

Minimally invasive surgery for the treatment of ureteral stump syndrome

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Abstract

Objective: The aim was to highlight the advantages and the feasibility of treating ureteral stump syndrome (USS) by different minimally invasive procedures.

Materials and Methods: Four patients with USS who were treated by different minimally invasive surgery approaches depending on their presentation and findings on radiologic investigations.

Results: Three patients had complete resolution of their symptoms, whereas the fourth patient had persistence of urinary tract infection.

Conclusion: Minimally invasive surgery is a valid treatment option for patients with USS with possible less morbidity than conventional open surgical excision.

Key Words: Endoscopy, laparoscopy, minimally invasive surgery, ureteral stump

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INTRODUCTION

Reports on ureteral stump syndrome (USS) emerged early in the 20th century.^[1] USS was defined as recurrent urinary tract infection (UTI), lower abdominal pain and hematuria in patients post (hemi)-nephrectomy with subtotal ureterectomy.^[2-5] Thus, some investigators advocated concomitant total ureterectomy to eliminate the future risk of developing USS.^[3-5] However, many other investigators found a low incidence of USS and a minority of their patients required surgical intervention.^[2,6-13] The later investigators recommended (hemi) nephrectomy with subtotal ureterectomy even in the presence of ipsilateral vesicoureteral reflux (VUR), in order to minimize the operative morbidity associated with second incision for total ureterectomy.^[2,6-13]

The traditional treatment of USS was open surgical excision of the ureteral stump.^[2,6,7,14] Different reports were published on minimally invasive approaches to treat USS.^[15-21]

Herein, we present our experience in treating USS by different minimally invasive techniques in four patients.

MATERIALS AND METHODS

From September 2006 to recent, four patients were treated in our institute for USS using different minimally invasive techniques. The files of those patients were reviewed to note the postoperative hospital stay period, any complications and resolution or persistence of symptoms.

The first patient was a 42-year-old woman. She had right nephrectomy in July 2003 for a nonfunctioning kidney after complaining of the right flank pain and recurrent UTIs. Unfortunately, the patient was lost from regular follow-up in our hospital. In January 2009, she was referred back to our department with recurrent UTIs associated with lower abdominal pain and occasional gross hematuria for the

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preceding year. Her urine cultures were positive on multiple occasions from the referring hospital. She was treated with oral antibiotics according to the culture sensitivities. Ultrasound study of the kidney and bladder revealed dilated right ureteral stump. Voiding cystourethrogram (VCUG) showed a refluxing right ureteral stump [Figure 1]. The patient was managed by cystoscopy and right retrograde ureterography followed by emptying the ureteral stump completely, using open-tip ureteral catheter, and occlusion of the right ureteral orifice by subureteric injection of 2 mL dextranomer/hyaluronic acid.

The second patient was 54-year-old woman. She underwent left nephrectomy in March 2008 due to symptomatic stone disease in a poorly functioning kidney. On regular postoperative follow-up, the patient was still complaining of the left flank pain associated with dysuria and suprapubic pain. Urine analysis on multiple occasions showed microscopic hematuria and sterile pyuria. Initially, her symptoms were managed conservatively, until a follow-up computerized tomography (CT) scan revealed dilated long left ureteral stump containing two small stones [Figures 2 and 3] that brought USS in the working differential diagnosis for her symptoms. VCUG showed no evidence of VUR in the retained ureteral stump. A thorough discussion with the patient about the options of management was done and she elected to undergo left retrograde ureterography with ureteroscopy and laser lithotripsy. In May 2010, the patient underwent the procedure. A small distal ureteral mucosal polyp was seen during semirigid ureteroscopy that was biopsied. The left ureteral stump was cleared from stones by laser lithotripsy and stone basketing.

