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Clinical Outcomes of Ureter Stone Treatment Delayed Due to The Sars-Cov-2 Pandemic

Sars-Cov-2 Pandemisi Nedeniyle Geciktirilen Üreter Taşı Tedavisinin Klinik Sonuçları

Çağlar YILDIRIM[1], Mehmet Yılmaz SALMAN[2], Mehmet Şirin ERTEK[1], Göksel BAYAR[1]

[1] Mardin Devlet Hastanesi, Üroloji Kliniği, Mardin, Türkiye

[2] Sancaktepe Şehit Prof Dr. İlhan Varank Eğitim ve Araştırma Hastanesi, Üroloji Kliniği, İstanbul, Türkiye

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Abstract

Objective: Our aim was to assess the outcomes for ureter stones with delayed treatment due to the SARS-CoV-2 pandemic.

Materials and Methods: Data from patients with ureterorenoscopy (URS) performed due to ureter stones were retrospectively assessed in the period during the pandemic of 1-31 January 2021 and the period before the pandemic of 1-31 January 2020. On first attendance, patients were assessed for emergency drainage requirements, ureter JJ stent requirement, post-op stone-free rate, re-URS requirements, and the presence of complications rated Clavien-2 and above.

Results: The study included 102 patients in total, 38 after and 64 before the pandemic. The post-pandemic group had a significantly higher impacted stone rate (15.8%) compared to the pre-pandemic group (3.1%) (p = 0.021). Seven patients (18.4%) in the first group and two patients (3.1%) in the second required emergency drainage (p = 0.008). Further, ureteral JJ stent requirements were significantly higher in the first group (71%) than in the second group (29.7%) (p<0.001). The re-URS requirements in the first group were significantly higher (18.4% vs 4.7%, p = 0.024), and in the postoperative period, stage 2 and higher complications developed in 10 patients in the first group (26.3%) and 3 patients in the second (4.7%) (p = 0.002).

Conclusion: Ureter stones with delayed treatment linked to the SARS-CoV-2 pandemic caused increased complications, permanent morbidity, and more difficult treatment processes.

Keywords: SARS-CoV-2 Pandemic, Ureter Stone, Treatment, Complication

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Öz

Amaç: SARS-CoV-2 pandemisi nedeniyle tedavisi gecikmiş üreter taşlarının sonuçlarını değerlendirmeyi amaçladık.

Gereç ve Yöntemler: Üreter taşı nedeniyle üreterorenoskopi (URS) yapılan hastalardan elde edilen veriler 1-31 Ocak 2021 pandemi döneminde ve 1-31 Ocak 2020 pandemi öncesi dönemde retrospektif olarak değerlendirildi. Acil drenaj gereksinimleri, üreter JJ stent gereksinimi, ameliyat sonrası taşsızlık oranı, yeniden URS gereksinimleri ve Clavien-2 ve üzeri olarak derecelendirilen komplikasyonlar kaydedildi.

Bulgular: Çalışmaya pandemi sonrası 38 ve pandemi öncesi 64 olmak üzere toplam 102 hasta dahil edildi. Pandemi sonrası grupta, pandemi öncesi gruba (%3,1) kıyasla önemli ölçüde daha yüksek gömülü taş oranı (%15.-,8) vardı (p = 0.021). Birinci grupta yedi hasta (%18,4) ve ikinci grupta iki hasta (%3,1) acil drenaj gerektirdi (p = 0,008). Ayrıca üreteral JJ stent gereksinimi birinci grupta (%71) ikinci gruba (%29,7) göre anlamlı derecede yüksekti (p<0.001). Birinci grupta re-URS gereksinimleri anlamlı olarak daha yüksekti (%18,4'e karşı %4,7, p=0,024). Birinci grupta 10 hastada (%26,3) ve ikinci grupta 3 hastada (%4,7) (p = 0,002) evre 2 ve üzeri komplikasyon gelişti

Sonuç: SARS-CoV-2 pandemisine bağlı tedavisi geciken üreter taşları artan komplikasyonlara, kalıcı morbiditeye ve daha zor tedavi süreçlerine neden olmuştur.

Anahtar Kelimeler: SARS-CoV-2 Pandemisi, Üreter Taşı, Üreteroskopi, Komplikasyon

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*Sorumlu Yazar (Corresponding Author): Göksel Bayar, **e-mail**: goxelle@yahoo.com

Introduction

The SARS-CoV-2 virus, first seen in Wuhan state in China in December 2019, became a pandemic affecting the whole world in a dramatic way in a very short period. The first case in Turkey confirmed by the Ministry of Health was reported on March 11, 2020. After the sudden and rapid spread of the disease, like all branches, urology had to revise clinical recommendations and current treatment regimens. Though there were differences between countries, the general approach was first shaped by use of all medical infrastructure as a priority in the struggle against the pandemic. In this period, all health professionals chose to delay non-emergency interventions. All elements relating to health labor, inpatient services, intensive care units, and respiratory devices were used first in the struggle against the pandemic (1-3).

