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Original Article *Özgün Araştırma*

IMPACT OF PREOPERATIVE STENT ON RETROGRADE INTRARENAL SURGERY OUTCOMES

Preoperatif Stent Uygulamasının Retrograd İntrarenal Cerrahi Sonuçları Üzerine Etkisi

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ABSTRACT

Objective: Retrograde intrarenal surgery is commonly indicated for the treatment of 10-20 mm ureteral and renal stones. Sometimes, primary retrograde endoscopy is not possible. Pre-stenting may facilitate passage of ureteroscope or ureteral access sheath in these cases. This study aimed to assess the impact of preoperative ureteral stenting on the outcomes of retrograde endoscopic stone surgery.

Material and Methods: A database of patients who underwent retrograde intrarenal surgery for proximal ureteral or renal calculi between January 2015 and October 2018 was analyzed. Sixty-seven patients had a ureteral stent preoperatively (Group 1). Control group (Group 2) consisting of 67 patients were chosen among the rest of the database with similar characteristics. Preoperative, intraoperative and postoperative data of two groups were compared.

Results: There were no statistically significant differences in demographic and preoperative features between the two groups except for previous stone surgery. Overall complication rate, stone free rate, operation time and postoperative double J placement rate were similar between two groups. Most of the complications were low grade for both groups. In group 2 ureteral stricture was seen in two patients.

Conclusion: Retrograde intrarenal surgery, Preoperative stent, Stone, Stone free rate, Double J stent.

***Keywords**: Retrograde intrarenal surgery, preoperative stent, stone, stone free rate, double J stent.*

ÖZ

Amaç: Retrograd intrarenal cerrahi genellikle 10-20 mm boyutunda üreteral ve renal taşların tedavisinde endikedir. Bazen primer retrograd endoskopi mümkün olmayabilir. Bu durumlarda prestent uygulaması üreteroskop veya üreteral akses kılıfın geçişini kolaylaştırabilir. Bu çalışmada, preoperatif üreter stent uygulamasının, retrograd endoskopik taş cerrahisi sonuçları üzerine etkisi değerlendirilmiştir.

Gereç ve Yöntemler: Ocak 2015-Ekim 2018 tarihleri arasında proksimal üreter veya intrarenal taşı olan hastalarda uygulanan retrograd intrarenal cerrahi sonuçları analiz adildi. Ameliyat öncesi 67 hastada üreteral stent vardı (Grup 1). Veri tabanında benzer özellikleri olan 67 hasta seçilerek kontrol grubu (Grup 2) oluşturuldu. İki grubun preoperatif, intraoperatif ve postoperatif verileri karşılaştırıldı.

Bulgular: Geçirilmiş taş cerrahisi dışında iki grup arasında demografik ve preoperatif veriler arasında istatistiksel olarak anlamlı fark yoktu. Genel komplikasyon taşsızlık, ameliyat süresi ve postoperatif çift J yerleştirme oranı iki grup arasında benzerdi. Her iki grupta çoğunlukla minör komplikasyonlar görüldü. Grup 2'de iki hastada üreteral darlık görüldü.

Sonuç: Retrograd intrarenal taş cerrahisi için preoperatif stent uygulamasının, cerrahi sonuçlar üzerine etkisi görülmemektedir.

***Anahtar Kelimeler**: Retrograd intrarenal cerrahi, preoperative stent, taş, taşsızlık oranı, çift J stent.*

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INTRODUCTION

Urinary stone disease (USD) prevalence is increasing and is seen around 14% within a lifetime (1). Treatment of USD by using flexible ureterorenoscope which emerged by the developments in endoscopic technology and instruments has become more popular. European Association of Urology (EAU) guidelines recommend shock wave lithotripsy (SWL) or endoscopy (retrograde intrarenal surgery, ureterorenoscopy or percutaneous nephrolithotomy (PNL)) for treatment of ureter or renal stones between 10- and 20-mm diameters (2).

After Hugh Hampton Young described the first ureteral dilatation in 1912, there was considerable progress in the area of ureteroscopy (3). Ureteral access sheath (UAS) which has become an essential device in retrograde intrarenal surgery (RIRS) is accepted as a facilitating tool for accessing the upper urinary tract. UAS not only decreases intrarenal pressure but also, shortens the operation time and increases the stone-free rates (SFR) (4). However, it may have a negative effect on the ureter by hindering ureteral blood flow.

