ISSN: 2581 – 3633

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: https://www.ijmacr.com

Volume – 9, Issue – 4, August – 2026, Page No.: 1012 – 1016

Clinical Outcomes of Ureteroscopic Stone Removal Versus Open Ureterolithotomy for Moderate - Sized Ureteral Calculi - A Prospective Observational Cohort Study

[1]Pangkhat Konyak, [2]Nyemwang W Konyak, [3]C Longe Peter, [2]H Pangshei, [2]Vivito Khala, [2]Kewecho Akami, [2]Lambert Marbaniang, [4]Viketoulie Samuel Sorhie, [3]L Longna, [3]Neikhrietsonuo Kesiezie, [5]Visar Linyu.

[1]Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar, India.

[2]North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong, Meghalaya, India.

[3]Nagaland Institute of Medical Sciences and Research (NIMSR), Kohima, Nagaland, India.

[4]Nagaland Hospital Authority Kohima (NHAK), Kohima, Nagaland, India.

[5]Christian Institute of Health Sciences and Research (CIHSR), Dimapur, Nagaland, India.

Corresponding Author: Dr. Kewecho Akami, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, NEIGRIHMS, Shillong, Meghalaya, India.

How to citation this article: Dr. Pangkhat Konyak, Dr. Nyemwang W Konyak, Dr. C Longe Peter, Dr. H Pangshei, Dr. Vivito Khala, Dr. Kewecho Akami, Dr. Viketoulie Samuel Sorhie, Dr. L Longna, Dr. Neikhrietsonuo Kesiezie, Dr. Visar Linyu,"Clinical Outcomes of Ureteroscopic Stone Removal Versus Open Ureterolithotomy for Moderate - Sized Ureteral Calculi - A Prospective Observational Cohort Study", IJMACR– August – 2026, Volume – 9, Issue –4, P. No. 1012–1016.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Ureteral calculi requiring intervention are commonly managed by minimally invasive techniques, while open Ureterolithotomy has a limited contemporary role. This study compared stone-free status and postoperative complications following Ureteroscopic stone removal (URS/URSL) and open Ureterolithotomy (OU).

Methods: This prospective comparative observational cohort study included 100 patients with ureteral calculi measuring >5 to ≤20 mm treated at Darbhanga Medical College and Hospital between September 2022 and February 2024. Fifty patients underwent URS/URSL and 50 underwent OU. Treatment selection was based on clinical circumstances, patient preference, guideline-based discussion, and availability of equipment; allocation was not randomized. Stone - free status at 4 weeks and postoperative complications were assessed. Categorical variables were compared using Pearson's chi-square test.

Results: Seventy patients were male and 30 were female; 55% were aged 31–40 years. Pain was the most common presenting symptom (98%). Stones were located in the upper, middle, and lower ureter in 51%, 16%, and 33% of patients, respectively. Stone-free status at 4 weeks was achieved in 88% of patients after URS/URSL and 98% after OU; however, the difference was not statistically significant (p=0.114).

Overall postoperative complications occurred in 32% of patients after URS/URSL and 62% after OU (p<0.001). Complication rates increased significantly with increasing stone size, while stone-free status decreased with increasing stone size (p<0.001 for both).

Conclusion: OU achieved a numerically higher stone-free rate than URS/URSL, although the difference was not statistically significant. Postoperative complications were significantly more frequent following OU. In this cohort, the findings support minimally invasive Ureteroscopic treatment when feasible, while open Ureterolithotomy may be reserved for selected situations.

Keywords: Ureteral Calculi, Ureteroscopy, Ureterolithotomy

Introduction

Ureteral stone disease is a common cause of acute flank pain, urinary obstruction, and emergency surgical presentation. Stone size and location influence spontaneous passage and treatment success. Contemporary guidelines favour endo urological treatment, particularly ureteroscopy (URS), for Ureteral stones requiring active intervention, while open or laparoscopic stone surgery is generally reserved for selected circumstances in which minimally invasive approaches have failed or are unsuitable.[1,2]

Comparative studies and systematic reviews have established the effectiveness of ureteroscopy for Ureteral calculi, with stone-free outcomes influenced by stone size and location.[2–4] However, prospective comparative data directly evaluating ureteroscopy and open Ureterolithotomy remain limited, particularly in government tertiary-care hospitals where availability of equipment may influence treatment selection.

