Arab Journal of Urology (2018) **16**, 441–445

Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

www.sciencedirect.com

STONE/ENDOUROLOGY
ORIGINAL ARTICLE

Bilateral same-session flexible ureterorenoscopy for renal and/or ureteric stone disease treatment

Ersan Arda [a,*], **Basri Cakiroglu** [b]

[a] *Department of Urology, Trakya University School of Medicine, Edirne, Turkey*
[b] *Department of Urology, Hisar Intercontinental Hospital, Istanbul, Turkey*

Received 22 February 2018, Received in revised form 22 March 2018, Accepted 11 April 2018
Available online 18 May 2018

KEYWORDS

Flexible ureterorenoscopy;
Bilateral;
Renal stones;
Ureteric stones

ABBREVIATIONS

ASA, American Society of Anesthesiologists;
EAU, European Association of Urology;
KUB, plain radiography of kidney-ureter-bladder;
PCNL, percutaneous nephrolithotomy;

Abstract ***Objective:*** To evaluate the effectiveness and safety of bilateral same-session flexible ureterorenoscopy (f-URS) in the treatment of bilateral renal and/or ureteric stone disease.

Patients and methods: From October 2007 to December 2015, 62 patients who had undergone bilateral, same-session f-URS were included in the study. The procedures were performed under general anaesthesia, in lithotomy, and initiated on the side in which the patient was clinically symptomatic or on the side in which the stone was smaller. Plain abdominal radiography, intravenous urography, renal ultrasonography and/or non-contrast computed tomography scans were conducted in all patients. The success rate was defined as, patients who were stone-free or only had residual fragments of < 3 mm.

Results: A total of 62 patients (43 male, 19 female), with a mean (SD) age of 39 (15.1) years, were included. The mean (SD) stone size was 23.2 (6.11) mm with a mean (SD) operative time of 58.8 (16.24) min. The stone-free rates were 90.3% and 100% after the first and second procedures, respectively. The mean (SD) hospital stay was 1.58 (0.72) days. There were minor complications (Clavien–Dindo grade I–II) in 10 (16%) patients and major complications (Clavien–Dindo III–IV), e.g. distal ureter laceration and laser injury of the ureter, in two patients.

* Corresponding author at: Kocasinan Mah, Karabıcak Apt., No:1, 22030 Edirne, Turkey.
E-mail address: ersanarda@gmail.com (E. Arda).
Peer review under responsibility of Arab Association of Urology.

Production and hosting by Elsevier

https://doi.org/10.1016/j.aju.2018.04.002

RIRS, retrograde intrarenal surgery;
SFR, stone-free rate;
SWL, shockwave lithotripsy;
UAS, ureteric access sheath;
(f-)URS, (flexible) ureterorenoscopy;
USG, renal ultrasonography

Conclusion: Same session bilateral f-URS is a successful and safe method for bilateral renal and/or ureteric stones.

Introduction

Percutaneous nephrolithotomy (PCNL), shockwave lithotripsy (SWL), and retrograde intrarenal surgery (RIRS) are the main methods for treating renal and/or ureteric stone disease. The 2017 European Association of Urology (EAU) guideline on urolithiasis suggests PCNL as the first-line treatment in renal stones of >20 mm, whereas SWL and RIRS were defined as second-line treatment options. However, no precedence was specified for kidney stones with a diameter of 10–20 mm; between SWL and endourological procedures (PCNL/RIRS) [1].

Although SWL is an effective treatment, especially for solitary urolithiasis it has been shown that in urolithiasis with multiple stones SWL had lower stone-free rates (SFRs) and higher retreatment requirements compared to RIRS [2]. Despite its success on SFRs, RIRS is an invasive procedure, which is associated with a higher risk of ureteric injury and infection [3]. For bilateral stones, these risks raise the question of whether same-session or staged bilateral procedures should be preferred [4]. Nevertheless, bilateral same-session flexible ureterorenoscopy (f-URS) can reduce hospital stay and prevent multiple surgical procedures.

In the present study, we aimed to report our experience of patients who underwent bilateral, same-session f-URS for bilateral renal and/or ureteric stone disease, and to discuss the outcomes and advantages/disadvantages of this treatment option.

Patients and methods

Between October 2007 and December 2015 at one institution, patients who underwent bilateral same-session f-URS for urinary stone treatment, were retrospectively evaluated and included in the study. Inclusion criteria were: patient's preference, other treatment failures, and American Society of Anesthesiologists (ASA) score of ≤ 2; whereas, paediatric patients and patients with abnormal creatinine levels were excluded.

