Original article

Comparison of Postoperative Outcomes of Ureteroscopic Lithotripsy with and without Double J Stent in Patients with Upper Ureteric Stone

Muhammad Ejaz Siddique[1], Hafiz Muhammad Ahmad Zaheer[2], Faisal Ahmed Zaeem[3], Muhammad Zahid Ahmed[4]

[1]Assistant Professor, [2]Postgraduate Resident, [3]Senior Registrar, [4]Associate Professor, Department of Urology, Fatima Jinnah Medical University/Sir Ganga Ram Hospital, Lahore-Pakistan,

Correspondence to: Dr. Muhammad Ejaz Siddique, Email: drejazsiddique@yahoo.com

ABSTRACT

Background: The management of upper ureteric stones typically involves ureteroscopic lithotripsy with a routine stent, but the newer double J (DJ) stent may offer improved outcomes. This study was conducted to assess postoperative effects, including urinary frequency, urgency, and dysuria.

Patients and methods: A randomized control trial was conducted at Urology department of Fatima Jinnah Medical University, Sir Ganga Ram Hospital, Lahore from January 2022- February 2023. Inclusion criteria comprised patients of both genders aged 18 to 45 years with a solitary upper ureteral stone measuring 10–15 mm. Patients with radiolucent ureteric stones, pregnancy, ureteric mucosal injury, ureteric strictures, perforation, and cases where the stone migrated to the kidney were excluded. Patients were diagnosed with an upper ureteric stone based on a non-contrast CT scan showing a high-attenuation structure (>200 Hounsfield units) within the ureteral lumen, located above the superior border of the sacroiliac joint. Patients were randomly allocated into two groups by using a computerized random number table. Group A (N=30) and Group B (N=30). Group A (Double J Stent) underwent ureteroscopy with intracorporeal lithotripsy and double J stent insertion under spinal anesthesia. A Foley catheter was removed after six hours, and the stent was removed after two weeks. Group B (No Stent) underwent the same procedure without stent placement or Foley catheter, with intravenous fluids discontinued after six hours and oral fluids encouraged. Postoperative outcomes included frequency (>8 voids/24h), urgency (compelling need to urinate), dysuria (pain or discomfort during urination), and stone clearance (no residual stones ≤3 mm on X-ray KUB after two weeks). All the procedure were performed by same surgical team. A pre-designed proforma was utilized to collect demographic and clinical data, including baseline variables such as age, gender, stone size, and laterality. Data was entered and analyzed by SPSS 25.0. The comparison between double J stent versus no stent groups for frequency, urgency, dysuria and stone clearance was performed by using Chi square test. A p-value of ≤0.05 was considered as significant.

Results: Mean age of participants was 30.68±8.08 years, which included 34 males (56.7%) and 26 females (43.0%). Mean stone size was 13.03±1.66 mm. Stones were located on the right in 45.0% of participants and on the left in 55.0%. Group A reported significantly higher rates of increased urinary frequency (56.7% vs. 23.3% in Group B; p=0.008) and urinary urgency (53.0% vs. 20.0% in Group B; p=0.07). Dysuria was more frequent in Group A (33.3%) compared to Group B (16.7%; p=0.136). Stone clearance was 100% in both groups.

Conclusion: Patients who undergo ureteroscopic lithotripsy followed by double J (DJ) stent placement experience statistically higher increased urinary frequency and urgency and relatively more dysuria compared to those without a routine stent, whereas stone clearance was achieved in all patients.

Keywords:

