

# A Prospective Observational Study of Clinical Profile and Management Modalities in Patients with Ureteral Calculi at A Tertiary Care Centre

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## Abstract

**Background:** Ureteric calculi are a common urological condition and a frequent cause of acute flank pain. The choice of management depends on stone size, location, and density, with minimally invasive techniques increasingly preferred. The aim and objective is to analyze the clinical profile, presentation, and management outcomes in patients with ureteric calculi treated at a tertiary care centre. **Material and Methods:** A prospective observational study of 50 patients with radiologically confirmed ureteric calculi was conducted. Data on demographic characteristics, stone size and site, clinical presentation, and treatment modalities were evaluated. **Results:** In the present study of 50 patients with ureteric calculi, most stones measured 6–10 mm and occurred predominantly in individuals aged 26–30 years, with a clear male predominance (72%). Upper ureteric stones were the most common, while PUJ stones were the least frequent. Flank pain was the most common presenting symptom, and gross haematuria the least. Eight patients were managed medically, mainly those with lower ureteric stones less than 7 mm. PUJ, upper, mid, lower, and VUJ stones were predominantly managed with URS/DJ stenting, with smaller proportions undergoing ESWL, pushback-PCNL, RIRS, or open surgery depending on stone size and density. **Conclusion:** The most frequent types of ureteric calculi in this investigation were related to being found in young males and mostly measured 6–10 mm in diameter and were predominantly located in the upper ureter. Smaller stones at the lower end were successfully treated with medical therapy, whereas URS/DJ stenting was most effective and common across locations. In general, the selection of treatment options was based on the stone's size, density, and location, and minimally invasive treatment options delivered satisfactory results.

**Keywords:** Ureteric calculi, Urolithiasis, Ureteroscopy, ESWL, Medical expulsive therapy.

Received: 02 January 2026

Revised: 20 January 2026

Accepted: 07 February 2026

Published: 24 February 2026

## INTRODUCTION

Urinary stones are a common human problem that has been present for centuries, and their pathophysiological mechanisms are poorly understood. Urolithiasis causes stones composed primarily of calcium oxalate or other minerals. Despite enhanced surgery care, the recurrence rate is high, and adequate metabolic assessment and prophylaxis are necessary.<sup>[1]</sup> The reasons are hypercalciuria and urinary obstruction. Therapy varies with the size and location of the stones and may include stents, ureteroscopy, PCNL, and ESWL. This study will evaluate the management outcome and clinical presentation of ureteric calculi in patients attending a tertiary care centre based on factors associated with the patient (including the nature of the stone and their location), clinical presentation (including symptoms, infection, and comorbidities), and procedural factors (including available equipment, skills, and costs).

## MATERIALS AND METHODS

The study under evaluation was a prospective observational study conducted from July 2023 to March 2025 at Dr. M.K. Shah Medical College and Research Centre, Ahmedabad. Fifty patients diagnosed with ureteric calculi were enrolled

with proper informed and written consent. Ethical approval was obtained from the Institutional Ethics Committee. Demographic data, clinical features, stone site, size, and management were recorded. Patients were followed up at 1 and 2 months post-intervention with imaging to assess stone clearance.

**Study type:** Prospective observational study

**Subject selection:** 50 patients with radiologically or sonologically confirmed ureteric calculi (July 2023 – March 2025)

**Inclusion criteria:**

- Patients above 18 years and willing to participate
- Radiological confirmation of ureteric calculi

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**DOI:**

10.21276/amit.2026.v13.i1.377

**How to cite this article:** Patel KM, Girishbhai PP, Talreja M. A Prospective Observational Study of Clinical Profile and Management Modalities in Patients with Ureteral Calculi at A Tertiary Care Centre. *Acta Med Int.* 2026;13(1):492-495.

**Exclusion criteria:**

- Patients below 18 years
- Ureteric calculi with anomalies (e.g., neurogenic bladder, stricture urethra)
- Calculi outside the ureter
- Unwilling participants

**Statistical analysis:** Data were analysed using descriptive statistics. Continuous variables were expressed as Mean ± SD and categorical variables as percentages.

**Data collection:** Detailed history, clinical examination, and investigations, including complete hemogram, urine analysis, and serum biochemistry (urea, creatinine), were performed for all patients.

