

Analysis of Stenting versus Non-Stenting in patients Undergoing Ureteroscopic Lithotripsy for Management of Ureteric Calculi

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ABSTRACT

Background: Ureteroscopic lithotripsy (URL) for ureteric calculi is commonly followed by ureteric stenting in around 60% of patients. However, its use for ureteric stones is debatable due to the stent-related symptoms and extra risks of stent migration, stent encrustation, and vesicoureteral reflux.

Aim: To compare stenting to no-stenting in terms of mean operative time and mean hospital stay in patients receiving ureteroscopic lithotripsy for the treatment of ureteric calculi.

Methods: This RCT, conducted at the Armed forces institute of urology Rawalpindi, included 104 patients aged 18 to 65 years with newly diagnosed ureteric calculi of 10-20 mm in size. They were subsequently separated into two equal groups, group A patient underwent ureteric stenting, and group B patients without a ureteric stent after uncomplicated calculus clearance with URL. Operative time was recorded in minutes, and hospital stay was measured in hours. Data were analyzed by SPSS version 22.

Results: The mean (SD) operative time was significantly longer in group A as compared to Group B, 48.02 ± 4.33 and 33.67 ± 2.27 min, respectively (p -value < 0.0001), similarly mean duration of hospital stay for Group B patients was significantly shorter as compared to Group A patients (21.94 ± 2.29 versus 27.10 ± 4.16 hours) which were significant statistically ($p < 0.0001$).

Practical implication: Every URS procedure does not need stenting. Patients with uncomplicated URS should not under DJ stenting. URS without stenting reduces hospital stay and operative time.

Conclusions: Non-stenting has reduced mean hospital stay duration and reduced mean operative time in comparison with stenting after URL; thus, unless desirably needed stenting in URL should be avoided. Keywords: Ureteroscopy (URL), DJ stenting, operative time. hospital stay.

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INTRODUCTION

Urolithiasis is among the most commonly encountered urological diseases with rising prevalence worldwide. It affects 11-13% of male and 5.6-7% of female population¹. There is a significant difference in the rates based on geographical location, climatic conditions, dietary habits, fluid consumption, heredity, age, occupation, and gender. The "Afro-Asian Stone Belt," where Pakistan lies, has a prevalence varying from 4 to 20%².

Most of the time, kidney stones are initially asymptomatic, but eventually, they progress into the ureter and cause obstructive symptoms, negating the need for treatment. Depending on the site, size, and density of the calculus on a computed tomography scan, patient built and personal wish, treatment options include conservative management, open surgery, extracorporeal shockwave lithotripsy, minimally invasive procedures such as laparoscopic and endoscopic stones removal³. The diagnostic uses of ureteroscopy are in conditions like confirming abnormal imaging findings, evaluating ureteric obstruction, or diagnosing upper tract urothelial carcinoma. Ureteroscopy therapeutic uses include several minimally invasive therapies such as Intracorporeal lithotripsy for ureteric stones, treatment of upper urinary tract urothelial carcinomas, ureteric stricture incision, and ureteropelvic junction obstruction management⁴. With fast technological growth, we now have more skilled instruments that make it simple to access the upper urinary tract, thus making URL the most frequently carried out procedure for managing ureteric stones¹.

Ureteric stents are frequently placed after ureteroscopic procedures and are recommended in conditions like upper urinary tract infection, significant stone burden, obstructive uropathies, ureteral injury or severe edema. According to a study on stent placement, 60% of patients receive stents after ureteric stone

treatment⁴. However, the use of ureteric stent after URL for ureteric stones treatment is debatable, considering the complications of stent migration, vesicoureteral reflux, stent-encrustation, and the stent-related symptoms, such as increased urinary frequency, irritability, and pain.

This study evaluated mean operative time and hospital stay in stenting versus non-stenting groups following URL. In the present circumstances, where cost assessments of the operating room, stent, and hospital stay result in continuously rising healthcare costs and different opinions on the subject of stent placement that can be found in the literature, we aim to change the local practice of stent placement based on evidence in terms of stone clearance when comparing mean operative time and mean hospital stay.

PATIENTS AND METHODS

Study design and approval: This RCT was conducted between 18th May 2020 to 17th November 2020 in the Armed forces institute of Urology Rawalpindi, Pakistan, after institutional review board approval of the study protocol. Each patient was informed of the study's design, and informed written consent was signed. Random allocation was done.

Patient recruitment: A total of 104 patients were treated for unilateral ureteric calculi with URL. These patients were randomly divided into two equal groups. In group A patients, a JJ-Stent was placed after calculus clearance, while in Group B patients, no JJ Stent was placed after the stone clearance.

