

Bilateral Single-Session Ureteroscopy with Pneumatic Lithotripsy for Bilateral Ureter Stones: Feasible and Safe

Bulent Gunlusoy Tansu Degirmenci Murat Arslan Zafer Kozacioğlu
Nihat Nergiz Suleyman Minareci Ali Riza Ayder

Izmir Education and Teaching Hospital, Izmir, Turkey

Key Words

Bilateral stones · Ureterorenoscopy · Pneumatic lithotripsy

Abstract

Introduction: To evaluate the feasibility and safety of bilateral single-session ureteroscopy in the treatment of bilateral stones with different localizations. **Materials and Methods:** Between February 2001 and October 2006, a total of 1,296 patients underwent ureteroscopy with pneumatic lithotripsy. Of these, 38 patients (2.9%) had bilateral ureter stones. The stones were located in the lower, middle and upper ureter in 44 (57.9%), 21 (27.6%) and 11 (14.5%) of the cases, respectively. Fifty-one stones (67.1%) were less than 1 cm. **Results:** Of the 76 stones, 67 (88.1%) were fragmented in a single procedure. The stone clearance rate was 93.1% after the second session. According to the localization of the stones, the stone clearance rate after single endoscopic session was 72.7% for upper ureteral calculi, 80.9% for midureter and 95.4% for lower ureter stones. For patients with calculi less than 1 cm and greater than 1 cm, the initial stone-free rate after ureteroscopy was 94.1% (48 of 51) and 76% (19 of 25), respectively ($p < 0.05$). No major complication was observed. **Conclusions:** Bilateral single-session pneumatic lithotripsy can be performed safely and has high success rates with minimal morbidity and short hospital stay.

Copyright © 2008 S. Karger AG, Basel

Introduction

Extracorporeal shock wave lithotripsy (ESWL) and ureteroscopy (URS) are alternative options in the management of ureteral calculi. URS was approved for treating lower ureteric stones, but technologically advanced ureteroscopes and lithotriptors have led to the safer usage of URS in the treatment of more proximal stones with high success rates similar to those performed for distal calculi. The success rates for ureteroscopic stone removal depend on the stone size and localization, the availability of ureteroscopic instruments and the experience of the surgeon. URS is an especially useful option for patients with failed ESWL, patients with large or impacted stones and for obese patients who cannot be treated with ESWL [1].

Bilateral URS is rarely indicated in a single session. The possibility of ominous complications such as bilateral injuries might prevent even the most experienced surgeons from attempting it [2]. But the wide usage of the ureteroscope on experienced hands lowers the complication rates to more acceptable levels. Single-session URS for bilateral urinary calculi will potentially reduce costs and anesthetic complications compared with staged procedures [3].

In this study, we report our treatment outcomes in patients undergoing bilateral, single-session URS for bilateral ureteral stones.

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

© 2008 S. Karger AG, Basel
0042-1138/08/0812-0202\$24.50/0

Accessible online at:
www.karger.com/uin

Bulent Gunlusoy
1828/6 sokak no:48/1
Karsiyaka, Izmir (Turkey)
Tel. +90 532 364 0274, Fax +90 232 261 4444
E-Mail bulentgunlusoy@hotmail.com

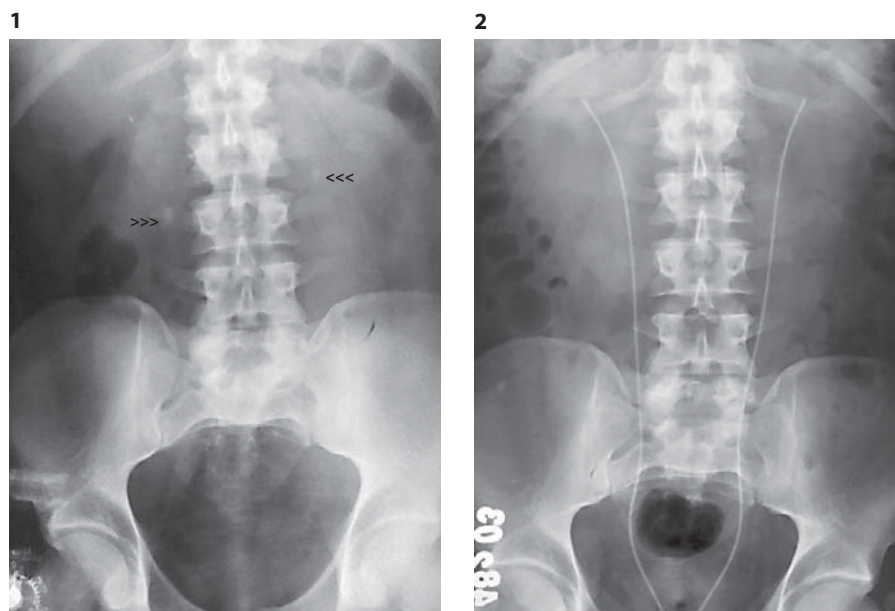


Fig. 1. Bilateral ureteral stones.

