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Clinical Presentations and Management of Patients with Ureteric Colic: A Retrospective Study

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Abstract **Objectives:** This study aims to describe the clinical presentations and management of patients with ureteric colic attending the emergency department. **Methods:** A retrospective chart review at King Abdulaziz Hospital analyzed medical records from 2018 to 2022, focusing on adult patients aged 18-80, presenting to the emergency department with a confirmed diagnosis of ureteric stones. Patients with incomplete records or unverified diagnoses were excluded. The results of patients were collected and statistically analyzed. **Results:** This study involved 221 patients with ureteric colic, with a mean age of 44.9 ± 12.6 years and a majority of males (77.7%); most of the patients presented in the summer season (n = 133, 60.2%). About 47.5% (n = 105) of them had a history of urolithiasis, and 21.3% (n = 47) had a positive family history of urolithiasis. The most common symptoms and signs were fluctuating pain (n = 170, 76.9%), pain localized to the side, back, or below the ribs (n = 161, 72.9%), Nausea/vomiting (n = 114, 51.6%), dysuria (n = 100, 45.2%). Over half of the 117 patients (52.9%), reported severe pain as measured by the Numerical Pain Rating Scale (NPRS). In older patients, the presence of hematuria, pyuria, and stones located in the lower and middle ureter were associated with increased pain severity. The majority of patients (99.1%) received analgesics, while 71.0% (n=157) underwent medical explosive therapy (MET). The invasive procedures showed that about 67.9% (n = 150) required double-J stent insertion, and 32.1% (n = 71) of them had ureteroscopy (URS). More than half of the patients were discharged on the same day of attending the emergency department (n = 122, 55.2%). Most patients improved by the given treatment (n = 192, 87.3%), while few of them had some complications. **Conclusion:** The majority of patients with ureteric colic were effectively managed through conservative treatment, with significant improvement. Timely intervention using minimally invasive techniques led to positive outcomes and shorter hospital stays

Key Words Ureteric colic, urolithiasis, emergency care, stone management techniques, Saudi Arabia

INTRODUCTION

Ureteric colic, a condition characterized by severe abdominal pain due to ureteric obstruction from kidney stones, is common worldwide, particularly in hot climates [1,2]. It is the most prevalent urological issue among adults, with a rising incidence across various demographics [3,4]. The most frequent site of obstruction is the vesicoureteral junction (VUJ), leading to hydro-ureter and intense visceral pain [5]. Prompt diagnosis and management are crucial to prevent complications like chronic renal insufficiency [6].

Risk factors for ureteric colic include advanced age, male gender, race, dietary habits, and climate [2,5-7]. Additionally, comorbidities such as family history of nephrolithiasis, hypertension, obesity, and diabetes are also significant contributors [1,8-10]. In Saudi Arabia, calcium-based stones, followed by uric acid stones, are the leading causes of ureteric colic [1].

Patients often present with sudden, sharp, radiating pain from the flank to the groin, with intensity tied to the severity of obstruction rather than stone size [2,11]. Other symptoms

include hematuria, nausea, vomiting, renal tenderness and pain lasting under 12 hours [11,12]. Diagnosis typically involves medical history, physical examination, laboratory tests and imaging studies, with CT scans being the most accurate diagnostic tool [11,13-15].

Management focuses on pain relief and facilitating stone passage. Initial treatment typically involves analgesics such as NSAIDs or opioids for pain control [16-19]. Patients showing any signs of systemic infection or a urinary tract infection (UTI) are typically given antibiotics [11]. Conservative measures like increased fluid intake or medical expulsive therapy (MET) may promote stone passage, while surgical intervention is required for larger stones or persistent obstruction [11,13,20,21].

Although international guidelines, such as those from the American Urological Association, exist for managing ureteric colic, there is a lack of region-specific data. Given the potential differences in patient demographics, stone composition and healthcare practices, this study aims to analyze the clinical presentation and management of ureteric colic cases among patients attending the emergency department at King Abdulaziz Hospital - Al Ahsa, Saudi Arabia. The data reported have limitations regarding demographic differences in urolithiasis formation and emergency presentations in Saudi Arabia, specifically related to ureteric stones, which this study aims to highlight. The study will provide valuable insights for developing tailored management strategies to enhance patient outcomes and safety.

