

A Novel Technique for Treatment of Distal Ureteral Calculi

Early Results

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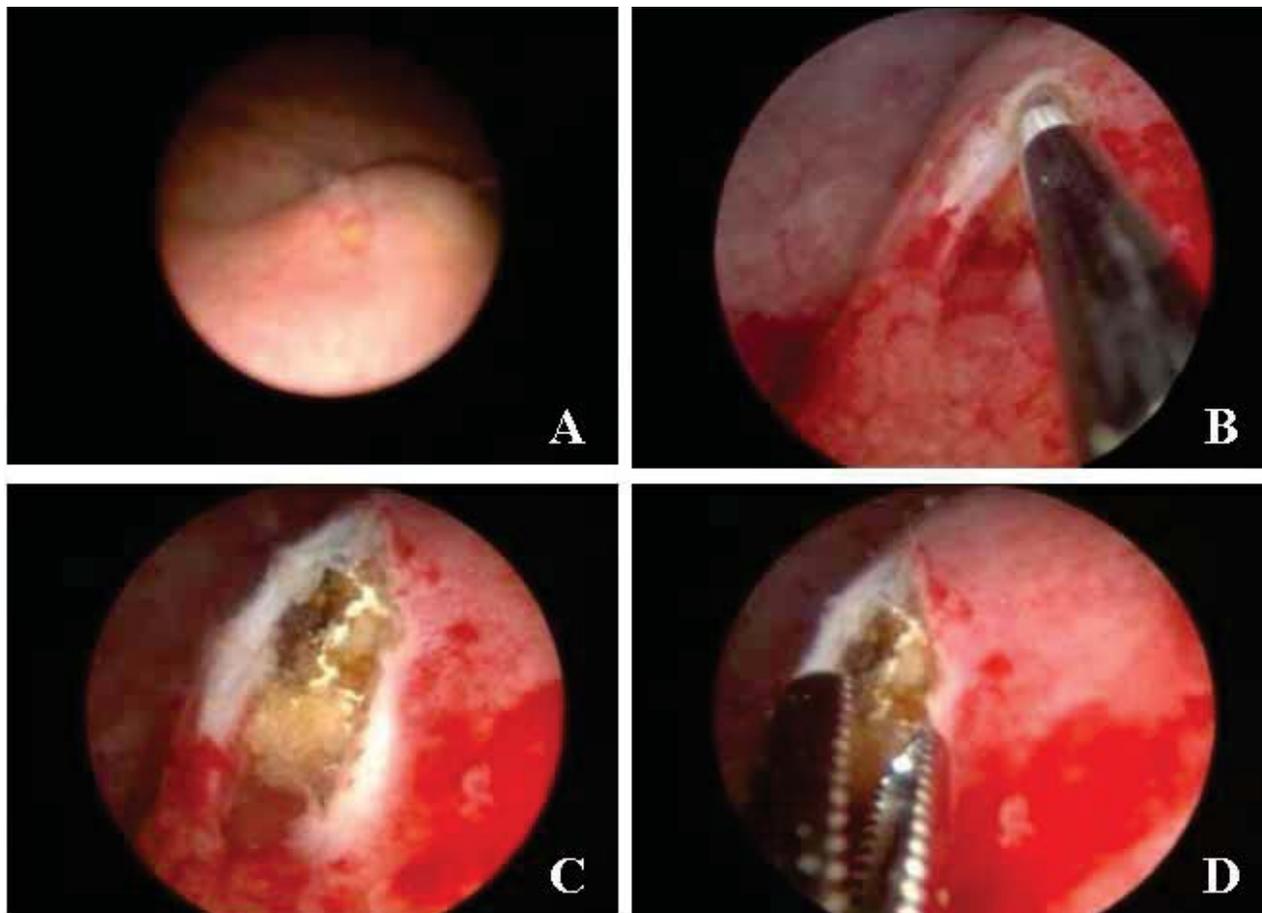
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INTRODUCTION

Management of ureteral calculi has dramatically changed. Shock wave lithotripsy (SWL) and ureteroscopy are commonly used treatment modalities for removal of distal ureteral stones. Analysis of the literature for the past 3 years indicates improvement in particular in stone-free rates at ureteroscopic lithotripsy. Semi-rigid and/or flexible ureteroscopes provide 90% to 100% stone-free rates for distal ureteral calculi and only a 74% stone-free rate in the proximal ureter.⁽¹⁻³⁾ Especially, improvements in the design and accessories of ureteroscopes have led to increase in success rates.

Currently, the new generation of ureteroscopes has decreased morbidity and operation time in experienced hands, and can be used safely for the treatment of proximal as well as distal ureteral stones.⁽⁴⁾ However, development of endoscopic technology has led to increase in new operation techniques. We present a novel technique for removal of impacted distal ureteral stones which are localized at ureteral orifice.



(A) Showing intramural ureteral calculi; (B & C) Radiofrequency incision of superior wall of the intramural ureter; (D) Extraction of calculi with endoscopic grasper.

