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# Minimally painful retrieval of ureteral stents using by ureterescope

## *Üreteral stentin üreteroskop kullanılarak minimal ağrıyla çıkarılması*

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**ABSTRACT**

**Aim:** The standard method for retrieving the ureteral stents is the cystoscopic technique. We describe a minimally painful method for retrieving ureteral stents by using an ureteroscope.

**Methods:** A total of 60 patients with ureteral stents were enrolled in this study. The patients were randomized into a cystoscopic (30 cases) and an ureteroscopic (30 cases) group. All stents were retrieved by a cystoscope in the first group and by an ureteroscope in the second group, under topical anesthesia. Patients in each group were assessed for stented time, stent side and reason of stent placement, operative time, peroperative pain, postoperative pain, irritative voiding symptoms and hematuria.

**Results:** Stents were successfully retrieved in 60 patients. There were no statistical differences in the two groups regarding patient's gender and age or stent side, operative time and stented time (p>0.05). Mean operative pain score was significantly higher in the cystoscopic group than in the ureteroscopic group (p<0.01). The irritative voiding symptom scores and hematuria were more prevalent in the first group than the second (p< 0.05).

**Conclusion:** In present study ureteroscopic stent retrieval was found to be minimally a painful, safe and reliable method. The ureteroscopic retrieval procedure is highly tolerable by patients than the cystoscopic retrieval. We suggest that it may be the standard technique for stent retrieval. *J Clin Exp Invest 2010; 1(1): 7-11*

**Key words:** Ureteroscopy, stents, cystoscopy, pain

**ÖZET**

**Amaç:** Üreteral stentlerin geriye çekiminde sistoskopik teknik standart yöntemdir. Biz bu çalışmada, üreteroskop kullanarak minimal ağrılı üreteral stent çekimi yöntemini araştırdık.

**Yöntemler:** Üreteral stenti bulunan 60 hasta çalışmaya alındı. 30 hasta sistoskopik gurup, 30 hasta üreteroskopik grup olacak şekilde hastalar rastgele iki gruba ayrıldı. Bütün stentler lokal anestezi altında, birinci grupta sistoskop kullanılarak, ikinci grupta ise üreteroskop kullanılarak çekildi. Hastalar stentli kalma zamanları, stentin bulunduğu taraf, stent takılma nedeni, operasyon süresi, operasyon sırasındaki ağrı, operasyon sonrası ağrı, irritatif işeme semptomları ve hematüri yönünden değerlendirilerek sonuçlar kaydedildi.

**Bulgular:** Stentler 60 hastada da başarıyla çekildi. Cinsiyet, hasta yaşı, stent tarafı, operasyon süresi, stentin kalış süresi açısından her iki grup arasında istatistiksel olarak anlamlı bir fark yoktu (p>0.05). Ortalama operasyon sırasındaki ağrı sistoskopik grupta anlamlı şekilde diğer gruptan yüksek olarak tespit edildi (p<0.01). İrritatif işeme semptomları ve hematüri de birinci grupta ikinci gruba göre daha fazla ortaya çıktığı görüldü (p<0.05).

**Sonuç:** Bu çalışmada üreteroskopik yöntemin minimal ağrılı, güvenilir ve uygulanabilir bir yöntem olduğu gösterildi. Üreteroskopik yöntem sistoskopik yönteme göre hasta tarafından daha iyi tolere edilebilir bir yöntemdir. Bu yöntem stent çekiminde sistoskopik yöntemin önüne geçebilir. *Klin Den Ar Derg 2010; 1(1): 7-11*

**Anahtar kelimeler:** Üreteroskopi, stent, sistoskopi, ağrı

## INTRODUCTION

Double J stents have been an essential part of urological practice. They are typically placed to prevent ureteral obstruction due to a variety of intrinsic or extrinsic etiologies. These include ureteral strictures, obstructing ureteral calculi, uretero-pelvic junction obstruction, retroperitoneal tumor or fibrosis, trauma, gestational hydronephrosis and iatrogenic injury. Stents are also placed to provide urinary diversion or postoperative drainage or to help

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identify and prevent inadvertent injury to the ureters before surgical procedures. Their use has increased especially with the popular use of extracorporeal shock wave lithotripsy and improvement in the endourological techniques and stent technology[1].

