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Original Research Article

Comparison of stented versus non-stented patients of ureteric calculi after intracorporeal lithotripsy

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ABSTRACT

Background: A ureteric stent is a tube that is inserted into the ureter to treat and prevent urinary blockage. Stenting is most commonly used to treat stone disease in the ureter during definitive procedures such as ureteroscopy and extracorporeal shock wave lithotripsy. The stent that remains in place frequently causes urinary tract infection and discomfort in the suprapubic area. We report results of our study which attempted to assess stent-related complaints following semirigid ureteroscopy and intracorporeal lithotripsy.
Methods: A total of 70 individuals were randomised to stented(n=35) and non-stented group (n=35) between September 2017 and March 2020. Under spinal anaesthesia URSL was performed. Patients' success, operation time, postoperative pain score, analgesic demand, stent-related symptoms, and risk of ureteral stricture development were all evaluated.
Results: There was no statistically significant difference between the two treatment groups in terms of ureteral dilation, intracorporeal lithotripsy, or the incidence of intraoperative and postoperative problems. It was found that non-stented group was cost effective as compared to stented group, Furthermore, removal of the stent using local anaesthesia was more painful than the initial ureteroscopy procedure using regional (spinal) anaesthesia. Postoperative pain in non-stented group (n=6) was less than stented group (n=17).
Conclusions: Routine placement of ureteral stent is not necessary in uncomplicated cases of ureteric calculi following ureteroscopy, the decision being made on the basis of intra operative findings, where the risks clearly outweigh the benefits offered by stenting.

Keywords: Ureteric stone, Lithotripsy, Stent, Intracorporeal

INTRODUCTION

A ureteric stent, is a tube that is placed inside the ureter to treat and also to prevent urinary obstruction. Stents used in ureter are called double J, double pig-tail, DJ or JJ stents. Stents are commonly indicated in urology for draining urine from the kidney to the bladder. After ureteroscopy, ureteral stents are routinely used to treat ureteral damage, significant edema, and concerns about infection or renal failure. Stents are inserted in 60% of patients following therapy for ureteral stones and in 80% of patients after treatment for renal stones, according to an international study.[1] The risk of blockage owing to postoperative ureteral edema or residual stone pieces is expected to be reduced with postoperative ureteral stenting. It is also supposed to reduce the effects of Instrumentation and the edema that follows, as well as to avoid the development of ureteral strictures. Stents, on

the other hand, have drawbacks. Urinary frequency and urgency, haematuria, dysuria, flank discomfort, and pelvic pain are the most prevalent side effects of ureteral stent insertion.[2] These adverse effects might lead to trips to the doctor's office or the emergency room. Meanwhile, skipping a stent might result in additional procedures and consultations.[3]

The body of research on the advantages and risks of inserting a ureteral stent has been compiled in several systematic reviews.[4-11]

Stenting is mostly done in the ureter for stone disease during definitive procedures like ureteroscopy and extracorporeal shock wave lithotripsy. Advances in instrumentation of ureter have made ureteroscopy less morbid that the stent placed following the procedure remains the main source of concern to the patient. The stent that remains in situ usually causes the symptoms of urinary tract infection, pain in the suprapubic region and flank due to urinary reflux, frequency, urgency, dysuria and haematuria.[12] An attempt has been made in this study to evaluate the stent related symptoms after semirigid ureteroscopy and intracorporeal lithotripsy for mid, lower and distal vesicoureteral junction calculi, and a comparison has been made between stented and non-stented patients.

METHODS

Study place

The study was conducted at Indraprastha Apollo Hospital, Sarita Vihar, New Delhi.

Study period

The study conducted from September 2017 to March 2020.

Study type

It was a prospective. A total of 70 patients were enrolled in the study.

Study analysis

Analysis was done usingStatistical Package for the Social Sciences (SPSS) software.

Inclusion criteria

Patients who underwent semirigid ureteroscopy for uncomplicated ureteric calculi and only uncomplicated vesico ureteric junction calculi, lower ureteric calculi and mid ureteric calculi were included in the study.