Urinary system stone disease has a broad clinical spectrum, from asymptomatic situations to serious complications requiring emergency surgical intervention. Delayed treatment of ureter stones, especially with complications causing obstruction, renal failure, and infection, may cause serious morbidity (4). Ureterorenoscopy (URS), commonly used around the world, is a safe and effective choice for stone disease treatment, with higher stone-free rates compared to shockwave lithotripsy and lower complication rates compared to percutaneous nephrolithotomy (5). During the pandemic, clinical decision-making in stone disease management was not just based on factors related to the patient and stone, but also linked to all other disciplines and available health infrastructure, including anesthesiologists, patient beds, mechanical ventilators, and intensive care units. It should not be forgotten that delayed intervention with ureter stones is a possible risk factor that may negatively affect the whole process (6).

Considering this data, our study aimed to compare the clinical features and complications in the postoperative period for patients who underwent ureter stone treatment at our clinic before the pandemic with those for patients after the pandemic.

Materials and Methods

This is single center retrospective study. Our hospital is in southeast region of Turkey. The third wave of the pandemic was not seen in this region as of February 2021. Second wave is over at December 2020 and, limited working in urology clinic and operation has started on January 1st with 8 patient beds. After the pandemic, patients who underwent URS during January 2021 were investigated. The control group comprised patients operated one year before, in January 2020 before the pandemic. Patients who were pregnant, younger than 18 years, solitary kidney and with interventions for kidney stones were excluded from the study. Although most of the patients did not come to the hospital despite having symptoms, there was a delay not only in treatment but also in diagnosis. Therefore, we analyzed time of from first symptom to treatment. Those with an ECOG performance score greater than 0 or those with a persistent disease (diabetes mellitus, hypertension, coronary heart disease etc.) were considered to have co-morbidities. Previous stone surgery was explored in terms of all urolithiasis procedures; open or endoscopic stone surgery, ureteroscopy, percutaneous nephrolithotomy. The diagnosis of ureteral stones was made by non-contrast tomography. Routine blood count, creatinine, electrolytes, coagulation parameters, urine culture were performed to all patients. Patients in both groups had demographic (age, gender), pre-operative (stone localization, dimension and surface area, impaction into mucosa, emergency statue, pre-treatment duration), per-operative (the need for a ureteral JJ stent at the end of the procedure, the stone-free rate) and post-operative (re-URS requirements, and Clavien-2 and higher complications) were investigated. All patients were checked three months after the operation, three months after stent removal if stent inserted. Emergency drainage requirements were determined by increased creatinine value, anuria, and pyonephrosis. In emergency patients, urine culture result was not waited and drainage was performed. In not emergency patients, procedure was done after seen sterile urine culture. Stone sized between 5-10 mm and without any emergency indication, we waited for spontaneously passing for one week, we gave alpha-blocker and anti-inflammatory drugs during the waiting period. Stone sized larger than 10 mm, we started

to prepare for the operation. However, we could not operate most of the patients early in the pandemic period. The primary reasons for delays in operations were not finding appropriate patient beds and the patient attending the hospital late during the pandemic. Definition of impacted stone is that the guide wire or contrast material does not pass next to the stone. Stone surface area was calculated with three-dimensional measurements on computed tomography. Prophylactic 1g ceftriaxone was done patients whom urine culture was sterile. Operation was performed by 6/7.5 Fr Ureteroscope (Richard Wolf®, Knittlingen, Germany), guide wire was sensor tip and 0.035-inch diameter (Boston Scientific®, Marlborough, Massachusetts, USA). Laser was used as the energy source for lithotripsy with Mega Pulse 30 W (Richard Wolf®, Knittlingen, Germany). Patients with an operation duration longer than half an hour; with an injury or suspected injury to the ureter; and with impacted, residual, or probable residual stones had a JJ stent inserted after URS. The stone-free was defined as the absence of a stone observation on computed tomography during check-up in the sixth week. Patients with stones that did not pass themselves in up to 6 weeks had URS performed again. Complication classification was made according to Clavien, and those with stage 2 and above were recorded. The study was conducted according to the principles of the Declaration of Helsinki. Written informed consent was obtained from the patients. The study received permission from the Ministry of Health and from the local ethics committee. The study was approved by the Ethics Committee of Sancaktepe Sehit Prof.Dr. İlhan Varank Training and Research Hospital (date: 10.02.2021 and approval number: 2021/108). Normality test was done by Kolmogorov-Smirnov, afterward the distribution of all numerical data was not normal. So non-parametric Mann Whitney U test was used and comparison of binary values used Pearson's chi-squared test. Statistical significance was accepted as $p<0.05$, and statistical analysis was performed using the SPSS for Windows software version 17 (Chicago, IL, USA).

