et al.*,<sup>[17]</sup> all patients presented with distal ureteral obstruction secondary to severe endometriosis. In both series, all patients underwent ureteroneocystostomy in combination with psoas hitch with 100% success rate. Lima *et al.*<sup>[18]</sup> advocated dome advancement technique which allows for a tension-free anastomosis of the bladder to a ureter transected cephalad to the iliac vessels, usually without the need for a psoas hitch, transaction of the contralateral bladder pedicle, or complex laparoscopic suturing. Rassweiler *et al.*<sup>[19]</sup> concluded that laparoscopic ureteral reimplant is a feasible procedure with similar functional outcomes as compared to open reimplant.

The ideal time to perform this reconstruction remains controversial. Some authors recommend a minimum waiting period of 4–6 weeks before embarking on reimplantation after iatrogenic ureteric injuries while few others suggest either early repair within 7 days. Abraham *et al.*<sup>[20]</sup> concluded that in hemodynamically stable patients, laparoscopic repair of iatrogenically induced lower ureteric strictures can be conveniently undertaken without undue delay from the inciting event. Compared to delayed repairs, the procedure is technically more demanding but morbidity incurred and outcome is at par. In 2 of our cases, characterized by ureterovaginal fistula after abdominal

hysterectomy, the laparoscopic reimplant was performed 2 weeks after hysterectomy without any technical difficulties and with good results. Contraindications for this procedure are the same as those for an open ureteroneocystostomy. Laparoscopic surgery has known advantages of less pain, a rapid recovery, and a shorter convalescence. It is important to mention that the magnified surgical field makes the procedure safer and possibly with better results in relation to open surgery. The success rate of laparoscopic ureteroneocystostomy is from 92% to 100%.<sup>[21]</sup> Stricture recurrence typically develops in the first postoperative year. Even though our follow-up period is short, we will carry out a reevaluation after a longer period.

Recently, several reported studies on robotic ureteroneocystostomy have been published showing successful results similar to those obtained with the laparoscopic technique.<sup>[20,22-29]</sup> The present study results are in similar lines with the previous conducted studies as depicted in Table 3. Uberoi *et al.*<sup>[26]</sup> published an article on the first robotic ureteroneocystostomy with psoas hitch and Casale *et al.*<sup>[24]</sup> have published the largest case series of robotic-assisted extravesical ureteral reimplantation. Robotic surgery usually makes pelvic reconstructive surgeries easier with better vision and dexterity during suturing. However, it has its own limitations in terms of high cost, limited availability, and inexperience of most of the surgeons worldwide. Ureteroneocystostomy has also been described using transumbilical endoscopic single-port technique (natural orifice transluminal endoscopic surgery).<sup>[25,26]</sup> The obvious limitation of this study is its retrospective nature, small number of patients, and limited follow-up.

## CONCLUSIONS

Laparoscopic ureteroneocystostomy with or without bladder flap (Boari) is feasible, providing functional outcomes comparable to open surgery while offering

**Table 3: Comparison of series of laparoscopic ureteral reimplantation in adults**

Author	n	Cause	Procedures	LOS (days)	Complication	Follow up (months)
Simmons <i>et al.</i> <sup>[15]</sup>	7	Iatrogenic, stones, other	LUR (4), Boari flap (3)	2.6 (2-3)	1 (urinoma)	23 (4-70)
Modi <i>et al.</i> <sup>[16]</sup>	6	Gynecological surgery	Psoas hitch	5.7 (5-6)	0	8 (2-14)
Nezhat <i>et al.</i> <sup>[17]</sup>	6	Endometriosis	Psoas hitch	N/A	0	33 (28-40)
Rassweiler <i>et al.</i> <sup>[19]</sup>	10	Mixed	Psoas hitch (6), Boari flap (4)	8.2	0	17 (9-23)
Gözen <i>et al.</i> <sup>[23]</sup>	24	Ureteral stricture	LUR (5), psoas hitch (10), Boari flap (9)	8.7	3 (bowel injury, ileus, DVT)	35
Ramalingam <i>et al.</i> <sup>[29]</sup>	3	Megaureter Stricture Ureteric injury	Boari flap (3)	4.6	0	6-36
Present study	20	Mixed	LUR (2), psoas hitch (9), Boari (11)	2.8	2 (external iliac vein injury and fever)	22.35 (6-45)

LOS: Length of stay, LUR: Laparoscopic ureteroneocystostomy, N/A: Not available, DVT: Deep vein thrombosis

the advantages of a minimal invasive technique (e.g., less postoperative analgesics, and shorter hospitalization and convalescence). The short-term results are encouraging with excellent success rates and minimal morbidity; however, longer follow-up will be necessary to establish this technique as a treatment of choice for the same.

