

Role of Ureteral Stenting in Patients Undergoing Intra-Corporial Pneumatic Lithotripsy for Mid and Distal Ureteric Stone

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ABSTRACT

Background: It has been a popular and accepted surgical tradition to place a ureteral stent after performing ureterostomy especially when performing lithotripsy for ureteral calculi. However the use of stents is accompanied by significant morbidity including pain, infection, and irritative voiding symptoms.

Aim: To compare the outcome of stented vs non stented patients after lithotripsy for ureteric stone

Study design: Randomized control trial

Setting & duration: Department of Urology / Jinnah Hospital, Lahore. Six month.

Methodology: 250 subjects were included in our study and randomly divided into 2 groups. During procedure, Storzureteroscope with pneumatic lithoclast was used to fragment stones into pieces. Operative findings were noted down. After that, in Group A, 6 Fr D.J stent was placed, while patients in group B was managed without DJ stent. Patients were followed up for 12 week. Outcome was measured in terms of postoperative pain, analgesia requirement and stone clearance.

Results: Out of 250 cases (125 in each group), mean post-operative pain score at 12 weeks was recorded as 2.56 ± 0.55 in Group-A and 2.11 ± 0.61 in Group-B, comparison of stone clearance in both groups shows that 118(94.4%) in Group-A and 116(92.8%) in Group-B were had no stones, p value was 0.60, comparison of additional analgesia in both groups shows that 38(30.4%) in Group-A and 13(10.4%) in Group-B had requirement of additional analgesia whereas 87(69.6%) in Group-A and 112(89.6%) in Group-B no need of additional analgesia, p value was 0.0001.

Conclusion: There was insignificant difference in frequency of stone clearance and mean post-operative pain in stented v/s non-stented patients after URS and pneumatic lithotripsy for mid & distal ureteric stones.

Keywords: Mid & distal ureteric stone, URS & pneumatic lithotripsy, DJ stent, post-operative pain, analgesia

INTRODUCTION

Urolithiasis is a great challenge for urologists and its incidence is growing day by day. It is the 3rd most common illness of urinary tract after UTI and prostatic disorders.¹ Calcium stones are usually found in 80% cases with renal stones while struvite stones found in 10-15% cases and uric acid stones in 5-10% cases only. There are other rare stones like cysteine, xanthine, glycine etc and they are usually associated with some underline metabolic error^{2,3}. Obstructive uropathy is a serious condition that occurs when stone obstructs passage of urine. Obstruction can occur at various levels like at renal pelvis, upper ureter or lower ureter. This effect is usually proportional to stone size. Sudden onset of severe, intermittent colicky pain radiating to groin, associated with nausea and vomiting is a hallmark of obstructive stones⁴.

The treatment of ureteric stones ranges from watchful waiting to ureteroscopy (URS) with intra-corporeal lithotripsy, extracorporeal shock waves lithotripsy, dormia basket extraction and ureterolithotomy. Nowadays URS has become the treatment of choice for managing ureteral stones, especially for mid and distal ones. The recent improvement in the ureteroscopes regarding reduction of the size of the scope, the better optical visualization and the improvement of durability together with the introduction of flexible ureteroscopes has made it an easier, safer and more efficient mode of treatment.

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The rationale of this study was to assess the need for routine ureteral stenting after uncomplicated URS & pneumatic lithotripsy for mid & distal ureteric stones and impact of DJ stenting on patient morbidity. New evidence from international studies suggest that routine placement of DJ stent should be discouraged which has more complications as compared to non-stented patients.

The objective of the study was to compare the outcome of stented vs non stented URS & pneumatic lithotripsy for mid and distal ureteric stone

METHODOLOGY

This randomized control trial was conducted in the Department of Urology / Jinnah Hospital, Lahore during a period of six months

Inclusion Criteria:

- Age group 15-55 years
- Either gender
- Middle and distal stone size (radio-opaque shadow of size 8-20mm was categorized on X-Ray KUB. The part of ureter in front of superior and inferior sacroiliac joint is mid ureter and the part of ureter below the inferior sacroiliac joint up-to urinary bladder is distal ureter)

Exclusion Criteria:

- Solitary functioning kidney determined on ultrasonography.
- Previously operated case determined on history
- Bilateral ureteric stones determined on ultrasound KUB.
- Multiple (2 or more) ureteric stones determined on ultrasound KUB.