The third patient was a 29-year-old female; she underwent right laparoscopic nephro-ureterectomy for poorly functioning kidney in 2010. She had recurrent UTI and she was diagnosed preoperatively to have right duplex pelvicaliceal system. Preoperative VCUG revealed associated ureterocele to the upper moiety ureter and Grade 5 VUR in the lower moiety. Intraoperative cystoscopy failed to show the ureteric orifices and hence laparoscopic subtotal ureterectomy was done down to the iliac vessels level after evacuation of the ureteric stump with suction. The ureteric stump was ligated using an endo-loop tie. During follow-up, the patient was complaining of lower abdominal pain associated with dysuria, frequency and urgency. Persistent UTI with multidrug-resistant *Escherichia coli* was documented on multiple urine cultures. The patient was treated with intravenous (IV) antibiotics and then started on suppressive low-dose antibiotic therapy, yet she had a recurrence of symptoms soon after stopping the suppressive therapy and a repeated urine culture grew the same organism. VCUG was repeated and revealed persistent ureterocele with VUR in a 1 cm ureteric stump [Figure 4]. Patient was started on IV antibiotics according to culture. Discussion with the

patient about management options was thorough and the patient elected for minimally invasive intervention. Cystoscopy



Figure 1: Voiding cystourethrogram showing refluxing retained right ureteral stump



Figure 2: Axial computerized tomography scan revealed dilated long retained left ureteral stump

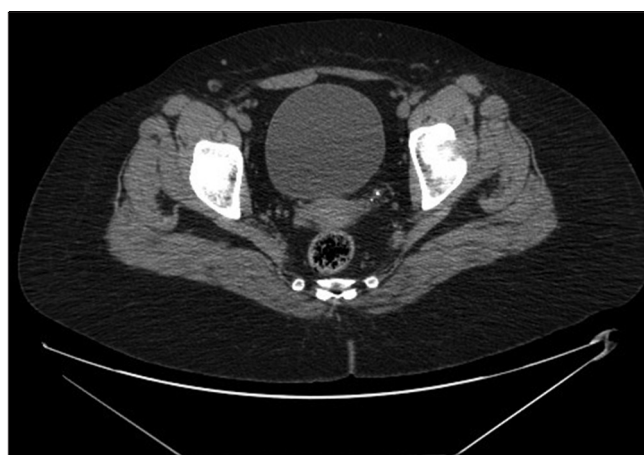


Figure 3: Lower level from the same axial computerized tomography scan showing two small stones in the distal part of the retained left ureteral stump

and ureterocele incision was undertaken, which released a large amount of pus from the ureterocele. Examination of the ureterocele-associated ureteral stump by the rigid cystoscope revealed 3 cm dead-ending ureter with no intramural lesions.

The fourth patient was a 25-year-old male. He underwent right hemi-nephrectomy with subtotal ureterectomy for obstructed nonfunctioning upper moiety in 2002. The patient had persistent lower abdominal pain and right flank pain. Investigations revealed a split function of 25% of the residual right lower moiety on radionuclide renography with residual long dilated ureteral stump corresponding to the removed upper moiety on CT scan. VCUG revealed no VUR in both lower moiety ureter and the upper moiety ureteral stump. The patient was bothered with the symptoms that he was requesting right nephrectomy to relieve the pain. Thorough discussion with the patient reached an agreement of performing laparoscopic right completion ureterectomy of the residual stump. Prior to laparoscopy, cystoscopy with retrograde ureterography and stenting of both duplex ureters on the right side was performed using different colored open-tip ureteral catheters to identify any inadvertent injury to the lower moiety ureter. Laparoscopic ureterectomy of the upper moiety ureteral stump was undertaken down to the common ureteral sheath then the



Figure 4: Voiding cystourethrogram showing persistent right ureterocele and reflux in the retained right ureteral stump

residual part was slit open on the side opposite to the lower moiety ureter to prevent ischemia of the healthy ureter.

RESULTS

Table 1 shows the postoperative results of included patients.

DISCUSSION

Controversy still exists whether urologists should perform total or subtotal ureterectomy with (hemi) nephrectomy, even in the presence of VUR. Few researchers retrospectively assessed the natural history of distal ureteral stump.^[2,6,7] They found 1.1-10% incidence of USS requiring surgical intervention and recommended against total ureterectomy. Androulakakis *et al.* suggested long ureteral stumps to act like a bladder diverticulum and predispose patients to develop USS.^[2] While short ureteral stumps drain urine effectively by retained peristaltic activity, thus USS is less likely to develop in short ureteral stumps.^[7] De Caluwe *et al.* excised the residual ureteral stumps in 10% of their patients post (hemi)-nephrectomy for recurrent UTIs due to VUR.^[6] They observed no effect of ipsilateral ureterocele puncture, before hemi-nephrectomy, on the fate of the retained ureteral stump.