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### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

- Hemal AK. Urologic laparoscopic surgery: Whether open incision is waning. *Indian J Urol* 2001;17:103-10.
- Inagaki T, Rha KH, Ong AM, Kavoussi LR, Jarrett TW. Laparoscopic pyeloplasty: Current status. *BJU Int* 2005;95 Suppl 2:102-5.
- Yohannes P, Gershbaum D, Rotariu PE, Smith AD, Lee BR. Management of ureteral stricture disease during laparoscopic ureteroneocystostomy. *J Endourol* 2001;15:839-43.
- Durrani SN, ur Rehman A, Khan S, Ullah H, Khan MK, Ullah A, *et al.* Ureteral trauma during open surgery: Aetiology, presentation and management. *J Ayub Med Coll Abbottabad* 2013;25:86-9.
- Ostrzenski A, Radolinski B, Ostrzenska KM. A review of laparoscopic ureteral injury in pelvic surgery. *Obstet Gynecol Surv* 2003;58:794-9.
- Brudenell M. Medico-legal aspects of ureteric damage during abdominal hysterectomy. *Br J Obstet Gynaecol* 1996;103:1180-3.
- de la Rosette JJ, Skrekas T, Segura JW. Handling and prevention of complications in stone basketing. *Eur Urol* 2006;50:991-8.
- Gustilo-Ashby AM, Paraiso MF. Treatment of urinary tract endometriosis. *J Minim Invasive Gynecol* 2006;13:559-65.
- Ghezzi F, Cromi A, Bergamini V, Serati M, Sacco A, Mueller MD, *et al.* Outcome of laparoscopic ureterolysis for ureteral endometriosis. *Fertil Steril* 2006;86:418-22.
- Frenna V, Santos L, Ohana E, Bailey C, Wattiez A. Laparoscopic management of ureteral endometriosis: Our experience. *J Minim Invasive Gynecol* 2007;14:169-71.
- Gomel V, James C. Intraoperative management of ureteral injury during operative laparoscopy. *Fertil Steril* 1991;55:416-9.
- Reddy PK, Evans RM. Laparoscopic ureteroneocystostomy. *J Urol* 1994;152:2057-9.
- Lakshmanan Y, Fung LC. Laparoscopic extravesicular ureteral reimplantation for vesicoureteral reflux: Recent technical advances. *J Endourol* 2000;14:589-93.
- Fergany A, Gill IS, Abdel-Samee A, Kaouk J, Meraney A, Sung G, *et al.* Laparoscopic bladder flap ureteral reimplantation: Survival porcine study. *J Urol* 2001;166:1920-3.
- Simmons MN, Gill IS, Fergany AF, Kaouk JH, Desai MM. Laparoscopic ureteral reconstruction for benign stricture disease. *Urology* 2007;69:280-4.
- Modi P, Goel R, Dodiya S. Laparoscopic ureteroneocystostomy for distal ureteral injuries. *Urology* 2005;66:751-3.
- Nezhat CH, Malik S, Nezhat F, Nezhat C. Laparoscopic ureteroneocystostomy and vesicopsoas hitch for infiltrative endometriosis. *JSL* 2004;8:3-7.
- Lima GC, Rais-Bahrami S, Link RE, Kavoussi LR. Laparoscopic ureteral reimplantation: A simplified dome advancement technique. *Urology* 2005;66:1307-9.
- Rassweiler JJ, Gözen AS, Erdogru T, Sugiono M, Teber D. Ureteral reimplantation for management of ureteral strictures: A retrospective comparison of laparoscopic and open techniques. *Eur Urol* 2007;51:512-22.
- Abraham GP, Das K, Ramaswami K, George DP, Abraham JJ, Thachil T, *et al.* Laparoscopic reconstruction of iatrogenic-induced lower ureteric strictures: Does timing of repair influence the outcome? *Indian J Urol* 2011;27:465-9.
- Modi P, Gupta R, Rizvi SJ. Laparoscopic ureteroneocystostomy and psoas hitch for post-hysterectomy ureterovaginal fistula. *J Urol* 2008;180:615-7.
- Basiri A, Karami H, Mehrabi S, Javaherforoozshadeh A. Laparoscopic distal ureterectomy and boari flap ureteroneocystostomy for a low-grade distal ureteral tumor. *Urol J* 2008;5:120-2.
- Gözen AS, Cresswell J, Canda AE, Ganta S, Rassweiler J, Teber D, *et al.* Laparoscopic ureteral reimplantation: Prospective evaluation of medium-term results and current developments. *World J Urol* 2010;28:221-6.
- Casale P, Patel RP, Kolon TF. Nerve sparing robotic extravesical ureteral reimplantation. *J Urol* 2008;179:1987-9.
- Desai MM, Stein R, Rao P, Canes D, Aron M, Rao PP, *et al.* Embryonic natural orifice transumbilical endoscopic surgery (E-NOTES) for advanced reconstruction: Initial experience. *Urology* 2009;73:182-7.
- Uberoi J, Harnisch B, Sethi AS, Babayan RK, Wang DS. Robot-assisted laparoscopic distal ureterectomy and ureteral reimplantation with psoas hitch. *J Endourol* 2007;21:368-73.
- Yohannes P, Chiou RK, Pelinkovic D. Rapid communication: Pure robot-assisted laparoscopic ureteral reimplantation for ureteral stricture disease: Case report. *J Endourol* 2003;17:891-3.
- Castillo OA, Litvak JP, Kerkebe M, Olivares R, Urena RD. Early experience with the laparoscopic boari flap at a single institution. *J Urol* 2005;173:862-5.
- Ramalingam M, Senthil K, Ganapathy Pai M. Laparoscopic boari flap repair: Report of 3 cases. *J Laparoendosc Adv Surg Tech A* 2008;18:271-5.