All patients' serum biochemistry, urine analysis, urine culture, plain radiography of kidney-ureter-bladder (KUB), renal ultrasonography (USG) and/or CT were recorded. The stone size was determined by measuring the maximum diameter using KUB or CT. Urine culture results were negative for all patients before the surgical procedure; however, one dose of oral ciprofloxacin was administered for prophylaxis. The procedures were performed under general anaesthesia, in lithotomy, and initiated on the side in which the patient was clinically symptomatic or on the side in which the stone was smaller.

None of the patients were pre-stented before the main surgical procedure. After a hydrophilic guidewire was passed into the renal pelvis, a ureteric access sheath (UAS), with an inner to outer size of 11/13 F, was placed. In 12 cases in which the UAS could not be placed or the semi-rigid ureteroscope could not be manipulated easily, ureteric dilatation was performed with a balloon dilator. Afterwards, a 8.5-F flexible ureterorenoscope was placed through the UAS and the stones were fragmented and/or dusted using a holmium (Ho):yttrium–aluminium–garnet (YAG) laser with a 272-μm laser fibre set at 0.2–2 J $\times$ 10–40 Hz. Visualised stone fragments were extracted with a 1.7- and 2.2-mm Nitinol stone extractor (NGage®; Cook Urological Inc., Bloomington, IN, USA). To facilitate adequate access and to make the fragmentation process easier, most of the lower pole stones were re-located by basketing to the renal pelvis or upper pole. At the end of the procedure, bilaterally a pigtail stent or a ureteric catheter was placed, according to the surgeon's preference. The operation was terminated after finishing both sides with the same steps. The duration of each patient's operation, except anaesthesia induction and ureteric stenting period, was recorded and defined as the mean operation time.

On the first postoperative day, serum biochemistry, KUB, and renal USG were performed in all patients. These same measurements were repeated at the 1-month follow-up, and at this time the success rate was defined as patients who were stone-free or only had residual fragments of <3 mm. In all, a control CT was performed in only six patients with residual stones of >3 mm.

Complications occurring at <30 days after surgery were defined as short-term complications and were

Table 1 Patient and stone characteristics.

Variable	Value
Age, years, mean (SD)	39 (15.1)
N (%)	
Gender	
Female	19 (30.6)
Male	43 (69.4)
Stone location	
Renal pelvis	23 (14.6)
Upper calyx	16 (10.1)
Middle calyx	38 (24)
Lower calyx	61(38.6)
Ureter	20 (12.7)

Table 2 Short-term patient complications.

Complication	*N*
Clavien–Dindo Grade I	6
Stent pain and discomfort	2
Bleeding	4
Clavien–Dindo Grade II	4
Febrile UTI	4
Clavien–Dindo Grade III	2
Laser injury of urothelium	1
Ureteric dilatation with contrast extravasation in distal ureter	1
Clavien–Dindo Grade IV	0

categorised by the Clavien–Dindo classification system [5].

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS®), version 17.0 (SPSS Inc., IBM Corp., Armonk, NY, USA). A paired sample *t*-test was used to compare the pre- and postoperative serum creatinine levels. A $P < 0.05$ was considered statistically significant.

Results

A total of 62 patients (43 male, 19 female) with a mean (SD) age of 39 (15.1) years were included in the present study. All patients who underwent bilateral f-URS were low-risk patients with an ASA score of ≤ 2.

The stone location was as follows: 61 (38.6%) in the lower calyx of the kidney, 38 (24%) in the middle calyx, 23 (14.5%) in the renal pelvis, 16 (10.1%) in the upper calyx, and 20 (12.6%) in the ureter (Table 1). The stone characteristics of the patients were as follows; seven patients had bilateral renal + unilateral ureteric stones, 13 patients had unilateral renal + unilateral ureteric stones, and 42 patients had bilateral renal stones. There was hydronephrosis in 16 patients bilaterally and 22 unilaterally, with a maximum grade of 2. The mean (SD) stone size was 23.2 (6.11) mm and the mean (SD) operative time was 58.8 (16.24) min.

At the 1-month follow-up, six patients had a unilateral residual stone, and thus the success rate was 90.3% after the first procedure. Five of the patients who had residual lower pole calyceal stones underwent additional RIRS procedure and one with a proximal ureteric stone underwent SWL. After the second procedure, our success rate was 100%. All stones were submitted for stone analysis, with uric acid and Ca-oxalate monohydrate composition found in five (8%) and 57 (92%) patients, respectively.