Fig. 2. Postoperative plain film. Bilateral ureteral catheters were placed after the lithotripsy.

Material and Methods

Between February 2001 and October 2006, a total of 1,296 patients underwent URS with pneumatic lithotripsy (PL). Of these, 38 (2.9%) had bilateral ureter stones (fig. 1). Preoperative plain film of the kidneys, ureter and bladder (KUB), and ultrasound or excretory urography were performed in all cases; noncontrast abdominal tomography and magnetic resonance urography were performed in uremic patients or those suspected to be harboring nonopaque stones. Stone size was measured radiologically. The number of stones in the lower, middle and upper ureter was 44 (57.9%), 21 (27.6%) and 11 (14.5%), respectively. Fifty-one (67.1%) of the 76 stones were less than 1 cm in diameter. Bilateral nephrostomy tubes were inserted to 2 patients with anuria and bilateral double-J stents were placed in 1 patient with bilateral hydronephrosis and high blood urea nitrogen before the operation. Ureteroscopic lithotripsy was performed by pneumatic lithotriptors and 8F or 10F rigid ureteroscope under general or regional anesthesia. Ureteroscopic dilatation of the orifice was done routinely with olive tip bougie dilators. Some stone fragments were removed with a wire basket or with forceps extraction. In all other cases, the fragmented stones were left in situ. After the procedure, 5F ureteral stents or double-J catheters were placed. Ureteral catheters were removed 24 h after the operation in uncomplicated procedures and 48–72 h after complicated cases. Hospitalization time ranged from 1 to 3 days with an average of 1.3.

Follow-up studies included a KUB film within 24 h postoperatively and 6 weeks after the operation as well as renal ultrasound at the 6th postoperative week. An intravenous urography was performed in cases of mild or severe dilatation. Stone-free status was defined as the absence of residual stones on a plain KUB film within 6 weeks after the operation. In the presence of a residual stone, a second session of URS was performed. Statistical analysis was performed with Student's *t*, χ^2 or Fisher's exact test.

Results

The patients' characteristics are shown in table 1. There were 21 (55.1%) male and 17 (44.9%) female patients with a mean age of 42 years (range 31–63). The mean stone size was 9.5 mm (5–21) and the mean operation time was 42 min (21–85). Of the 76 stones, 67 (88.1%) were fragmented in a single procedure and the disintegrated fragments passed spontaneously. The stone clearance rate was 93.1% after the second session. The stone clearance rates with regard to the localization of the stones after single endoscopic session were 72.7, 80.9 and 95.4% for upper, middle and lower ureter, respectively. The stone clearance rate was highest in the lower ureteral stones with regard to localization ($p < 0.05$). For patients with calculi less than or equal to 1 cm the initial stone-free rate after URS was 94.1% (48 of 51); for those with calculi greater than 1 cm, it was 76% (19 of 25; $p < 0.05$). Bilateral ureteral catheters were placed after PL and were removed after 24 h postoperatively in 46 uncomplicated ureteric units (fig. 2). Nine ureteric units with complicated procedures had their catheters in place for 48–72 h. Bilateral double-J stents were inserted after the operation in 6 units with bilateral hydronephrosis. The stents were removed after 1 month. A ureteral catheter on one side and a double-J stent on the other side were placed in 1 patient after a complicated procedure. Four ureteric units with bilateral nephrostomy tubes did not require any stents. Of the 6 stones with unsuccessful procedures, 3 underwent second-session URS

Table 1. Patients' characteristics

Patients	38
Sex	
Male	21
Female	17
Mean age, years	42 (31–63)
Stone location, %	
Upper ureter	11
Middle ureter	21
Lower ureter	44
Mean stone size, mm	9.5 (5–21)
Mean operation time, min	42 (21–85)
Mean hospitalization time, days	1.3 (1–3)