Ureteric stone, Ureteroscopic Lithotripsy, Double J, Routine, Stent, Outcome

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INTRODUCTION

Ureteric stones are formed in or travel down to the ureters and can block urinary flow from the kidneys to the bladder. Patients having ureteral stones may present with flank pain, nausea, vomiting, and hematuria.[1] Ureteroscopy with or without intracorporeal lithotripsy is a commonly used treatment for ureteral stones.[2]Following ureteroscopy, ureteric stents are used to decrease the risk of obstruction after stone fragmentation and facilitate stone fragment passage. However, their routine use remains debatable. Lithotripsy plays a crucial role in breaking stones into smaller fragments, enabling spontaneous passage or easier extraction.. However, use of ureteric stents after ureteroscopy is debatable.[3,4] Use of double J stents (DJS) following ureteroscopy is a point of

ongoing debate among urologists. It helps maintain ureteral patency postoperatively, particularly in cases where there is a risk of obstruction due to residual stone fragments or postoperative swelling.[5–7] The European Association of Urology (EAU) guidelines are opposed to the routine placement of a double J stent (DJS) after uncomplicated ureteroscopy (URS) for stone removal in its entirety.[8] However, DJS is frequently utilized in complex cases in order to avoid ureteric obstruction due to residual fragments or postoperative edema, thereby decreasing the incidence of ureteral stricture to 1%. This risk increases with longer procedures, with the use of larger ureteroscopes (>9.5F), or with the presence of a ureteral injury or a stone which is impacted within the lumen, any of which may contribute to a decline in renal function.[9]Though the use of double J hook ends is beneficial, it leads to certain side effects, such as discomfort in the bladder, pain in the pelvic region and blood in the urine, as well as affects one's quality of social life and ability to engage in sexual activities.[10] Literature reported that 80% of patients experienced DJ stent-related pain, daily life disruptions, urinary symptoms, and that 32% reported sexual dysfunction, with other studies noting morbidity rates of 50–80%.[11] One of the major controversies is regarding role of DJS placement post ESWL on stone clearance rates. Although there are studies supporting that DJS could maintain ureteric patency in addition to helping with clearance, it has been suggested by some as potentially impeding urine flow and therefore reducing the effect of ESWL.[12,13] Further research is essential to evaluate the impact of double J stent (DJS) placement on stone clearance and to develop evidence-based clinical guidelines. While advancements in ureteroscope design and extracorporeal shock wave lithotripsy (ESWL) continue, their integration into routine practice is expected to enhance outcomes. Improved semi-rigid ureteroscopes facilitate navigation through smaller calyceal diverticula, reducing radiation exposure during procedures. The objective of this study is to compare postoperative outcomes of ureteroscopic lithotripsy with and without DJS in patients with upper ureteric stones.

PATIENTS AND METHODS

The study was conducted as a randomized controlled trial, after ethical approval by the IRB/ERC of Fatima Jinnah Medical University and Sir Ganga Ram Hospital, Lahore at the department of Urology. A sample size of 60 (30 in each group) was determined based on an expected urinary frequency of 51.4% in the double J stent group and 14.2% in the no-stent group, using a 95% confidence level, 80% power, and 20% dropout rate.[14] Patients of both genders aged 18 to 45 years with a solitary upper ureteral stone measuring 10–15 mm were included. Exclusion criteria comprised radiolucent ureteric stones, pregnancy, ureteric mucosal injury, ureteric strictures, perforation, and patients in whom the stone migrated to the kidney. Patients were randomly assigned to one of two groups using a computerized random number table. Group A (Double J Stent): Under spinal anesthesia, patients underwent ureteroscopy with intracorporeal lithotripsy and a double J stent insertion. The procedure began with rigid cystoscopy connected to a video monitor to localize the ureteric orifices. An 8 French semi-rigid ureteroscope, guided by a 0.035-inch guidewire, was used to reach the stone, which was stabilized with a stone cone to prevent migration. The stone was fragmented using a pneumatic lithoclast, and a 6 French double J stent was inserted post-procedure. Foley catheter was inserted and was removed six hours postoperatively, after which intravenous fluids were discontinued, and oral fluids encouraged. The double J stent was removed after two weeks. Group B (No Stent): Patients received the same ureteroscopy and lithotripsy procedure without double J stent placement. No Foley catheter was used, and intravenous fluids were stopped six hours postoperatively with oral fluids encouraged. All the procedure were performed by same surgical team. Postoperative outcomes were assessed on the first postoperative day, with X-ray KUB performed to confirm stent position and check for stone fragments. All patients were discharged with counseling on postoperative symptoms such as urinary frequency, urgency, and dysuria, and prescribed ciprofloxacin, analgesics, and antispasmodics for five days. Follow-up included a fresh X-ray KUB two weeks later, with stone clearance defined as no residual stones or fragments >3 mm. Patients were followed after 2 weeks to evaluate post operative outcomes. Postoperative outcomes were measured in terms of frequency which is defined as a patient reporting more than eight voids per 24 hours. Urgency was characterized by a sudden, compelling desire to pass urine that was difficult to defer. Dysuria was identified as discomfort, burning, or pain associated with urination. Stone clearance was determined by the absence of residual stones or fragments ≤3 mm in size on X-ray KUB after two weeks. All the complications were dealt according to standard guidelines. A pre-designed proforma was utilized to collect demographic and clinical data, including baseline variables such as age, gender, stone size, and laterality. The Statistical Package for Social Sciences (SPSS) version 26 was used for data entry and analysis. Quantitative variables such as age and stone size were reported using mean ± standard deviation. Qualitative variables such as gender, laterality, frequency, urgency, dysuria and stone clearance were reported using frequency (percentage). The comparison between double J stent versus no stent groups for frequency, urgency,