Exclusion criteria

Patients with upper ureteric calculi which was impacted/ edematous and associated with difficult entry of ureteroscope into the ureteric orifice and those who had residual stones in ureter post procedure were excluded from the study.

The preoperative work up of patients included general physical examination of the patient, ultrasound KUB (kidney, ureter, bladder) to make out the site, size of calculus and proximal pelvicalyceal and ureteric dilatation, plain X-ray KUB (kidney, ureter, bladder) also to make out the size and location of stone and intravenous urogram to make out the degree of obstruction caused by the calculus and excretion status of the renal units. CT scan KUB (kidney, ureter, bladder) plain was done in cases of suspected radiolucent calculi that could not be visualised in plain X-ray.

Under spinal anaesthesia, patient was placed in the lithotomy position with the ipsilateral leg lower and straighter to facilitate easy ureteroscope entry. Cystoscopy was done using 20 F sheath, 30-degree scope. The entire urethra assessed and bladder visualised for any associated pathology. Both the ureteric orifices were visualised and 0.032-inch guidewire passed into the ipsilateral ureter containing the calculus. Then the cystoscope was removed and 8 F infant feeding tube passed into the bladder. Wolf Fibre Ureterorenoscope with direct view eyepiece, 6/7.5 Fr was passed into the ureter under normal saline irrigation and passed proximally until the calculus was visualised. Patients with intra operative findings of difficult ureteroscope entry, dense stone impaction, oedema and bleeding were excluded from the study. Patients who underwent balloon dilatation of the ureteric orifice were also excluded from the study. Then pneumatic lithotripsy was done and stone fragmentation completed. Patients with residual stone fragments in the ureter, post procedure were excluded from the study. Patients who underwent ureteroscopy and lithotripsy for uncomplicated ureteric calculi were stratified into two groups. Among the total of 70 patients, 35 patients were stented with a 5 F, one end closed, 26 cm double J stent and 35 patients were not stented and were followed up in the post operative period and observed for pain, urinary frequency, haematuria and fever. All patients were discharged on the second post operative day. All patients were again reviewed two weeks later. Those patients who were stented were advised an X-ray KUB (kidney, ureter, bladder), their stent position was confirmed and stent removal was done after two weeks cystoscopically as an outpatient procedure. This study comprised of 27 vesico ureteric junction and 38 lower ureteric calculi. It comprises of only 5 mid ureteric calculi patients as most of the patients who underwent ureteroscopy could not be included in the study owing to the presence of associated oedema and stone impaction. Patients with residual stone fragments

that were detected on post operative plain X-ray KUB (kidney, ureter, bladder) were excluded from the study.

RESULTS

The average age of the patients in stented and non-stented groups were 36.1 and 38.5 years respectively with the age range varying from 13 to 63 years comprising of both groups. The size of the calculus varied from 6 to 14 mm comprising of both groups with an average size of 8.9 mm in the stented group and 8.5 mm in the non-stented group of patients.

Table 1: Age and size.

Parameters	With DJ stent	Without DJ stent
Size of stone (Average)	8.9 mm	8.5 mm
Stone Size Range	6-14 mm	6-12 mm
Age of patients (Average)	36.1 years	38.5 years
Average Range	13-56 years	13-63 years

Table 2: Sex distribution.

Sex	With DJ Stent	Without DJ stent
Males	22 (62.8%)	18 (51.4%)
Females	13 (37.1%)	17 (48.5%)

Table 3: Side of calculi.

Laterality	With DJ Stent	Without DJ stent
Right side	19 (54.2%)	18 (51.4%)
Left side	16 (45.7%)	17 (48.5%)

Table 4: Site of calculi.

Laterality	With DJ Stent	Without DJ stent
Right side	19 (54.2%)	18 (51.4%)
Left side	16 (45.7%)	17 (48.5%)

Table 5: Study parameters.

