

Bilateral same session renal stone surgery tolerance and complications

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Abstract

Introduction: The prevalence rate of upper urinary tract calculi in Saudi Arabia is one of the highest globally. Bilateral renal stone management is an option but is still controversial.

Methodology: The study was a retrospective study, including 31 patients with bilateral renal or ureteric stones who underwent bilateral same-session ureterorenoscopy (BSS-URS). The data collected included age, gender, body mass index (BMI), stone burden bilaterally, operative time bilaterally, hospital stay, stone location, type of anesthesia, stone history, renal anomaly as well as pre- and postoperative JJ stenting. In addition, data related to complications (ureteric injury, renal failure, urinary tract infection, pain requiring an emergency department visit within 1 week of the procedure), the stone-free rate (defined as ≤ 3 mm asymptomatic stone fragment identified with computed tomography Kidney, Ureter and Bladder 3 months after surgery) was also collected. The data were collected from the electronic patient record system, entered in an Excel spreadsheet, and descriptive analysis was done.

Results: In total, 31 patients were included, with the majority (80.6%, $n = 25$) male. The mean age was 41.6 years, the mean BMI 28.7 ± 5.59 , the mean operative time for each renal unit 46.53 ± 25.69 min, and the mean hospital stay 17.87 ± 8.43 h. The majority (96.7%, $n = 30$) received general anesthesia. Less than half (40.3%, $n = 25$) of the renal units had stones in multiple calyces and the majority (90.3%, $n = 56$) of the renal units were stone free at the 3-month follow-up. A small proportion (3.2%, $n = 2$) of the renal units were polycystic. Pre-stenting was documented in 40.3% ($n = 25$) of the renal units and the majority (95.2%, $n = 59$) were stented postoperatively.

Conclusion: BSS-URS is a safe and a highly effective management option for bilateral renal stones.

Keywords: Endourology, lithiasis, lithotripsy, ureteroscopy

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INTRODUCTION

Urolithiasis is a disease with the global health problem. In the recent past, the prevalence and incidence of urinary tract stones increased with a significant number of patients presenting with bilateral stones.^[1,2] The treatment options, particularly retrograde intrarenal surgeries, have evolved extensively, though the management of bilateral stones remains controversial due to safety concerns.

Extracorporeal Shock Wave Lithotripsy (ESWL) is the least invasive intervention with a reasonable success rate, however in cases of multiple or high burden stones, the success rate is reduced and secondary procedures,^[3] such as Percutaneous Nephrolithotomy (PCNL) and Flexible Ureterorenoscopy (FURS) may be required. Staged and simultaneous bilateral PCNL are both feasible options for upper urinary tract stones. Although performing PCNL bilaterally in the same operation saves patients from multiple operative procedures, reduces the length of hospital stay, and accelerates their recovery, it is of limited use in cases with concurrent renal and ureteral stones.^[4] FURS has an improved success rate compared to ESWL, is less invasive than PCNL and it is possible to reach both ureteral and renal stones.^[5] However, bilateral same-session ureterorenoscopy (BSS-URS) is not widely accepted due to the potential risk of bilateral ureteral injuries which could cause significant morbidity.

Saudi Arabia has one of the highest rates of urinary tract stones, attributed to various environmental and nutritional factors.^[6] If BSS-URS is proven to be a feasible and safe management option for bilateral renal stones, it can be implemented in practice to reduce cost, working days lost, and the need for subsequent interventions. The aim of this study is to evaluate the outcome and safety of BSS-URS in the management of bilateral renal stones.

METHODOLOGY

This was a retrospective study, including 31 patients with bilateral renal or ureteric stones, 62 renal units, who underwent BSS-URS at King Abdulaziz Medical City in Riyadh from June 2016 till June 2018.

The data collected included age, gender, body mass index (BMI), stone burden bilaterally, operative time bilaterally, hospital stay, stone location, type of anesthesia, stone history, renal anomaly as well as pre-and postoperative JJ stenting. In addition, data related to complications (ureteric injury, renal failure, urinary tract infection [UTI], pain requiring an emergency department visit within 1 week of the procedure) and the stone free rate defined as < 3mm

asymptomatic stone fragment identified with computed tomography kidney, ureter, and bladder (CT KUB) 3 months after surgery was also collected. A renal US was done 9 months post-procedure to rule out hydronephrosis. The data were collected, entered in an Excel spreadsheet, and analyzed with descriptive statistics.

We used a Storz Flex X2 flexible ureteroscope for all the patients with a 10/12F ureteric access sheath. All patients received prophylactic antibiotics on the induction of the anesthesia. The patients were discharged home as per departmental protocol for postoperative analgesia and given an appointment for removal of the JJ stent 2 weeks later.