The disadvantages of the stents are encrustation, infection, intolerance of a foreign body and the need for endoscopic retrieval. New stents have a high patient tolerance and a low rate of encrustation and infection by limiting biofilm formation on the stent surface[1].

Most children require general anesthesia or sedation for removal, but topical anesthesia is generally enough for adults. The classic method for retrieving the ureteral stents is using a cystoscope and grasping forceps under topical anesthesia. However, it is a painful method. Various alternative techniques were described including cystoscopic and noncystoscopic methods[2,3]. We described a minimally painful and a simple method for retrieval of ureteral stents using an uretero-renoscope.

## METHODS

This study was designed as a prospective, randomized controlled trial. From July 2007 to April 2008, 60 patients with ureteral stents were enrolled in this study. All patients were assessed by urinalysis, urine culture and a plain abdominal X-ray. Patients with a history of sepsis, renal failure, solitary kidney, bilateral ureteral stents, migrated stents and under age of 18 years were excluded from the study. A total of 60 consecutive adults divided into two groups. A total of 30 patients underwent cystoscopic retrieval, and 30 patients underwent ureteroscopic retrieval. A 20 Fr Karl Storz rigid cystoscope and a flexible grasping forceps were used in the cystoscopic group. A 8.5 Fr, 34 cm Karl Storz semirigid ureteroscope with a 5 Fr working channel and a rigid grasping forceps were used in the ureteroscope group. All stents were retrieved under topical anesthesia by lidocain gel. No patient required general anesthesia or sedation. The operation time was calculated from the time the cystoscope or ureteroscope was introduced to the final removal of all endoscopes and stents. A visual analogue pain scale (VAS) was used to quantify the degree of pain. "No pain" was designated with the zero point and "the most intractable pain ever felt" at the 10 cm end. The patients were asked to mark the degree of pain using this analogue scoring system. Before the study, approval was obtained and all patients gave informed consent. All patients received oral quinolone preoperatively except pregnants (they received oral first-generation cephalosporins), which was maintained for 3 days. Patients in each group were assessed for stented time, stent side and reason of stent placement, operation time, peroperative pain, postoperative pain, irritative voiding symptoms and hematuria. Postoperative pain and irritative voiding symptoms were rated according to the study carried out by Jeong et al.[4]: absent (score 1), mild (symptoms within 0–3 days of operation, bearable with no medication; score 2), moderate (symptoms persisting for 3–7 days, painful enough for medication; score 3), and severe (symptoms for 7 days, requiring the use of analgesic; score 4).

Statistical analysis was done with SPSS 10.0 statistical software. After the distribution of all parameters was tested using Kolmogorov-Smirnov test; chi square test, independent samples test, Fisher's exact test and Mann Whitney U test were used to compare the results of two groups. All continuous variables were expressed as mean plus/minus standard deviation. A $p<0.05$ was accepted as a threshold for statistical significance.

## RESULTS

The stent was successfully retrieved in all 60 patients. All patients discharged at the same day. The characteristics of the patient's stent side and reason of stent placement are shown in Table 1. There were no statistical differences in the two groups regarding patient gender and age or stent side, operative time or stented time. The most common reason for stent placement was ureteroscopic lithotripsy (65%).

