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# The Effect of Ureteral Double-J Stent Removal Methods on Pain Intensity in Male Patients Under Local Anesthesia

## Lokal Anestezi ile Üreteral Çift-J Stent Çekilme Yöntemlerinin Erkek Hastalarda Ağrı Şiddeti Üzerine Etkisi

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***ABSTRACT***

**Objective:** Ureteral stents are commonly used, especially in the treatment of ureteral stones, and are removed endoscopically after a certain period following the procedure. The removal of these stents under local anesthesia, particularly in male patients, can cause pain. Rigid cystoscopes are typically used, but the use of thinner and more flexible endoscopic instruments is considered an alternative to reduce pain. This study aims to compare the pain experienced during Double-J stent removal using a rigid cystoscope versus a semirigid ureterorenoscope (URS).

**Materials and Methods**: Our study included patients who underwent unilateral endoscopic ureteral stone treatment followed by Double-J stent placement. Patients were divided into two groups based on whether their stent removal was performed using a rigid cystoscope or a semirigid URS. All stent removals were performed by the same surgeon. Immediately after the ureteral stent removal, the pain score was evaluated and recorded by the operating physician using the Visual Analog Scale (VAS).

**Results:** Among the 120 patients included in the study, 57 (47.5%) were in the cystoscopy group (group 1) and 63 (52.5%) were in the URS group (group 2). There was no significant difference between the groups in terms of stent side (p=0.47) and average age (p=0.16). However, group 1 had a significantly higher VAS score (3.6±1.7) compared to group 2 (1.9±0.8) (p<0.001).

**Conclusion**: Due to the long and complex structure of the male urethra, men may experience more pain than women during ureteral stent removal under local anesthesia. Our study found that the use of semirigid URS caused less pain than a rigid cystoscope. Flexible cystoscopes are not commonly used due to their high cost and durability issues, while semirigid URS presents a more cost-effective alternative. The single-center and small sample size of our study indicates the need for larger-scale studies. In conclusion, semirigid URS causes less pain compared to rigid cystoscopes in male patients and is better tolerated.

**Keywords:** local anesthesia, stent removal, ureteral stone, VAS score

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## *ÖZET*

**Amaç:** Üreteral stentler, özellikle üreter taşlarının tedavisinde yaygın olarak kullanılmakta olup, operasyonda belirli bir süre sonra endoskopik yöntemle çıkarılmaktadır. Özellikle erkek hastalarda lokal anestezi ile çıkarılması ağrıya neden olabilmektedir. Genellikle rigid sistoskop kullanılmakta olup hastanın daha az ağrı duyması için daha ince ve esnek endoskopik aletlerin kullanımı alternatif olarak görülmektedir. Bu çalışmada, üreteral çift-J stent çıkarımında rigid sistoskop ile semirigid üreterorenoskop (URS) kullanımının ağrı açısından karşılaştırılması hedeflenmektedir.

**Gereç ve Yöntemler:** Çalışmamıza tek taraflı endoskopik üreter taş tedavisi sonrası üreteral çift-J stent yerleştirilen hastalar dahil edildi. Hastalar stent çekimlerinin rigit sistoskop ile veya semirigid URS ile olması durumuna göre Sistoskopi ve URS grubu olarak ikiye ayrıldı. Tüm stent çekimleri aynı cerrah tarafından gerçekleştirildi. Üreteral stent çıkarıldıktan hemen sonra, işlemi yapan doktor tarafından görsel analog skala (VAS) ağrı skoru değerlendirildi ve kaydedildi.

**Bulgular:** Çalışmaya dahil edilen 120 hastanın, 57'si (%47,5) sistoskopi (grup 1), 63'ü (%52,5) URS (grup 2) gruplarını oluşturdu. Gruplar arasında stentin tarafı ($p = 0,47$) ve yaş ortalaması ($p = 0,16$) açısından anlamlı fark yoktu. Ancak, grup 1'in VAS skoru ($3,6 \pm 1,7$), grup 2'ye ($1,9 \pm 0,8$) göre anlamlı derecede yüksekti ('$p<0,001$).

