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Original Research Article

Comparison of post operative outcomes of non-stented versus stent for 7 days versus stent for 14 days following uncomplicated ureteroscopic lithotripsy-a single institution study

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ABSTRACT

Background: Ureteral stenting after uncomplicated URSL (ureteroscopic lithotripsy) is preferred by most urologists. Routine stenting exposes patients to more stent related complications. This study was done to compare post-op outcomes of stented and non-stented URSLs and to determine the optimal stent duration time following uncomplicated URSLs at our institute.
Methods: A total 90 patients with ureteric stones of <1.4 cm size admitted to our Institute between August-2023 and March-2024 were treated by URSL and randomized to 3 groups namely-non-stented group (n=30); stented for 7 days group (n=30); stented for 14 days group (n=30). The patients were followed up for 4 weeks following URSL. The primary outcomes assessed were post-op LUTS, dysuria, flank/suprapubic pain, hematuria and stone free state. The secondary outcome assessed was rehospitalization rate.
Results: The incidence of flank pain, LUTS and dysuria was higher in the stented groups compared with non-stented group. Loin/suprapubic pain, Irritative symptoms were higher in the 14 days stented group than 7 days stented group. However, there was no statistical difference in the three groups in terms of stone-free rate. Mean operation time was less in non-stented group than in stented groups ($p<0.05$).
Conclusions: The non-stented group has less incidence of pain and irritative symptoms with comparative stone free rate to the stented groups. The incidence of post op stent related complications increases with increasing duration of stent. We suggest that it is not necessary to place a ureteral stent routinely after uncomplicated URSL for ureteric stones smaller than 1.4 cm.

Keywords: LUTS, Stent, Stone, Ureteroscopic lithotripsy, URSL

INTRODUCTION

Urolithiasis is a major clinical and economic burden for healthcare systems. It is a highly prevalent condition with high rates of recurrence and a substantial impact on quality of life. Ureteric stenting is certainly necessary in complicated ureteroscopies involving bleeding, ureteric trauma, or large residual stone burden.[1]

However, placing a ureteric stent after uncomplicated URSL is debated. Nowadays, most urologists routinely insert ureteric stents, justified by the hypothetical fact that stent placement promotes the passage of residual stone fragments and clots, presumably lowers the risk of stricture formation, prevents ureteric obstruction and renal colic resulting from ureteric oedema following stone retrieval.[2] However, ureteric stent insertion after ureteroscopy is potentially associated with some morbidity including pain, infection, irritative voiding symptoms and also more serious complications such as upward stent migration, sepsis, 'forgotten stents', or encrustation with stone formation, thereby increasing

morbidity and costs. Randomized prospective trials have found that routine stenting after uncomplicated ureteroscopy is not necessary because stenting might be associated with higher morbidity.[3] In our institution, we routinely place stents for all cases of URSLs. In order to find out the optimal timing of stent placement with least stent related complications at our institute, we compared the post operative outcomes of patients randomized into 3 groups-non stented; stented for 7 days; stented for 14 days.

METHODS

Study design

This prospective comparative study was done at the institute of urology, Madras medical college and Rajiv Gandhi govt. general hospital, Chennai, Tamil Nadu, India during the period between August 2023 and March 2024. All participants were informed about the study design and signed written informed consent was obtained from every patient. Random allocation was done using a balanced blocked random number list.

Inclusion criteria

Inclusion criteria for current study were: age group 18-65 years, unilateral procedures and uncomplicated intra-operative course. URSL was defined as uncomplicated if the stone was fragmented and extracted without ureteric injury, which included ureteric perforation or severe mucosal injury.

Exclusion criteria

Exclusion criteria for current study were: bilateral ureteric stones, intraoperative ureteric injury, solitary kidney, features of pyelonephritis, complex anatomy, and renal failure.

Methodology

In this study, 90 patients with ureteric stones of <1.4 cm size were treated by URSL. Following the procedure, patients were randomized to 3 groups namely-non-stented group (n=30) who had no stent placed at the end of the operation [Group 1]; stented for 7 days group (n=30) [Group 2]; stented for 14 days group (n=30) [Group 3]. The patients were followed up for 4 weeks following URSL. The primary outcomes assessed were post op LUTS, dysuria, flank/suprapubic pain, hematuria and the stone free state indicated by a clinically insignificant residual fragment (CIRF). The secondary outcome assessed was rate of rehospitalization for treating post operative complications.