**Table 1.** Characteristics of patients, stent side and reasons of stent placement.

| | Cystoscopic | Ureteroscopic | P value |
|---|---|---|---|
| Number of total cases | 30 | 30 | |
| Male | 13 | 14 | 0.795 |
| Female | 17 | 16 | |
| Age, years, Mean±SD | 35.8±9.9 | 35.9±9.2 | 0,979 |
| Male | 35.6±10.4 (19-62) | 37.4±9.1 (25-55) | 0.610 |
| Female | 36.0±9.8 (22-55) | 34.6±9.4 (22-59) | 0.589 |
| Stent side | R:13/L:17 | R:17/L:13 | |
| Male | R:7/L:6 | R:8/L:6 | |
| Female | R:6/L:11 | R:9/L:7 | |
| Reason of stent placement | | | |
| Ureteroscopic lithotripsy | 20 (66.6%) | 19 (63.3%) | |
| ESWL | 6 (20%) | 8 (26.6%) | |
| Hydronephrosis | | | |
| Stricture | 1 (3.3%) | - | |
| Pregnancy | 2 (6.6%) | 1 (3.3%) | |
| Open surgery | 1 (3.3%) | 2 (6.6%) | |
| Malignancy | - | - | |

R: Right, L: Left

The operative pain score, stented time, operative time, postoperative pain score, irritative voiding symptoms and hematuria of two groups are shown in Table 2. There was no statistical differences between two groups regarding stented time. Mean operative time in the ureteroscopic group was longer than in the cystoscopic group, but the difference did not reach to a significant level ($p>0.05$). Both in male and female patients the mean operation pain score (VAS) was significantly higher in the cystoscopic group than in the ureteroscopic group ($p<0.01$) (Figure 1). The entire irritative voiding symptom scores (postoperative lower abdominal pain, dysuria, frequency, urgency) were significantly higher in the cystoscopic group among males, however they were statistically not significant in both groups among females. Hematuria was more prevalent in the cystoscopic group ($p<0.05$), but it was not significant among female patients of two groups ($p>0.05$).

**Table 2.** Stented time, operative time, peroperative pain, postoperative pain, irritative voiding symptoms and hematuria (Mean±SD).

| | Cystoscopic | Ureteroscopic | P value |
|---|---|---|---|
| Stented time, days | 28.0±6.1 | 27.7±5.6 | 0.811 |
| Male | 26.0±4.8 (15-32) | 27.2±5.7 (19-42) | 0.788 |
| Female | 29.5±6.6 (20-45) | 28.0±5.7 (20-43) | 0.536 |
| Operation time, sec | 28.3±11.1 | 30.8±12.6 | 0.420 |
| Male | 37.6±10.6 (28-62) | 40.1±11.9 (26-76) | 0.343 |
| Female | 21.2±4.2 (14-30) | 22.7±5.9 (15-41) | 0.612 |
| Operative pain score, VAS | 5.4±1.4 | 1.7±1,2 | <0.001 |
| Male | 6.3±1.3 (4-9) | 2.6±1.0 (1-4) | <0.001 |
| Female | 4.7±1.0 (3-7) | 0.8±0.8 (0-2) | <0.001 |
| Lower abdominal pain score | 1.2±0.4 | 1.0±0 | 0.006 |
| Male | 1.4±0.5 (1-2) | 1.0±0 (1-1) | 0.005 |
| Female | 1.0±0.2 (1-2) | 1.0±0 (1-1) | 0.332 |
| Dysuria score | 1.7±0.8 | 1.1±0.3 | 0.001 |
| Male | 2.3±0.7 (1-3) | 1.2±0.4 (1-2) | <0.001 |
| Female | 1.2±0.5 (1-3) | 1.0±0.2 (1-2) | 0.165 |
| Frequency score | 1.3±0.4 | 1.0±0.2 | 0.01 |
| Male | 1.6±0.5 (1-2) | 1.0±0.2 (1-2) | 0.003 |
| Female | 1.1±0.3 (1-2) | 1.0±0.2 (1-2) | 0.588 |
| Urgency score | 1.2±0.4 | 1.0±0.2 | 0.039 |
| Male | 1.4±0.5 (1-2) | 1.0±0.2 (1-2) | 0.023 |
| Female | 1.1±0.3 (1-2) | 1.0±0.2 (1-2) | 0.588 |
| Hematuria | | | |
| Male | 13 | 3 | 0.007 |
| Female | 8 | 2 | 0.018 |
| | 5 | 1 | 0.175 |