The present study therefore compared stone-free status and postoperative complications between ureteroscopic stone removal and open Ureterolithotomy using prospectively collected clinical data.

Materials and Methods

Study design and setting

A prospective comparative observational cohort study was conducted in the Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Bihar, India, from September 2022 to February 2024.

Participants and intervention

Patients with single or multiple unilateral or bilateral Ureteral calculi measuring >5 to ≤20 mm were eligible for inclusion. Patients with stones <5 mm or >20 mm and those considered unfit for the planned procedure were excluded.

Purposive sampling was used. Fifty patients underwent Ureteroscopic stone removal (URS/URSL), while 50 underwent open Ureterolithotomy (OU). Treatment allocation was not randomized. The choice of procedure was based on clinical circumstances, discussion with the patient, contemporary treatment guidance, and availability of equipment.

Assessment and outcomes

Clinical history, physical examination, and imaging findings were used to document presenting symptoms, stone size, and stone location. The primary outcome was

stone-free status at 4 weeks after the procedure. The secondary outcome was postoperative complication status. Postoperative fever, haematuria, dysuria, burning micturition, and pain were recorded. Duration of postoperative pain was categorized as nil, <7 days, 8–14 days, or ≥15 days.

Statistical analysis

Data were analysed using IBM SPSS Statistics version 26. Categorical variables were expressed as frequencies and percentages and compared using Pearson's chi-square test. A p-value <0.05 was considered statistically significant.

Results

A total of 100 patients were included in the study, with 50 patients in the URS/URSL group and 50 in the OU group. There were 70 males and 30 females. The largest age group was 31–40 years, comprising 55% of the study population.

Pain was the most common presenting symptom, reported by 98% of patients, followed by radiation of pain (71%), nausea (38%), dysuria (33%), burning micturition (22%), haematuria (21%), vomiting (21%), and fever (6%).

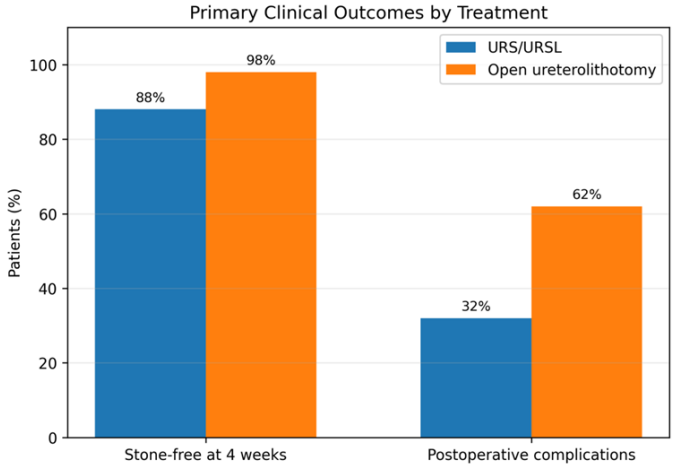
Table 1: Primary outcomes according to treatment group.

Outcome	URS/URSL (n=50)	OU (n=50)	Total (n=100)
Stone-free at 4 weeks	44 (88%)	49 (98%)	93 (93%)
Stone-free failure	6 (12%)	1 (2%)	7 (7%)
Postoperative complication	16 (32%)	31 (62%)	47 (47%)
No postoperative complication	34 (68%)	19 (38%)	53 (53%)

Stone - free status at 4 weeks was achieved in 88% of patients following URS/URSL and 98% following OU. Although the stone-free rate was numerically higher in the OU group, the difference was not statistically significant (p=0.114).