Patient assessment

All patients were admitted to the hospital and assessed preoperatively by history and physical examination. Laboratory data collected included CBC, renal function tests including serum creatinine, urea, sodium and potassium; urine analysis; and urine cultures. Stone size and location were assessed preoperatively by X-ray KUB and plain CT-KUB. Proximal ureteric stones were defined as those located above the superior border of the sacroiliac joint. Mid-ureteric stones were defined as those located between the superior and inferior borders of the sacroiliac joint, and distal ureteric stones as those located below the inferior border of the sacroiliac joint.

Technique

All procedures were done under spinal anaesthesia in lithotomy position by surgeons of similar experience. Intravenous antibiotics were given to all patients at the time of anaesthesia induction and one day post op. Patients were then switched to oral antibiotics for another 3 days. URSL consisted of passage of a semi-rigid ureteroscope (6-7.5 Fr; Richard Wolf, Germany) into the ureter and placing a 0.035-inch safety hydrophilic guidewire into the ureter. Stone is fragmented using a pneumatic lithoclast and the fragments are retrieved by ureteroscopic grasping forceps under vision. At the end of the ureteroscopy, the ureter was inspected to exclude the presence of residual stones or ureteric injury. The patients without ureteric mucosal injury or perforation were included into this study.

Patients were randomized to 3 groups namely-group 1-non-stented group (n=30) who had no stent placed at the end of the operation; group 2-stented for 7 days group (n=30); group 3-stented for 14 days group (n=30). For the stented groups, a double J polyurethane stents were used. Operating times were calculated starting with the insertion of the ureteroscope until the final removal of ureteroscope. For patients in group 2, the stent was left in situ for 7 days and removed in urology OPD under local anaesthesia. For patients in group 3, the stent was left in situ for 14 days and then removed similarly.

Outcome measures and follow-up

All patients were evaluated on immediate post op period of 12 hours. Patients were also evaluated at 1, 2, 3 and 4 weeks of post op course in urology OPD. The outcomes of interest which recorded were fever; flank pain; suprapubic pain; dysuria; LUTS including urgency and frequency; hematuria; duration of hospitalization and readmission to the hospital for managing the above complications. Postoperative imaging included X-ray KUB and ultrasound KUB were performed at the end of 4 weeks of post op.

Statistical analysis

The collected data were entered in the Microsoft Excel and analysed with IBM SPSS Statistics for Windows, version 29.0.(Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis,

percentage analysis was used for categorical variables and the mean and SD were used for continuous variables. To find the significant difference between in the multivariate analysis, the one-way ANOVA with Tukey's post-Hoc test was used. To find the significance in qualitative categorical data, chi-square test was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS

A total of 90 patients who have undergone uncomplicated URSL, which was defined as the ureteroscopic stone fragmentation and stone retrieval without ureteric mucosal injury or perforation, were included. The 90 patients were randomly divided into 3 groups of 30 patients each as described earlier.

The patients in the three study groups were comparable in their characteristics and methods of stone retrieval.

In all 3 groups, distal ureter was the predominant location of stones (Table 1). All patients were discharged within 2 days after procedure except for 2 patients in group 1; 3 patients in group 2 and 3 who were discharged on day three.

Table 1: Comparison of the results of the three groups.

Variables	Non stented group, N (%)	Stented for 7 days group, N (%)	Stented for 14 days group, N (%)	P value
No. of patients	30	30	30	0.593
Age means (in years)	37.6	35.5	38.7	
Sex				
Male	17 (56.7)	16 (53.3)	18 (60)	0.193
Female	13 (43.3)	14 (46.7)	12 (40)	
BMI mean (kg/m^2)	21.3	21.7	22.0	0.202
Stone size (mm)	9.8	10.4	10.9	0.086
Stone location				
Proximal	9 (30)	7 (23.3)	8 (26.7)	0.919
Middle	7 (23.3)	6 (20)	8 (26.7)	
Distal	14 (46.7)	17 (56.7)	14 (46.7)	
Stone laterality				
Right	15 (50)	18 (60)	11 (36.7)	0.193
Left	15 (50)	12 (40)	19 (63.3)	
Operation time mean (min)	19.2	25.4	26.3	0.0005
Stone free state				
Yes	26 (86.7)	28 (93.3)	28 (93.3)	0.830
No	4 (13.3)	2 (6.7)	1 (6.7)	
Rehospitalization				
Yes	3 (10)	6 (20)	7 (23.3)	0.372
No	27 (90)	24 (80)	23 (76.7)	

The mean operating time was lesser in the non-stented group and statistically significant among the groups ($p<0.05$) (Figure 1).