The ureter can be easily damaged during open, laparoscopic or endoscopic procedures (5,6). Therefore, in some centers, a ureteral stent is placed preoperatively to facilitate the passage of ureteroscope or UAS to avoid ureteral injury and to improve SFR (7). Several studies have reported that ureteral stenting before ureteroscopy may increase the success rate of access with passive dilatation and may allow easier upper tract access (8-11) but the indications of this procedure and the relations with the surgical outcomes have not been established yet (12).

This study aimed to assess the effect of preoperative ureteral stenting on the outcomes of endoscopic stone surgery.

MATERIALS AND METHODS

This study was approved by the local clinical ethics committee and all the patients signed informed consent (Date: 12.12.2018, desicion number: 2017-KAEK-189_2018.12.12_14). Also, this study was designed in accordance with the Declaration of Helsinki.

A database of patients who underwent RIRS procedure for proximal ureter or renal calculi in our department between January 2015 and October 2018 was analyzed retrospectively. Sixty- seven patients had a ureteral stent preoperatively. Control group was chosen among the rest of the database with similar characteristics. The patients who have multiple renal calculi, lower pole stones, parenchymal stones, renal abnormalities and proximal uretral stones that underwent URS were excluded. Preoperative stents were placed in case of indications such as obstructive pyelonephritis, fever, unsuccessful ureteroscopic access, renal insufficiency, and renal colic.

For comparison, patients were defined as belonging to group 1 if pre-stented and group 2 if not pre-stented. This division resulted in two comparison groups of 67 patients each. All procedures were performed by the same team in our department.

Preoperative laboratory and radiological tests were performed before the operation. Various imaging methods (Kidney Ureter Bladder Graphy (KUBG), ultrasonography (US), intravenous urography (IVU) and non-contrast computed tomography (CT) were performed. Preoperative stone and patient characteristics were recorded. If a urinary tract infection (UTI) was encountered, it was treated before the operation. All operations were performed after confirming preoperative sterile urinary profiles. A second-generation cephalosporin was administered as surgical prophylaxis 1 hour before operation.

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All procedures were performed under general anesthesia. None of the patients underwent ureteral balloon dilatation. In group 1, following a pre-stenting period of 15 days, ureteral stent was removed, and then the surgeon accessed to the ureter by a 9.5 F ureteroscope (Karl Storz, Tuttlingen, Germany) for a safe dilatation through a guidewire. In Group 2, the 9.5 F ureteroscope introduced directly to the ureter through the guidewire. UAS (Elite Flex, Ankara, Turkey) was placed in the ureter in all of the cases. A 7.5 F flexible ureteroscope (Flex-X2, Karl Storz, Tuttlingen, Germany) was used for RIRS. A 200 micrometer laser fiber (Ho YAG Laser; Dornier MedTech; Munich, Germany / Dornier Med-Tech GmbH, Medilas H20 and HSolvo, Wessling, Germany) was used for laser lithotripsy in both groups. Nitinol stone retrieval baskets were also used if necessary. At the end of the operation, a ureteral stent was placed in case of bleeding, perforation, residual fragments, mucosal injury, etc. for at least 21 days. The period from the beginning of cystoscopy through the end of ureteral stent placement was defined as operation time. Hospitalization time was one day except for the patients who had any complication. Intraoperative and postoperative data were recorded and assessed.

All patients were checked on follow-up at the fourth week when the stent was removed and third month after the surgery and controlled with KUBG. If necessary, patients were evaluated with CT or US. Being stone free was accepted as success. We analyzed data for age, gender, SWL history, previous stone surgery, stone parameters (stone size, location, density) operation time, residual stones. Stone size was recorded as the maximum diameter of stone in non-contrast CT. The perioperative and postoperative complications were classified according to the modified Clavien-Dindo classification (13).

Preoperative, intraoperative and postoperative data of two groups were compared.

