

IS ROUTINE URETERAL STENTING NECESSARY AFTER
UNCOMPLICATED URETEROSCOPIC LITHOTRIPSY?
A RETROSPECTIVE ANALYSIS AND REVIEW
OF LITERATURE

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Abstract

Urolithiasis is a common condition with increasing prevalence worldwide, high recurrence rate, and substantial impact on quality of life. Ureteroscopy combined with laser stone dusting or fragmentation and basketing is one of the most popular procedures for treatment of ureteral and renal calculi. However, there is no consensus in the literature about whether a ureteric stent should be placed after uncomplicated ureteroscopy for stone retrieval. Furthermore, the definition of uncomplicated URSL remains controversial as well. Stents, however, are potentially associated with some side effects worsening of the quality of life of patients, prolonged operating time, additional intervention for extraction, and higher costs.

A review of literature shows a number of studies suggesting that routine stenting can be avoided following uncomplicated ureteroscopy. This encourages us to conduct a retrospective study evaluating the need for routine ureteral stent placement in patients undergoing ureteroscopic laser lithotripsy and basketing.

Key words: urolithiasis, ureteroscopic laser lithotripsy, ureteral stents

Introduction. Urolithiasis is a common condition with increasing prevalence worldwide, high recurrence rate and substantial impact on quality of life. Ureteral and renal calculi can lead to symptoms involving severe abdominal and flank pain,

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nausea, fever, and urinary tract problems. In the past, shockwave lithotripsy was the gold standard of treatment not only for renal and proximal ureteral stones but for distal ureteral stones as well. During the last decade, endoscopic management of stones has changed significantly due to technical progress and improvements in endoscopic instruments. In the contemporary urology practice ureteroscopy combined with laser stone dusting or fragmentation and basketing is one of the most popular procedures for treatment of ureteral and renal calculi. Despite the fact that endoscopic treatment of urolithiasis has proven its high level of efficiency and safety it still has a clinically significant risk of complications and morbidity.

Ureteric stent insertion after ureteroscopic lithotripsy (URSL) is best indicated for patients with solitary or transplanted kidney, bilateral urolithiasis, renal impairment and pregnancy. Ureteric stenting is also recommended in complicated ureteroscopies involving large residual stone burden, ureteric trauma or perforation, bleeding and urinary tract infection (UTI) [1]. One study of stent placement after ureteroscopy for stone treatment revealed that stents are used in 60% of patients with ureteral stones and in 80% of patients with renal stones [2]. However, there is no consensus about whether a ureteric stent should be placed after uncomplicated ureteroscopy for stone retrieval. Furthermore, the definition of uncomplicated URSL remains controversial because of the lack of strict definition and subjective assessment [3]. Despite this controversy, most urologists prefer postoperative ureteral stenting because it is thought to decrease renal obstruction due to postoperative ureteral oedema, small stone fragments or blood clots, and presumably lowers the risk of stricture formation.

Stents, however, are potentially associated with some side effects including flank and suprapubic pain, urinary frequency, urgency and urge incontinence, bleeding, dysuria, as well as some more serious complications like proximal stent migration, recurrent UTI, especially due to nosocomial infections, sepsis, 'forgotten stents', or stent encrustation. All these side effects deteriorate quality of life of patients and can lead to more frequent office and emergency department visits. Furthermore, routine ureteric stent placement may be associated with prolonged operating time, need of an additional intervention for their extraction and higher costs [4].

Materials and methods. A review of literature shows a few studies suggesting that routine stenting can be avoided following uncomplicated ureteroscopy. This encourages us to conduct a retrospective analysis evaluating the need for routine ureteral stent placement in patients undergoing ureteroscopic laser lithotripsy and basketing.

The definition of uncomplicated URSL that we applied to our study is based on the preoperative CT urography and urine analyses and by the visual assessment by the operating urologist.

A total of 54 patients with uncomplicated ureterorenoscopy with laser lithotripsy and basketing were equally randomized into two groups (stented versus

nonstented group) by 27 patients. The procedure was performed with the patient under either general or epidural/spinal anesthesia.

