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SURGICAL SCIENCES / CERRAHİ TIP BİLİMLERİ

Bilateral Same Session Ureteroscopy in Patients with Multiple Stones: Is It a Safe and Effective Alternative?

Birden Fazla Taşı Olan Hastalarda İki Taraflı Aynı Seans Üreteroskopi: Güvenli ve Etkili Bir Alternatif midir?

Muhammed Arif İbiş[1], Adem Sancı[2], Muammer Babayiğit[2], Eralp Kubilay[2], Khaled Obaid[2], Mehmet İlker Gökçe[2], Çağatay Göğüş[2], Yaşar Bedük[2]

[1]Keçiören Training and Research Hospital, Clinic of Urology, Ankara, Turkey
[2]Ankara University Faculty of Medicine, Department of Urology, Ankara, Turkey

Abstract

Objectives: The aim of our study was to evaluate the results of patients who underwent simultaneous bilateral same session ureteroscopy (BSSU) in cases of bilateral ureteral stones.

Materials and Methods: The medical records of 721 patients who underwent ureteroscopy at our institution, between March 2014 and August 2018, were reviewed retrospectively. BSSU was performed in 46 cases (6.4%) in total. Patient and stone characteristics, stone-free rate, and complication rates were recorded eventually. Variables were compared between successful and unsuccessful cases.

Results: Complete stone-free was achieved in 36 (78.2%) patients after the first session and the overall SFR was 95.7% (44/46). In 18 of the patients, at least one of the two sides had an impacted stone. The rate of stone impaction was statistically higher in unsuccessful cases (p=0.033). While postoperative bilateral JJ stent was placed in 40 of the patients, it was unilateral in 6 patients. Complications were encountered in 6 patients in total (13%). All of these complications were low grade, and 3 patients had fever and 3 patients had hematuria causing prolonged catheterization. The median hospital stay of patients was 1 (1-6) day.

Conclusion: Performing BSSU in the same session in cases with bilateral ureteral stones is an effective and safe alternative with low complication and high success rates. However, patients should be informed that the possibility of inserting a JJ catheter is higher and that additional intervention may be required, especially in cases with impacted stones.

Key Words: Bilateral Urolithiasis, Bilateral Same Session Ureteroscopy, Multiple Ureteral Stones

Öz

Amaç: Çalışmamızın amacı, bilateral üreter taşı olgularında eş zamanlı bilateral aynı seans üreteroskopi (BSSU) yapılan hastaların sonuçlarını değerlendirmektir.

Gereç ve Yöntem: Mart 2014-Ağustos 2018 tarihleri arasında kurumumuzda üreteroskopi yapılan 721 hastanın verileri retrospektif olarak incelendi. Toplam 46 olguya (%6,4) BSSU uygulandığı görüldü. Hasta ve taş özellikleri, taşsızlık oranı ve komplikasyon oranları kaydedildi. Değişkenler taşsızlık sağlanan ve sağlanamayan hasta grupları arasında karşılaştırıldı.

Bulgular: Otuz altı (%78,2) hastada ilk seanstan sonra tam taşsızlık sağlandı ve toplam taşsızlık oranı %95,7 (44/46) idi. Hastaların 18'inde en az bir tarafında empakte taş vardı. Başarısız olgularda empakte taş oranı istatistiksel olarak daha yüksekti (p=0,033). Hastaların 40'ına postoperatif bilateral JJ stent yerleştirilirken, 6 hastada JJ stent tek taraflı yerleştirildi. Toplamda 6 (%13) hastada komplikasyonlar görüldü. Bu komplikasyonların tümü düşük dereceli olup, 3 hastada ateş, 3 hastada kateterizasyonun uzamasına neden olan hematüri vardı. Hastaların ortanca hastanede kalış süresi 1 (1-6) gündü.