METHODS

Study Design and Settings

This retrospective chart review was conducted at King Abdulaziz Hospital - Al Ahsa, part of the National Guard Health Affairs in Saudi Arabia, located in the eastern province. The medical records from January 2018 to December 2022 were retrieved from the hospital administration; we used a random sampling technique to minimize bias. The sample size was estimated using the EPI info programme. Based on a 95% confidence interval, 5% margin of error and the entire population, The predicted sample size was 221. Therefore, 221 patients were taken as a sample size for the study and Two senior urologists analyzed the data for the same patients.

Inclusion Criteria

The study included all adult patients with records with the following details: aged 18 to 80 years, of any gender and nationality, who presented to the emergency department with a confirmed diagnosis of ureteric stones. Patients were eligible for inclusion regardless of comorbid conditions if ureteric stones were their primary diagnosis.

Exclusion Criteria

Records were excluded either due to cases with incomplete medical records, unverified diagnoses, nonrelevant diagnoses, or missing essential data, such as missing demographic features, documented signs, symptoms and urolithiasis characteristics, were excluded to ensure the accuracy and reliability of the analysis.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) version 26.0 (IBM Software Group, Chicago, IL, USA) was used for the statistical analysis. Two senior urologists performed inter-rater reliability for data extraction from medical records to assess the degree of agreement among two independent seniors from the research team using the Kappa value. Categorical variables were described using counts and percentages, while continuous variables were described using mean and standard deviations (SD). Binary logistic regression was executed to determine the predictors of severe pain among patients with ureteric colic. The dependent variable was the severity of pain, which was defined as severe and less pain. Statistical significance was sought at values lower than 5% or if the one does not belong to the 95% confidence interval (C.I.) of the adjusted odds ratios (AOR).

Ethical Consideration

The study was conducted under the Declaration of Helsinki and received approval from the Institutional Review Board (IRB) of the Ministry of National Guard—King Abdullah International Medical Research Center (KAIMRC) under project number RA19/026/A. All patient data were anonymized and kept confidential to ensure privacy and compliance with ethical standards.

RESULTS

A total of 221 subjects were included in this study. The Kappa value of data extracted from medical records was 0.76, which represents substantial inter-rater reliability of the extracted data.

Table 1 displays the demographic and clinical characteristics of study subjects. The mean age of patients was 44.9 12.6 years and the majority of them were males (n = 171, 77.4%). Approximately, 47.5% (n = 105) of all subjects had previous history of urolithiasis and 21.3% (n = 47) had positive family history of stones. The distribution of the study sample by daily habits exhibited that about one-half (n = 110, 49.8%) of patients drink less the 1 L of water per day while most of them had normal diet (n = 209, 94.6%). The majority of patients were presented to the emergency department during the summer season (n = 133, 60.2%). Patients also had different comorbidities including diabetes mellitus (n = 73, 33.0%), hypertension (n = 62, 28.1%), gout (n = 3, 1.4%) and others (n = 51, 23.1%).

Figure 1 shows the symptoms and clinical presentations of subjects attending the emergency department over the study period. The results revealed that patients exhibited varied signs and symptoms when attending the emergency department. The data showed that fluctuating pain was the most common symptom, reported by 76.9% (n = 170) of

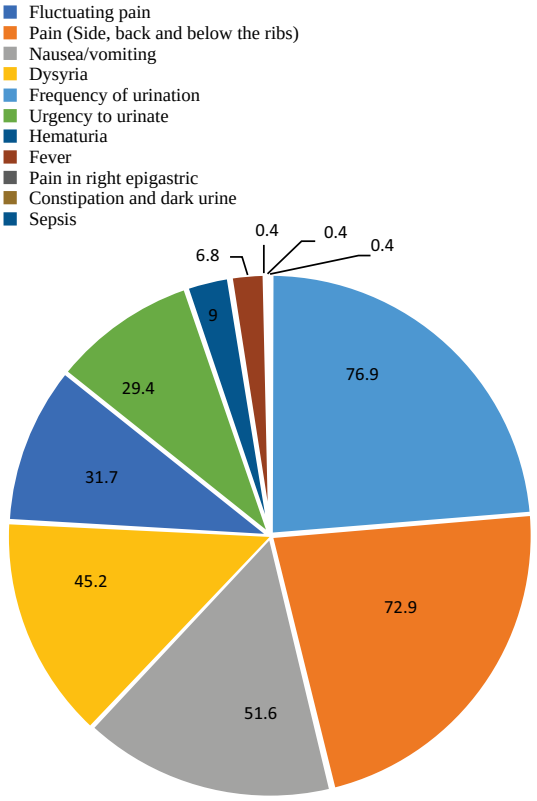

Figure 1: Clinical presentations of patients with ureteric colic

Table 1: Summary statistics of patients' demographic and clinical characteristics