Data collection procedure: 250 subjects fulfilling the inclusion criteria were included in our study after approval from ethical committee and an informed consent. Subjects were randomly divided into 2 groups using a computer based random allocation procedure into group A and group B. Patients were admitted in ward through OPD after investigations. Fitness for general anesthesia was taken by concerned department. During procedure, Storz ureteroscope with pneumatic lithoclast was used to fragment stones into pieces. Operative findings were noted down (Performa attached). After that, in Group A, 6 Fr D.J stent was placed, while patients in group B was managed without DJ stent. Patients stayed in ward for 24-48 hours after the procedure and then discharge. Diclofenac sodium 50mg tablet was given for one month for pain management. Subjects were followed up at 1 week, 2 week, 4 week, 8 week and 12 week interval after the procedure. Outcome was measured in terms of postoperative pain (Measured by VAS score in both groups at 12th week postoperatively. Its range is 0-10 and pain increases as score increases.), analgesia requirement (Patients were advised tab diclofenac sodium 50 mg for pain relief for one week post-operatively and followed till 12 weeks) and stone clearance (determined by digital X-ray KUB at 12th week post operatively. No radio-opaque shadow on X-ray was taken as stone clearance) at 12th week of assessment.

Analysis procedure: The data was analyzed using SPSS version 17.0. Mean±SD was calculated for quantitative variables like age, post-operative VAS score at 12th week. Frequency and percentage was calculated for variables like gender, stone clearance and additional analgesia. Independent samples t-test was used to compare both groups for mean post-operative score and chi square test was used to compare the frequency of stone clearance and need for additional analgesia in both groups. A p-value ≤0.05 was considered as significant.

RESULTS

Age distribution of the patients was done, it shows that 33(26.4%) in Group-A and 31(24.8%) in Group-B were between 15-30 years age whereas 92(73.6%) in Group-A and 94(75.2%) in Group-B were between 31-55 years of age, mean+sd was calculated as 36.63+8.81 years in Group-A and 37.33+8.76 years in Group-B. Gender distribution shows that 66(52.8%) in Group-A and 63(50.4%) in Group-B were male whereas 59(47.2%) in Group-A and 62(49.6%) in Group-B were females (Table 1).

Mean post-operative pain score at 12 weeks was recorded as 2.56±0.55 in Group-A and 2.11±0.61 in Group-B, p value 0.0001. Comparison of stone clearance in both groups shows that 118(94.4%) in Group-A and 116(92.8%) in Group-B were had no stones whereas rest of 7(5.6%) in Group-A and 9(7.2%) in Group-B were not cleared, p value was 0.60. Comparison of additional analgesia in both groups shows that 38(30.4%) in Group-A and 13(10.4%) in Group-B had requirement of additional analgesia whereas 87(69.6%) in Group-A and 112(89.6%) in Group-B no need of additional analgesia, p value was 0.0001 (Table 2).

Table 1: Baseline characteristics of patients (n=250)

Age	Group-A (n=125)		Group-B (n=125)	
	f	%	f	%
15-30 years	33	26.4	31	24.8
31-55 years	92	73.6	94	75.2
Total	125	100	125	100
Age (years)	36.63±8.81		37.33±8.76	
Male	66 (52.8%)		63 (50.4%)	
Female	59 (47.2%)		62 (49.6%)	

Table 2: Comparison of outcome in both group at 12th week after treatment (n=250)

	Group-A	Group-B	p-value
Pain score on VAS	2.56±0.55	2.11±0.61	0.0001
Stone clearance	118 (94.4%)	116(92.8%)	0.60
Additional analgesia	38 (30.4%)	13 (10.4%)	0.0001

DISCUSSION

In most of the cases ureteroscopy is completed without the need of stenting the ureter by a double j (DJ) catheter. In some cases it is mandatory to stent, while the question remains to be addressed if it is necessary to insert a DJ catheter after all ureteroscopic procedures. There is no consensus on placing a ureteral catheter after uncomplicated ureteroscopy and it is still controversial^{5,6}. It is a routine justified by the belief that this practice decreases ureteral stricture formation, protects the kidney and minimizes postoperative pain. However the use of stents is accompanied by significant morbidity including pain, infection, and irritative voiding symptoms.