**Sonuç:** Erkek üretrası uzun ve karmaşık bir yapıya sahip olduğundan, lokal anestezi ile üreteral stent çıkarımında erkekler, kadınlara göre daha fazla ağrı hissedebilir. Çalışmamızda, semirigid URS kullanımının rigid sistoskopa göre daha az ağrıya yol açtığı görüldü. Flexible sistoskoplar yüksek maliyet ve dayanıklılık sorunları nedeniyle yaygın kullanılmazken, semirigid URS daha uygun bir alternatif olarak öne çıkmaktadır. Çalışmamızın tek merkezli ve küçük örneklemli olması, daha geniş çaplı araştırmalara ihtiyaç duyulduğunu göstermektedir. Genel olarak, erkek hastalarda semirigid URS'nin, rigid sistoskopa göre daha az ağrıya neden olduğu ve bu cihazın daha iyi tolere edildiği sonucuna varılmıştır.

**Anahtar Kelimeler:** lokal anestezi, stent çekimi, üreter taşı, vas skoru

## INTRODUCTION

Since the introduction of double-J (DJ) stents in 1978, ureteral stents have become an important and almost indispensable tool in modern urological practice, particularly in the treatment of ureteral stones (1). The use of ureteral stents has emerged as an effective method to prevent ureteral obstruction, postoperative pain, hydronephrosis, and ureteral stricture after ureteral stone surgeries (2). These stents are removed endoscopically after a certain period following the stone surgeries. The removal of ureteral stents under local anesthesia can cause discomfort and pain in male patients due to the length of the urethra.

Ureteral stent removal is usually performed in an outpatient setting under local anesthesia using a rigid cystoscope. Although the analgesic effect provided using lidocaine gels before or during the procedure is debated in various studies, there are meta-analyses indicating that it provides analgesia (3-5). However, due to the rigid structure and larger diameter of rigid cystoscopes, many patients require analgesics during DJ stent removals, and some procedures may require deep sedation (6). Performing the ureteral stent removal procedure with smaller diameter semirigid ureterorenoscopes (URS) under local anesthesia may result in less perceived pain during the procedure. Although studies have been conducted on performing this procedure with flexible cystoscopes as an alternative to rigid cystoscopes, there are no studies in the literature using semirigid URS to reduce the diameter of the endoscopic tool used for ureteral stent removal (7). On the other hand, the cost and accessibility problems of flexible cystoscopes still exist. Therefore, in this study, we aim to evaluate the difference in pain experienced between performing ureteral DJ stent removal under local anesthesia using a rigid cystoscope versus a semirigid URS.

## MATERIALS AND METHODS

Between 2021 and 2024, male patients who underwent unilateral endoscopic ureteral stone surgery and required ureteral stent removal were included in the study. Written informed consent forms were obtained from all patients confirming their participation in the study. The study was conducted by the Helsinki Declaration, and ethical approval was obtained from the Etlik City Hospital of Medicine Ethics Committee on (March 26, 2025), approval number (AESH-BADEK-2025-0160). Patients were assigned to two groups based on whether their stent removal was performed with

a rigid cystoscope or semirigid URS: the cystoscopy group (group 1) and the URS group (group 2). Patients were randomly assigned to either group in a 1:1 ratio according to the order in which they agreed to undergo ureteral stent placement for their ureteral stone operation. After all stone treatments, a 4.8 Fr, 24 cm Plastimed brand polyurethane double-J ureteral catheter was placed, and its position was confirmed with fluoroscopy. After the ureteral stone surgery, patients were instructed to return within 3-4 weeks for stent removal. Prior to all ureteral stent removal procedures, a sterile urine culture was confirmed. Ten minutes before the procedure, in the local procedure room, a lubricant containing 0.05% antiseptic Chlorhexidine Digluconate and 2% Lidocaine Hydrochloride local anesthetic (Konix brand Katejel) was instilled into the urethra. All ureteral stent removal procedures were performed by the same urologist (E.H.) under local anesthesia in the lithotomy position, following appropriate draping and sterilization. In the Cystoscopy group, a 19 Fr Karl-Storz rigid cystoscope and forceps were used. In the URS group, a 9.8 Fr (thick) Karl-Storz ureterorenoscope and forceps were used. Immediately after the ureteral stent was removed, the pain score was assessed by the performing physician using the Visual Analog Scale (VAS). The VAS pain score was determined by measuring the pain the patient felt on a scale from 0 (no pain) to 10 (severe pain).

