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Clinical Profile and Diagnostic Evaluation of Patients with Ureterolithiasis

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Abstract **Original Research Article**

Background: Despite advances in diagnostic imaging, there remains limited data on the detailed clinical characteristics and diagnostic profiles of patients presenting with ureterolithiasis in many regions, including Bangladesh. Therefore, this study aims to evaluate the clinical characteristics and diagnostic findings in patients presenting with ureterolithiasis. ***Aim of the study:*** The aim of the study was to assess the clinical characteristics and evaluate diagnostic findings in patients presenting with ureterolithiasis. ***Methods:*** This cross-sectional descriptive study was conducted at the Departments of Surgery and Urology, Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh, from December 2013 to May 2014. Fifty-eight patients over 12 years with ureterolithiasis were enrolled using consecutive convenient sampling. Clinical and diagnostic data were collected using a validated tool after standard investigations. Data were analyzed with SPSS 21.0. ***Results:*** Among 58 ureterolithiasis patients, most were aged 31–40 years (36.2%) and male (62.1%). All reported abdominal pain; 84.5% had radiation of pain, 39.6% nausea/vomiting, 36.2% haematuria, 27.6% burning micturition, and 22.4% fever. Imaging showed radioopaque calculi on X-ray in 93.1%, hydronephrotic changes on USG and IVU in 89.7%. Right-sided stones predominated (60.3%), mainly in the lower third of the ureter (58.6%). Most stones (89.7%) measured 1.0–2.0 cm. ***Conclusion:*** Ureterolithiasis predominantly affects middle-aged males, presenting with characteristic symptoms and identifiable radiological findings that aid timely diagnosis and management.

Keywords: Ureterolithiasis, Clinical Profile, Diagnostic Evaluation.

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INTRODUCTION

Urolithiasis is a prevalent condition affecting individuals across all age groups. Research from the United States and other countries has shown a steady rise in the incidence of upper urinary tract stones over the past five decades [1-5]. Population-based studies have also demonstrated a rising prevalence of urinary stone disease in the elderly population. The occurrence of stones in the urinary tract has been a longstanding challenge for humans throughout history [6]. Various factors contribute to its development, including heredity, environmental influences, age, sex, urinary infections, metabolic disorders, and dietary imbalances. Among urinary tract disorders, stone formation holds significant clinical importance [7]. In Bangladesh, the incidence of urinary stones is increasing in both rural and urban populations, posing a notable strain on healthcare resources and the economy [8]. The disease has a multifactorial etiology, with reported incidence and prevalence rates ranging from 7% to 13% in North America, 5% to 8% in Europe, and 1% to 5% in Asia [9].

Acute flank pain caused by renal colic is among the most intense types of pain and represents a significant healthcare burden, frequently leading patients to seek emergency care worldwide [10]. Renal colic affects approximately 12% of the population, with around 1.2 million individuals presenting to medical facilities each year [11]. The typical symptoms include sudden-onset flank pain, nausea, vomiting, and pain that radiates,

which are the most common complaints observed in emergency departments.

Non-contrast computed tomography (NCCT) is regarded as the gold standard diagnostic method for patients suspected of acute renal colic. It shows excellent sensitivity (95–97%) and specificity (96–100%) in identifying urinary tract stones, coupled with a high negative predictive value [12]. Ultrasound is often used as the initial imaging modality due to its safety, affordability, and ability to help guide diagnosis and further imaging needs. It is especially preferred for young female patients with flank pain, as they generally have a lower incidence of stones compared to males [13]. Studies have shown that ultrasound alone can achieve a sensitivity of approximately 73.5%, specificity of 92.7%, and a negative predictive value of 74.5% for detecting urolithiasis. Despite these findings, the choice of initial radiological investigation remains debated. Advances in imaging technology have continuously improved the accuracy of diagnosing urinary calculi.

