

Evaluating Outcomes in Ureteric Calculi Management: A Comparative Study of Stented and Non-Stented Approaches

Dr Santhosh S¹, Dr Jaydeep M Gadhavi², Dr Hiren Parmar³

¹MBBS, DNB (Surgery), DNB (Urology), Consultant Urologist, Manipal Hospital Malleshwaram, Bengaluru, Karnataka, India

²Associate Professor, Department of General Surgery, GMERS Medical College, Gandhinagar, Gujarat, India

³Associate Professor, Department of General Surgery, GMERS Medical College Gandhinagar, Gujarat, India

Cite this paper as: Santhosh S, Jaydeep M Gadhavi, Hiren Parmar (2024) Evaluating Outcomes in Ureteric Calculi Management: A Comparative Study of Stented and Non-Stented Approaches. *Frontiers in Health Informatics*, 13 (3), 554-557.

Abstract

Background and Aim: 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. This study aims to assess the symptoms linked to stents after undergoing semirigid ureteroscopy and intracorporeal lithotripsy for stones situated at the mid, lower, and distal vesicoureteral junctions.

Material and Methods: The study involved 30 patients. Semirigid ureteroscopy was used to evaluate simple ureteric stones. The study only included individuals with uncomplicated vesico-ureteric junction, lower, and mid-ureteric calculi. Thirty patients were studied, with fifteen in group 1 receiving stents and fifteen in group 2 being closely observed post-op. We assessed patients' success, operation time, postoperative pain score, analgesic demand, stent-related symptoms, and ureteral stricture risk.

Results: The sizes of the calculi varied between 7 and 12 millimeters, with the stented group showing an average size of 7.8 millimeters, while the non-stented group had an average size of 8.1 millimeters. The study revealed that the incidence of mid ureteric calculi was relatively low, primarily because most cases were complicated. In contrast, there were significantly more patients with lower and vesico ureteric junction calculi.

Conclusion: Individuals who did not receive stents reported experiencing significantly less pain, a decrease in urinary symptoms, and a lower need for analgesics following their surgical procedure.

Key Words: Intracorporeal Lithotripsy, Stenting, Ureteric Calculi, Urinary Tract Infection

Introduction

In the general population, it is estimated that around 10–15 percent of individuals are impacted by urinary stones. There is an increasing trend in the incidence of urolithiasis among individuals over time. Most of these stones are recognised for their ability to pass naturally, with or without the support of medical interventions that facilitate their expulsion. The size of the calculus and its location within the ureter are crucial factors in assessing the likelihood of its expulsion.^{1,2}

Furthermore, the stent acts as a foreign object that helps to alleviate urinary obstruction. The lengths of stents for adults typically vary between 24 and 30 centimetres. Stenting is usually carried out using a cystoscopic

placement method. In urology, stents are commonly advised to facilitate the flow of urine from the kidney to the bladder. Ureteroscopy and extracorporeal shock wave lithotripsy are two effective procedures utilised in the treatment of stone disease. Stenting is commonly carried out in the ureter during these procedures.^{3,4}

The role of ureteral stents is currently under scrutiny, even though they have proven to be an essential tool in medical practice. It is important to be aware of several potential drawbacks that may arise, including flank pain, voiding symptoms, infections, encrustation, and the formation of stones associated with the stent. Consequently, several studies recommend that these should be used exclusively for procedures associated with complications, such as ureteric injuries or instances where a stone fragment remains after the procedure has concluded.^{5,6}

Symptoms commonly associated with a stent left in place include urinary tract infections, pain in the suprapubic region and flank due to urinary reflux, as well as frequency, urgency, dysuria, and haematuria. This study aims to assess the symptoms linked to stents after undergoing semirigid ureteroscopy and intracorporeal lithotripsy for stones situated at the mid, lower, and distal vesicoureteral junctions. Furthermore, a comparison has been conducted between patients who have received stents and those who have not undergone stenting.

Material and Methods

This study represents a forward-looking analysis conducted within the hospital, medical college, and surgical department. A full year was dedicated to conducting the research for the study. The study included a total of thirty patients. Before the patients took part in the study, they received detailed information about the goals and procedures of the research project, and they were asked to sign a document confirming their consent to participate. Here is a comprehensive outline of the criteria for inclusion and exclusion that were applied in the study:

The research involved patients who underwent semirigid ureteroscopy to assess uncomplicated ureteric stones. Furthermore, the study focused exclusively on patients with uncomplicated vesico-ureteric junction calculi, lower ureteric calculi, and mid ureteric calculi.

Individuals with intra-operative findings such as challenging ureteroscope entry, significant stone impaction, swelling, or bleeding were excluded from the study. Individuals who underwent balloon dilatation of the ureteric orifice were excluded from the study. In the next step, we completed the stone fragmentation process and proceeded with pneumatic lithotripsy. Individuals with remaining stone fragments in their ureters post-procedure were excluded from participating in the study.

The preoperative assessment of patients involved a comprehensive physical examination, an ultrasound of the kidney, ureter, and bladder to evaluate the location and size of the calculus, along with any proximal pelvicalyceal and ureteric dilatation. Additionally, a plain X-ray of the kidney, ureter, and bladder was performed to ascertain the size and position of the stone, and an intravenous urogram was conducted to assess the level of obstruction caused by the calculus and the excretion status of the renal units. When there is a suspicion of radiolucent calculi that are not visible on plain X-rays, a plain CT scan of the kidney, ureter, and bladder is conducted.