Inclusion and exclusion criteria: Patients between the ages of 18 and 65, of either gender, with unilateral ureteric stones 10mm to 20mm in diameter, normal renal function tests, and ASA I, II and III were included in the study. Uncompleted stone removal, unsuccessful ureteroscopic access to the stone, stone migration to the kidney, injury to the ureter, significant intraoperative bleeding, or suspected further ureteral pathology such as ureteral stricture

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and urothelial cancer were among the exclusion criteria. Patients were also excluded if they were pregnant, had a mental illness, had undergone JJ stenting in the past, had diabetes mellitus, had an active UTI, had only one working kidney, or had ASA IV or V.

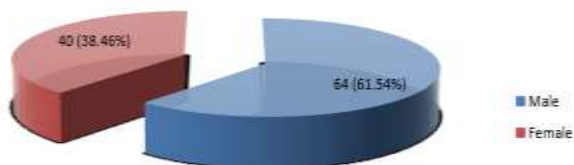
Patient assessment: Preoperative history and physical examinations were performed on all patients after admission to the hospital. Laboratory investigations advised included full blood counts (CBC), serum urea and creatinine (RFTs), urine analysis, and culture. The site and size of the Ureteric calculus were determined before surgery by USG KUB, plain X Ray KUB and plain CT Scan KUB.

Technique: The same skilled urologist carried out each procedure under spinal or general anesthesia. Antibiotics were administered intravenously one hour before anesthesia induction and continued throughout the patient's hospital stay. After that, patients received oral antibiotics for an additional five days. Under fluoroscopy, a safety guidewire (0.035 inches) was passed into the ureter with a cystoscope. A semirigid URS (Wolf 8.5 Fr) was inserted into the ureter, and calculi were evacuated with a Dormia basket after fragmentation with a pneumatic lithoclast (EMS LithoClast). At the end of the ureteroscopy, the operating urologist visually inspected the ureter for residual stone fragments and ureteric injuries like mucosal tears and ureteric perforation. If the calculus was fragmented and removed without causing damage to the ureter, the procedure was considered uncomplicated, while the procedure was considered complicated if the ureteric injury was present. As a result, a JJ-Stent was placed, and the patient was dropped from the research study. A JJ Stent (4.8fr, 28cm) was inserted under fluoroscopic guidance in group A. In group B patients, no DJ Stent was inserted. Operative times were recorded in minutes with a stopwatch, beginning with cystoscope insertion and ending with the complete removal of the last endoscope. At the same time, the hospital stay was recorded in hours between the anesthesia induction and the time of patient discharge.

RESULTS

Patients' ages in this study ranged from 18 to 65, with a mean age of 37.23±9.69 years. The mean age of group A patient was 37.17±9.51 years, while group B was 37.46±9.97 years. Most of the patients, 71(68.27%), were between 18-40 years of age (Table1).

Figure 1: Distribution of patients according to gender (n=104)



Out of these 104 patients, 64 (61.54%) were male, and 40 (38.46%) were females, with ratio of 1.8:1. The difference in stone size and age of the patients between the two groups was not significant statistically (Table 1). The mean operative time was 48.02 ± 4.33 minutes for URL with stenting (group versus 33.67 ± 2.27 minutes for URL without stenting(group-B), p-value =0.0001 which is statistically significant. Mean duration of hospital stay for patients who underwent URL without stenting was significantly shorter when compared to URL with stenting (21.94 ± 2.29 versus 27.10 ± 4.16 hours) which was also statistically significant (p =0.0001), shown in Table II.

Table I: Distribution of patients according to age and stone size (n=104)

Patients' parameters	Group A	Group B	p-value
Age (Years)	37.17 ± 9.51	37.46± 9.97	0.92
Stone size (mm)	13.58 ± 2.65	13.75± 2.60	0.89

Table-II: Comparison of operative time and hospital stay (n=104)

Patients' parameters	Group A	Group B	p-value
Mean operative time (minutes)	48.02 ± 4.33	33.67 ± 2.27	0.0001
Hospital Stay(hours)	27.10 ± 4.16	21.94 ± 2.29	0.0001

DISCUSSION

Every urologist now uses ureteral stents regularly since Finney, Hepperlen, and colleagues first introduced the double-J stent to the urological society in 1978. Numerous design and material advancements have been made over time to increase the effectiveness of ureteral stents. Routine ureteral stenting has been questioned in many studies⁵. Most centers routinely perform ureteric stenting after stone fragmentation, but their misuse has been questioned. We have conducted this study to analyze stenting versus no-stenting in terms of mean operative time and mean hospital stay in ureteric calculi patients undergoing stone fragmentation with URL. In an RCT, Al Demour S et al⁶ compared the mean operating time, re-admission to the hospital, and return to a normal daily routine. In our study, similar intra-operative variables, i.e. mean operative time, hospital stay, age, and stone size, were formulated for comparable results. In our study, there was no significant difference in baseline variables of both groups, as reported by Allam C et al⁷.