The idea behind this study was to assess the need for routine ureteral stenting after uncomplicated URS & pneumatic lithotripsy for mid & distal ureteric stones and impact of DJ stenting on patient morbidity. New evidence from international studies suggest that routine placement of DJ stent should be discouraged which has more complications as compared to non-stented patients. No study has yet been done in our standing in light of new evidences.

In our study, out of 250 cases (125 in each group), mean post-operative pain score at 12 weeks was recorded as 2.56±0.55 in Group-A and 2.11±0.61 in Group-B, comparison of stone clearance in both groups shows that 118(94.4%) in Group-A and 116(92.8%) in Group-B were had no stones, p value was 0.60, comparison of additional analgesia in both groups shows that 38(30.4%) in Group-A and 13(10.4%) in Group-B had requirement of additional analgesia whereas 87(69.6%) in Group-A and 112(89.6%) in Group-B no need of additional analgesia, p value was 0.0001.

In a study by Rasool et al stone clearance at 24 hours post-operative was 67% in mid ureteric and 73% in lower ureteric stones, at one week 79% and 83%, at one month 87% and 92% among groups. The stented group had more complications and 18% patients of this group had irritative bladder symptoms.⁷ In a study by Chen et al showed that the stone-free rate was 100% in each group and preoperative hydronephrosis equally resolved in both groups. Mean pain score plus or minus standard deviation improved significantly in the non-stented (6.33 +/- 1.81 preoperatively to 2.30 +/- 1.93 postoperatively, p<0.0001) and stented (7.10 +/- 1.03 to 2.30 +/- 2.22, p < 0.0001)

group. There was no statistical difference in pain reduction between the 2 groups ($p=0.18$). The amount of extra parenteral analgesic used was similar in both groups. One patient in the nonstented group visited the emergency room for postoperative renal colic, 25(83.3%) patients in the stented group complained of at least 1 irritative bladder symptom and only 4(13.3%) in the nonstented group experienced bladder discomfort⁸.

In a study done by Harrech N et al showed mean pain score of 2.6 ± 1.4 in Dj stent and 2.1 ± 1.4 in non-stent group. Dj stent group has dysuria in 26.1%, hematuria in 7.1% frequency and urgency in 40.4% and need for analgesic in 26.1% as compared to non-stenting group has dysuria in 13.1%, hematuria in 5.2% frequency and urgency in 18.4% and need for analgesic in 7.8%⁹.

Hamdy M. Ibrahim and others determined the differences in outcome between ureteral stenting and nonstenting following uncomplicated ureteroscopy for distal ureteral stones and concluded that uncomplicated ureteroscopy for treatment of distal ureteral stones is safe without stent placement. Patients without stents have significantly fewer irritative bladder symptoms and are not at risk of increased complications¹⁰.

Studies have demonstrated that ureteral stents decrease the frequency and amplitude of ureteral contraction in animals. In an animal model of ureteral stones causing obstruction, ureteral dilatation was observed proximal to the obstruction in the stented group whereas a nephrostomy tube group had no dilatation¹¹. Stents also impeded spontaneous stone passage and reduced ureteral contractility when compared to the nephrostomy group¹¹.

This is controversial, however, as others have shown that ureteral stents facilitate spontaneous passage of distal ureteric stones less than 10 mm in diameter in 83% of patients studied.¹² The ureter and ureteral orifice are theorized to passively dilate from the stent, thus facilitating stone passage. Although stents may affect ureteral peristalsis, the dilation of the ureter and orifice do facilitate spontaneous passage of smaller stones.

There is an increasing awareness that stents impact patients' quality of life. Stents may cause morbidity in up to 80% of patients with symptoms ranging from irritative voiding symptoms, hematuria, flank pain, suprapubic pain, infection, and stent migration to the "forgotten" encrusted stent. As a consequence of these concerns, the use of routine stent placement is being more thoroughly considered on a case-by-case basis when utilized as an adjunct to SWL or ureteroscopy^{13,14,15}.