Address for Correspondence/Yazışma Adresi: Muhammed Arif İbiş
Keçiören Training and Research Hospital, Clinic of Urology, Ankara, Turkey
Phone: +90 541 624 04 50 **E-mail:** m.arifibis@hotmail.com **ORCID ID:** orcid.org/0000-0001-8581-2101
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Sonuç: Bilateral üreter taşı olan olgularda aynı seansta bilateral üreteroskopi yapılması düşük komplikasyon ve yüksek başarı oranları ile etkili ve güvenli bir alternatiftir. Ancak JJ kateteri yerleştirme olasılığının daha yüksek olduğu ve özellikle empakte taş olgularında ek müdahale gerekebileceği konusunda hastalar bilgilendirilmelidir.

Anahtar Kelimeler: Bilateral Ürolitiyazis, Bilateral Aynı Seansta Üreteroskopi, Çoklu Üreter Taşı

Introduction

Urolithiasis is a common disease worldwide. Shock wave lithotripsy (SWL), ureteroscopy (URS), and percutaneous nephrolithotomy are the three main interventions for the management of urolithiasis. The choice of treatment is determined by patient and stone characteristics (1).

The history of endoscopic procedures on the ureter dates back to the beginning of the 20th century. First, in 1912, Yang inserted a rigid cystoscope into the ureter in a patient with a posterior urethral valve (2). Half a century later, Marshal and colleagues passed a 3 mm fiberscope into the distal ureter for the management of distal ureteral calculi. After these, more advanced rigid and flexible ureteroscopes were developed gradually (3). Today, URS, is an ideal and minimally invasive approach for diagnostic and therapeutic procedures in the ureter and provides great success in ureter surgery. Semi-rigid URS is used for the treatment of urolithiasis in almost every part of the ureter, especially in the lower and middle ureter. With the latest advances in fiber optic technology and assistive instrumentation, proximal ureteral and renal calculi are successfully treated through a retrograde approach (4). Technological advancements in optics, digitalisation and laser fragmentation techniques have all played a part in this process.

The incidence of bilateral urolithiasis is around 10% (5). Bilateral same session ureteroscopy (BSSU) in patients with bilateral ureteral stones has advantages such as less procedure requirement, less anesthetic substance exposure, and a shorter hospital stay, as well as lower cost (6). But, its use did not become widespread in earlier times, and even it was considered riskier for complications such as bilateral ureteral injury (7). Although URS is a minimally invasive procedure, current literature reports that, there are complications with URS varying between 2.6% and 8.6% (8,9). The treatment of bilateral urolithiasis is a subject of great controversy among endourologists worldwide. Staged unilateral URS is generally preferred to BSSU approach. Concerns about BSSU stem from higher morbidity compared to a staged approach (6).

The purpose of our study was to assess the outcomes of patients who performed BSSU in cases of bilateral ureteral stones. The overall success rate and complication rates were discussed in the era of literature.

Materials and Methods

All cases of BSSU performed for urolithiasis at our institution between March 2014 and August 2018 were included into the study. The data of the patients were analyzed retrospectively (the informed consent was not obtained from the patients). The approval from the Clinical Research Ethics Committee of Ankara University was obtained (approval number: 2021/241, date: 27.07.2021). Bilateral ureteroscopy for indications other than urolithiasis were excluded. All patients had preoperative urine cultures and non-contrast computed tomography scans. Patients with UTI were treated with an appropriate antibiotic regimen before the procedure, depending on the urine culture test results. Stone size was recorded as largest stone diameter in any plane. Stone free was defined as absence of any stone fragments during operation. Cases that were totally stone-free were considered successful. X-ray or renal ultrasound (US) was performed for routine follow-up at 4 weeks postoperatively. Complications were recorded according to Modified Clavien Classification. All BSSU procedures were performed under general anesthesia.