In our study, the mean age of 37.23 ± 9.69 years. In group A patients, the mean age was 37.17 ± 9.51 years; in group B, it was 37.46 ± 9.97 years. The majority of the patients, 71 (68.27%), were 18-40 years of age. These findings are also remarkably comparable to those of RasoolM et al⁸ and Hossain JMZ et al⁹, whose studies showed mean ages of 38 and 39 years, respectively. Similarly, Manan A et al¹⁰ investigations revealed a mean age of 38 years. However, in contrast to our study and other publications, Fong YK et al¹¹ observed a much higher mean age of 43 years in their study. Most of the patients in our study were between 18 and 40 years. The ratio of these 104 patients was 1.8:1, with 64(61.54%) men and 40(38.46%) women. Multiple previous studies also revealed this male predominance⁸⁻¹⁰. Our study thus showed that the majority of ureteric calculi patients were mainly male and first presented in their third and fourth decade of life.

In my study, the mean operative time was 48.02±4.33 minutes for URL with stenting versus 33.67±2.27 minutes for URL without stenting (p-value=0.0001). The hospital stay mean duration for patients who underwent URL without stenting was significantly shorter compared to URL with stenting (21.94±2.29 versus 27.10±4.16 hours), which was statistically significant (p = 0.0001). Savić S et al reported that the stone-free percentage in the second postoperative week was 94.9% in the stenting group and 95.5% in the non-stenting group (p 1.0). In contrast, the mean operating time in the stenting group was 41.5+5.10 minutes as opposed to 37+1.21 minutes in the non-stenting group (p<0.001). In the same study, the stenting group's mean hospitalization time was 24.88+0.89 hours, while the non-stenting group was 26.03+1.2 hours (p <0.001)¹². The mean operational time was 42+11.2 minutes in the stenting group versus 37 + 6.25 minutes in the non-stenting group in a different local trial by Zaki MR et al (p < 0.05)¹³.

However, the placement of a ureteric stent following ureteroscopy is linked to specific morbidities, such as discomfort, UTI, and irritative LUTS. The placement of ureteric stents may also lead to more severe complications such as stent encrustation stent migration or "forgotten DJ stent," which would increase morbidity and expenditures¹⁴. According to randomized prospective trials, regular stenting following a simple ureteroscopy is not required because stenting may be associated with increased morbidity^{15,16}.

Ucuzal et al¹⁷ reported that patients receiving stents experienced unwanted side effects and significantly compromised their quality of life. Therefore routine stent insertion after URL is controversial.

Stenting raises the cost of a ureteroscopic procedure and requires cystoscopy for stent removal unless a string is attached to the stent's distal end^{18,19}. By analyzing patient perceptions about the outcome of the treatment, together with the clinical parameters, our results indicate the importance of patient subjective satisfaction. This is an important parameter and should be considered when deciding on stent insertion, except when clear indications are present. Although clinical factors are of prime importance, considerations about the quality of life and patient satisfaction assessed by standardized questionnaires are also crucial.

Thus, stent insertion should be restricted to specific indications, such as patients with solitary functioning kidney, UTI, surgical complications, and significant stone burden²⁰. Ureteric stone removal with Uncomplicated ureteroscopy is safe without stenting; after taking into account risks and adverse effects, frequent use of ureteric stents following uncomplicated ureteroscopy for stone extraction may be unnecessary²¹. Patients without DJ stents have remarkably fewer lower urinary tract symptoms like pain, urinary urgency, and frequency, and they do not have a higher risk of complications²².

CONCLUSION

This study concluded that non-stenting has reduced mean hospital stay and mean operative time in comparison with stenting after URL. Therefore, it is determined that placing DJ stents in patients undergoing ureterorenoscopy for ureteric stones is only an economic burden rather than having any beneficial effects. Therefore, we advise against routinely using JJ stent insertion following ureterorenoscopic lithotripsy in all patients, and only promoting it in specific, complicated cases.

Authorship and contribution Declaration: Each author of this article fulfilled following Criteria of Authorship:

1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.
4. All authors agree to be responsible for all aspects of their research work

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