Results

The study included 102 patients in total, 38 during the pandemic and 64 before the pandemic. The demographic data of the patients are shown in Table 1. There was no difference between the two groups in terms of age, gender, presence of co-morbidities, and previous stone surgery. The stone side, localization, and mean surface area were similar in the two groups (Table 1). Median time of from first symptom to treatment was 35 days in group 1 and 7 days in group 2 ($p< 0.001$) (Table 1). The impacted stone rate at attendance during the pandemic (15.8%) was significantly higher compared to the group before the pandemic (3.1%; $p = 0.021$). There were seven patients requiring emergency drainage in the first group (18.4%) and two in the second (3.1%; $p = 0.008$). The reason for emergency drainage was a progressive creatinine increase or anuria for four patients in the first group and one in the second, while the reason was pyonephrosis for three patients in the first group and one in the second. Ureteral JJ stent requirements were significantly higher in the first group (71%) compared to the second group (29.7%; $p<0.001$). Re-URS was needed by seven of nine patients in the first group and three of five patients in the second group for residual stones that did not pass. The remaining four patients experienced a spontaneous passage of their stones within the 6-week period. The re-URS requirements in the first group were significantly higher than in the second group (18.7% vs. 4.7%, $p = 0.024$).

Stage 2 or higher complications developed in 9 patients in the first group (23.7%) and three patients in the second group (4.4%; $p = 0.004$). In the first group, stage 2 complications were a febrile urinary tract infection in four patients. Stage 3a complications were ureter perforation in three patients were treated only with a JJ stent. Ureter stricture was occurred in two patients and ureter balloon dilatation and stent insertion performed due to stricture. The one of two patients with a stage 4a complication had a nearly 6-month duration between diagnosis and first URS and had a JJ stent inserted due to a ureter perforation developing during URS. A later follow-up found hydronephrosis did not regress, and with separation function at 7% on renal scintigraphy after 6 months, the patient underwent a nephrectomy. The other patient with ureter stricture was done open ureteroureterostomy after 6 months later in reason of stricture resistance to balloon dilatation and classified 3b. In the second group, only three patients had complications. Of these, one was

a febrile urinary tract infection, one hematuria that cause renal colic and lengthened hospitalization (stage 2) and one had a JJ stent inserted for ureter perforation and did not require additional treatment (stage 3).

Table 1
Comparison of the patient's pre-operative details (IQR: Inter quartile range, *: p value is significant under 0.05).

	After pandemic January 2021	Before pandemic January 2020	P value
Number of patients (n)	38	64	
Median age (year) (IQR 25-75)	39 (28.5-50.5)	41 (34-51.75)	0.961
Gender (male/female) (%)	16/22 (42-58 %)	22/42 (34-66 %)	0.435
Co-morbidities (%)	5 (13.2%)	6 (9.4%)	0.552
Previous stone surgery (%)	3 (7.9%)	4 (6.3%)	0.755
Localization (proximal/distal) (%)	17/21 (45-55 %)	28/36 (44-56 %)	0.923
Side (right/left) (%)	22/16 (58-42 %)	29/35 (45-55 %)	0.219
Median stone surface area (mm^2) (IQR 25-75)	50.24 (39.2-63.6)	45.5 (36-62.8)	0.526
Laterality (bilateral) (%)	3 (7.9%)	1 (1.6%)	0.111
Median time of from first symptom to treatment (days) (IQR 25-75)	35 (28-62.5)	7 (5-10)	<0.001*

Table 2
Comparison of the patient's peri- and post-operative outcomes (URS: ureteroscopy, *: p value is significant under 0.05).