Despite the growing burden of ureterolithiasis and advances in diagnostic imaging, there remains limited data on the detailed clinical characteristics and diagnostic profiles of patients presenting with ureteric stones in many regions, including Bangladesh. Moreover, variability in presentation and diagnostic challenges contribute to delays in management and impact patient outcomes. Therefore, this study aims to evaluate the clinical characteristics and diagnostic findings in patients presenting with ureterolithiasis.

Objective

- assess the clinical characteristics and evaluate diagnostic findings in patients presenting with ureterolithiasis.

METHODOLOGY & MATERIALS

This cross-sectional descriptive study was conducted at the Departments of Surgery and Urology, Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh, between December 2013 and May 2014. A total of 58 patients admitted for surgical management of ureterolithiasis and meeting the inclusion criteria were enrolled using consecutive convenient sampling.

Inclusion criteria:

- Patients diagnosed with ureterolithiasis
- Age above 12 years irrespective of sex

Exclusion criteria:

- Presence of concomitant renal or bladder stones
- Children below 12 years of age
- Patients with comorbid conditions such as uncontrolled hypertension, diabetes mellitus, hepatic or renal disease rendering them unfit for surgery

Data were collected using a validated structured sheet after clinical evaluation and investigations including hemoglobin, urine analysis, blood urea, serum creatinine, ultrasonography, KUB radiograph, and intravenous urography. Informed consent was obtained prior to open ureterolithotomy or endourological procedures performed under anesthesia. Postoperative care involved monitoring, medication, and timely removal of drains and sutures. Patients were discharged on the 3rd postoperative day following endoscopic surgery and on the 8th day following open surgery, with follow-up at two weeks to assess outcomes. Data were analyzed using SPSS version 21.0; quantitative variables are presented as means ± standard deviations and qualitative data as frequencies and percentages. Ethical approval was obtained from the institutional review board, and confidentiality and voluntary participation were ensured throughout the study.

RESULTS

Table 1: Age Distribution of the Study Population (n=58)

Age Group	Frequency (n)	Percentage (%)
18–20 years	6	10.3
21–30 years	18	31.0
31–40 years	21	36.2
41–50 years	7	12.1
51–60 years	4	6.9
>60 years	2	3.4

Table 1 presents the age-wise distribution of 58 patients diagnosed with ureterolithiasis. The majority of the patients were between 31–40 years, accounting for 21 (36.2%) cases, followed by 18 (31.0%) patients in the 21–30 years group. Other age groups included 7 (12.1%) patients aged 41–50 years, 6 (10.3%) aged 18–20 years, 4 (6.9%) aged 51–60 years, and 2 (3.4%) patients above 60 years.

Table 2: Sex Distribution of the Study Population (n=58)

Sex	Frequency (n)	Percentage (%)
Male	36	62.1%
Female	22	37.9%

Table 2 presents the distribution of patients according to sex. Among the 58 patients with ureterolithiasis, 36 (62.1%) were male and 22 (37.9%) were female, resulting in a male-to-female ratio of approximately 1.6:1.

Table 3: Mode of Clinical Presentation among the Study Population (n=58)

Mode of presentation	Frequency	Percentage
Abdominal pain	58	100.0
Radiation pain	49	84.5
Haematuria	21	36.2
Burning micturition	16	27.6
Nausea/Vomiting	25	39.6
Fever	13	22.4

Table 3 illustrates the clinical symptoms reported by patients with ureterolithiasis at presentation. Abdominal pain was the universal symptom, observed in all 58 patients (100.0%). Radiation of pain to the groin, genitalia, or thigh was reported by 49 patients (84.5%). Other common symptoms included nausea or vomiting in 25 (39.6%), haematuria in 21 (36.2%), burning micturition in 16 (27.6%), and fever in 13 (22.4%) patients.