All patients with urinary tract infection, solitary kidney, bilateral ureter or kidney calculi with or without azotemia, ureteral strictures, anomalies of the urinary tract, and large residual stone burden were considered complicated and were not included into the study.

Patient evaluation was performed on day 3, day 15 and day 30 after the procedure with a follow-up ultrasound examination, urine culture on day 14, and a symptom score questionnaire with regard to flank and pelvic pain, frequency, urgency, urge incontinence, dysuria, and hematuria. In all patients of group 1 stents were extracted between 3 and 6 weeks after the procedure.

The outcomes measured were postoperative patient pain, lower urinary tract symptoms, the need for hospital care as a result of the postoperative pain and complications like residual hydronephrosis and urinary tract infection.

The statistical information was processed with SPSS Statistics v26. For all tests, a level of significance $p > 0.05$ was adopted. Descriptive statistics, non-parametric tests, ANOVA and Bonferroni post-hoc test were used for statistical analysis.

Results. The average stone size into the two groups is 10.6 ± 0.5 mm with an average stone density of 1009.4 ± 26.0 HU. According to stone location – renal pelvis in 11 cases, proximal ureter in 16 patients, mid part of the ureter – 6 cases, and distal ureter in 21 patients.

All patients underwent a semi-rigid ureteroscopy (semi-rigid ureteroscope of Karl Storz) and stone fragmentation/dusting (holmium laser) with or without stone basketing. In five patients a flexible scope was used additionally for achieving complete stone removal. Stone free rate was measured visually by the surgeon and by x-ray during the procedure itself and was achieved in 22 patients of group 1 and 23 patients in group 2. In the other 9 patients stone fragments less than 2 mm in size were left inside the ureter or renal pelvis for spontaneous evacuation. In group 1 a double pigtail ureteral 5 or 6 Fr stent was placed following ureteroscopy.

The two patient groups were comparable according to the baseline variables (Table 1).

The success of the procedure was defined as stone free or stone fragments less than 2 mm and was identical in both groups (100%).

Flank discomfort was significantly lower in the no-stent group on days 3, 14, and 30 ($\chi^2 = 13.17$; $p = 0.004$) as was the incidence of suprapubic pain ($\chi^2 = 44.15$; $p = 0.000$). There was no significant difference in urinary frequency, urgency, urge incontinence and dysuria between the groups on postoperative day 1 ($p > 0.05$), but all these symptoms were significantly increased in the stented group at all other time-points before the stent removal ($\chi^2_{\text{frequency}} = 16.36$; $p = 0.001$; $\chi^2_{\text{urgency}} = 13.88$; $p = 0.003$; $\chi^2_{\text{dysuria}} = 20.13$; $p = 0.000$). Stented individuals also have more pelvic and flank pain in the later postoperative phase