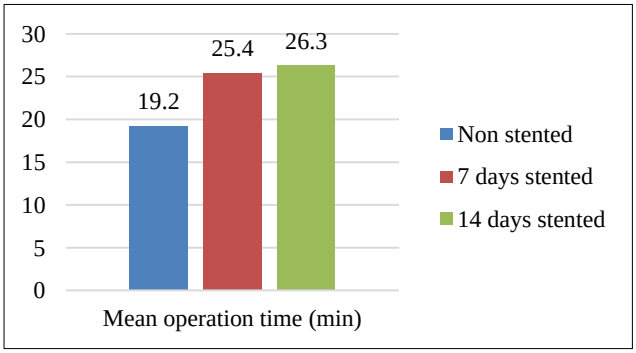

Figure 1: Comparison of mean operating times in all 3 groups.

Loin / Suprapubic pain, dysuria, LUTS were higher in the 14 days stented group than 7 days stented group. Incidence of Procedure related complications decreased after removal of stents in groups 2 and 3.

There were overall lesser procedure related complications like LUTS, fever, hematuria, loin/suprapubic pain, dysuria in the non-stented group during all time periods of follow up (Figure 2 and 3).

The stone free rate at the end of 1 month was 86.7%, 93.3% and 93.3% for groups 1, 2 and 3 respectively and were comparable in all 3 groups. The re-hospitalisation rates for treating post procedural complications are 10%, 20%, 23.3% for groups 1, 2 and 3 respectively, which shows lower re-hospitalisation rates for the non-stented group, (Figure 4).

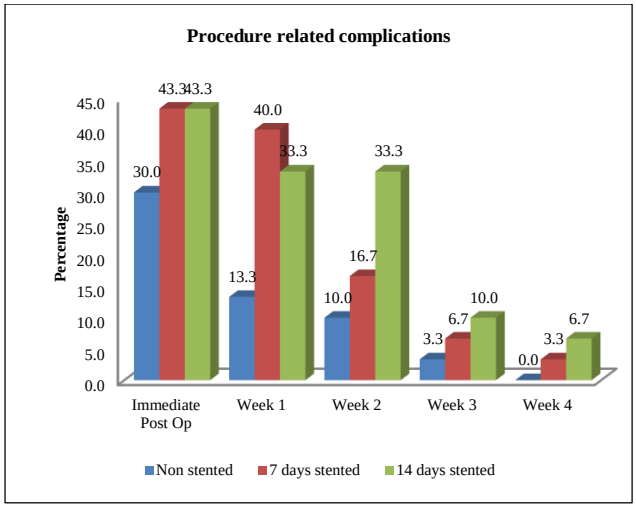

Figure 2: Comparison of weekly occurrence of procedure related complications in all 3 groups.

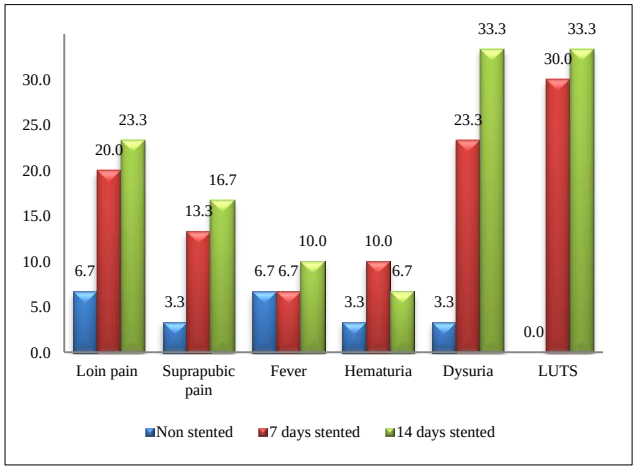

Figure 3: Comparison of total number of procedure related complications all 3 groups.