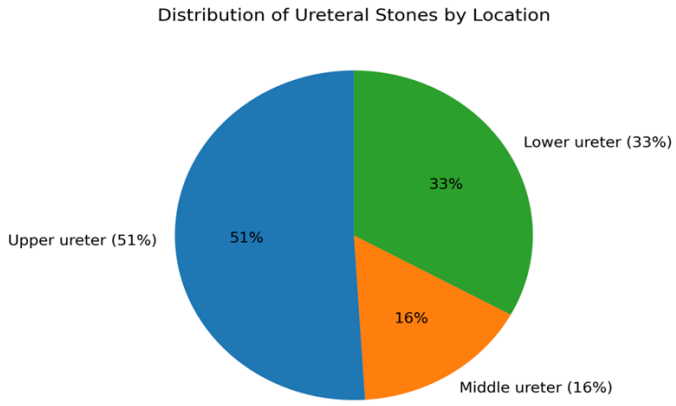
Overall postoperative complications were significantly more frequent following OU than URS/URSL (62% versus 32%, p<0.001).

Figure 1: Comparison of four-week stone-free status and postoperative complications between URS/URSL and open Ureterolithotomy.



Stones were located in the upper third of the ureter in 51% of patients, the middle third in 16%, and the lower third in 33%.

Figure 2: Distribution of Ureteral stones according to anatomical location.



Regarding stone size, 17% of stones measured 5–8 mm, 45% measured 9–12 mm, 30% measured 13–16 mm, and 8% measured 17–20 mm.

Stone-free status decreased significantly with increasing stone size, from 94.11% for stones measuring 5–8 mm to 37.50% for stones measuring 17–20 mm ($p<0.001$). Similarly, postoperative complications increased significantly with increasing stone size, from 17.64% for stones measuring 5–8 mm to 87.50% for stones measuring 17–20 mm ($p<0.001$).

Figure 3: Stone - free status and postoperative complications according to stone size.

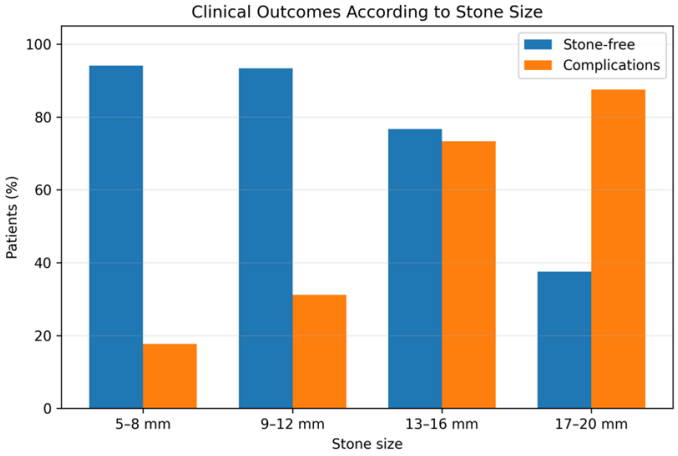


Table 2: Association of stone size with clinical outcomes.

Stone size	Stone-free achieved	Postoperative complication
5–8 mm	16/17 (94.11%)	3/17 (17.64%)
9–12 mm	42/45 (93.33%)	14/45 (31.11%)
13–16 mm	23/30 (76.67%)	22/30 (73.33%)
17–20 mm	3/8 (37.50%)	7/8 (87.50%)

Discussion

The principal finding of this study was a numerically higher 4-week stone-free rate following OU compared with URS/URSL (98% versus 88%); however, this difference was not statistically significant ($p=0.114$). In contrast, postoperative complications were significantly more frequent following OU than URS/URSL (62% versus 32%, $p<0.001$).

These findings should not be interpreted as evidence that open surgery is superior to ureteroscopy. The study was non-randomized, and treatment selection could have been influenced by clinical circumstances, patient preference, and equipment availability. In addition, the sample size was not prospectively calculated to detect a predefined difference in stone-free rates. Therefore, the observed difference in stone-free status should be interpreted cautiously.