### Inclusion Criteria

The study included male patients aged 18-80 years who underwent their first unilateral ureteral stone surgery and had a ureteral DJ stent placed. Patients were included regardless of their use of alpha-blockers.

### Exclusion Criteria

Patients with an active urinary tract infection during ureteral stent removal, those with encrusted or migrated DJ stents, those with residual stones around the DJ stent in the ureter, those who had previously undergone urological surgery before the DJ stent placement, patients with bleeding diathesis, those with anatomical variations of the collecting system such as a duplicated ureter, patients whose stent removal had been delayed beyond 45 days, patients who lacked cognitive function to indicate a VAS score, and those with urethral anomalies such as hypospadias, meatal stenosis, or urethral stricture that could increase pain during stent removal were excluded from the study.

### Statistical Analysis

Statistical analyses were performed using the SPSS software package (IBM SPSS Statistics, version 21, New York, USA). Given the sample size and distribution characteristics, the Kolmogorov-Smirnov test was employed to evaluate the normality of the distribution of continuous variables. For comparisons between two groups involving normally distributed quantitative variables, such as the Visual Analog Scale (VAS) score, the independent samples t-test was utilized. For quantitative variables that did not meet the normality assumption, including the age parameter, the non-parametric Mann-Whitney U test was applied.

Categorical variables, such as the side of the stent and alpha-blocker usage, were compared using the chi-square test due to their nominal nature. Additionally, the correlation between Age and VAS scores was assessed using Spearman's rank correlation coefficient, as the data did not meet the parametric assumptions required for Pearson correlation analysis.

All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

## RESULTS

A total of 136 patients were initially included in the study, but four patients declined to participate, leaving 132 patients who were divided into two groups, each consisting of 66 patients. Due to intraoperative reasons, such as stone push-up to the kidney and residual stone, five patients from the cystoscopy group and two patients from the URS group were excluded from the study. Additionally, five patients were excluded because they did not show up for stent removal within the specified time frame or underwent general anesthesia for DJ stent removal. As a result, 120 patients were included in the final analysis, with 57 patients (47.5%) in the cystoscopy group (group 1) and 63 patients (52.5%) in the URS group (group 2) (Table 1). In group 1, 25 patients had right-sided stents (43.9%), and 32 had left-sided stents (56.1%). In group 2, 32 patients had right-sided stents (50.8%), and 31 had left-sided stents (49.2%). No statistically significant difference was observed between the groups in terms of stent laterality ($p = 0.47$). The

median ages of group 1 and group 2 were 49 (IQR: 41–60) and 45 (IQR: 36–58), respectively. No statistically significant difference was observed between the groups in terms of age (p = 0.16). In group 1, 11 patients (19.3%) and in group 2, 13 patients (20.6%) were using alpha-blockers. Chi-square analysis showed no statistically significant difference in alpha-blocker use between the groups (p = 0.39). The VAS scores for group 1 and group 2 were 3.6 ± 1.7 and 1.9 ± 0.8, respectively, with group 1 having a significantly higher VAS score (p<0.001) (Figure 1).