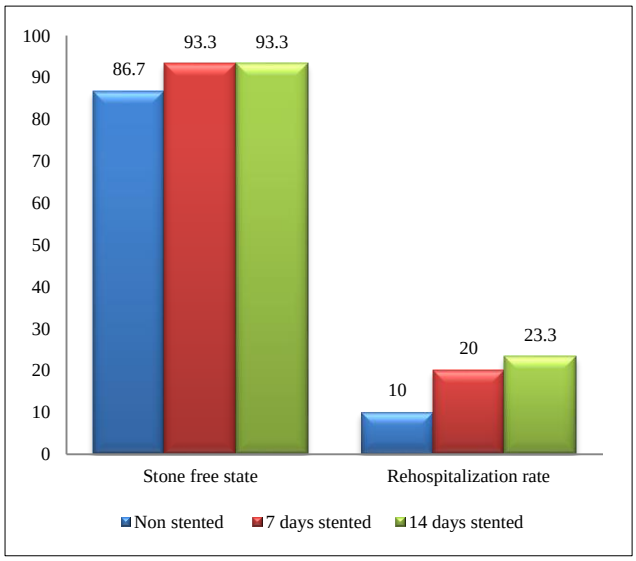

Figure 4: Comparison of stone free state and rehospitalization rate in all 3 groups.

DISCUSSION

Routine ureteric stent placement after URSL is a common clinical practice to prevent complications, such as ureteric stricture, flank pain and renal failure due to ureteric oedema or passage of stone fragments and clots. Ureteral stenting may be associated with prolonged operating time and costs and is a frequent cause of morbidity like pain, hematuria, LUTS, dysuria. Stent migration and urosepsis are other complications.[4] Joshi et al and Ucuzal et al reported that patients with ureteral stents had undesirable consequences and a significantly negative impact on patients' quality of life.[5,6] Patients with no stent following a URSL procedure have a better post-op quality of life with fewer complaints.[6] Therefore, whether it is routinely necessary to stent after URSL remains controversial. This ongoing controversy has raised the question of whether stenting is really indicated after uncomplicated URSLs.

The definition of uncomplicated URSL used in our present study is simple and based principally on visual assessment by the operating urologist. The results of the present study cannot be generalized to patients undergoing complicated URSL, as they were excluded.

Bregg and Riehle found that 22 out of 50 patients (44%) experienced moderate to intolerable discomfort that was relieved by removal of the stent.[7] Chen et al randomized 60 patients undergoing ureteroscopy to stent placement for 3 days versus no stent. They found that patients with a 3-day stent were more likely to have significant discomfort than those without a stent.[8] Reports in the literature suggest that the use of stents was associated with complications with incidence of stent-related symptoms and morbidity of 10 to 85%.[9] As Richter et al stated, placement of a ureteral stent is "a friendly procedure with unfriendly morbidity".[10] A study by Djaladat et al used short-term ureteric stents attached to a Foley catheter, thereby allowing early stent removal. Reduction in LUTS is the most significant advantage when stents were removed earlier.[11]

Similar to the results of these studies, in our study, there was overall higher procedure related complications like pain and irritative symptoms in the stented groups 2 and 3 during all time periods of follow up. Pain, dysuria, LUTS were higher in the 14 days stented group than 7 days stented group indicating increasing incidence of symptoms with increasing duration of stent. Incidence of Procedure related complications decreased after removal of stents in the stented groups 2 and 3.

Torricelli et al found that stenting following ureteroscopy led to lower pain scores and a reduced likelihood for rehospitalization.[12] Although, in our study the Rehospitalization rates were lower in non-stented group, nevertheless 3 patients in the non-stented group required rehospitalization including 2 patients for pain and 1 patient for increasing creatinine possibly due to residual stone or post op ureteric edema. Majority of

rehospitalization for the stented groups was for intolerable pain, LUTS and fever.

The mean operating time was lesser for the non-stented group and was statistically significant among the groups ($p<0.05$). Wang et al in his study stated that in uncomplicated URSLs, the stone clearance rate when no stent was used was non-inferior to that when stent was used.[13] The stone free rate at the end of 1 month is comparable in all 3 groups and there was no statistically significant difference in the success rate between the groups which was similar to previous studies.

The limitation of our study was that it was a single institution study with a smaller study sample. Also, we have not provided a validated assessment score for the assessment of flank pain, dysuria or LUTS such as the ureteric stent symptom questionnaire and most of the outcomes were measured subjectively.

CONCLUSION

The non-stented group has less incidence of pain, dysuria and irritative symptoms and also less economic burden to the patients with comparative stone free rate to the stented groups. The incidence of post op stent related complications increases with increasing duration of stent. We suggest that it is not necessary to place a ureteral stent routinely after uncomplicated URSL for ureteric stones smaller than 1.4 cm. It may be suggested that stenting should be limited to selective cases, such as patients with a single kidney, urinary tract infection, complications during surgery, and large stones with large residual fragments.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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