Table 2. Success rates according to stone localization and size

	Stones	Success rate
Upper ureter	11	8 (72.7%)
Middle ureter	21	17 (80.9%)
Lower ureter	44	42 (95.4%)
Size ≤1 cm	51	48 (94.1%)
Size >1 cm	25	19 (76%)

and 3 were sent for ESWL. Three migrated stones were treated by double-J stent insertion and further ESWL. The postoperative complications were mainly minor, consisting of postoperative fever in 6 of 38 (15.8%) and urinary tract infection in 4 of 38 patients (10.5%). There were mucosal lesions (small laceration without leak) in 5 (6.7%) and stone migration in 4 of 76 ureters (5.2%). Antibiotics were given according to urine cultures. Traumatic procedures due to ureteroscopes with large lumens resulted in mucosal lesions and were treated with ureteral stenting. Neither major postoperative complications (perforation, stricture) nor long-term complications were seen. Success rates with regard to stone localization and size are shown in table 2.

Discussion

Bilateral stones are an alarming condition for most urologists. Optimal treatment for these calculi remains controversial. ESWL is the least invasive treatment for ureteral calculi with reasonable success rates and is recommended as the first-line therapy [4]. Although it has

the advantage of being an outpatient procedure, it fails to decompress the obstructed system immediately most of the time. Moreover, stone-free rate is lower for distal and larger stones. Bilateral ureteral stones frequently cause obstructive uropathy and subsequent deterioration of the renal function, leading to immediate surgical intervention. URS has the advantage of disimpaction and/or fragmentation of the stone leading to immediate decompression of the obstructed renal unit [5]. Ureteroscopic lithotripsy is our first-line approach for bilateral ureteral stones in any localization. Ideal candidates for single-session bilateral ureteroscopic procedures include bilateral distal ureteral calculi in association with an obstructing ureterocele or stricture, as well as those with bilateral stones who failed other approaches [2]. The combination of tight impaction, proximal location and heavy stone burden contributed to the increased difficulty of URS, and hence longer operating time [5]. Our choice of treatment for the bilateral ureteral stones with bilateral hydronephrosis is based on the presence of sepsis and the degree of dilatation of the ureter and the pelvis. Patients with bilateral obstruction and urosepsis are good candidates for bilateral nephrostomy insertion before operation.

Percutaneous nephrostomy may help to decompress the system and minimize potential morbidity. Bilateral nephrostomy tubes were placed preoperatively in 2 of our patients with anuria, one of which had pyelonephritis and the other having deteriorated renal function. These patients were operated after 2 weeks and nephrostomy tubes were removed after successful stone clearance. In all other cases, we preferred to perform the procedure as soon as possible.

Dilatation of the orifice is still debatable. According to some authors, there is no need of dilatation before URS and semirigid ureteroscopes provide simplicity and safety [6–8]. The data in the literature have suggested that ureteral dilation is often required when ureteroscopes greater than 10.5F are used and this size of ureteroscope has also been associated with greater complication rates [9]. Methods or equipments which are useful to dilate the ureteral orifice before stone manipulation are guide wire and dilators or balloon, sequential ureteroscopic dilation, blind basket or core tip catheter. We performed sequential dilation with olive tip bougie dilators and dilated the orifice before each manipulation. The dilatation of the intramural ureter provides easy access. The ureteral catheter is placed to prevent ureteral stricture and to reduce the incidence of postoperative renal colic secondary to ureteral edema [6, 10]. Most urologists suggest that it is not necessary to place a ureteral catheter, especially after

uncomplicated cases [11–14]. We routinely use ureteral catheters after each procedure. In noncomplicated cases, we remove catheters after 24 h, in complicated cases after 48–72 h. Most problems which we encountered in our study with catheters were minor such as mild irritative bladder symptoms, hematuria or bacteriuria.

Hollenbeck et al. [3] reported that bilateral URS carries an increased risk of postoperative morbidity in their series of 34 patients with bilateral calculi. They concluded that the risk is proportional to the number of renal units treated. In another study, Deliveliotis et al. [15] reported that bilateral URS in 1 session can be performed safely in selected patients with a stone-free rate of 83.3%. Camilleri et al. [2] found that the overall stone-free rate following bilateral ureteroscopic stone manipulation was 81%, which was directly related to the stone burden and localization. In the current study, the overall stone-free rate for bilateral stones was 88.1% after the first URS session. Our study showed that URS displayed higher success rates in lower ureteral stones (95.4%) and in those smaller than 1 cm (94.1%). The patients with upper ureteral stones had the lowest stone-free rate (72.7%).

