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ASYMPTOMATIC INTRARENAL CALCULI - ARE THEY REALLY ASYMPTOMATIC? A PROSPECTIVE STUDY IN A TERTIARY CARE CENTRE

Urology

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ABSTRACT

Introduction: Asymptomatic renal stones are commonly detected incidentally with more ubiquitous use of imaging in medicine today. Surgical treatment of asymptomatic stones may benefit the patient by avoiding future symptomatic progression that may lead to need for urgent surgical intervention or emergency department (ED) visits . The data regarding the natural course of asymptomatic intrarenal calculi is inadequate. We investigate stone-related events (SREs) in individuals with untreated intrarenal calculi and also SRE prediction factors. **Method:** All patients found with an asymptomatic intrarenal calculus from January 2024 to September 2024 on CT KUB managed conservatively with interval imaging for ≥6 months were included . Patients were assessed for any SRE, and the rate of occurrence was examined based on the size, location, and number of calculi. Multivariate logistic regression analysis was performed to determine significant predictors for SREs. **Result:** In total, out of 121 patients, 76 met inclusion criteria , The mean stone size was 4.44 mm (range1–12mm). Duration of follow-up was 6 months. The overall rate of SREs, including intervention (n = 19) and spontaneous stone passage after ureteral colic (n = 11), was 40% (n = 30/76). Stones >5 mm were more likely to lead to an event compared with stones less than 5 mm (p = 0.001). Interpolar stones and stones located in multiple calices were more likely to cause a SRE than lower pole stones (p = 0.04 and p = 0.03, respectively)**Conclusions:** The location and size of the stones were important indicators of an SRE. Asymptomatic renal stones can be monitored safely with long-term follow-up. Regular evaluations and timely intervention are advised for patients with associated risk factors. Patients with asymptomatic renal stones can be accurately risk-stratified by urologists using the data from this study.

KEYWORDS

ASYMPTOMATIC RENAL CALCULI, STONE RELATED EVENTS

INTRODUCTION

The true incidence of asymptomatic renal calculi in India remains poorly defined due to the absence of nationwide population-based screening programs. Reports from Northern India have indicated that over 60% of individuals with renal calculi were asymptomatic at the time of diagnosis.

The overall prevalence of urolithiasis in India is estimated to range between 7% and 15%, and 40%–60% of these stones are asymptomatic. It can be conservatively estimated that around 5% of the adult population in India may harbor asymptomatic renal calculi.

For the purposes of this study, "asymptomatic" is defined as pain-free on presentation to clinic and without recent intervention or infection.

Although treatment indications for urinary stone disease are well established, there is no consensus on when it is most appropriate to begin treatment for asymptomatic renal stones. Expectant (conservative) management is often recommended in patients who present with asymptomatic renal stones; however, surgical treatment of asymptomatic stones may benefit the patient by avoiding future symptomatic progression.

AIM

To investigate stone-related events (SREs) in individuals with asymptomatic intrarenal calculi and to identify SRE prediction factors.

MATERIALS AND METHODS

Study Design and Setting

Patients with asymptomatic intrarenal calculi diagnosed on Ultrasound KUB and CT KUB were prospectively studied. The study was conducted at the Institute of Nephro Urology (INU), Bengaluru, between January 2024 and March 2025.

Inclusion Criteria

Patients with non-obstructing asymptomatic renal calculi with ≥6 months of follow-up were included in the study.

Exclusion Criteria

The following patients were excluded from the study:

- Patient preference for treatment over surveillance
- Non-attendance of follow-up
- Solitary kidney
- Coexistent ureteral stones
- A history of urinary tract congenital anomalies
- Increased serum creatinine (greater than 2 mg/dl)
- Pregnancy

Surveillance Protocol

Out of 121 patients, 76 met the inclusion criteria, and a total of 96 renal units were studied. In those with bilateral stones under surveillance, each renal unit was evaluated independently. The active surveillance (AS) protocol consisted of recommended renal ultrasound and KUB radiograph 6 months after initial presentation, with additional CT if clinically indicated.

Outcome Measures

Stone-related events (SREs) were defined as spontaneous stone passage, stone migration to the ureter requiring intervention, and non-colic-related symptoms leading to intervention. The impact of gender, age, stone size (<5 mm; 6–10 mm; >10 mm), laterality (unilateral/bilateral), stone position, stone burden, and number of stones (single or multiple [>1 stone]) on the rate of SRE was evaluated.

Statistical Analysis

Numerical data are presented as mean ± standard deviation. Categorical data are given as numbers and percentages. Multivariate logistic regression analysis was performed with a confidence interval of 95% and significance threshold of $p \leq 0.05$, using SPSS version 25.0.