Dilatation of the ureteric orifice was performed in 12 of 62 (19%) patients (eight patients unilaterally, four bilaterally) and UASs were placed in all renal units. Ureteric catheters were placed in 26 (41.9%) of the patients that were removed on the first postoperative day, whereas pigtail stents were placed in 36 (58.1%) patients and removed 2 weeks after a stone-free course.

Minor complications (Clavien–Dindo grades I–II) occurred in 10 (16%) patients. Four of them had a febrile UTI, four had urinary bleeding, and two had stent-related pain. Major complications (Clavien–Dindo grades III–IV), e.g. distal ureter laceration and laser injury of the ureter, occurred in two patients. For the treatment of these two patients, a pigtail catheter was kept *in situ* for 4–6 weeks and the ureter was expected to heal. The mean (SD) hospital stay was 1.58 (0.72) days. None of the patients had late complications during follow-up (Table 2).

The mean (SD) serum creatinine level before surgery and after stent removal was 1.08 (0.37) mg/dL and 0.95 (0.31) mg/dL, respectively. There was no statistically significant difference between pre- and postoperative serum creatinine level ($P = 0.83$; Table 3).

Discussion

URS was used effectively for distal ureteric stones when it was first introduced and now is also being used for proximal ureteric and renal stones with the development of stone fragmenting techniques and flexible ureterorenoscopes with smaller diameters [6]. Although the treatment of bilateral urinary stones is still controversial, due to the short duration of surgery and anaesthesia, and reduced hospitalisation, same-session f-URS can be the first-line treatment method [7,8]. However, complications such as infection and ureteric injury still

Table 3 Operative and postoperative outcomes.

Variable	Value
Operation time, min, mean (SD)	58.8 (16.24)
Stone-clearance rate, %	
After first session	90.3
After second session	100
Serum creatinine level, mg/dL, mean (SD)	
Preoperative	1.08 (0.37)
Postoperative	0.95 (0.31)
Hospitalisation time, days, mean (SD)	1.58 (0.72)

lead to controversy as to whether same-session URS or a staged procedure should be used.

SFRs for bilateral same-session URS have been reported to be >85% [9–16]. When we evaluated the results of unilateral URS, SFR was found to be between 70% and 97% [17–19]. In the last few years same-session bilateral compared to single-session unilateral URS became the prior method because no difference between success rates was seen. Our present study demonstrated a 90.3% SFR after the first procedure and a 100% SFR after the second procedure, which is consistent with the literature.

The overall complication rate of bilateral f-URS in the present study was 19.3%, which is also consistent with prior studies. Published complication rates from earlier cohort series of bilateral URS procedures ranged from 10% to 29% [9–15]. In the most recent study published on same-session URS, complication rates were reported to be 16.2% [20].

Ingimarsson et al. [20] evaluated unilateral URS procedures from their own database with a complication rate of 15.8%. No significant difference between the same-session bilateral and single-session unilateral URS was found in terms of complications ($P = 0.79$). However, mild flank pain and/or LUTS due to bilateral ureteric stenting may be more frequent in same-session procedures. It was shown that patients who underwent same-session URS were more frequently referred to emergency services due to these symptoms.

Complications, such as perforation and ureteric stricture, have been shown to be directly related to the diameter of the ureterorenoscope [6,17]. Therefore, earlier series were associated with higher complication rates (up to 45%), including postoperative fever and ureteric injury [4]. The most frequent reason for this was the diameter of the ureterorenoscope (10.5/12 F in the first series), which is now <8 F [6,17]. To reduce complication rates, it is recommended to use a safety guidewire, avoid forced manipulation and to use ureteric catheterisation [6]. Additionally, increased experience of the surgeon plays an important role in the reduction of morbidity and the complication rate.

According to the EAU guidelines on urolithiasis, ureteric catheterisation has been purposed as optional in uncomplicated URS procedures. However, in cases of perforation, bleeding, presence of residual fragments and infection, catheterisation is recommended [1]. Some reported studies showed that bilateral URS procedures may lead to acute renal failure due to bilateral ureteric oedema [15]. In our present study, no severe complication, such as early acute renal failure, was observed due to the placement of ureteric stents or JJ catheters in each patient.

Our present study had some limitations. First of all, our present study was based on a retrospective analysis of patients who underwent same-session f-URS. However, no comparison was made with patients who had staged-session URS. Another limitation was that patients could not be followed for long-term complications such as ureteric stricture or renal dysfunction.