Ureterorenoscopic manipulations may cause complications such as ureteral perforation, access problems, stone migration, urosepsis and ureteral stricture [16]. But our review and several other studies comparing complication rates confirmed progressively decreasing

morbidity attributed to increased experience with ureterorenoscopy [17]. Hollenbeck et al. [3] reported that the complication rate during single-session bilateral URS was 29%. Deliveliotis et al. [15] reported no major complications in 22 patients who underwent bilateral URS in 1 session. The complications were minor in the current study and were treated by conservative methods. No major complication was observed. For achieving successful results with low complication rates, it is necessary to provide good vision and careful advancement of the ureteroscope in the ureter. In cases with stricture we use an ureteral catheter as a guide in order to pass through. To avoid migration, URS with low fluid pressure is appropriate. Several other studies comparing complication rates as well as our review established progressively decreasing morbidity in time with increased experience.

Conclusions

Bilateral single-session URS with PL is a safe and minimally invasive procedure with high success rates and minimal complications in experienced hands. It has the advantage of short hospital stay and prevents multiple procedures.

References

- 1 Ceylan K, Sünbül O, Sahin A, Günes M: Ureteroscopic treatment of ureteral lithiasis with pneumatic lithotripsy: analysis of 287 procedures in a public hospital. *Urol Res* 2005;33:422–425.
- 2 Camilleri JC, Schwab DM, Eshghi M: Bilateral same session ureteroscopy. *J Urol* 1994; 152:49–52.
- 3 Hollenbeck BK, Schuster TG, Faerber GJ, Wolf JS: Safety and efficacy of same-session bilateral ureteroscopy. *J Endourol* 2003;17: 881–885.
- 4 Segura JW, Preminger GM, Assimos DG, et al: Ureteral Stones Clinical Guidelines Panel summary report on the management of ureteral calculi. *J Urol* 1997;158:1915–1921.
- 5 Cheung MC, Lee F, Yip SKH, Tam PC: Out-patient holmium laser lithotripsy using semirigid ureteroscope. *Eur Urol* 2001;39: 702–708.
- 6 Harmon WJ, Sershon PD, Blute ML, Patterson DE, Segura JW: Ureteroscopy: current practice and long term complications. *J Urol* 1997;157:28–32.
- 7 Francesca F, Scattoni V, Nava L, Pompa P, Grasso M, Rigatti P: Failures and complications of transurethral ureteroscopy in 297 cases: conventional rigid instruments versus small caliber semirigid ureteroscopes. *Eur Urol* 1995;28:112–115.
- 8 Stoller ML, Wolf JS, Hofmann R, Marc B: Ureteroscopy without routine balloon dilation: an outcome assessment. *J Urol* 1992; 147:1238–1242.
- 9 Yaycıoğlu O, Güvel S, Kılınc F, Eğilmez T, Özkardeş H: Results with 7.5F versus 10F rigid ureteroscopes in treatment of ureteral calculi. *Urology* 2004;64:643–646.
- 10 Netto NR, Claro JA, Esteves SC, Andrade EF: Ureteroscopic stone removal of distal ureter: Why change? *J Urol* 1997;157:2081–2083.
- 11 Chen YT, Chen J, Wong WY, Yang SS, Hsieh CH, Wang CC: Is ureteral stenting necessary after uncomplicated ureteroscopic lithotripsy? *J Urol* 2002;167:1977–1980.
- 12 Rane A, Cahill D, Larner T, Saleemi A, Tip-taft R: To stent or not to stent. *J Endourol* 2000;14:479–481.
- 13 Hosking DH, Mc Colm SE, Smith WE: Is stenting following ureteroscopy for removal of distal ureteral calculi necessary? *J Urol* 1999;161:48–50.
- 14 Segura JW: Editorial: Ureteroscopy – current and future practice. *J Urol* 1999;161:51.
- 15 Deliveliotis C, Picramenos D, Alexopoulou K, Christofis I, Kostakopoulos A, Dimopoulos C: One-session bilateral ureteroscopy: Is it safe in selected patients? *Int Urol Nephrol* 1996;28:481–484.
- 16 Parker BD, Frederick RW, Reilly TP, Lowry PS, Bird ET: Efficiency and cost of treating proximal ureteral stones: shock wave lithotripsy versus ureteroscopy plus holmium: yttrium-aluminum-garnet laser. *Urology* 2004;64:1102–1106.
- 17 Naqui SA, Khali M, Zafer MN, Rizui SA: Treatment of ureteric stones: comparison of laser and pneumatic lithotripsy. *Br J Urol* 1994;74:694–698.