RESULTS

Patient Characteristics

In total, 121 patients with intrarenal stones were identified. Forty-five were excluded per the exclusion criteria (i.e., <6 months follow-up), and 96 renal units from 76 patients were included in the study. The baseline characteristics of the study population are summarised in Table 1.

Table 1. Baseline Characteristics of the Study Population

Variable	Value
Renal units	96

Age in years, mean (range)	44.2 (19–84)
Initial stone diameter in mm, mean (range)	4.44 (1–15)
Follow-up in months, range	6–14
Gender	
Male	53
Female	23
Age in years	
< 50	71
> 50	25
Stone size	
0–5 mm	54
>5–10 mm	32
>10 mm	10
Anatomical location	
Lower pole	32 (32.7%)
Interpolar	22 (22.9%)
Upper pole	12 (12.8%)
Renal pelvis	7 (9.4%)
Multiple	21 (22.2%)
Laterality	
Left	51 (52.6%)
Right	45 (47.4%)
Unilateral/bilateral	
Unilateral	36 (37.6%)
Bilateral	60 (62.4%)

Stone-Related Events

The overall rate of SREs, including intervention (n = 30; 25.2%) and spontaneous stone passage after ureteral colic (n = 14), was 45.12% (n = 44/96). All patients with spontaneous stone passage had associated renal colic symptoms.

Of the intervention group, 82.5% (n = 24) underwent intervention for ureteral colic, 15% (n = 4) for asymptomatic stone growth, and 2.5% (n = 2) due to patient preference in the absence of other indications. The methods of intervention were ureteroscopic lithotripsy (URSL) in 83.75% (n = 25), shock wave lithotripsy (SWL) in 10% (n = 3), and a combination of URSL + SWL in 6.25% (n = 2).

Stone-Related Events by Stone Size

Table 2 presents the rate of SREs according to stone size.

Table 2. Rate of Stone-Related Events According to Stone Size

Stone Size	Stone-Related Events, N/Total (%)
<5 mm	10/54 (18.48%)
5–10 mm	26/32 (79.97%)
>10 mm	8/10 (80%)

Risk Factors for Stone-Related Events

Table 3 presents the p-values from multivariate logistic regression analysis for each variable.

Table 3. Risk Factors for Stone-Related Events

Variable	p-value
Gender – Female	0.86
Gender – Male	0.20
Age <50 years	0.17
Age ≥50 years	0.17
Side – Left	0.70
Side – Right	0.70
Stone size 1–5 mm	0.02
Stone size 5–10 mm	0.01
Stone size >10 mm	0.01
Location – Lower pole	0.90
Location – Interpolar	0.05
Location – Upper pole	0.70
Location – Pelvis	0.30
Location – Multiple	0.03

Management of Stone-Related Events by Stone Size

Table 4 summarises the management modalities employed stratified by stone size.

Table 4. Management of Stone-Related Events by Stone Size

Stone Size	Spontaneous Passage	URSL	ESWL
<5 mm	10	—	—
5–10 mm	4	19	3
>10 mm	—	6	—

Stones >5 mm were significantly more likely to lead to a SRE compared with stones <5 mm (p = 0.01). Stones in the interpolar region and in multiple locations were significantly more likely than lower pole stones to lead to a SRE (p = 0.05 and p = 0.03, respectively).

DISCUSSION

This study investigated the natural course of asymptomatic kidney stones and assessed how the distribution of asymptomatic renal stones and stone burden affected the incidence of SREs. Our study recorded an overall SRE rate of 45.12%, which is consistent with rates reported in the published literature.

Table 5 provides a comparison of SRE and intervention rates between the present study and previously published series.

Table 5. Comparison with Published Literature

Study	SRE Rate (%)	Intervention Rate (%)
Glowacki et al.	31.8%	16.8%
Burgher et al.	77%	26%
Koh et al.	65.9%	6.9%
Dropkin et al.	28%	17%
Present Study	45.12%	25.2%

Limitations

There are some limitations to this study. First, the study was performed in a single centre, which may limit the generalizability of the findings. Additionally, 45 patients were excluded due to less than 6 months of follow-up. These patients may have sought treatment elsewhere or remained asymptomatic, which may have led to a selection bias toward the SRE group.

CONCLUSION

The question of whether asymptomatic kidney stones need to be monitored and/or treated is one that is often asked in urological practice. The findings of this study demonstrate that a significant proportion of patients with asymptomatic intrarenal calculi will experience a stone-related event. Lower pole stones were significantly less likely than stones outside of the lower pole to cause symptoms or pass spontaneously.

Stone size and location can be utilised to risk-stratify patients based on their probability of experiencing a SRE. Stone size >5 mm, interpolar position, and multi-caliceal stone burden are associated with a greater probability of an SRE. These results can help urologists make informed decisions regarding the management of asymptomatic non-obstructing renal stones.

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