Parameter	With DJ Stent	Without DJ stent	P value
Frequency	18 (51.4%)	5 (14.2%)	0.001
Pain	17 (48.5%)	6(17.1%)	0.004
Fever	10 (28.5%)	4(11.4%)	0.65
Haematuria	7 (20%)	2 (5.7%)	0.67

The composition of each group- stented and non-stented according to sex was as follows. Of the 70 patients enrolled in the study, in the stented group, there were 22 males and 13 females. In the non-stented group, there were 18 male and 17 females.

When the side of the ureter dealt with by ureteroscopy was considered, among 70 patients enrolled in the study, the stented group had 19 right sided and left sided ureteric calculi. In the non-stented group, there were 18 patients with right sided calculi and 17 patients with left sided calculi.

With regard to location of the calculus, most of the patients comprised of lower ureteric (38) and vesico ureteric junction calculi (27) and few 5 mid ureteric calculi. The number of patients with mid ureteric calculi was low compared to lower and vesico ureteric junction calculi in the study as the cases with mid ureteric calculi were complicated in most of the instances. The composition is as follows.

The parameters that were studied in the patients were urinary frequency (irritative lower urinary tract symptom), loin pain, fever and haematuria. The patients were evaluated for the above parameters in the post operative period and again after two weeks, when they were reviewed. Ideally the incidence of stricture formation has to be taken into account as a complication following ureteroscopic instrumentation. But in our study the incidence of stricture in the ureter following ureteroscopy was not taken into account as the period of study has to be extended.

Meanwhile, the patients who were symptomatic with respect to the above-mentioned parameters who attended the outpatient clinic in the intervening two weeks period were also taken into account. The number of patients who were symptomatic with respect to the parameters mentioned were entered in the study in both stented and non-stented group and were compared. Their statistical significance was calculated by the chi square test.

The overall incidence of the symptoms mentioned (urinary frequency, pain, haematuria and fever) among both the group of patients who were enrolled in the study was as follows:

Frequency

The symptom of urinary frequency was noted in 18 out of 35 stented patients (51.4%) and 5 out of 35 (14.2%) non-stented patients. It is generally said that presence of a stent coiled inside the bladder causes irritative lower urinary tract symptom of urinary frequency. This symptom is more pronounced in patients were the intravesical portion of the stent is longer and particularly if the stent crosses the midline of the bladder and irritates the trigone. Among the 23 patients who had urinary frequency, 6 patients (5 stented and 1 non-stented) had severe symptoms and attended the outpatient clinic. They were evaluated with urine analysis, and were treated with alpha receptor blocker Tamsulosin 0.4 mg once daily.

Among the 6 patients, 2 patients had urinary tract infection that was documented by culture and sensitivity and treated with culture specific oral antibiotics.

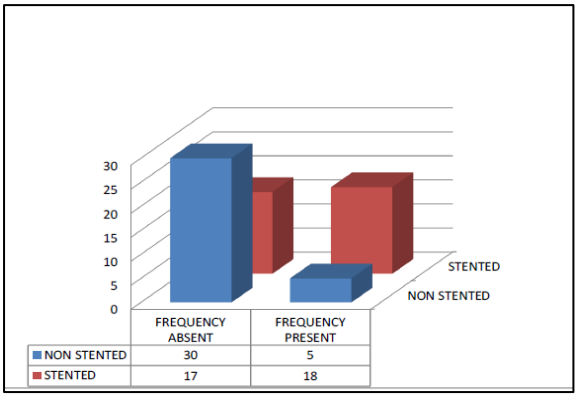

Figure 1: Incidence of frequency in two groups.
Figure depicting incidence of the symptom of frequency in the study group (both stented and non-stented). frequency was observed more in the stented group 18 than in the non-stented group 5. statistical significance (p=0.001) was noted.