CASE REPORT

The study included 407 patients who underwent ureteroscopy to treat ureteral stones at the Department of Urology of Clinical Hospital Center of Goztepe and Mus State Hospital, Turkey, between 2005 and 2011. Medical expulsion therapy was performed in all of the patients for one week (Doxazosin 4 mg). All interventions were performed with a semi-rigid Richard Wolf ureteroscope and an electropneumatic generator was used for lithotripsy (Swiss LithoClast, Electro Medical Systems).

We analyzed our patients prospectively. In 17 patients, impacted stones were localized at the ureteral orifice, and ureteroscopy and/or guidewire was not suitable for advancement into the ureter upto the calculi. Stone impaction was defined

if the stones were localized at intramural ureter and persisted in spite of one-week medical expulsion therapy. In these patients, the guidewire could not be advanced around the stone into the ureter intra-operatively. Therefore, a novel technique was performed for removal of the stone. Initially, all of patients were informed about the procedure and signed an informed consent pre-operatively. Thereafter, all of them were examined by x-ray and ultrasonography. Computed tomography (CT) scan and/or intravenous urography was performed peri-operatively if it was necessary.

Urine culture and ultrasonography were performed once a month and once three months, respectively, during follow-up period. Voiding cystourethrography (VCUG) or cystoscopy was performed if it was necessary during the follow-up.

TECHNIQUE

We used PlasmaKinetic™ bipolar radiofrequency hot knife for incision of superior wall of the orifice while conducting the calculi into the bladder. The technique was applied only for impacted ureteral calculi localized intramurally in the ureter, for which cystoscopy and ureteroscopy, and/or guidewire were not suitable for advancement into the ureter upto the calculi. The device was adjusted to 30 watts energy. After the stone had been reproduced into the bladder, it was fragmented by an electropneumatic generator (Swiss LithoClast, Electro Medical Systems), and extracted out of the body by forceps and/or basket catheter (Figure). Patients were catheterized with Foley catheter for about one or two days postoperatively and treated with quinolone during the 1st postoperative week. For none of the patients, ureteral stent and/or double-J stent was performed.

Median age and stone size were 52.1 years (range, 31 to 80 years) and 12.4 mm (range, 10 to 16 mm), respectively. Eight of the patients were female, and the youngest female patient was 47 years old. All of the patients had hydronephrosis (range, 1 to 3). Average international prostate symptom score (IPSS) was 5 (range, 0 to 12). Patients' characteristics are shown in Table.

Procedure was performed on all of the patients successfully. There was no significant bleeding peri-operatively, and quality of display was perfect during the operation. None of the patients had urinary tract infection and hydronephrosis peri-operatively.

Intravenous urography and ultrasonography were performed in 4 and 17 patients, respectively, during the follow-up period. Voiding cystourethrography and cystoscopy were performed in only 2 and 1 patients at the 3rd postoperative month, respectively, because of the flank pain. Vesicoureteral reflux was not observed on VCUG. Cystoscopy was normal and the ureteral orifice was intact.

DISCUSSION

There are two minimally-invasive techniques for the surgical treatment of distal ureteral calculi. However, ureteroscopy and its equipments have shown more progression,

Patients' characteristic.	
Variables	Median (range)
Age, y	52.1 (31 to 80)
Stone size, mm	12.4 (10 to 16)
Hydronephrosis, grade	2 (1 to 3)
Operation time, min	18 (12 to 24)
Hospitalization, day	1.1 (1 to 3)
Follow-up, month	16.7 (11 to 21)

including smaller diameter, better image quality, advanced flexible and bipolar radiofrequency technology, usage of laser, and basket catheter.

Stone size, composition, and localization, hydronephrosis, symptoms, anatomic variation, infection, duration of the disease, patient's expectancy, cost, availability of equipment, and SWL are contributory factors for selection of ureteral calculi treatment. The stone-free rate of semi-rigid ureterorenoscopy is around 80%, 90%, and 95% in the proximal, middle, and distal ureter, respectively.⁽⁵⁻⁸⁾

Irreversible loss of the kidney function can occur after two weeks at complete obstruction, but it can progress to total renal unit loss in 6 weeks.⁽⁹⁾ However, 28% of patients with ureteral calculi can have impairment of the kidney function at presentation.⁽¹⁰⁾ In our study, all of the patients had hydronephrosis, and the average time of diagnosis to treatment was 11.3 days (range, 2 to 18 days).

Our technique was safe and effective and had minimal morbidity. The most important limitations of our technique could have been ureteral stricture and vesicoureteral reflux; however, they were not observed in any of the patients. The youngest female patient was 47 years old. Therefore, VCUG was only performed in 2 patients, which had flank pain. Treatment of vesicoureteral reflux is controversial in adults. We administered oral quinolone during the 1st postoperative week. This may explain minor decubation complication.

The technique was safe and effective for impacted stones localized in the distal ureter which did not allow ureteroscopy and guidewire pass into the ureter. Shortening the

operation time and improving quality of display are advantages of this technique. Further studies with more patients and longer follow-up are needed for propagation of this technique.

CONFLICT OF INTEREST

None declared.

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