In the growing era of minimally invasive surgery (MIS), more modern treatment options for USS have been reported to replace open surgical excision. MIS has the general advantages of associated decreased postoperative pain, reduced hospital stay and convalescence period, and having better cosmetic results.

Bullock *et al.* were the first to successfully treat one patient with refluxing retained ureteral stump by endoscopic subureteric injection of Teflon.^[15] This was followed by two patients from Ireland treated by the same technique.^[16] Perez-Brayfield *et al.* had 67% success rate after treating six patients by endoscopic subureteric injection of dextranomer/hyaluronic acid for refluxing ureteral stumps.^[20] They attributed failures to the ectopically positioned ureteral orifices. We treated the first patient in this report by endoscopic subureteric

Table 1: Postoperative results

Patient no	Postoperative hospital stay	Complications	Outcome	Follow-up period
1	1-day	No	Complete resolution of symptoms negative urine culture VCUG revealed resolution of reflux	60 months
2	1-day	No	Complete resolution of symptoms biopsy revealed inflammatory process negative urine analysis	43 months
3	3 days (till completion of antibiotic course)	No	Still symptomatic positive urine cultures	6 months
4	2 days	No	Complete resolution of symptoms CT urography revealed patient lower moiety ureter	87 months

VCUG: Voiding cystourethrogram, CT: Computerized tomography

injection of dextranomer/hyaluronic acid after performing retrograde ureterography and emptying the stump completely using open-tip ureteric catheter, which rendered the patient asymptomatic.

Russinko *et al.* have reported a patient with stone disease in a retained ureteral stump after ileocystoplasty.^[17] They treated the stones by semirigid ureteroscopy and laser lithotripsy. The second patient in this report had two stones in a dilated (possibly obstructed) ureteral stump. Semirigid ureteroscopy and laser lithotripsy with stone extraction was a successful option in eliminating the patient's symptoms and allowing the ureteral stump to collapse.

Our third patient had empyema in a retained ureterocele postnephrectomy and subtotal ureterectomy. She underwent cystoscopy and transurethral ureterocele incision that was a brief uneventful procedure. Unfortunately, the patient developed recurrent UTI 1-month after the intervention, which might be rising from the refluxing short lower moiety ureteral stump or new VUR in the ureterocele-associated stump. Ehrlich *et al.* successfully treated 4 girls with refluxing ectopic ureteral stumps by transurethral fulguration.^[18] Ikeda *et al.* modified that technique by performing transurethral incision of the dilated ectopic ureteral stump (empyema) first, followed by fulguration of the ureteral stump with a ball electrode.^[19] This later technique might be one option, beside laparoscopic or open stump excision, in the treatment of our third patient.

Labairu-Huerta *et al.* described laparoscopic ureterectomy in treating residual ureteral stump empyema after draining the ureteral stump by double-J stent.^[21] We performed laparoscopic ureterectomy for residual upper moiety ureteral stump in the fourth patient. The novel idea of stenting both duplex ureters with different colored open-tip ureteral catheters helped in correctly identifying the upper moiety ureter and possible prompt intraoperative identification of any injury to the lower moiety ureter if any. The laparoscopic approach has the well-recognized advantages of less postoperative pain and decreased hospital stay and convalescence in comparison to the open approach.

The rationale of performing retrograde ureterography or direct full visualization of the ureteral stumps, before proceeding with the intended mode of treatment, is to rule-out the rare, but genuine risk of ureteral stump cancer. Kim *et al.* reported eight patients with ureteral stump cancer (six transitional cell and two squamous cell carcinomas) out of 318 patients postnephrectomy for benign disease.^[22] This also implies the importance of long-term follow-up for patients undergoing nephrectomy.

CONCLUSION

Minimally invasive surgery offers a less morbid treatment option for patients with USS, which should be discussed with the patients prior to proceeding with open surgical excision of the ureteral stump. Individualized MIS treatment strategy should be applied according to the patient's complaint and the offending pathology responsible for symptomatic USS that is, stones, empyema, etc. Nevertheless, further large studies are needed to determine the success rate and the associated complications of MIS in comparison to open surgical excision in treating USS.

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