Techniques and Instruments

Semi-rigid 6.5-7 F (Storz 27000 L) and Flex X 2S 7.5-F (Storz) flexible ureteroscopes were used. If the ureteroscope could not be advanced due to ureteral narrowing, we dilated the ureter with a ureteral balloon catheter. Ureteral access sheaths [9.5/11.5 F, 35 cm (Cook) or 10/12, 45 cm (Coloplast)] were used at attending urologist responsibility during flexible ureteroscopy. A Ho:YAG laser with a 270 µm fiber was applied for stone fragmentation. Intraoperative fluoroscopy was used in making key manipulations visible. Instead of continuous mode, intermittent paused exposure was applied to reduce the irradiation in the operating room. In some cases, a few instruments (graspers, baskets, etc.) were utilized for stone fragment extraction. Bilateral ureteral stents were kept on a hanging pull string for 2-3 days for patients to remove themselves after ureteroscopy. When there was mucosal damage or significant edema, the extraction string was removed and the stent remained there for 2-3 weeks.

Statistical Analysis

All statistical analyses were performed with SPSS 25.0.0.1 software (IBM Corp., Armonk, NY, USA) with the Mann-Whitney U, chi-squared test, Fisher-Freeman-Halton exact test, and

Independent Samples t-test. Normal distribution assumption for continuous variables was analyzed with the Shapiro-Wilk test. The statistical significance level was accepted as 0.05.

Results

In total, 46 patients aged between 27 and 66 years with bilateral ureter and/or renal pelvis stones underwent BSSU. Mean body mass index (BMI) of the patients who underwent bilateral ureteroscopy was 29±4.6 and 20 (43.4%) were female. In all, 21 patients (45.7%) had multiple stones (range 1-4) in their ureter and renal pelvis, while 54.3% had single stones on both sides. The mean stone size was 8.1±1.8 mm while the mean stone burden was 21.31±5.1 mm per patient. BSSU was performed with a semirigid ureteroscope in 22 (47.8%), a flexible ureteroscope in 11 cases (23.9%), and semirigid and flexible ureteroscopes in 13 (28.3%) (Table 1). Only 11 of 46 cases required unilateral ureteral balloon dilation when the ureteroscope could not be advanced due to narrowing at the intramural ureter. JJ stents were placed in all patients postoperatively. While postoperative bilateral JJ stent was placed in 40 of the patients, it was unilateral in 6 patients. The median hospital stay of patients is 1 (1-6) days (Table 1).

Table 2 summarizes the clinical and radiological characteristics of 46 patients according to their operation success. Complete stone-free was achieved in 36 (78.2%) patients after the first session. Stone-free was achieved in 6 of the remaining 10 patients in the second session. SWL was performed in 2 patients, the stone migrated to the kidney in 1 patient was followed up and one patient was lost to followed up. Twenty-five patients were imaged with X-ray and 20 patients with US at 4-week postoperatively. While immediate stone free rate (SFR) after the first procedure was obtained in 78.3%, the overall SFR 95.7% (44/46). The characteristics including gender, age, the American Society of Anesthesiologists score, stone size, stone number, stone location, stone opacity, hydronephrosis, ureteroscopy, postoperative stent, and hospital stay of the 46 study patients were not statistically different between groups except stone impaction (p=0.033).

The overall 30-day complication rate was 13%. Fever was observed in three patients and hematuria causing prolonged catheterization in three patients. The postoperative complications were grouped according to the Clavien-Dindo classification of surgical complications. All complications were low grade. Haematuria improved after haemostatic drugs or oral and intravenous fluids, while treatment with antipyretics and antibiotics was successful in controlling the fever.

Discussion

This study demonstrates that BSSU can be performed with low odds (13%) of minor complications and good success rates. Severe complications did not occur; however, 3 cases, had gross hematuria, in whom blood transfusion was not needed, and 3 casess, developed fever, which was suppressed using medical treatment. Additionally, our present results of the BSSU approach for the treatment of bilateral urinary stone disease