Categorical characteristics		N	%
Gender			
Male		171	77.4
Female		50	22.6
Previous history of urolithiasis			
Yes		105	47.5
No		116	52.5
Family history of stones			
Yes		47	21.3
No		173	78.3
NR		1	0.4
Water intake per day			
Less than 1 L		110	49.8
1L-2L		99	44.8
2L-3L		11	5.0
More than 3L		1	0.4
Diet			
Normal		209	94.6
Consume (fast food, Alcohol and nuts)		9	4.0
NR		3	1.4
Season complaints presented			
Summer		133	60.2
Winter		67	30.3
Autumn		21	9.5
Comorbidities			
Diabetes mellitus		73	33.0
Hypertension		62	28.1
Gout		3	1.4
Others		51	23.1
Continuous characteristics	Measure	Mean	SD
Age	Mean and SD	44.9	12.6

NR: Not reported; L: Liters; SD: Standard deviation

patients. Pain localized to the side, back, or below the ribs was also highly prevalent, affecting about 72.9% (n = 161). Nausea / vomiting was observed in 51.6% (n = 114) of patients, followed by dysuria in 45.2% (n = 100). Less common symptoms included increased frequency of urination, reported by 31.7% (n = 70) and urgency to urinate in 29.4% (n = 65). Hematuria was seen in 9.0% (n = 20), while fever was reported in 6.8% (n = 15). Rare symptoms, each occurring in one patient (0.4%), included pain in the right epigastric region, constipation, dark urine and sepsis.

Patients who presented at emergency department (ER) underwent physical examination and the results are shown in Table 2. The results showed that the majority of patients were stable and conscious in ER (n = 211, 95.5%). Pain scores based on the Numerical Pain Rating Scale (NPRS), showed that more than half of patients (n = 117, 52.9%) presented with severe pain, 41.6% (n = 92) patients presented with moderate pain and 5.4% (n = 12) presented with mild pain score. Approximately, 29.9% (n = 66) of patients presented with flank tenderness, 17.7% (n = 39) with tenderness of lower abdominal and 6.3% (n = 14) with bimanual palpation.

Following the physical examination, patients underwent laboratory studies, including blood and urinary tests. The results are summarized in Table 3. As for blood samples tests, the findings showed that nearly all patients had normal red blood cell counts (RBCs) and platelet counts (PLT), with 98.6% (n = 218) displaying a normal estimated glomerular filtration rate (eGFR) and 99.5% (n = 220) having normal calcium levels. However, 8.1% (n = 18) of patients presented with abnormal white blood cell counts (WBCs), with an average of 12.4±1.3 (10^3/μL), indicating potential signs of infection. Additionally, 21.3% (n = 47) of patients had abnormal creatinine levels.

According to the urine tests, urine analysis was done in 89.6% (n = 198) of patients. The results showed that 24.2% (n = 48) of patients were normal. However, about 55.6% (n = 110) of patients had experienced microscopic hematuria (high RBC), 17.7% (n = 35) had signs of UTI by exhibiting either high RBC and bacteria, high RBC, bacteria and high WBC, high RBC and WBC, or high RBC and nitrites (NIT). Moreover, 2.0% (n = 4) had high WBC. Unfortunately, due to poor patient compliance, 9.5% (n = 21) had done stone analysis. Of them, the majority were calcium oxalate (n = 13, 61.9%), while 23.8% (n = 5) were calcium oxalate monohydrate (COM) and 14.3% (n = 3) were uric acid. The results also showed that the majority of the passed stones had a size of less than 10mm (n = 190, 85.9%) (Table 3).