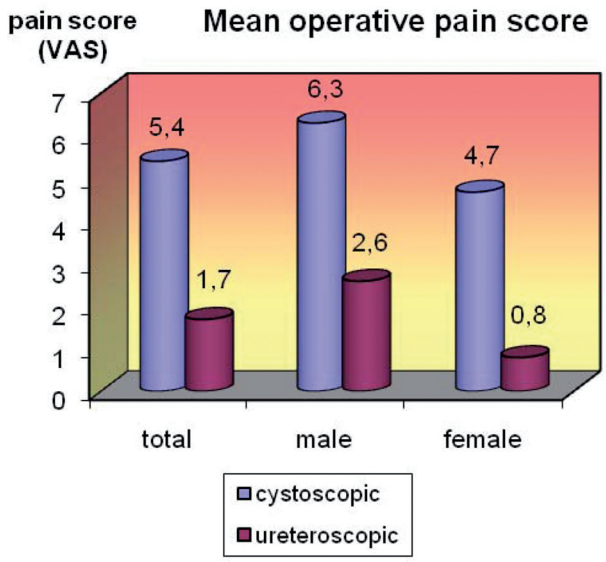


**Figure 1.** The comparison of the pain scores recorded with the cystoscopic (blue) and ureteroscopic (purple) group.

## DISCUSSION

The traditional method for retrieving of ureteral stents is the cystoscopic technique which is particularly troublesome because of pain especially in the male patients when using a conventional rigid cystoscope. In this report, we suggest the use of ureteronoscope to retrieve ureteral stents.

Various alternative techniques were described including endoscopic and non-endoscopic methods. One of the non-cystoscopic techniques was to remove the ureteral stents by a urethral catheter with a rare earth magnet attached to its proximal end. In this technique the ureteral stent had a stainless steel bead attached to its distal end[5]. However these materials are not used widespread. The use of a nylon snare or wire-loop retrievers, as proposed by some authors, is not a simple procedure[6]. Stents with nylon tethers attached to their distal ends enable manual withdrawal without anesthesia. But this technique can apply only to short term stents because the suture sometimes causes dislodgement of the stent. Additionally the dangling suture can cause a slight degree of incontinence[7]. Some authors have described minimally invasive, nonendoscopic stent retrieval methods using fluoroscopic techniques[8-10]. However it is not a widespread application neither at radiology nor at urology clinics. Also flexible cystoscopic retrieval has been described[11-12]. Retrieval instruments specifically designed for the flexible cystoscope, are often unsuitable, prone to breakage and very expensive, especially if this breakage causes frequent replacement[13]. Furthermore Simonato et all. have devised a wire hook to retrieve stents by flexible cystoscope[14]. It was a simple and inexpensive method, however we know that the flexible cystoscope has not been as widely accepted in the field of urology as in other fields[15]. As a matter of fact in our country most urology clinics use the ureteroscope rather than the flexible cystoscope. The ureteroscope is a better known instrument to urologists.

Certain complications can be occurred with implantation of a foreign object into the urinary tract, including urinary tract infection, malposition and migration, irritative voiding symptoms, encrustation, pyuria, hematuria, incontinence, stent fracture, ureteral erosion or fistulization, and the forgotten stent[16].

One of the known complications is the migration of the stent beyond the ureteric orifice. The standard technique for the retrieval of a proximally migrated stent is ureteroscopic extraction with a basket or a grasping forceps. Nevertheless many different methods have been described for migrated stents[2]. At this time ureteroscopes did not defined for retrieval nonmigrated ureteral stents except in an infant. It has no drawbacks in applying ureteroscopic procedure in pediatric patients under sedation or general anesthesia or when pediatric endoscopes and graspers are unavailable[3].