Conclusion

Same-session bilateral f-URS is a successful and safe method for the treatment of bilateral renal and/or ureteric stone disease.

Conflict of interest

The authors declare that they have no competing interests.

References

[1] Türk C, Neisius A, Petrik A, Seitz C, Skolarikos A, Tepeler A et al., EAU Guidelines on Urolithiasis, 2017. Available at: http://uroweb.org/guideline/urolithiasis/. Accessed April 2018.

[2] Donaldson JF, Scrimgeour D, Stewart F, MacLennan S, Lam TB, McClinton E. Systematic review and meta-analysis of the clinical effectiveness of shock wave lithotripsy, retrograde intrarenal surgery, and percutaneous nephrolithotomy for lower-pole renal Stones. *Eur Urol* 2015;**67**:612–6.

[3] Preminger GM, Tiselius HG, Assimos DG, Alken P, Buck C, Gallucci M, et al. 2007 guideline for the management of ureteral calculi. *J Urol* 2007;**178**:2418–34.

[4] Hollenbeck BK. ST, Faerber GJ, Wolf JS Jr. Safety and efficacy of same-session bilateral ureteroscopy. *J Endourol* 2003;**17**:881–5.

[5] Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;**240**:205–13.

[6] Su LM, Sosa RE. Ureteroscopy and retrograde ureteral access. In: Walsh PC, Retik AB, Vaughan ED, Wein AJ, editors. *Campbell's Urology*. 8th ed. Philadelphia, PA: WB Saunders; 2002. p. 3306–18.

[7] Camilleri JC, Schwalb DM, Eshghi M. Bilateral same session ureteroscopy. *J Urol* 1994;**152**:49–52.

[8] 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**:481–4.

[9] Darabi M, Keshvari M. Bilateral same-session ureteroscopy: its efficacy and safety for diagnosis and treatment. *Urol J* 2005;**2**:8–12.

[10] El-Hefnawy AS, El-Nahas AR, El-Tabey NA, Shoma AM, El-Assmy AM, El-Kenawy MR, et al. Bilateral same-session ureteroscopy for treatment of ureteral calculi: critical analysis of risk factors. *Scand J Urol Nephrol* 2011;**45**:97–101.

[11] Isen K. Single-session ureteroscopic pneumatic lithotripsy for the management of bilateral ureteric Stones. *Int Braz J Urol* 2012;**38**:63–8.

[12] Watson JM, Chang C, Pattaras JG, Ogan K. Same session bilateral ureteroscopy is safe and efficacious. *J Urol* 2011;**185**:170–4.

[13] Gunlusoy B, Degirmenci T, Arslan M, Kozacıoglu Z, Koras O, Ceylan Y, et al. Is bilateral ureterorenoscopy the first choice for the treatment of bilateral ureteral stones? An updated study. *Urol Int* 2012;**89**:412–7.

[14] Mushtaque M, Gupta CL, Shah I, Khanday MA, Khanday SA. Outcome of bilateral ureteroscopic retrieval of stones in a single session. *Urol Ann* 2012;**4**:158–61.

[15] Huang Z, Fu F, Zhong Z, Zhang L, Xu R, Zhao X. Flexible ureteroscopy and laser lithotripsy for bilateral multiple intrarenal stones: is this a valuable choice? *Urology* 2012;**80**:800–4.
[16] Drake T, Ali A, Somani BK. Feasibility and safety of bilateral same-session flexible ureteroscopy (FURS) for renal and ureteral stone disease. *Cent European J Urol* 2015;**68**:193–6.
[17] Wendt-Nordahl G, Mut T, Krombach P, Michel MS, Knoll T. Do new generation flexible ureterorenoscopes offer a higher treatment success than their predecessors? *Urol Res* 2011;**1**:185–8.
[18] Perlmutter AE, Talug C, Tarry WF, Zaslau S, Mohseni H, Kandzari SJ. Impact of stone location on success rates of endoscopic lithotripsy for nephrolithiasis. *Urology* 2008;**71**:214–7.
[19] Miernik A, Wilhelm K, Ardelt PU, Adams F, Kuehhas FE, Schoenthaler M. Standardized flexible ureteroscopic technique to improve stone-free rates. *Urology* 2012;**80**:1198–202.
[20] Ingimarsson JP, Rivera M, Knoedler JJ, Krambeck AE. Same-session bilateral ureteroscopy: safety and outcomes. *Urology* 2017;**108**:29–33.