Table 1: Patient, operation, and stone data

Variable	Value
Gender, n (%)	
Male	26 (56.6)
Female	20 (43.4)
Age (y)	44.9±6.2
ASA, n (%)	
1	23 (50)
2	16 (34.8)
3	7 (15.2)
Stone size (mm)	8.1±1.8
Stone number, n (%)	
Single (Both right and left)	25 (54.3)
Multiple (Right or left)	21 (45.7)
Stone location, n (%)	
Right	
Distal ureter	24 (40.7)
Mid ureter	15 (25.4)
Proksimal ureter/renal pelvis	20 (33.9)
Left	
Distal ureter	22 (35.5)
Mid ureter	21 (33.9)
Proksimal ureter/renal pelvis	19 (30.6)
Stone impaction, n (%)	
No	28 (60.9)
Yes	18 (39.1)
Stone opacity, n (%)	
No	11 (23.9)
Yes	25 (76.1)
Hydronephrosis, n (%)	
No or mild	25 (54.3)
Moderate or severe	21 (45.7)
Ureteroscopy, n (%)	
Semi-rigid	22 (47.8)
Flexible	11 (23.9)
Both	13 (28.3)
Postoperative stent, n (%)	
Unilateral	6 (13)
Bilateral	40 (87)
Hospital stay	1 (1-6)
Complications, n (%)	
Fever	3 (6.5)
Prolonged haematuria	3 (6.5)
Clavien-Dindo grade, n (%)	
I-II	6 (13)
III-IV	0 (0)

ASA: The American Society of Anesthesiologists score

disclosed a successful outcome rate of 78.3% after the first procedure and an overall success rate of 95.7%. Also, in the current study, stone impaction was a significant risk factor for unsuccessful cases (p=0.033).

Since BSSU subjects both ureters to surgical trauma with increased morbidity risks, the treatment of bilateral ureteral stones in the same session is a controversial issue. In 2003, Hollenbeck et al. (10) reported that BSSU is not safe and produces higher rates of postoperative complications. With advancements in minimal invasive therapeutic approach, treatment success rate has increased and postoperative morbidity has decreased (11). With the accumulation of miniaturized endoscopic surgery and surgeon experience, the overall URS complication rate decreased to 5-9% and the perforation rate to less than 2% (12). Current literature reports that, there are complications with URS varying between 2.6% and 8.6% (8,9).

In 2016, Ge et al. (6) conducted a systematic review which included 11 studies involving 431 patients who underwent BSSU. In the review, where most stone sizes were no larger than 20 mm, the mean stone-free rate was 72% in the proximal ureter, 85% in the middle ureter, and 96% in the distal ureter. Although the complication rate was relatively higher, most of the complications were minor (6). The Croes Ureteroscopy global

Table 2: Comparisons between groups of successful and unsuccessful cases

Variables	Successful cases n=36	Unsuccessful cases n=10	p-value
Gender, n (%)			0.476
Male	19 (73.1)	7 (26.9)	
Female	17 (85)	3 (15)	
Age (y)	45±6.8	44.6±5.5	0.919
ASA, n (%)			0.188
1	16 (69.6)	7 (30.4)	
2	14 (87.5)	2 (12.5)	
3	6 (85.7)	1 (14.3)	
Stone size (mm)	7.8±1.5	8.3±2.2	0.463
Stone number, n (%)			0.475
Single (Both right and left)	21 (84)	4 (16)	
Multiple (Right or left)	15 (71.4)	6 (28.6)	
Stone location, n (%)			0.966
Distal ureter + Distal ureter	9 (81.8)	2 (18.2)	
Distal ureter + Mid ureter	8 (80)	2 (20)	
Distal ureter + Proximal ureter/renal pelvis	6 (75)	2 (25)	
Mid ureter + Mid ureter	3 (100)	0 (0)	
Mid ureter + Proximal ureter/renal pelvis	6 (66.7)	3 (33.3)	
Proximal ureter/renal pelvis + Proximal ureter/renal pelvis	4 (80)	1 (20)	
Stone impaction, n (%)			0.033
No	25 (89.3)	3 (10.7)	
Yes	11 (61.1)	7 (38.9)	
Stone opacity, n (%)			0.682
No	8 (72.7)	3 (27.3)	
Yes	28 (80)	7 (20)	
Hydronephrosis, n (%)			0.150
No or mild	22 (88)	3 (22)	
Moderate or severe	14 (66.7)	7 (33.3)	
Ureteroscopy, n (%)			0.898
Semi-rigid	18 (81.8)	4 (18.2)	
Flexible	8 (72.7)	3 (27.3)	
Both	10 (76.9)	3 (23.1)	
Postoperative stent, n (%)			1
Unilateral	5 (83.3)	1 (16.7)	
Bilateral	31 (77.5)	9 (22.5)	
Hospital stay [median, (min.-max.)]	1 (1-6)	1 (1-4)	0.527