**Table 1.** Comparison of Side, Age, Alpha Blocker Use, and VAS Score between Groups

| | Cystoscopy (Group 1) (n=57) | URS (Group 2) (n=63) | p-value |
|---|---|---|---|
| Side (Right/Left) | 25(43.9%) , 32(56.1%) | 32(50.8%), 31(49.2%) | 0.47 |
| Age (median (IQR)) | 49 (IQR: 41–60) | 45 (IQR: 36–58) | 0.16 |
| Alpha Blocker Use | 11 (19.3%) | 13 (20.6%) | 0.39 |
| VAS Score (mean ± SD) | 3.6 ± 1.7 (1-9) | 1.9 ± 0.8 (1-5) | <0.001 |

VAS Score: Visual Analog Scale (VAS) pain score, SD: Standard Deviation, IQR: Interquartile Range

In the Spearman correlation analysis, including all patients, there appeared to be a positive relationship between age and VAS score (r = 0.150); however, this correlation was not statistically significant (p = 0.101).

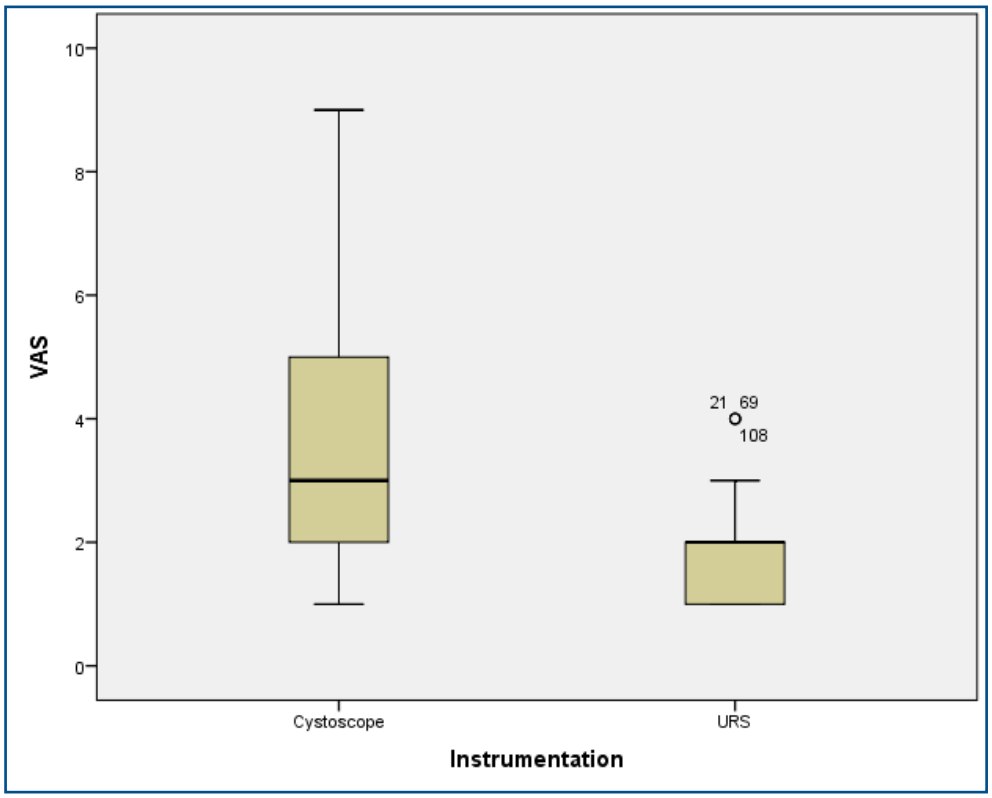


**Figure 1.** Comparison of VAS scores between group 1 and group 2 showing significantly higher pain in group 1 (p < 0.001).

## DISCUSSION

The male urethra has a long and complex anatomical structure. While the distal part of the urethra is more flexible, the proximal membranous part is surrounded by the striated external urethral sphincter and continues as the prostatic urethra. The female urethra, on the other hand, is approximately 4 cm long from the bladder neck to the vaginal vestibule. Due to this anatomical difference between the male and female urethra, males may experience significantly

more severe pain than females when undergoing endoscopic removal of the ureteral stent with local anesthesia. Therefore, a less painful procedure may be required, especially for male patients.

In our study, no statistical differences were observed between the groups in terms of age and stent side, indicating that these two factors were appropriately randomized. The only statistical difference between the groups was the VAS score. We found that patients in the URS group, where the endoscopic instrument was thinner, experienced less pain.