The most common age group was 26–30 years, and the least common was 76–80 years. 72% of the cases were males, while 28% were females.

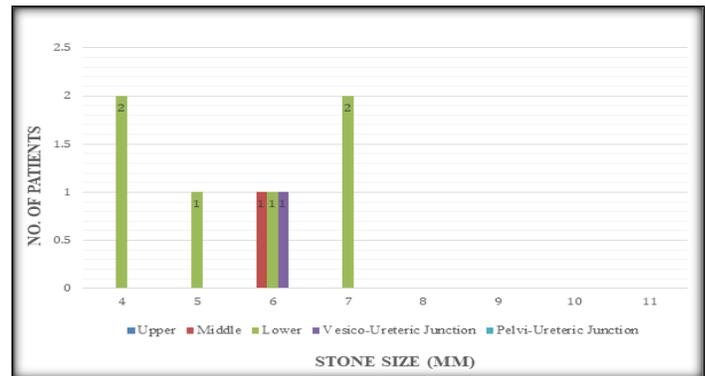


Figure 1: Medical management (by location).

**RESULTS**

In the present study involving 50 patients, the majority had ureteric stones measuring 6–10 mm, followed by 11–15 mm.

**Table 1: Frequency of patients with Site of ureteric stone**

Sr. No.	Site of Stone Impaction	No. of Patients	Percentage
1.	Pelvi-Ureteric Junction	5	10%
2.	Upper Ureter	18	36%
3.	Mid Ureter	5	10%
4.	Lower Ureter	16	32%
5.	Vesico-Ureteric Junction	6	12%

In the present study, most of the stones were located in the upper ureter region, while the fewest were found at the pelvi-ureteric junction.

**Table 2: Findings & Presentation**

Sr. No.	Presentation	No. of Patients	Percentage
1.	Pain	42	84%
2.	Fever	25	50%
3.	Nausea/Vomiting	15	30%
4.	Burning Micturition	38	76%
5.	Microscopic Haematuria	14	28%
6.	Gross Haematuria	10	20%
7.	Hydronephrosis	44	88%

In the present study, flank pain emerged as the most frequent presenting symptom, whereas gross haematuria was the least commonly reported.

**Table 3: Co-Morbidities**

Sr. No.	Co-morbidities	No. of Patients	Percentage
1.	Hypertension	12	24%
2.	Diabetes	8	16%
3.	Congestive Cardiac Failure	1	2%
4.	COPD	1	2%

In the present study, most patients were normotensive and non-diabetic, with hypertension observed in 24% and diabetes in 16% of the patients.

**Table 4: Medical management (by location)**

Location of stone		Stone size(mm)									Total
Lower	Size(mm)	4	5	6	7	8	9	10	11		
	No.	2	1	1	2	0	0	0	0	6	
Middle	Size(mm)	4	5	6	7	8	9	10	11		
	No.	0	0	1	0	0	0	0	0	1	
Upper	Size(mm)	4	5	6	7	8	9	10	11		
	No.	0	0	0	0	0	0	0	0	0	
Vesico- Ureteric Junction	Size(mm)	4	5	6	7	8	9	10	11		
	No.	0	0	1	0	0	0	0	0	1	
Pelvi- Ureteric	Size(mm)	4	5	6	7	8	9	10	11		

Junction	No.	0	0	0	0	0	0	0	0	0
Total										8

In the present study, 8 of 50 patients were managed medically, most of whom had lower ureteric calculi measuring less than 7 mm.

**Table 5: Management of Pelvi-Ureteric Junction Calculi**

Parameters	URSI with Dj-stenting	ESWL	Open	Pushback-PCNL	RIRS
Percentage of Patients	-	2%	2%	4%	2%
Mean Stone size	-	14 mm	20 mm	18 mm	16 mm
Mean Stone Density (HU)	-		900 – 1200 HU	1000 – 1300 HU	950 – 1100 HU

In Pelvi-Ureteric Junction calculi, ESWL and RIRS were each done in 2% of cases, pushback-PCNL in 4%, and open surgery in 2%, with a mean stone size of 14–20 mm and a density of 900–1300 HU.