dysuria and stone clearance was performed by using Chi square test. Stratification was performed to address confounding factors such as frequency, dysuria, and other catheter-related outcomes. P-value of ≤0.05 was considered as significant.

RESULTS

A total of 60 patients were enrolled. The mean age of the participants was 30.68±8.08 years. The cohort consisted of 34 males (56.7%) and 26 females (43.0%). Stones measuring between 10 and 12 mm were found in 25 participants (41.7%), and those measuring between 13 and 15 mm were present in 35 participants (58.3%).

In terms of stone laterality, 27 participants (45.0%) had stones on the right side, while 33 participants (55.0%) had stones on the left side. The mean age of participants in Group A was 30.83±8.48 years, and in Group B: 30.53±7.82 years p=0.887). Majority of the patients were aged betweem 18–30 years (Group A: 50.0%, Group B: 60.0%). Gender-wise male participants in Group A were 60.0%, and in Group B 53.3% (p=0.602). Mean stone size in Group A was 13.07±1.62 mm, and in Group B, 13.00±1.72 mm; p=0.878) and stone size categories (10–12 mm vs. 13–15 mm) were similarly distributed (p=0.602). Table 1 summarizes the demographic details of study participants.

Regarding urinary urgency, 16 participants (53.0%) in Group A experienced urgency, whereas only 6 participants (20.0%) in Group B did so (p = 0.07). Urgency was absent in 14 participants (46.7%) in Group A and 24 participants (80.0%) in Group B. Dysuria was reported in 10 participants (33.3%) from Group A, compared to 5 participants (16.7%) from Group B (p = 0.136). Dysuria was absent in 20 participants (66.7%) in Group A and 25 participants (83.3%) in Group B. Notably, stone clearance was achieved in all participants, with 30 individuals (100.0%) in both Group A and Group B reporting successful stone removal, and no participants in either group had residual stones. Table 2 compares the frequency of outcome variables between two groups.

Table 1: Comparison of demographic characteristics between the Groups

Characteristics	Group A (N=30)	Group B (N=30)	p-value
Age (18-45years)	30.83±8.48	30.53±7.82	0.887
18-30 years	15 (50.0%)	18 (60.0%)	0.436
31-45 years	15 (50.0%)	12 (40.0%)	
Gender			
Male	18 (60.0%)	16 (53.3%)	0.602
Female	12 (40.0%)	14 (46.7%)	
Stone size (mm)	13.07±1.62	13.00±1.72	0.878
10-12 mm	18 (60.0%)	16 (53.3%)	0.602
13-15 mm	12 (40.0%)	14 (46.7%)	
Laterality			
Right	13 (43.3%)	14 (46.7%)	0.795
Left	17 (56.7%)	16 (53.3%)	

*Independent sample t-test. ** Chi-Square test. Taking p-value≤0.05 as significant

Table 2: Comparison of study outcomes between the groups

Outcome	Study Groups		p-value
	Group A	Group B	
Urinary frequency			
Increased	17 (56.7%)	7 (23.3%)	0.008
Normal	13 (43.3%)	23 (76.7%)	
Urgency			
Present	16 (53.0%)	6 (20.0%)	0.07
Absent	14 (46.7%)	24 (80.0%)	
Dysuria			
Present	10 (33.3%)	5 (16.7%)	0.136
Absent	20 (66.7%)	25 (83.3%)	
Stone clearance			
Yes	30 (100.0%)	30 (100.0%)	-
No	0 (0.0%)	0 (0.0%)	

Chi square test, taking p-value≤0.05 as significant.