In this study we showed that minimally painful and irritative ureteral stent retrieval with ureteroscope is a safe and reliable method. Both in male and female patients the mean operative pain score (VAS) was significantly higher in the cystoscopic group than in the ureteroscopic group. Irritative voiding symptoms were significantly higher in the cystoscopic group among males; however the difference was not significant between two groups among females. The retrieval procedure is highly patient tolerable because minimal discomfort was associated with the passage of an 8.5 Fr ureteroscope in the anesthetized urethra especially in male patients. It is also a minimally painful method in females. Sedation or general anesthesia was unnecessary, enabling patients to return to normal activity immediately.

In conclusion, ureteroscopic stent retrieval was found as a minimally painful, safe and reliable method in both gender patients in present study. Also ureteroscopic stent retrieval less provoke irritative symptoms among males, meanwhile in female patients both technique cause similar irritative symptoms. The ureteroscopic retrieval procedure is highly patient tolerable rather than the cystoscopic retrieval. We suggest that it may be the standard technique for this procedure. Further studies with more patients needed to make this issue clearer.

## REFERENCES

1.Reid G DJ, Tieszer C. Encrustation and microbial adhesion on stents. In: Stenting the Urinary System. Edited by D. Yachia. Oxford: Isis Medical Media, 1998, chapt. 10, pp. 79–83.

2.Yap RL, Batler RA, Kube D, Smith ND. Retrieval of migrated ureteral stent by intususception of ureteral balloon dilator tip. Urology 2004;63:571-573.

3.Isen K. Retrieval of DJ stent by using ureteroscope in an infant. J Pediatr Urol 2008;4:247-8.

4.Jeong H, Kwak C, Lee SE. Ureteric stenting after ureteroscopy for ureteric stones: a prospective randomized study assessing symptoms and complications. BJU Int 2004;93:1032-4

5.Taylor WN, McDougall IT. Minimally invasive ureteral stent retrieval. J Urol 2002;168:2020-3.

6.Figueroa TE. Retrieval of ureteral stents in children. Tech Urol 1995;1:45-7.

7.Schulman CC WT, Zlotta AR: Single-J ureteral stent with a distal suture. In: Stenting the Urinary System. Edited by D. Yachia. Oxford: Isis Medical Media, 1998, chapt. 20, pp. 161-4.

8.Wetton CW, Gedroyc WM. Retrograde radiological retrieval and replacement of double-J ureteric stents. Clin Radiol 1995;50:562-5.

9.Vesey SG, Athmanathan N. A computerized ureteric stent retrieval system. Br J Urol 1996;78:156-7.

10.Cowan NC, Cranston DW. Retrograde radiological retrieval and replacement of double-J ureteric stents. Clin Radiol 1996;51:305-6.

11.Evans JW, Ralph DJ. Removal of ureteric stents with a flexible cystoscope. Br J Urol 1991;67:109-11.

12.Fowler CG. Removal of ureteric stents with the flexible cystoscope. Br J Urol 1987;60:280-3.

13.Iyer SK, Alston D. New flexible cystoscopic stent retriever forceps. Br J Urol 1991;68:441-4.

14.Simonato A, Galli S, Carmignani G. Simple, safe and inexpensive retrieval of JJ stents with a flexible cystoscope. Br J Urol 1998;81:490-1.

15.Yoshimura R, Wada S, Kishimoto T. Why the flexible cystoscope has not yet been widely introduced?: A questionnaire to Japanese urologists. Int J Urol 1999;6:549-59.

16.Dyer RB, Chen MY, Zagoria RJ, Regan JD, Hood CG, Kavanagh PV. Complications of ureteral stent placement. Radiographics 2002;22:1005-22.