Table 4: Imaging Findings among the Study Population (n=58)

Imaging Technique		Frequency (n)	Percentage (%)
Plain X-ray KUB		54	93.1%
USG	Demonstrate calculus	0	0.0%
	Hydronephrotic change	52	89.7%
IVU	Hydronephrotic change	52	89.7%
	Poorly functioning kidney	15	25.9%
	Non-functioning kidney	0	0.0%

Table 4 highlights the radiological findings from different imaging modalities used in the diagnosis of ureterolithiasis. Plain X-ray of the kidneys, ureters, and bladder (KUB) identified radioopaque calculi in 54 patients (93.1%). Ultrasonography (USG) did not directly visualize any calculi but revealed hydronephrotic changes in 52 patients (89.7%). Intravenous urography (IVU) also demonstrated hydronephrotic changes in 52 patients (89.7%), with 15 (25.9%) showing poorly functioning kidneys and none showing non-functioning kidneys.

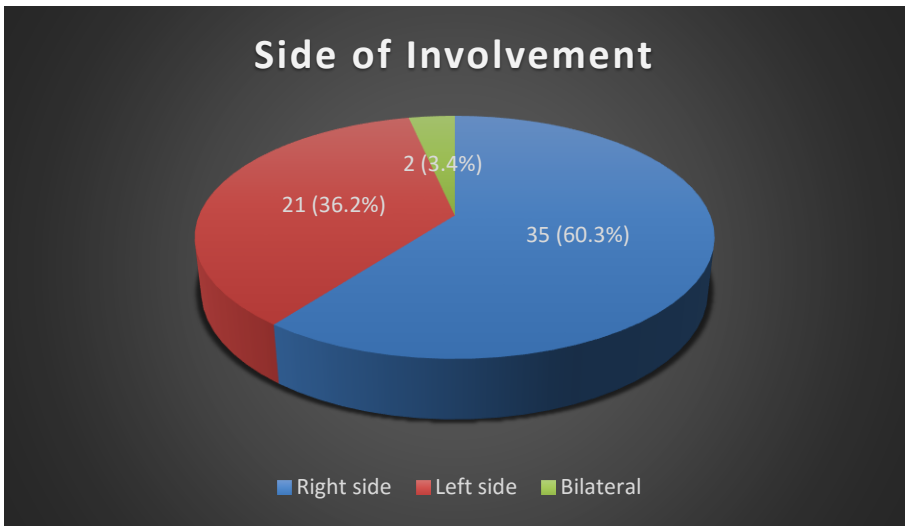

Figure 1: Distribution of the Patients by Side of Ureteric Involvement (n=58)

Figure 1 shows the distribution of ureterolithiasis cases according to the side of ureteric involvement. The majority of patients had right-sided involvement, observed in 35 (60.3%) cases. Left-sided stones were present in 21 (36.2%) patients, while bilateral involvement was noted in only 2 (3.4%) cases.

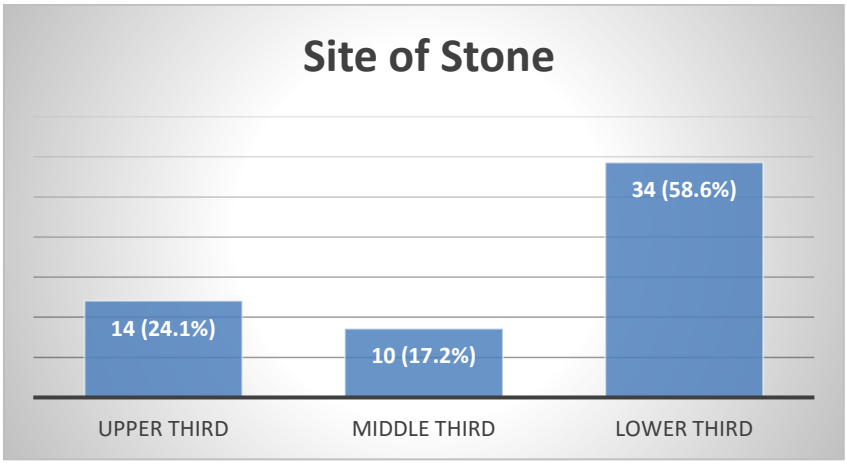

Figure 2: Distribution of the Patients by Site of Stone (n=58)

Figure 2 presents the anatomical location of ureteric stones among the study patients. Stones were most commonly found in the lower third of the ureter in 34 (58.6%) patients, followed by the upper third in 14 (24.1%) patients, and the middle third in 10 (17.2%) patients.