The higher postoperative morbidity observed following OU is clinically plausible because open surgery requires ureteral exposure and tissue dissection, whereas ureteroscopy provides access to the ureter with substantially less surgical disruption. Current EAU guidance recommends minimally invasive approaches for most Ureteral stones requiring active treatment, while open or laparoscopic surgery is generally reserved for selected situations in which endo urological treatment has failed or is unlikely to be successful.[1]

Stone size was strongly associated with both outcomes in the present study. Stone-free status decreased from 94.11% for stones measuring 5–8 mm to 37.50% for stones measuring 17–20 mm, whereas postoperative complications increased from 17.64% to 87.50% across the same size categories ($p<0.001$ for both). These findings are consistent with the established influence of stone size on treatment success and morbidity.[2-4]

Contemporary evidence supports ureteroscopy as an established minimally invasive treatment option, while laparoscopic Ureterolithotomy may achieve high stone-free rates in selected patients with large proximal ureteral stones.[5,6] Treatment should therefore be individualized according to stone size, location, patient

factors, and available expertise.[7] The higher stone-free rate observed with OU in our study should not be interpreted as evidence of superiority, given the non-randomized design.

The study also has practical relevance in resource-constrained settings, where the availability of endo urological equipment may influence treatment selection. However, this factor may introduce selection bias and represents an important limitation of the study. Further prospective multicentre studies with standardized selection criteria are warranted to better define the role of Ureterolithotomy in contemporary practice.

Conclusion

In this prospective observational cohort of 100 patients with Ureteral calculi measuring >5 to ≤20 mm, open Ureterolithotomy achieved a higher numerical 4-week stone-free rate than URS/URSL (98% versus 88%), although the difference was not statistically significant (p=0.114).

Postoperative complications were significantly more frequent following open Ureterolithotomy than URS/URSL (62% versus 32%, p<0.001). Larger stones were associated with lower stone-free rates and higher postoperative complication rates.

These findings support minimally invasive ureteroscopic management of Ureteral calculi when feasible, while open Ureterolithotomy may be considered in selected patients and clinical circumstances.

Declarations

- **Authors' contributions:** All authors contributed to the study conception, data collection, analysis and interpretation of data, and preparation and revision of the manuscript. All authors approved the final manuscript.
- **Ethical approval:** The study was approved by the Institutional Ethics Committee.
- **Informed consent:** Written informed consent was obtained from all participants before enrollment in the study.

References

1. European Association of Urology. EAU Guide lines on Urolithiasis. Arnhem: EAU Guidelines Office; 2026.
2. Drake T, Grivas N, Dabestani S, et al. What are the benefits and harms of ureteroscopy compared with shock-wave lithotripsy in the treatment of upper ureteral stones? A systematic review. Eur Urol. 2017;72(5):772–786. doi: 10.1016/j.eururo.2017.04.016.
3. Sorokin I, Mamoulakis C, Miyazawa K, Rodgers A, Talati J, Lotan Y. Epidemiology of stone disease across the world. World J Urol. 2017; 35(9):1301–1320.
4. Wathigo FK, Hayombe A, Maina D. Urolithiasis analysis in a multiethnic population at a tertiary hospital in Nairobi, Kenya. BMC Res Notes. 2017;10:158.
5. Wu T, Duan X, Chen S, Yang X, Tang T, Cui S. Ureteroscopic lithotripsy versus laparoscopic Ureterolithotomy or percutaneous nephrolithotomy in the management of large proximal Ureteral stones: a systematic review and meta - analysis. Urol Int. 2017; 99 (3):308-319.
6. Li J, Chang X, Wang Y, Han Z. Laparoscopic Ureterolithotomy versus Ureteroscopic laser lithotripsy for large proximal ureteral stones: a systematic review and meta-analysis. Minerva Urol Nefrol. 2020; 72(1):30-37.
7. Wang Y, Chang X, Wang H, et al. Efficacy and safety of various surgical treatments for proximal Ureteral stone ≥10 mm: a systematic review and network meta-analysis. Int Braz J Urol. 2020; 46(5):759-771.