DISCUSSION

The management of upper ureteric stones often involves ureteroscopic lithotripsy, a procedure typically accompanied by the use of a routine stent to facilitate urine flow and prevent complications.[15] Recently, the double J (DJ) stent has emerged as a newer option, potentially offering enhanced outcomes. However, data comparing the postoperative outcomes of ureteroscopic lithotripsy with and without DJ stents remain scarce.[16] To address this gap, this study was designed to compare the postoperative effects of ureteroscopic lithotripsy with and without a DJ stent, evaluating parameters such as urinary frequency, urgency, and dysuria. The findings aim to guide clinical decisions and optimize patient outcomes. Mean age of the patients in this study was 30.68±8.08 years. Previously mean age in such studies was reported by Wahab and coresearchers from Pakistan as 37.11±9.51 years, and 36.1 (range 13-56) years by Khan and colleagues from India.[14,17] This suggests a potential shift toward a younger demography in recent cases of upper ureteric stones, possibly indicating earlier onset or different risk factors in this population. Understanding this age trend can help tailor preventive and therapeutic approaches for a younger cohort. The gender distribution showed a slightly higher prevalence of males, comprising 56.7% (n=34) of the participants, while females made up 43.0% (n=26). This male dominance was also reported in previous studies.[14,18] However, in another study, males were only 20.6% of the study population.[19] This variability highlights the need for further research to understand gender differences in stone formation and management across diverse populations. In the current study it was reported that Group A reported significantly higher rates of increased urinary frequency (56.7% vs. 23.3% in Group B; p=0.008) and urinary urgency (53.0% vs. 20.0% in Group B; p=0.07). Dysuria was more frequent in Group A (33.3%) compared to Group B (16.7%; p=0.136). Stone clearance was 100% in both groups. Akmal and coworkers reported urinary infection insignificantly high in DJ stent

group than without DJ stent (2.17% vs. 1.02%; p-value=0.524) while frequency of dysuria was significantly high in the former group (33.36% vs. 20.40%; p-value=0.039) and failure to pass stone had insignificant difference between the groups (2.17% vs. 5.10%; p-value=0.284).[18] One previous study reported that incidence of symptoms was significantly high in group with DJ stents than without DJ stents (51.4% vs. 14.2%; p-value=0.001), whereas in another study it was reported that frequency of problem of urinary retention was high in DJ stent group.[14,20] Another study that helps in understanding whether double J stents (DJS) improve stone clearance or not. Considering DJS, final stone clearance was possible in 83 cases (42.7 %) vs. in the non-DJS group with 87 cases (44.8%), resulting a similar average postoperative mean SF rate of both principle techniques In summary, although DJS may provide some advantages in stone clearance than without stents, these data will lead to further studies about when and how patients should be treated with ESWL together with or after removal of a stent.[21]

CONCLUSION

Patients with a double J (DJ) stent following ureteroscopic lithotripsy experienced more urinary frequency and urgency compared to those without a stent, though some of these differences were not always statistically significant. Dysuria was also more common in the DJ stent group but lacked statistical significance. Despite these symptoms, stone clearance was achieved in all patients. The decision to use a DJ stent should be individualized, balancing the benefits of complete stone removal against potential postoperative discomfort.

Author Contributions

MES: Conceptualization, manuscript drafting, data curation, and manuscript editing.
HMAZ: Conceptualization, manuscript drafting, data, manuscript editing.
FAZ: Conceptualization, manuscript drafting.
MZA: Data Analysis, drafting the manuscript, editing and revision of manuscript.

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