Additional diagnostic tests for ureteric stones were carried out using radiographic imaging techniques and the findings are shown in Table 4. X-ray was done in 49 (22.2%) of patients. Of them, the majority had no stones (n = 39, 79.6%) while about 10.4% (n = 5) had left stones, 6.1% (n = 3) had renal stones and 2.0% (n = 1) had steinstrasse. Meanwhile, Ultrasound (US) was done in approximately one-half patients (n = 112, 50.7%). Of 112 patients, the results of US showed that most patients had mild hydronephrosis (n = 70, 62.5%),

Table 2: Results of physical examination of patients with ureteric colic

Physical examination	Measures	N	%
Patient status at ER	Stable and conscious	211	95.5
	Unstable	10	4.5
NPRS score	1-3 (Mild)	12	5.4
	4-7 (Moderate)	92	41.6
	8-10 (Severe)	117	52.9
Flank Tenderness	Yes	66	29.9
Bimanual Palpation	Yes	14	6.3
Tenderness of Lower Abdominal	Yes	39	17.6

ER: Emergency room; NPRS: Numeric Pain Rating Scale

Table 3: Laboratory studies results

Blood Tests (n = 221)	Result	N	%
RBC ($10^3/\mu L$)	Normal	220	99.6
	Abnormal	1	0.4
WBC ($10^3/\mu L$)	Normal	203	91.9
	Abnormal	18	8.1
Platelet (10 /L)	Normal	221	100.0
	Abnormal	0	0.0
eGFR (mL/min/1.73 m^2)	Normal	218	98.6
	Abnormal	3	1.4
Calcium (mmol/L)	Normal	221	100.0
	Abnormal	0	0.0
Creatinine	Normal	174	78.7
	Abnormal	47	21.3
Urine Tests (n = 198)	Normal	48	24.2
	High WBC	4	2.0
	High RBC (microscopic hematuria)	110	55.6
	Signs of UTI (leukocytes, WBC)	35	17.7
Stone Analysis (n = 21)	Ca oxalate	13	61.9
	COM	5	23.8
	Uric acid	3	14.3

RBC: Red blood cell; WBC: White blood cell; eGFR: Estimated glomerular filtration rate; UTI: Urinary tract infection; COM: Calcium oxalate monohydrate

Table 4: Imaging results

Imaging type	Results	N	%
X-Ray (n = 49)	No stone	39	79.6
	Left stones	5	10.2
	Renal stones	3	6.1
	Steinstrasse	1	2.0
Ultrasound (n = 112)	Mild hydronephrosis	70	62.5
	Moderate hydronephrosis	7	6.5
	Severe hydronephrosis	1	0.9
	Small renal calculi	8	7.1
	Right distal stone	3	2.7
	Small ureteric stone	2	1.8
	No stones	14	12.5
Size of Stone	Less Than 10 mm	190	85.9
	More Than 10	28	12.7
	NR	3	1.4
Laterality of Stone (n = 214)	Unilateral	211	98.6
	Bilateral	3	1.4
Location of the Urine Stone	Upper Ureter	54	24.4
	Mid-Ureter	43	19.5
	Lower Ureter	122	55.2
	NR	2	0.9
Non-contrast CT-KUB Scan (n = 136)		Mean	SD
Stone Hounsfield unit (HU)		757.2	126.8

NA: Not reported; CT-KUB: Computed tomography of kidneys, ureters and bladder

while moderate and severe hydronephrosis were evident in 6.5% (n = 7) and 0.9% (n = 1) of patients, respectively. Furthermore, the results of the US indicated that about 7.1% (n = 8) of patients had small renal calculi, 2.7% (n = 3) right distal stones, 2.7% (n = 3) and 1.8% (n = 2) small ureteric stone. However, 12.5% (n = 14) of them showed no stones. As for stone laterality, the results showed that most patients had unilateral stones (n = 211, 98.6%), while 1.4% (n = 3) of them had bilateral stones. The majority of patients, 61.5% (n = 136), underwent a Non-contrast Computed tomography of kidneys, ureters and bladder (CT-KUB) Scan with mean stone Hounsfield unit (HU) 757.2. However, 7 patients had no stone noted on CT as they had mentioned possible passage of the stone. The location of the stone was also determined and the results showed that the majority of patients had a lower ureter (n = 122, 55.2%), followed by an upper ureter (n = 54, 24.4%) and mid ureter (n = 43, 19.5%).