Individuals diagnosed with uncomplicated ureteric calculi who underwent ureteroscopy and lithotripsy were categorized into two separate groups. The study comprised thirty patients, with fifteen receiving stents in group 1, while the remaining fifteen in group 2 were not stented and were closely monitored throughout the post-operative period. On the second post-operative day, all patients were discharged from the hospital. After a two-

week interval, each patient underwent a follow-up examination. Individuals who received stents were advised to have an X-ray KUB (kidney, ureter, bladder) examination. The stent position was confirmed, and after a two-week period, the stent was removed cystoscopically as an outpatient procedure.

Results

The average age of patients in the stented group was 32 years, whereas the average age of patients in the non-stented group was 34 years. The patients in both groups were aged between 15 and 65 years, respectively. The sizes of the calculi varied between 7 and 12 millimeters, with the stented group showing an average size of 7.8 millimeters, while the non-stented group had an average size of 8.1 millimeters. The size of the calculus exhibited variation between the two groups. A total of thirty patients participated in the study, comprising 18 males and 12 females.

Regarding the location of the calculi, most patients presented with stones in the lower ureteric region (14) and at the vesico ureteric junction (12), while only four patients had calculi situated in the middle of the ureteric region. The study revealed that the incidence of mid ureteric calculi was relatively low, primarily because most cases were complicated. In contrast, there were significantly more patients with lower and vesico ureteric junction calculi. The layout of the composition is presented as follows. The VAS pain score for flank pain and dysuria indicated a significant difference at every follow-up time point, with Group 1 exhibiting a higher mean VAS score than Group 2. This indicates that a notable distinction exists between the two groups.

Table 1: Demographic analysis of the patients

Parameters	Group 1	Group 2
Size of stone	7.8 mm	8.1 mm
Age of patients	32 years	34 years
Sex distribution	10 males & 5 females	8 males & 7 females
Pain	Moderate to severe	Mild to moderate

Discussion

Following the procedure of ureteroscopic stone removal, it is a standard practice to place ureteral stents. The rationale for the routine use of ureteral stents following ureteroscopy appears to be more grounded in supposition rather than evidence-based medicine. The use of a stent after stone removal has been a common recommendation by urologists for all ureteroscopic lithotripsy procedures. However, there is an ongoing discussion about the necessity of routine stent placement in these cases. It is important to recognise that the insertion of a ureteral stent may lead to considerable morbidity.^{3,7}

Our research findings indicate that 51.4% of patients in the stented group experienced the irritative voiding symptom of urinary frequency, compared to 14.2% in the non-stented segment of the population. The results align with the findings from all the previously discussed studies. The overall cost of the procedure tends to rise when ureteroscopy is routinely accompanied by the placement of a ureteral stent. Our research indicates that the non-stented group demonstrated greater cost-effectiveness compared to the stented group, a finding that aligns with the results reported by Netto et al.⁸

Our research findings indicate that the group receiving stents experienced a greater occurrence of haematuria and fever compared to the group that did not receive stents. However, it is important to note that the statistical significance of this observation was insufficient to fully support these results. The non-stented group showed a

notable reduction in postoperative pain compared to the stented group.

Recent advancements in endourological technology have led to a significant decrease in the incidence of ureteral stricture over the past few years. Unlike the results observed in other studies, this research did not reveal any cases of stricture formation.

Conclusion

Individuals who did not receive stents reported experiencing significantly less pain, a decrease in urinary symptoms, and a lower need for analgesics following their surgical procedure. One additional benefit is that it offers a more economical solution and removes the necessity for cystoscopy to extract the stent. Based on the results of the intraoperative ureteroscopy, it is important to assess the potential risks and complications linked to ureter stenting alongside the benefits that stenting can offer.

References

1. Zhang L, Zhang X, Pu Y, Zhang Y, Fan J. Global, regional, and national burden of urolithiasis from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. *Clinical Epidemiology*. 2022;971-983.
2. Kittanamongkolchai W, Vaughan LE, Enders FT, et al. The changing incidence and presentation of urinary stones over 3 decades. Paper presented at: Mayo Clinic Proceedings 2018.
3. Ordonez M, Hwang EC, Borofsky M, Bakker CJ, Gandhi S, Dahm P. Ureteral stent versus no ureteral stent for ureteroscopy in the management of renal and ureteral calculi. *Cochrane Database of Systematic Reviews*. 2019(2).
4. Diatmika AANO, Djojodimedjo T, Kloping YP, Hidayatullah F, Soebadi MA. Comparison of ureteral stent diameters on ureteral stent-related symptoms: A systematic review and meta-analysis. *Turkish Journal of Urology*. 2022;48(1):30.
5. Bernasconi V, Tozzi M, Pietropaolo A, et al. Comprehensive overview of ureteral stents based on clinical aspects, material and design. *Central European Journal of Urology*. 2023;76(1):49.
6. Al-Aown A, Kyriazis I, Kallidonis P, et al. Ureteral stents: new ideas, new designs. *Therapeutic advances in urology*. 2010;2(2):85-92.
7. Allam CL, Aden JK, Reed AM. The role of routine ureteral stenting following uncomplicated ureteroscopic treatment for upper ureteral and renal stones: a randomized control trial. *Journal of Endourology*. 2023;37(3):257-263.
8. Netto NR, Ikonomidis J, Zillo C. Routine ureteral stenting after ureteroscopy for ureteral lithiasis: is it really necessary? *The Journal of urology*. 2001;166(4):1252-1254.