The lack of a significant difference in alpha-blocker use between the two groups examined in the study has equated the patients' use of alpha-blockers, which could alleviate stent-related irritative symptoms. No correlation was found between age and VAS score in the included patients. Since similarity between the groups was achieved, it can be inferred that the primary factor affecting the VAS score was the surgical procedure during stent removal.

The process of DJ stent removal has become a concerning issue in the stone surgery process, particularly in male patients, due to the increased perception of pain. Although non-invasive methods such as magnetic systems and systems with strings extending outside the urethra can be used for ureteral stent removal, they are not widely used in practical urological practice due to difficulties in obtaining them, or because the ureteral stent may spontaneously dislodge before the desired time (8,9). Most previous studies have compared patient pain between flexible and rigid cystoscopes, with the majority finding flexible cystoscopes to be advantageous (7). However, flexible cystoscopes have cost-related problems due to their tendency to break down quickly, high repair costs, shorter lifespan compared to rigid cystoscopes, and high prices. Many health institutions in our country still lack flexible cystoscopes, and ureteral stent removal procedures are performed with rigid cystoscopes. In two studies in the literature comparing semirigid URS and flexible cystoscopes, the VAS pain scores were found to be similar, and as a result, semirigid URS was emphasized as a better alternative due to its lower cost (10,11). In our study, we found that semirigid URS caused less pain in male patients during ureteral stent removal with local anesthesia compared to rigid cystoscopes.

Factors that may increase pain during endoscopic interventions with local anesthesia in male patients include the length of the urethra, the active tone of the external urethral sphincter, prostatic hypertrophy, and the height of the bladder neck. Specifically, the greater active tone of the urethral sphincter in younger males compared to older males may lead to increased pain during the procedure. In older male patients, the narrowing of the urethral lumen due to prostatic hypertrophy will be alleviated by using thinner endoscopic devices, thus reducing pain. Both our study and that of Söylemez et al. (10) have shown that when the endoscopic device has a lower French size, less pain is experienced.

Although the use of flexible cystoscopes for ureteral stent removal with local anesthesia is a preferred approach, their high costs limit their usage. Lai et al. (11) compared flexible cystoscopes and semirigid URS for ureteral stent removal and found that both methods had similar results in terms of procedure duration, post-procedure hematuria, irritable bladder symptoms, and pain scores. In our study, we demonstrated that semirigid URS, which is widely used by urologists, caused less pain due to its thinner structure compared to rigid cystoscopes.

However, it should be noted that semirigid URS is longer and thinner, which may pose a higher risk of urethral injury when used by less experienced urologists under local anesthesia. In our study, no urethral injury occurred during the stent removal procedures using semirigid URS.

Although the fact that all ureteral stent removal procedures were performed by the same doctor is a strength of the study, the limitation of this study is that it was a single-center study with a relatively small sample size. There would be unavoidable inherent bias. A multi-center prospective randomized controlled study with a larger sample size would be ideal.

## CONCLUSIONS

In the modern healthcare system, where minimally invasive approaches are prioritized across all surgical specialties,

the use of finer instruments will improve patient comfort. In male patients, the use of semirigid URS for ureteral stent removal with local anesthesia appears to be better tolerated compared to the use of rigid cystoscopes.

**Data Availability Statement:** Available from the author via email.

**Conflict of Interest Statement:** The authors declare no conflict of interest.

**Consent to participate:** Since the study was retrospective, consent was not obtained from the participants.

**Research involving human participants and/or animals:** All analyses performed involving human participants were in accordance with the 1964 Helsinki Declaration and its later amendments.

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**Ethıcs Statement:** The study protocol was approved by the Etlik City Hospital of Medicine Ethics Committee. Decision no: AEŞH-BADEK-2025-0160, Date: 2025/03/26.

**Author Contributions:** EH: first author, manuscript preparation, analysis and interpretation of data, data collection, manuscript writing/editing, İEE: manuscript editing, review of articles, supervising the manuscript. All the authors discussed the results and commented on the manuscript.

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