Table 5: Patients' management and outcomes

Treatment	Type	N	%
Conservative Management	Analgesics	219	99.1
	Antibiotics	51	23.1
	Ibuprofen	2	0.9
	MET	157	71.0
Non-Invasive Treatment; ESWL	Yes	4	1.8
Invasive Treatment	Double-J stent insertion	150	67.9
	Semirigid URS	27	12.2
	Reusable flexible URS	19	8.6
	Disposable flexible URS	25	11.3
Hospital Length of Stay (LOS)	Less than one day	122	55.2
	1-2 days	68	30.8
	More than 2 days	31	14.0
Outcome	Improved	192	
	Renal and scarring and improved	1	
	DAMA	2	
	DJ Stent Displace	2	
	Hematuria and UTI	1	
	Passed the stone	3	
	Recurrent stone	17	
	Recurrent and DJ	1	
	UTI	2	

MET: Medical explosive therapy, ESWL: Extracorporeal shock wave lithotripsy, DJ: Double-J, URS: Ureteroscopy, DAMA: Discharge against medical advice, UTI: Urinary tract infection

The majority of patients with ureteric colic were managed conservatively, with 99.1% (n = 219) receiving analgesics and 71.0% (n = 157) undergoing MET. Antibiotics were administered to 23.1% (n = 51), while ibuprofen was used in 0.9% (n = 2) of cases. Non-invasive extracorporeal shock wave lithotripsy (ESWL) treatment was applied in 1.8% (n = 4) of cases. Invasive treatment methods included double-J stent insertion (n = 150, 67.9%), semirigid URS in 12.2% (n = 27), reusable flexible URS in 8.6% (n = 19) and disposable flexible URS in 11.3% (n = 25) (Table 5).

Regarding hospital length of stay, 55.2% (n = 122) of patients stayed less than one day, 30.8% (n = 68) stayed 1-2 days and 14.0% (n = 31) lasted more than two days as indicated in Table 5. As for outcomes, 87.3% (n = 192) of patients showed improvement. In comparison, other outcomes included 7.7% (n = 17) with recurrent stones, 1.4% (n = 3)

Table 6: Results of binary logistics regression of factors associated with severe pain

Variable	AOR	95% C.I.
Male sex	1.10	0.80-1.45
Age, years	1.20*	1.05-1.35
Hematuria	1.98*	1.50-2.73
Pyuria	1.72*	1.20-2.30
Hydronephrosis	1.06	0.80-1.72
Stone size, mm	1.15	0.95-1.40
Stone location		
Upper Ureter	Reference category	
Mid-Ureter	1.45*	1.10-1.90
Lower Ureter	1.70*	1.30-2.25

*Denotes significant at 5% level of significance, AOR: Adjusted odds ratio; C.I.: Confidence interval; mm: Millimetre

passing the stone and minor cases with conditions such as displaced DJ stent (n = 2), hematuria and UTI (n = 1) and discharge against medical advice (DAMA) (n = 2) as shown in Table 5.

The results of the binary logistic regression analysis revealed several significant predictors of severe pain in patients with ureteric colic as displayed in Table 6. Age was found to be a significant predictor, with each additional year associated with a 20% increase in the odds of severe pain (AOR = 1.20, 95% CI: 1.05-1.35). Similarly, the presence of hematuria almost doubled the likelihood of severe pain (AOR = 1.98, 95% CI: 1.50-2.73), while pyuria increased the odds by 75% (AOR = 1.75, 95% CI: 1.20-2.30). Additionally, the location of the stone was a significant factor. Stones located in the mid-ureter (AOR = 1.45, 95% CI: 1.10-1.90) and the lower ureter (AOR = 1.70, 95% CI: 1.30-2.25) were associated with a higher likelihood of severe pain compared to those in the upper ureter. In contrast, male sex (AOR = 1.10, 95% CI: 0.80-1.45), stone size (AOR = 1.15, 95% CI: 0.95-1.40) and hydronephrosis (AOR = 1.06, 95% CI: 0.80-1.72) were not statistically significant predictors of severe pain.

DISCUSSION

This retrospective chart review showed that the majority of patients presenting with ureteric colic to the emergency department were males and in middle age, with 47.5% having a history of urolithiasis; 60.2% presented in the summer season and a low level of hydration, with 49.8% drinking less than 1 L of water per day (Table 1). This aligns with existing literature that suggests stone disease is more prevalent among males, particularly during the summer months when insensible water loss increases due to the hot climate [1,2,9,22,23]. Al-Hadramy [22] investigated the seasonal patterns of renal colic cases reported to the emergency department in the western region of Saudi Arabia, observing a higher number of presentations during the hot summer months. Khan *et al.* [23] examined the epidemiological risk factors for renal colic in the central region of Saudi Arabia, revealing a marked male predominance with a male-to-female ratio of 5:1 and a strong correlation with the hot months. Alkhunaizi [1] also reported similar findings in the eastern region of Saudi Arabia. International studies also reported that warmer areas and seasons are significant contributors to stone passage and referral to emergency departments worldwide [24-30]. Decreased fluid intake, increased sweat and increased urine concentration could all contribute to increased crystallization and stone development [1]. Aside from climatic conditions, other factors that lead to stone development include genetics, dietary habits, water hardness, race, gender, age, occupation and body weight [1].