T a b l e 1

Clinical characteristics of patients

	Cohort (<i>N</i> = 54)	Stented (<i>N</i> = 27)	Nonstented (<i>N</i> = 27)	<i>p</i> value
Age (mean $\pm$ SE)	44.9 $\pm$ 2.0	45.8 $\pm$ 3.1	44.0 $\pm$ 2.7	NA
Sex <i>N</i> (%)	Men 31 (57.4 $\pm$ 6.7%) Women 23 (42.6 $\pm$ 6.7%)	Men 16 (59.3 $\pm$ 9.5%) Women 11 (40.7 $\pm$ 9.5%)	Men 15 (55.6 $\pm$ 9.6%) Women 12 (44.4 $\pm$ 9.6%)	NA
Position <i>N</i> (%)	Right 31 (57.4 $\pm$ 6.7%) Left 23 (42.6 $\pm$ 6.7%)	Right 15 (55.6 $\pm$ 9.6%) Left 12 (44.4 $\pm$ 9.6%)	Right 16 (59.3 $\pm$ 9.5%) Left 11 (40.7 $\pm$ 9.5%)	NA
Stone size (mean $\pm$ SE) mm	10.6 $\pm$ 0.5	10.6 $\pm$ 0.7	10.7 $\pm$ 0.7	NA
Stone location <i>N</i> (%)	Distal uter 21 (38.9 $\pm$ 6.6%) Renal pelvis 11 (20.4 $\pm$ 5.5%) Mild part of the ureter 6 (11.1 $\pm$ 4.3%) Proximal uter 16 (29.6 $\pm$ 4.3%)	Distal uter 10 (37.0 $\pm$ 9.3%) Renal pelvis 6 (22.2 $\pm$ 8.0%) Mild part of the ureter 3 (11.1 $\pm$ 6.0%) Proximal uter 8 (29.6 $\pm$ 8.8%)	Distal uter 11 (40.7 $\pm$ 9.5%) Renal pelvis 5 (18.5 $\pm$ 7.5%) Mild part of the ureter 3 (11.1 $\pm$ 6.0%) Proximal uter 8 (29.6 $\pm$ 8.8%)	NA
Stone density (mean $\pm$ SE) HU	1009.4 $\pm$ 26.0	1000.0 $\pm$ 34.7	1018.9 $\pm$ 39.4	NA
Operative time (mean $\pm$ SE) minutes	31.8 $\pm$ 1.7	33.3 $\pm$ 2.4	30.3 $\pm$ 2.4	NA

(days 3 to 30). Twenty-two (81.5 $\pm$ 7.5%) patients in the stented group complained of at least one irritative bladder symptom and only four (14.8 $\pm$ 6.8%) in the nonstented group experienced bladder discomfort (Fig. 1).

A significant difference in postoperative hematuria was reported between the two groups ($\chi^2 = 7.53$; $p = 0.05$). Eighteen patients (66.7 $\pm$ 9.1%) in group 1 complained of macroscopic hematuria at different time points before the stent extraction compared to only 5 patients (18.5 $\pm$ 7.5%) from group 2 (Fig. 1).

An anatomical ureteral stricture was not found in any patients of the two groups through the follow-up period. We do not perform a follow-up IVP or CT urography for evaluation of ureteral stricture formation because we do not think it is applicable in patients without clinical symptoms and no signs of obstruction on the follow-up ultrasound.

The only disadvantage found for the unstented approach was the readmission rate; two of our patients (7.4 $\pm$ 5.0%) were re-hospitalised 3 and 7 days after the procedure for management of pain. Both of them were managed conservatively without insertion of a ureteric sent and they were discharged after 2 days. One