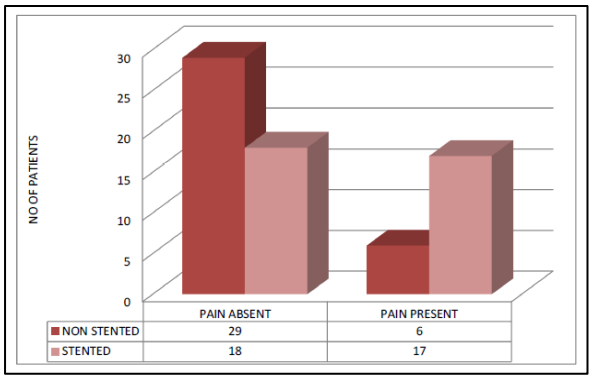

Figure 2: Incidence of pain in the two groups.
Figure showing the incidence of pain in the study group (stented and non-stented). Pain in the stented group was observed in 17 stented patients compared to 6 non-stented patients. statistical significance was noted (p=0.004)

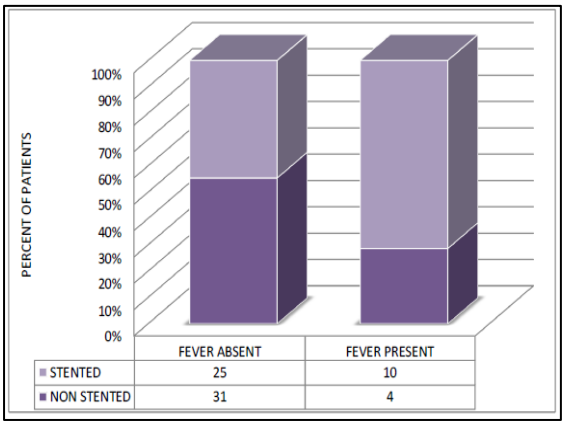

Figure 3: Incidence of fever in the two groups.
Figure showing the incidence of fever in the study group (both stented and non-stented).10 stented and 4 non-stented patients had fever. it was not statistically significant (p=0.65)

The statistical analysis for urinary frequency in comparing both groups revealed statistical significance (p<0.005), as calculated by chi square test.

Pain

The symptom of pain, particularly ipsilateral loin and suprapubic pain was noted in 17 out of 35 (48.5%) stented patients and 6 out of 35 (17.1%) non-stented patients. The incidence of pain could be attributed to both procedural pain and stent related pain. But it was noted that the incidence of pain in the stented group was substantially higher (48.5%) compared to the non-stented (17.1%) group. All 23 patients (17 stented and 6 non-stented patients) were treated with oral dicyclomine 10 mg given twice daily and oral paracetamol 500 mg given twice daily for control of pain. In 4 patients the pain was severe, and they were treated with oral non-steroidal anti-inflammatory drugs. Statistical analysis of pain comparing both groups showed the following results. The results showed that the incidence of pain was statistically significant (p<0.005) in the stented group compared to the non-stented group. Percentage wise, incidence of pain in the stented group was substantially higher (48.5%) compared to the non-stented (17.1%) group.

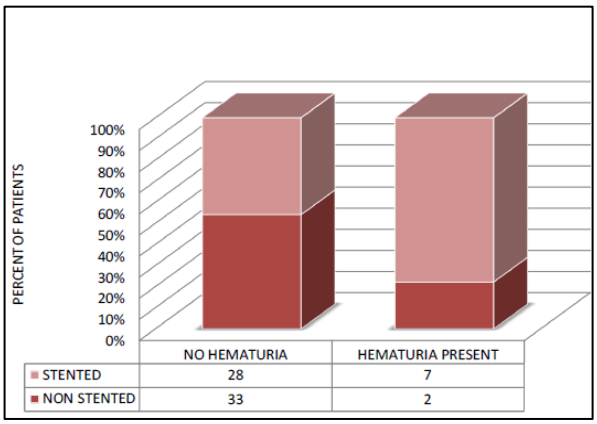

Figure 4: Incidence of hematuria in the two groups.
Figure depicting the incidence of haematuria in the study group (stented and non-stented). haematuria was observed in 7 stented and 2 non-stented patients. statistical significance was not established (p=0.67)