		After pandemic January 2021	Before pandemic January 2020	P value
Number of patients (n)		38	64	
Impaction of stone (%)		6 (15.8%)	2 (3.1%)	0.021*
Requirement for emergency drainage on attendance (%)		7 (18.4%)	2 (3.1%)	0.008*
	Due to increased creatinine or anuria	4 (10.5%)	1 (1.55%)	
	Due to pyonephrosis	3 (7.9%)	1 (1.55%)	
Stone-free rate (%)		29 (76.3%)	59 (92.2%)	0.024*
Requirement for ureter JJ stent (%)		27 (71%)	19 (29.7%)	<0.001*
Requirement for Re-URS (%)		7 (18.4%)	3 (4.7%)	0.024*
Complication rate (%)		9 (23.7%)	3 (4.7%)	0.004*
	Stage 2	4 (10.5%)	2 (3.1%)	
	Stage 3a	3 (7.9%)	1 (1.55%)	
	Stage 3b	1 (2.65%)	0	
	Stage 4a	1 (2.65%)	0	

Discussion

SARS-CoV-2 is a newly discovered virus that spread around the world in a short duration, causing a pandemic (7). As in all branches, there were changes in urological clinical practice during the adjustment process to the pandemic, and stone disease management changed in this period (8). A recent study in the field of urology by Ficarra et al. recommended postponing all non-emergency urological interventions during the pandemic and proposed an organization scheme for all surgical procedures to be performed (9). The first data from the field in the study by Gökçe et al. reported that suitable strategies may be developed after a 21-day adaptation process for an optimum preoperative assessment by anesthesiologists and urologists for stone disease (10). Even after an appropriate preoperative assessment, Stensland et al. proposed the need to limit endourological stone interventions for obstruction and infection during the SARS-CoV-2 pandemic. They proposed insertion of a percutaneous nephrostomy catheter under local anesthesia or, if possible, a ureteral JJ stent insertion as priority treatment choices (11). In our clinic, a center where stone disease is frequently treated, palliative choices were first used for the treatment of ureter stones due to the present conditions; however, when necessary, patient-specific invasive treatment choices were included in practice. For this reason, though covering similar time intervals, the case numbers in the study groups were more limited after the pandemic.

Urinary system stones have a highly broad range of clinical presentations. In addition to the presence of asymptomatic stone patients, patients may attend hospital with severe and life-threatening complications (12). The latest guidelines report the general complication rate of URS as 9¬–25% (4). Among the most important of these are the proximal retreat of the stone, re-intervention due to residual stones, septic complications, and ureter injuries (13, 14). A study including 11,885 patients by the URS study group of the Clinical Research Office of Endourological Society reported the most common complications were fever, unsuccessful intervention, and hemorrhage. Postoperative mortality was observed in five patients in total (15). No study found in the literature compares the complication rates encountered after ureter stone interventions in the periods before and after the pandemic. Our study with this focus is the first to research the difference in clinical presentation and complication rates between these two periods. In the study, we observed complication rate was higher in post pandemic group.

Patient behavior in using the health system changed due to the pandemic (16). In this period, patient admission to health centers was largely affected by the SARS-CoV-2 transmission risk. A study reported that during the pandemic, urology, just like all branches of expertise, underwent rooted change from face-to-face interviews to telemedicine (17, 18). When we approach the topic from the perspective of ureter stone treatment, it is possible to encounter patients with delayed treatment in clinics without the technological infrastructure available. Due to difficulties experienced in accessing professional opinions, the duration between the onset of symptoms in patients and admission to hospital was significantly longer during the pandemic in our study. As expected, stones remaining in the ureter for long periods led to difficulties in clinics at the time of attendance and during operation procedures. Postoperative complication rates were significantly higher (19). The most dramatic example of this situation in a nephrectomy having been performed due to function loss as a result. In the literature, delayed treatment is shown to increase the risk of postoperative negative outcomes (19). In addition, our study identified higher rates of impacted stones, emergency interventions, and JJ stent and re-intervention requirements among patients with delayed diagnosis due to the pandemic compared to the period before the pandemic. In this group, postoperative complications, ureter injury and stenosis, were observed more frequently. In other words, managing the treatment process for these patients in the preoperative period is riskier and more difficult.

Low patient number and retrospective nature may be deficiencies of the study. However, we think that single center nature is superior to multicenter in terms of establishing homogenization. Retrospectivity is inevitable method, because a method such as disrupting the treatment of patients cannot be scientific and ethical. All operations have not performed by same urologist, but all operation have been done under the

supervision of the same clinic chief. Furthermore, patients' distribution to urologist was similar, and three of all urologists had similar knowledge and practice capacity about ureteroscopy.

Conclusion

Delayed ureter stone treatment linked to the SARS-CoV-2 pandemic caused increased complications, permanent morbidity, and more difficult treatment processes. Under these extraordinary conditions, performing personalized and, if possible, timely treatment for ureter stones has vital importance.

Ethics Committee Approval: The study was approved by the Ethics Committee of Sancaktepe Sehit Prof.Dr. İlhan Varank Training and Research Hospital (date: 10.02.2021 and approval number: 2021/108).

Informed Consent: Written consent was obtained from the participants.

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