ASA: The American Society of Anesthesiologists score, min.: Minimum, max.: Maximum

study consisted of 273 patients who underwent bilateral URS for multiple stones. Compared with patients who underwent ipsilateral ureteroscopy for single stones, patients with BSSU and multiple stone treatments had longer operative times, lower stone-free rates, and higher retreatment rates. Complication rates were similar (13). In a recent review of 16 studies, including 1073 cases, which evaluated the treatment of ureteral stone, an overall SFR was 90.5%, and minor (the Calvien I-II) and major (the Clavien III-IV) complication rates were 22.4% and 1.4%, respectively (14).

Success rates were lower in patients with impacted stones, in our study. We think that this is due to infection that occurs proximal to the impacted stone. In order to minimize the risk of urosepsis, we ended the procedure by inserting a double j stent without interfering with the stone in cases where pyuric urine came from behind the stone during the operation. This situation negatively affected our SFR after the first procedure. It is now well established that URS for non-impacted stones is associated with higher stone-free and lower intraoperative complication rates compared to URS for impacted stones (15). El-Hefnawy et al. (16) reported stone surface area, stones in the proximal ureter, and stone impaction as risk factors influencing the success of BSSU. It has been emphasized that ureteral edema caused by impacted stone increases the risk of mucosal damage and ureter perforation, and the success rate decreases. Contrary to this study, we found that stone size, stone number, and stone location were not different in successful and unsuccessful cases in our study.

The decision to postoperative stent insertion was left to the surgeon's discretion, but at least one JJ stent was placed in all patients in the present study. For this reason, as it was not compared with stent-free patients, it was not possible to evaluate the impact of postoperative stenting on the prevention of postoperative complications. In our experience, due to concerns about simultaneous renal damage resulting from bilateral urinary obstruction, JJ stents should be utilized in all BSSU cases. We think that stenting will be beneficial for the continuity of urinary flow after stone fragmentation or dusting. In addition, mucosal damage during the treatment of impacted stones and the utilize of access sheaths may necessitate postoperative stenting.

BSSU has advantages over staged procedures such as reduction of the overall operative time, anesthesia requirement, and hospital stay (10). However, the surgeon's concern about intraoperative complications may make them avoid from BSSU. An attentive patient selection and appropriate utilization of instrumentation can reduce complication rates. Each patient should be informed that the contralateral procedure might be postponed to another day, and it might be possible to clear only one side of the stones that day.

Study Limitations

Several limitations in this study should be noted. The study was retrospective in nature. Due to the relatively small number of patients, as with other studies, in literature, a multivariate analysis to find out independent influencing factors on SFRs and complications could not be performed. Also, BSSU SFR and complication rates were not compared to staged procedures. Even so, this study demonstrated that BSSU is an effective and safe approach, with low-grade complications and high overall SFR.

Conclusion

BSSU can achieve a high SFR with low-grade complications. Proper patient selection and preoperative patient counseling should be done carefully. Patients should be informed that the possibility of inserting a JJ catheter is higher. It should be kept in mind that the failure rates of impacted stones may be higher.

Ethics

Ethics Committee Approval: The approval from the Clinical Research Ethics Committee of Ankara University was obtained (approval number: 2021/241, date: 27.07.2021).

Informed Consent: Informed consent was not obtained owing to the retrospective nature of the study.

Peer-reviewed: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.A.İ., K.O., Y.B., Concept: A.S., K.O., E.K., M.İ.G., Design: M.B., E.K., Ç.G., Y.B., Data Collection or Processing: A.S., K.O., Ç.G., Analysis or Interpretation: M.A.İ, M.B., E.K., Literature Search: A.S., Ç.G., M.İ.G, Y.B., Writing: M.A.İ., M.B., M.İ.G.

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