**Table 6: Management of Upper Ureteric Calculi**

Sr. No.	Parameters	URSI with Dj-stenting	ESWL	Pushback-PCNL	Open	RIRS
1.	Percentage of Patients	8%	2%	16%	2%	4%
2.	Mean Stone size	9 – 10 mm	10 mm	15 – 16 mm	26 mm	17 mm
3.	Mean Stone Density (HU)	1000 – 1200 HU	700 – 850 HU	1000 – 1250 HU	1000 – 1300 HU	950 – 1100 HU

For upper ureteric calculi, URS/DJ stenting was performed in 8% of patients, ESWL in 2%, pushback-PCNL in 16%, open surgery in 2%, and RIRS in 4%. The mean stone size ranged from 9 to 26 mm, while stone density ranged from 700 to 1300 HU, depending on the treatment modality.

**Table 7: Management of Mid-Ureteric Calculi**

Sr. No.	Parameters	URSI with Dj-stenting	Open	ESWL
1.	Percentage of Patients	8%	2%	2%
2.	Mean Stone size	11 – 12 mm	22 mm	13 mm
3.	Mean Stone Density (HU)	1100 – 1200 HU	1100 – 1350 HU	750 – 900 HU

For mid-ureteric calculi, URS/DJ stenting was performed in 8% of cases, while open surgery and ESWL were each used in 2%. Stones treated ranged in size from 11–22 mm, with stone density varying between 750–1350 HU across modalities.

**Table 8: Management of Lower-Ureteric Calculi**

Sr. No.	Parameters	URSI with Dj-stenting	Open
1.	Percentage of Patients	20%	-
2.	Mean Stone size	9 – 10 mm	-
3.	Mean Stone Density (HU)	950 – 1200 HU	-

For lower ureteric calculi, URS/DJ stenting was the primary management in 20% of patients, with treated stones measuring 9–10 mm and having a mean density of 950–1200 HU.

**Table 9: Management of Vesico-Ureteric Junction Calculi**

Sr. No.	Parameters	URSI with Dj-stenting	Open
1.	Percentage of Patients	10%	-
2.	Mean Stone size	11 – 12 mm	-
3.	Mean Stone Density (HU)	1000 – 1300 HU	-

For vesico-ureteric junction calculi, URS/DJ stenting was performed in 10% of patients, with stones measuring 11–12 mm and a mean density of 1000–1300 HU.

## DISCUSSION

In this study of 50 patients, the highest incidence of ureteric calculi occurred in the 26–40-year age group (32%), consistent with reports showing peak occurrence between 20 and 50 years.<sup>[5]</sup> Males predominated (72%), with a sex ratio of 2.57:1, similar to findings by Scales et al.<sup>[6]</sup> Colicky flank

pain was the most common symptom (84%), followed by burning micturition (76%), haematuria (48%), and fever (50%). Stone size ranged widely, with 44% measuring 6–10 mm. In contrast, Prstojevic et al. reported a mean size of 15 mm, and Song et al. reported a mean of 4.87±3.49 mm.<sup>[3,7]</sup> Upper ureteric stones accounted for 36% of cases, though Baker et al. and Song et al. observed more distal and UVJ stones in their studies.<sup>[3,8]</sup> Plain X-ray remained a simple diagnostic tool but had limitations for radiolucent stones. Right-sided dominance (54%) was reported, and Kretschmer reported a more even distribution.<sup>[9]</sup> 16% of patients were successfully treated with medical management,

with 6 stones passing spontaneously, especially those less than 5 mm. However, the AUA Guidelines have higher passage rates for stones less than 5mm.<sup>[10]</sup> The average length of hospital stay was 7-10 days, and morbidity from endoscopic procedures was low, making ureteroscopy the management of choice.

## CONCLUSION

Ureteric calculi were most apparent in young adult males in this study, and the majority were 6-10 mm in size and often present in the upper ureter. Pain in the flank was the main manifestation, and most patients had no major comorbidities. Small lower ureteric cases managed medically were only effective, and URS/DJ stenting was the best intervention based on most stone locations. ESWL, pushback-PCNL, RIRS, and open surgery were reserved for cases with stones of certain diameters, densities, and locations. In general, the nature and location of the stones, as well as minimally invasive endourological procedures, were associated with high treatment success rates and safety. Limitations of the study include the small sample size, single-centre design, and short follow-up period, which may limit the generalizability of the results.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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