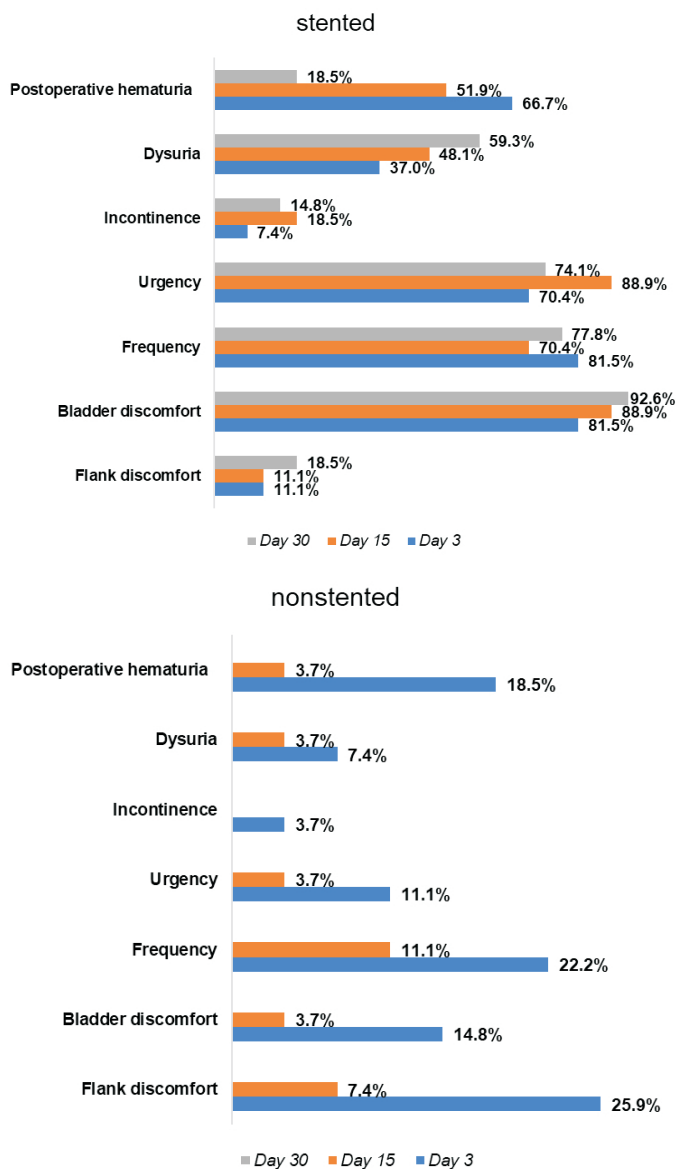


Fig. 1. Postoperative complications: a) stented patients b) nonstented patients

patient from group 2 ($3.7 \pm 3.6\%$) underwent stenting on the day after the procedure due to severe edema of the ureter orifice; no residual stone fragments were found during the secondary ureteroscopy.

Discussion. The reported results in the current study may raise questions about the well-accepted clinical practice for stent insertion after almost every ureteroscopic procedure for ureter and renal stones. We can bravely say that our

study can be considered pilot on this topic in our country because comparative studies between stent and no stent in patients who underwent uncomplicated URSL are lacking in our literature.

MUSLUMANOGLU et al. [2] reported the results of the Clinical Research Office of Endourological Society (CROES) Ureteroscopy Global Study Cohort and found stenting rates of approximately 80% for renal stones and 60% for ureteral stones, varying from 29% to 96% across countries. Another study showed that the reported stenting rates in the United States are nearly 90%.

The exact aetiology of symptoms related to ureteric stent insertion is still not completely clear. It has been proposed that the intravesical loop of the stent may lead to reflux and high pressure in the ureter and renal pelvis consequently during micturition, as well as increased bladder mucosa irritation [5,6].

Several authors reported in their studies on the topic that stenting after ureteroscopy for stones is the most frequent cause of morbidity and has negative effect on patients' quality of life [7,8]. A significant increase in dysuria, frequency, and haematuria in stented patients was also found in a study including 14 trials [9].

All these side effects prompted the use of stents with extraction magnet strings in order to prevent early complications, non-invasive stent removal, reduction in stent dwell time, decreased morbidity and overall costs [10,11]. In our study we did not use these kinds of stents even though they are available on the market because our previous experience with them had shown that patients experienced even more side effects which are probably due to the extraction string itself. We also believe that no stent at all guarantees best quality of life of our patients [12].

Some authors suggest that routine ureteric stent placement may result in prolonged operating time but in most of the studies this is not considered to be clinically significant which corresponds with our results as well [13–15].

On the other hand, it is thought that unstented patients were significantly more likely to have additional medical visits compared to those who received a post-ureteroscopy stent and there is an increased risk of ureteral stricture formation [16]. Our results showed clearly enough that these negative points can be avoided by proper selection of patients and complete stone removal.

As a study limitation we may point out the lack of validated assessment of cost but we think that the cost effectiveness in the no-stented group seems to be proven for both national healthcare systems and patients as well.

Conclusion. Comparing the results of our study with those in the foreign literature we can conclude that routine stent placement after uncomplicated ureteroscopic laser lithotripsy and basketing for renal and ureter stones can be avoided, thereby reducing patient morbidity, the need of second intervention for stent extraction and costs for both health care system and patients as well. We hope that this study will challenge urologists to reassess the need of stent insertion and change some “old fashioned” manners in our daily practice.

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