All statistical tests were calculated using Statistics Package for Social Sciences version 25 (IBM SPSS®, Chicago, IL). Kolmogorov-Smirnov and Shapiro-Wilk tests were performed for normality analysis. Numerical parameters with abnormal distribution were analyzed with the Mann-Whitney U test. Categorical parameters were analyzed with the Chi-Square test. $p<0.05$ was accepted significant.

RESULTS

The demographic and peroperative features of the patients are given in Table-1. The mean age was 47.8 and 44.9 years in group 1 and group 2, respectively. There was no statistically significant difference between the two groups except previous stone surgery. In group 1, unsuccessful ureteroscopic access was recorded in 12 (17.9%) patients.

The complications are given in Table-2. In 19.5% of patients, complications occurred in group 1. In Group 2, the complication rate was 13.5%. There was no statistically significant difference between the two groups for complications. ($p=0.126$). Most of the complications were low grade for both groups. In group 2, ureteral stricture was seen as major complication in two patients.

The postoperative features of the groups are given in Table 3. There was no statistically significant difference between the two groups for SFR, operation time and postoperative JJ. Mean operation time was 42.61 and 44.37 minutes in group 1 and group 2, respectively ($p>0.05$). SFR was 88.1% and 76.1% in group 1 and group 2, respectively ($p=0.115$).

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Table 1: The demographic values and preoperative features

	Group 1 (n=67)	Group 2 (n=67)	p value
Age (SD±)	47.81±13.70	44.98±14.59	0.142
Gender (n, %)			
Female	18 (26.9%)	23 (34.3%)	0.453
Male	49 (73.1%)	44 (65.7%)	
SWL History (n,%)	12 (17.9%)	8 (11.9%)	0.467
Previous Stone Surgery (n,%)	58 (86.5%)	11 (16.4%)	<0.001
Opacity (n,%)			
Non-opaque	22 (32.8%)	19 (28.4%)	0.571
Opaque	44 (65.7%)	45 (67.2%)	
Semi-opaque	1 (1.5%)	3 (4.5%)	
Stone Size (mm)(SD±)	12.36±5.91	13.07±5.11	0.124
Stone Density (HU)(SD±)	1143.13±319.54	1061.15±355.53	0.774
Stone Side (n,%)			
Upper Calyx	8 (11.9%)	8 (11.9%)	
Middle Calyx	13 (19.4%)	12 (17.9%)	
Pelvic	22 (32.8%)	18 (26.9%)	0.920
UPJ	7 (10.4%)	9 (13.4%)	
Proximal Ureter	17 (25.4%)	20 (29.9%)	

SD: Standart Deviation, SWL: Shock Wave Litotripsy, mm: milimeter, HU: Hounsfield Unit, UPJ: Ureteropelvic Junction

Table 2: Clavian classification of the complications.

Clavian Classification	Group 1 (n=67)	Group 2 (n=67)	p value
No Complication (n,%)	54 (80.5)	58 (86.5)	
Grade 1 (n,%)	13 (19.5)	7 (10.5)	0.126
Grade 3b (n,%)	0 (0)	2 (3)	

Table 3: Postoperative comparison of the groups

	Group 1 (n=67)	Group 2 (n=67)	p value
Postoperative JJ usage (n,%)	66 (98.5%)	66 (98.5%)	1.00
Stone Free (n,%)	59 (88.1%)	51 (76.1%)	0.115
Operation Time (±SD) (min)	42.61±22.95	44.37±28.14	0.793

SD: Standart Deviation, RIRS: Retrograd Intrarenal Surgery, URS: Ureterorenoscopy
Min: Minute

DISCUSSION

Preoperative stent usage is a standard procedure in patients with urinary infection, severe pain, solitary kidney and severe hydronephrosis. A large number of series recommend postoperative ureteral stenting whereas there is limited data on the effect of preoperative stenting on surgical outcomes. Few series have reported the effect of preoperative ureteral stent placement on success of stone surgery (3,8,14,15).