Previous presence of stones and family history were not highly prevalent among our cohort (21.3%) (Table 1), which is consistent with several previous findings [1,9]. A study conducted by Safdar *et al.* [9] reported that about 35.9% of patients with renal stones had positive family history of disease stones. However, the percentage of positive family history with urolithiasis should be attributed to the genetic basis of the disease.

The clinical presentation of patients in this study was consistent with the classic symptoms of ureteric colic, including flank pain, nausea, vomiting, intermittent dysuria, hematuria, the urgency to urinate and frequency of urination (Figure 1) and consistent with various previously reported finding [2,11,12]. The discomfort of ureteric colic is caused by an obstruction of urine flow, which causes an increase in wall tension. Rising pressure in the renal pelvis drives prostaglandin synthesis and release and vasodilation causes diuresis, which raises intrarenal pressure even more. Prostaglandins can also cause smooth muscle spasms directly in the ureter. Hydronephrosis and renal capsule distension can cause nausea and vomiting because they share splanchnic innervation with the intestines [31].

Non-contrast CT-KUB was the most commonly used diagnostic modality in our cohort, accounting for 61.5% of cases (Table 4). For diagnostic evaluation, non-contrast CT of the abdomen and pelvis remains the gold standard for assessing urinary tract stones [5,32,33]. The current study indicated that all patients underwent this imaging modality, although approximately 50% also had the US when the initial diagnosis was uncertain [5,15,32,33]. Despite its limited sensitivity and specificity, some patients initially underwent an X-ray of the kidneys, ureters and bladder (KUB) during triage [34]. This highlights a need for better diagnostic standardization to avoid reliance on less effective imaging techniques, which can delay appropriate management.

Treatment decisions in our cohort were largely influenced by the patient's condition, the size and location of the stone and the laterality of obstruction [31,34]. As is well-documented, smaller stones (<5 mm) have a high likelihood of spontaneous passage, with around 75% of such stones

passing without invasive intervention [35]. In line with this, the majority of our patients responded well to conservative management, including analgesia and MET, consistent with European Association of Urology (EAU) guidelines [36]. However, patients with larger stones or persistent obstruction required invasive management, which involved URS and laser lithotripsy or double-J stent insertion [37]. Although double-J stent insertion can provide immediate pain relief and control, its routine preoperative use is generally discouraged unless there is an infection, as it necessitates additional anesthesia and surgical procedures [11]. Notably, ESWL was not largely used in our cohort due to its higher re-treatment rates [11,38,39].

Despite the need for invasive procedures in some cases, most patients were discharged on the same day, suggesting that even surgical interventions can be managed efficiently with minimal hospital stay [31,34,40]. The overall outcome showed improved outcomes, with the vast majority of patients achieving stone-free status and significant symptom relief, regardless of whether they underwent conservative or invasive management.

The result of binary logistic regression analysis of our study also showed that older patients, hematuria, pyuria and stones located in the lower and middle ureter were associated with an increased severity of the disease at emergency department presentation. However, hydronephrosis, sex and stone size were not associated factors of severe pain scores (Table 6). Our findings are consistent with several previous findings [32,41,42]. For example, Gourlay *et al.* [32] indicated that older patients, stone location and stranding were associated with higher severity scores while sex and hydronephrosis were not significantly associated, but the stone size was weakly correlated with severe pain in patients with acute renal colic. Moreover, Sasmaz and Vedat [41] found that hematuria, hydronephrosis, pyuria, high WBC and high CRC were significant factors of severe pain, while stone size did not significantly correlate. This reinforces the idea that obstruction severity is not always proportional to stone burden [5,32].