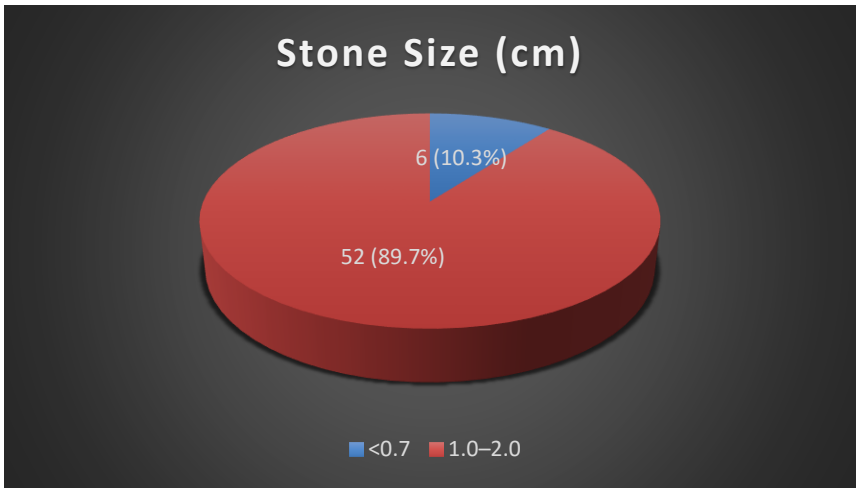

Figure 3: Distribution of the Patients by Stone Size (n=58)

Figure 3 shows the size distribution of ureteric stones among the study population. The majority of stones (52 patients, 89.7%) measured between 1.0 and 2.0 cm, while smaller stones less than 0.7 cm were seen in 6 patients (10.3%).

DISCUSSION

Ureterolithiasis continues to be a common urological emergency and a major cause of abdominal pain requiring hospital attention. This study, conducted at the Department of Surgery, Sylhet MAG Osmani Medical College Hospital, Sylhet, during the period from December 2013 to May 2014, highlights the clinical presentation and diagnostic findings of patients admitted with ureteric stones. The results demonstrate a predominance among young to middle-aged adults, with abdominal pain as the universal symptom and imaging findings frequently revealing hydronephrosis. These findings underscore the importance of early symptom recognition and appropriate imaging to guide timely and effective management in similar tertiary care settings.

In the present study, the highest prevalence of ureterolithiasis was observed in the 31–40 years age group (36.2%), followed by the 21–30 years group (31.0%), indicating a significant clustering of cases among young to middle-aged adults. This pattern is consistent with the findings of Faridi *et al.,*[14], who also reported a peak incidence in the 31–40 years age group. Similarly, Degheili *et al.,*[15] found that the majority of stones occurred between 20–49 years of age (54.4%), which closely reflects the concentration seen in our study (67.2% in the 21–40 years range). These similarities across studies reinforce the understanding that ureterolithiasis predominantly affects individuals in the

productive years of life, posing both clinical and socioeconomic burdens.

In the present study, males constituted the majority of patients with ureterolithiasis (62.1%), compared to 37.9% females, yielding a male-to-female ratio of approximately 1.6:1. This finding aligns closely with the results reported by Alaya *et al.,*[16], who observed a male predominance of 60% versus 40% in their cohort (sex ratio ~1.5:1), and Alshoabi *et al.,*[17], who documented an even higher male prevalence of 67.3% compared to 32.7% in female patients. The consistent male predominance across these studies may be attributed to anatomical, hormonal, dietary, and occupational factors that increase stone risk in men.