RESULTS

In total, 31 patients were included in the study with the majority (80.6%, $n = 25$) male. The mean age was 41.6 ± 11.81 years, the mean BMI 28.7 ± 5.59 kg/m² [Table 1], the mean operative time for each renal unit 46.53 ± 25.69 min [Table 2]. The majority (96.7%, $n = 30$) was done under general anesthesia. Less than half (40.3%, $n = 25$) of the renal units had stones in multiple calyces, and the majority (90.3%, $n = 56$) [Table 3] of the renal units were stone free at the 3-month follow-up. A small proportion of renal units (3.2%, $n = 2$) were polycystic. The mean hospital stay was 17.87 ± 8.43 h [Table 1]. No patient had hydronephrosis at the 9-month follow-up renal US. Pre-stenting was done in 40.3% ($n = 25$) of the renal units with the majority (95.2%, $n = 59$) stented postoperatively [Table 2]. Two patients (3.45%) developed a UTI postoperatively which required antibiotic treatment as an outpatient. The mean fluoroscopy time per unit was 57.6 s with a maximum 135 s.

DISCUSSION

FURS is a huge technological advancement developed for the management of renal stones. Since it was introduced, ureteroscopy was used to treat only distal ureteric stones. Henceforth, recently it is used with all types of stones including renal and proximal ureteric stones due to technological advances in scopes and the maneuvers used.^[7] The goal in the management of urolithiasis is to render patients stone-free, using the least invasive procedure with the lowest complications rate, and financially cost-effective. Bilateral ureteroscopy has a stone-free rate of more than 85%, saving patients the need for subsequent procedures.^[8,9] In the current study, the stone-free rate was 90.3%, which agrees with other reported series.^[10]

A stone-free rate is defined as ≤ 3 mm asymptomatic stone fragment identified with CT KUB 3 months after surgery.

Table 1: Demographic information of the sample

Variable	Units
Males <i>n</i> (%)	25 (80.6)
Females <i>n</i> (%)	6 (19.4)
BMI mean, median±SD	28.47, 28.40±5.59
Age mean, median±SD	41.06, 40±11.81
Stone burden (mm) mean, median±SD	11.79, 11±4.79
Hospital stay (hours) mean, median±SD	17.87, 24±8.43
General anesthesia <i>n</i> (%)	30 (96.77)
Spinal anesthesia <i>n</i> (%)	1 (3.33)
UTI <i>n</i> (%)	2 (3.45)

Table 2: Stone location

Renal Unit Characteristics	<i>n</i> (%)
Pre stenting	25 (40.3)
Stent post op	59 (95.2)
Stone history	22 (35.5)
Stone free rate	56 (90.3)
Renal anomalies (polycystic kidney)	2 (3.2)
Operative time (minutes) bilateral kidneys (mean, median±SD)	46.53, 45±25.69

Table 3: Renal Unit Characteristics

Stone Location	<i>n</i> (%)
Upper calyx	1 (1.6)
Middle calyx	5 (8.1)
Lower calyx	4 (6.5)
Renal pelvis	8 (12.9)
Multiple calyces	25 (40.3)
Upper ureter	13 (21)
Multiple	6 (9.7)
Total	62 (100)

This is a matter of controversy as some authors define stone free as zero fragments or residual on noncontrast CT KUB. It is difficult to justify the origin of our criteria.^[11] Huang *et al.*, in a retrospective analysis with 25 patients who underwent BSS-URS for multiple intrarenal stones, reported a stone-free rate of 72% after the first session and 92% after the second session. They defined stone free as the absence of fragments <1 mm using an ultrasound scan.^[9] In the current study, 90.3% (*n* = 56) of the renal units were deemed stone free at the 3-month follow-up with CT scan.^[9]

A recent systematic review done by Geraghty *et al.* explored the use of BSS-URS versus staged therapy and concluded the outcomes identical, with the additional advantage for BSS-URS of reduced cost, hospital stay, and operative time. In terms of complications, BSS-URS had fewer complications than staged therapy.^[10]

Currently, new endourological modalities exist which has made BSS-URS a more feasible option. For example, ureteral access sheaths that reduce intrarenal pressure facilitates an easier introduction of the ureteroscope as well as removing the stone fragments.^[12] In addition, hard to

reach stones can be fragmented and extracted more easily due to new innovations in laser and basket technologies.^[13]

The mean operative time per patient in the current study was approximately 90 min. A recent study published by Knipper *et al.* reported that a longer operative time may be associated with a higher complication rate which is true for minor complications. The rate of major complications is low regardless of the operative time.^[14]

This study has limitations. First, the sample size was small, the setting a specialized tertiary care hospital, and all BSS-URS procedures were done by a fellowship-trained endourologist which may affect the operative time and stone clearance rate. The same may not be applicable to nonfellowship trained urologists. Second, we did not compare the BSS-URS with staged therapy or the cost of such treatment. The current study is one of few studies related to BSS-URS but with a relatively large sample size. Follow-up was intermediate as all patients were followed up to 9 months with no significant complications, hydronephrosis, and the stone-free rate was high as (90%).

In conclusion, BSS-URS is a safe procedure with tolerable complications if done by an experienced endourologists. It is a judicious option, saving patients the inconvenience of subsequent procedures. With ureteroscopy being the most used procedure for urolithiasis management, it is crucial to find the best approach to achieve a stone-free status with the least number of sessions. BSS-URS has been proven to be a reasonable, safe option with low a complication rate and in selected patients, preferred above-staged therapy. We recommend randomized control trials to explore this novel approach in treating patients with bilateral renal stones compared with staged therapy including the financial aspects of both therapies.

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Conflicts of interest

There are no conflicts of interest.

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