The findings from this study emphasize the importance of timely and accurate diagnostic evaluation of ureteric colic using non-contrast CT as the primary imaging modality [43,44]. While the US can be used in cases where the diagnosis is uncertain, reliance on X-ray KUB should be minimized due to its limited diagnostic utility [11,44]. In terms of treatment, conservative management should remain the first-line approach for most patients, particularly those with smaller stones, while invasive interventions should be reserved for more complex cases [11,13,17-21]. Given that a significant proportion of patients require invasive management, healthcare providers should ensure that minimally invasive options like URS are readily available to reduce patient morbidity and hospital stay.

Regarding the composition of urinary stones in our cohort, the majority were calcium oxalate, followed by COM and uric acid, which represented the population in the eastern region (Table 2); the report from the eastern and central regions of Saudi Arabia showed that calcium oxalate stones were found to be the most common, followed by uric acid and phosphate stones [1,23]. Calcium stones are the most common type of stone, including calcium oxalate, calcium phosphate and mixed calcium oxalate and phosphate. Up to 20% of cases involve uric acid, cystine and struvite stones [31]. A significant number of patients in our cohort (Table 1) had one or more metabolic abnormalities, such as hypertension, diabetes mellitus, or hyperuricemia., which may explain the expected rise in the prevalence of urinary stones.

A concerning finding from this study was the low rate of patient compliance with post-treatment follow-up, particularly regarding stone analysis after passage. Understanding the pathology of stone formation is essential, as it can help prevent recurrence in some cases. By managing the causes and providing specific dietary modification advice, recurrence can be minimized. Educating patients on the importance of stone analysis is crucial, as understanding the stone composition can guide future preventive strategies. We recommend implementing educational programs to increase patient awareness about the long-term risks of recurrent stones and the benefits of follow-up care [45].

Recently, the Saudi Urological Association published The Saudi Urolithiasis Guidelines, which are a set of recommendations for diagnosing, evaluating and treating urolithiasis in the Saudi population [46]. These guidelines are based on the latest evidence and expert consensus aimed at improving patient outcomes and optimizing care delivery. They address various aspects of urolithiasis, including risk factors, diagnosis, medical and surgical treatments and prevention strategies. By adhering to these guidelines, healthcare professionals can enhance the quality of care for individuals with urolithiasis in Saudi Arabia.

Limitations

The current study was subject to some potential limitations. It was retrospective and conducted at a single center with a relatively small sample size. Therefore, there may have been risks, such as the absence of important data and it may only represent part of the spectrum of the urolithiasis population in Saudi Arabia. The data relied on the accuracy and completeness of medical records and some patients with missing or incomplete data were excluded, which could introduce selection bias. Moreover, this study was conducted in a single institution, limiting the generalizability of the findings to other settings. We were not able to cover the

cost-effectiveness of conservative vs. invasive treatments. However, our study is the first in Saudi Arabia to highlight the characteristics of ureteric stones and their presentation to emergency departments; future research should include multiple centers to provide a more comprehensive understanding of ureteric colic across different regions in Saudi Arabia. Additionally, prospective studies incorporating patient education and long-term follow-up are needed to assess the impact of these interventions on recurrence rates and overall patient outcomes.

CONCLUSION

According to the study of epidemiological factors, it appears that Saudis are more prone to developing stones. The stone season appears to occur mostly during the hot summer months in the eastern province of Saudi Arabia. This study highlighted the importance of accurate diagnosis and tailored management of ureteric colic, with most patients responding well to conservative treatment. When conservative therapy is unsuccessful, the treatment options are ESWL and URS. Timely intervention using minimally invasive techniques ensured positive outcomes with short hospital stays. However, low patient compliance with post-treatment follow-up, especially stone analysis, highlights the need for educational programs to improve patient awareness. Further research is required to address these gaps and enhance long-term outcomes and patient safety. Adherence to recent management of urolithiasis guidelines, healthcare professionals can enhance the quality of care for individuals with urolithiasis in Saudi Arabia.

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Statement of Ethics

This study was retrospective and involved the collection of existing data and records. This study has the Institutional Review Board (IRB) of the Ministry of National Guard—King Abdullah International Medical Research Center (KAIMRC) under project number RA19/026/A. The ethical committee approved all procedures of the study. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the declaration of Helsinki guidelines. The participants faced no anticipated risks regarding data privacy and confidentiality and no personal information was revealed. Additionally, the data used was securely stored and would be deleted after a specified period. The requirement for written consent was waived because of the retrospective study design.

Conflict of Interest

The authors declare no conflicts of interest. There are no funding sponsors for this research project.

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