In the present study, all patients (100%) presented with abdominal pain, and a large proportion (84.5%) experienced radiation of pain, reflecting the classical presentation of ureterolithiasis. Other symptoms reported were nausea and vomiting (39.6%), hematuria (36.2%), burning during urination (27.6%), and fever (22.4%). These findings are in agreement with descriptions in *StatPearls*, which highlight flank pain radiating to the groin as a hallmark symptom of ureteric colic [18]. Furthermore, literature reviews across adult and pediatric populations have emphasized that abdominal or flank pain often coexists with hematuria, nausea/vomiting, and occasionally fever [19], supporting the symptom profile observed in our cohort.

The imaging findings in this study revealed that plain X-ray KUB identified radioopaque calculi in 93.1% of patients, while ultrasonography (USG) did not visualize any calculi but detected hydronephrotic changes in 89.7% of cases. Intravenous urography (IVU) similarly demonstrated hydronephrosis in 89.7% of patients and identified poorly functioning kidneys in 25.9%, with no cases of non-functioning kidneys. These results are consistent with those reported by Mutazindwa *et al.,*[20], who found that IVU detected more cases of hydronephrosis than US, highlighting IVU's superior sensitivity in identifying hydronephrotic changes. The inability of US to visualize calculi aligns with Radiopaedia's observation that US has limited sensitivity for detecting small stones, especially those under 3 mm [21]. Collectively, these findings highlight the complementary value of plain X-ray, ultrasound, and intravenous urography in the thorough diagnostic assessment of ureterolithiasis.

In this study, the majority of ureterolithiasis cases involved the right side, accounting for 60.3% of patients, while left-sided stones were observed in 36.2%, and bilateral involvement was rare at 3.4%. These findings contrast with Letavernier *et al.,*[22], who reported a left-sided predominance (61%) specifically for uric acid stones, highlighting how stone composition may influence laterality. Conversely, Zheng *et al.,*[23] found nearly equal distributions between unilateral and bilateral stones in a larger cohort, suggesting variability in stone laterality across populations. Overall, while right-sided involvement was predominant in our study, these comparisons emphasize that the side of ureteric stone occurrence can vary depending on factors such as stone type and patient demographics.

In the present study, the majority of ureteric stones were located in the lower third of the ureter (58.6%), followed by the upper third (24.1%) and the middle third (17.2%). These findings are consistent with those reported by Song *et al.,*[24], who found that 46.3% of ureteral stones were situated at the ureterovesical junction (UVJ), 30.5% in the proximal ureter, 16.8% in the distal ureter, and 5.2% at the ureteropelvic junction (UPJ). This concordance highlights the lower third of the ureter, especially the UVJ, as the most common site for stone lodgment, likely due to anatomical narrowing at this junction, which predisposes to stone impaction and symptoms.

In the present study, most ureteric stones (89.7%) measured between 1.0 and 2.0 cm, with a smaller proportion (10.3%) measuring less than 0.7 cm. This size distribution aligns with clinical observations that stones within the 1.0–2.0 cm range are common and often require intervention. For instance, retrograde intrarenal surgery (RIRS) has been demonstrated to be an effective treatment for kidney stones of this size, providing high stone-free rates and low complication rates [25]. These findings highlight the clinical relevance of accurately assessing stone size to guide appropriate management strategies in patients with ureterolithiasis.

Limitations of the study

This study had some limitations:

- The study was conducted at a single tertiary care hospital, limiting generalizability.
- The sample size was relatively small due to time constraints.
- Long-term patient outcomes were not assessed within the study period.

CONCLUSION

The clinical and diagnostic profile of patients with ureterolithiasis has been clearly outlined in this study. The majority of patients were males aged 31–40 years, who predominantly presented with abdominal pain often radiating to the groin or thigh. Imaging modalities revealed that most stones were located on the right side and in the lower third of the ureter, with sizes ranging mostly between 1.0 and 2.0 cm. Plain X-ray KUB was effective in detecting radioopaque calculi in over 90% of cases, while ultrasound and intravenous urography frequently showed hydronephrotic changes. These findings highlight the typical symptomatology and radiological patterns of ureterolithiasis, emphasizing the importance of comprehensive clinical and imaging evaluation to guide appropriate management strategies.

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