The access to an orifice during endoscopic stone surgery is an important process affecting the success of the operation. To overcome the difficulties experienced at the access stage, urologists perform ureteral balloon dilatation or catheter dilatation to facilitate the procedure. Jones et al. reported that ureteral stent placement for passive dilatation after an unsuccessful ureteroscopy procedure had improved operation success in the second stage (9). In recent years, whether obtaining a spontaneous dilatation by placing a stent into the ureter before the endoscopic surgery, or not, has become a popular topic among urologists. Auge et al. noted that more than 50% of the urologists with more than ten years of experience were performing pre-stenting. On the other hand, none of the urologists with less than two years of experience were performing pre-senting (16). The effect of preoperative ureteral stenting on operation success and complication

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rates have not been clarified yet although there are numerous studies in the literature.

Shield et al. evaluated a series of 221 patients and noted that a successful surgical procedure was negatively associated with stone size, cumulative stone burden and the number of stones. Preoperative stent placement was not statistically associated with success rates (17). Similarly, Lei Chu et al. evaluated 104 patients and noted that preoperative stent was associated with a decreased operative time in patients who have stone burdens greater than 1 cm (10). Netch et al. reported a match-paired analysis of 286 patients. They placed a stent to half of the patients before surgery. They evaluated patients according to their stone size and performed endoscopic surgery for all. According to their results, ureteral stent application increased stone-free rates before surgery for stones of size >5 mm. There was no significant difference between the patients regarding complications (14). In our study, we excluded the patients who had multiple renal calculi and there were not any significant differences between the two groups for stone sizes and operation times.

Lee MH et al. introduced ureteral stent to some of their patients one week before the operation and they performed the same process to the second group more than a week before the surgery (7). They did not place any stents to the rest of the patients. In the end, they reported that stenting time was not important, but they claimed that stenting before endoscopic stone surgery reduced the complication rate and the need for balloon dilatation. In our study, the pre-stenting period was 15 days in group 1 and the complication rates were not significantly different between the two groups. Also, there was no need for balloon dilatation in our standard technique. We think that ureteral stricture was seen only in 2 patients in group 2, because of the longer operation time as some studies showed that UAS may transiently decrease ureteral blood flow by overdistension and these changes may cause ureteral stricture (7).

Lumma et al. examined the URS series of 550 patients over ten years. A preoperative stent was used in 88.4% of the patients. They found that preoperative ureteral stenting did not make a significant change in complication rates and claimed that such a procedure was not rational before surgery. They also reported that ureteral stents did not affect stone-free rates (18). Similarly, Zhang J et al. evaluated a series of 176 patients regarding entry success. Sixty-two of patients were stented before the operation and success of access was 100 % in that group. One hundred fourteen of the patients were not stented and success rate of access in that group was 91.2 %. They claimed that stenting had no effect on SFR and duration of surgery. They also stated that stenting before surgery did not affect the success of accessing to the ureter (12). On the other hand, Rubenstein et al. claimed that preoperative stent placement provided higher stone-free rates, according to the results in an URS series of 90 patients (3). In addition, it is stated that pre-senting facilitates the management of urolithiasis especially for kidney stones, while increasing the SFR and decreasing the intraoperative complication rates (19,20). In EAU guideline, it is reported that pre-senting facilitates and improves outcomes of URS (in particular for renal stones) and also emphasized that preoperative routine stent placement is not recommended (21). In our study, SFR, operation time and complication rate were not significantly different. As a result, we think that routine pre-senting should not be decided for inappropriate patients.

In this study we compared two groups which had 67 patients each. For demographic and preoperative features, previous stone surgery was statistically significant between two groups. The studies researching RIRS success revealed that previous stone surgery does not affect RIRS success (22,23). The other features were similar between the groups. For the

complications there was no statistically significant difference between the groups. This result was similar with the literature (18). The stone-free rates were similar between Group 1 and 2. (p=0.115). This can be explained with advanced technology in laser and flexible ureterorenoscope and increasing experience.

Retrospective design of our study is a limitation. Other limitations include low number of study population, collection of single-centered data, and failure to evaluate the complex stones (multiple stones, lower calyx, anatomical varieties).

If a surgeon does not place ureteral stent before endoscopic stone surgery for an approved indication, it may give extra morbidity for the patient. However, is the benefit of ureteral stent placement worth taking a risk for both the patient and surgeon? It is clear that this question has not been clarified yet with the findings in the literature. Prospectively designed studies in larger populations are needed. Based on our data, we believe that ureteral stenting out-of-indication before the procedure will not bring benefit to the patient and the surgeon.

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