Fever

Among the 70 patients enrolled in the study, 10 out of 35 patients in the stented group (28.5%) and 4 out of 35 (11.4%) patients in the non-stented group had fever. Fever in the study group patients varied from a temperature range of 99 F to 100.8 F with a mean temperature of 99.6 F. Among the 14 patients with fever, 3 patients were admitted and treated with culture sensitive parenteral antibiotics. In all 14 patients with fever, urine culture and sensitivity were done and 10 patients were found to be culture positive (8 patients for Escherichia coli, 2 patients for Klebsiella species) and treated with oral antibiotics in 7 patients and parenteral

antibiotics in 3 patients. Fever can be attributed to both the possibility of infection related to the procedure and stent related infection. From the study group, it was made out that the incidence of fever was more in the stented group compared to the non-stented group (28.5% versus 11.4%). But the outcomes were not statistically significant (p>0.005), as calculated by the chi square test.

Haematuria

Evaluation with regard to the symptom of haematuria showed that, the incidence was 7 out of 35 (20%) patients in the stented group and 2 out of 35 (5.7%) in the non-stented group. All 9 patients were enrolled positivity for haematuria only after urine analysis showed more than 3 RBCs/high power field. In fact, to be precise, 13 patients gave history of haematuria and 4 patients were excluded positivity after their urine analysis was negative for RBCs. The symptom of haematuria is due to the stent causing irritative effects on the bladder mucosa as well as procedure related. Those patients who had obvious bleeding intra operatively during the procedure were excluded from the study, as those patients had to be invariably stented to prevent obstruction, as a result of possible clot retention. All 9 patients with haematuria were treated with reassurance, rest and advised plenty of oral fluids.

DISCUSSION

Stenting after ureteroscopy has been recommended to prevent the development of ureteral stricture, it also facilitates passage of stone fragments and promotes ureteral healing after ureteroscopy. In 1999, Hosking et al have concluded that routine placement of ureteral stent following uncomplicated ureteroscopic removal of distal ureteral stones was not necessary and same observation was seen in our study.[13] A few prospective randomized trials have recently been reported in the literature, and all showed no difference in stone free status between stented and nonstented groups.[14-16] In our study, irritative voiding symptom of urinary frequency in the stented group was observed in 51.4% of patients, as compared to 14.2% of patients in the non-stented group. These results were comparable with all above mentioned studies. Routine placement of ureteral stent after ureteroscopy increases the overall cost of the procedure.[17] In our study, non-stented group was cost effective as compared to stented group and same was reported by Netto et al.[7] The incidence of haematuria and fever are higher in the stented than in the non-stented group, as witnessed in our study, even though there is not enough statistical significance. Postoperative pain in our study was less in non-stented group (17.1%) as compared to stented group (48.5%). The increased intrapelvic renal pressure, especially while voiding, explains this increased incidence of pain. Ramsay et al demonstrated in porcine model that ureteral intubation caused an increase in intrapelvic renal pressure which was the reason for more pain in the patients with stent.[18] The development of ureteral stricture is a well-established long-term complication following ureteroscopy. However, the incidence of ureteral stricture is dramatically decreased in recent years due to the advancements made in endourological technology. In this study no stricture formation was found as compared to the other studies. However, the period of follow up has to be extended for assessing stricture of the ureter. Hence, stricture was not included as a variable in our study.

CONCLUSION

Following ureteroscopy, and before stenting of the ureter one must take into account aspects such as stone location, size, degree of impaction, bleeding, accompanying edema, and difficulties traversing the ureteric orifice. Depending on the intraoperative ureteroscopy results, the risks and problems associated with ureter stenting should be assessed against the benefits of stenting. Stent removal necessitates yet another invasive operation, which raises patient morbidity as well as the treatment's total expense.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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