In order to quantify patient morbidity from stents, Joshi et al., have developed and validated the first questionnaire of stent symptoms, the Ureteral Stent Symptom Questionnaire, which consists of 48 items spanning five criteria: pain, voiding symptoms, work performance, sexual health, and overall general health^{14,15}. Results indicate that 76% of stented patients experienced negative symptoms, 70% required analgesic, and 42% had to reduce their activity by half. This validated tool should become a standard evaluation technique of new stent technologies¹⁵.

In summary, we found no significant difference between the post-operative pain score and stone clearance however additional usage of analgesia was significantly higher in stent group, we are of the view that further studies should be done by evaluating quality of life in patients undergoing ureteroscopy with stent.

CONCLUSION

We concluded that there is no significant difference in frequency of stone clearance and mean post-operative pain in stented v/s non-stented patients after URS and pneumatic lithotripsy for mid & distal ureteric stones, however, additional analgesia was used significantly higher in stented group as compared to non-stented.

REFERENCES

1. Morgan MS, Pearle MS. Medical management of renal stones. *Brnj* 2016;352:152.
2. Cloutier J, Villa L, Traxer O, Daudon M. Kidney stone analysis: "Give me your stone, I will tell you who you are!". *World journal of urology* 2015;33(2):157-69.
3. Aleigh T, Petros B. Kidney Stone Disease: An Update on Current Concepts. *Advances in urology* 2018;2018.
4. Goel RH, Unnikrishnan R, Remer EM. Acute urinary tract disorders. *Radiologic Clinics* 2015;53(6):1273-92.
5. Ozturk H. Facilitate stent removal: Magnetic DJ stent. *Urology case reports* 2017;11:55-6.
6. Takazawa R, Kitayama S, Tsujii T. Appropriate kidney stone size for ureteroscopic lithotripsy: When to switch to a percutaneous approach. *World journal of nephrology* 2015;4(1):111.
7. Rasool M. Ureterorenoscopic Lithotripsy; Efficacy and Complications. Is Ureteric Stenting Necessary in Every Patient? *Ann Pak Inst Med Sci* 2012;8(3):161-4.
8. Chen Y-T, Chen J, Wong W-Y, Shei-dei Yang S, Hsieh C-H, Wang C-c. Is ureteral stenting necessary after uncomplicated ureteroscopic lithotripsy? A prospective, randomized controlled trial. *The Journal of urology* 2002;167(5):1977-80.
9. El Harrech Y, Abakka N, El Anzaoui J, Ghoundale O, Touiti D. Ureteral stenting after uncomplicated ureteroscopy for distal ureteral stones: a randomized, controlled trial. *Minimally Invasive Surgery* 2014;2014.
10. Ibrahim HM, Al-Kandari AM, Shaaban HS, Elshebini YH, Shokeir AA. Role of ureteral stenting after uncomplicated ureteroscopy for distal ureteral stones: a randomized, controlled trial. *The Journal of urology* 2008;180(3):961-5.
11. Lennon G, Thornhill J, Grainger R, McDermott T, Butler M. Double pigtail ureteric stent versus percutaneous nephrostomy: effects on stone transit and ureteric motility. *European urology* 1997;31:24-9.
12. Leventhal EK, Rozanski TA, Crain TW, Deshon GE, Dretler SP. Indwelling ureteral stents as definitive therapy for distal ureteral calculi. *The Journal of urology* 1995;153(1):34-6.
13. Joshi H, Okeke A, News N, Keeley F, Timoney A. Characterization of urinary symptoms in patients with ureteral stents. *Urology* 2002;59(4):511-6.
14. Joshi H, Stainthorpe A, MacDonagh R, Keeley F, Timoney A. Indwelling ureteral stents: evaluation of symptoms, quality of life and utility. *The Journal of urology* 2003;169(3):1065-9.
15. Joshi H, News N, Stainthorpe A, MacDonagh R, Keeley F, Timoney A. Ureteral stent symptom questionnaire: development and validation of a multidimensional quality of life measure. *The Journal of urology* 2003;169(3):1060-4