

Research Article

Single – Center Assessment of Short-Term Morbidity Associated with Ureteric Stone

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ABSTRACT

Background: Ureteric calculus or stones are those inside the ureter, from the ureteropelvic junction to just the vesico ureteric junction at each point. Peristaltic pain (renal colic), nausea, vomiting and hematuria may occur in patients with ureteric calculi. In patients with renal colic and flank pain in the emergency department, a workup must be done to detect any ureteral stones creating obstruction. Hydronephrosis, renal injury, or urinary tract infection are complications of ureteric calculi. Obstructive pyelonephritis is a serious complication triggered through upper stones of the urinary tract which, if it advances to septicaemia, will become a urological emergency with the a highly dangerous effect. The occurrence of complications after ureteric stone application is variable and is correlated with operating time, calculus location, ureteroscopy form, and surgeon knowledge.

Objectives: To assess the short term morbidity associated with ureteric stones in randomly selected group of patients attending the urology center in Al-Diwaniyah Teaching Hospital.

Patients and Method: This is a cross sectional study performed in single_center in Al_Diwaniyah Teaching Hospital, from April to September 2020. The study included 150 patients assessed by reviewing their chronic medical illness, characteristic of stones, clinical features and complications associated with ureteric stone.

Results: In the current study, Most of cases were between 20-40 years of age. The study included 99 (66.0 %) males and 51 (34.0 %) females. Diabetes mellitus was seen in 9 (6 %), systemic hypertension was seen in 16 (10.7 %) and ischemic heart disease was seen in 5 (3.3 %) of cases. The most common symptom was pain (100%) followed by nausea and vomiting (76%) then by hematuria (75%), dysuria (74%) and frequency (61%). pyelonephritis is the most encountered complication in our studied patients (27.3 %) followed by morbidity associated with surgical intervention in 14% while 12.7% of our patients were unable to continue with their usual work. Drugs side effects were noticed in 19 patients (12.7 %) after medical therapy. Uremia occur in 11 patients (7.3%). one patient unfortunately developed urosepsis but his condition is controlled finally.

Conclusion: Ureteric stones are a common urological emergency owing to its considerable symptoms and serious complication that include pyelonephritis, uremia and sepsis. Treatment strategies can result in further morbidity to patients.

Keywords: Ureteric stones, pyelonephritis, surgical intervention, Pyonephrosis, Urosepsis, Uremia, Drug side effect.

INTRODUCTION

Urolithiasis is often a common condition influencing the urinary tract, and a major cause of death at a high cost. Both gender groups are affected by Urinary Stone Disease. That prevalence rate of stone disease reported is 5%-12% to males, 4%-7% to females [1]. Ureteric calculus or stones are those inside the ureter, from the uretero pelvic junction to just the vesico ureteric junction at each point. A ureter, with both the ureter passing the iliac vessels as that of the boundary, is divided into distal and proximal sections. The proximal ureter elongates because of the obstruction when the stone moves through the ureter, whereas the distal ureter doesn't really affect the stone [2]. A prevalence rate of ureteric calculus is significant

ly higher, affects approximately 12% of males and 7% of females. [3] with such a previous history of ureteric calculus and a healthy family medical history, the risk is higher. The majority of patients are between 30 and 60 years of age, with a median occurrence of 35-45 years of age. Main symptom of calculus happening past the age 50 was uncommon [4].

Peristaltic pain (renal colic), nausea, vomiting and hematuria may occur in patients with ureteric calculi. In patients with renal colic and flank pain in the emergency department, a workup must be done to detect any ureteral stones creating obstruction [4]. The existence of microscopic hematuria supports the evaluation of urolithiasis in a patient of symptoms indicative of ureteral colic, and it is reported about 10-20% of urolithiasis patients

may have urinalysis without microscopic hematuria[5]. Acute kidney colic is frequently associated by nausea and vomiting, and occurs in with at least 50 percent of cases. Nausea is triggered by the typical innervation path via the celiac axis and vagal nerve afferents[6] of the renal pelvis, stomach , and intestines. The possibility of ureteral stone accidental passage is correlated with both position (proximal, middle, and distal ureter) and stone size[7]. As a variable of stone size, the accidental passage rate was 87% for stones 1 mm thick; 76% for stones 2-4 millimeters; 60% for stones 5-7 millimeters; 48% for stones 7-9 millimeters; and 25% for stones greater than 9 mm. In addition, distal and ureterovesical junction stones were more likely to have a spontaneous passage rate than stones in the proximal ureter or mid-ureteral stones. In most patients with acute renal colic due to ureteric calculus, water intake and analgesia can be handled conservatively before the calculus passes through. NSAIDs are as good as opioids. Where oral sedation is inadequate, hospital stay may be needed in patients with a single kidney or in patients with urosepsis or acute kidney failure[8]. Chemical treatment of symptoms may be the first step in treating acute renal colic triggered by blocking ureteral stones. The insertion of a ureteral catheter or nephrostomy tube is typically the next step whenever drug treatment does not relieve the symptoms[9]. These simple maneuvers will provide the patient with immediate pain control and are usually accompanied by ureteroscopy (URS) or extracorporeal shockwave lithotripsy (ESWL), which is actually the center of symptomatic ureteral stone treatment[10]. Hydronephrosis, renal injury, and urinary tract infection are complications of ureteric stones. Hydronephrosis is a disease that results from blockage of the urinary tract. Hydronephrosis can lead to permanent kidney problems if failed to manage or neglected and may ultimately lead to renal failure[11],[12]

Obstructive pyelonephritis is really a serious complication triggered by upper urinary stones which, if that develops to septicaemia, is becoming a urological emergency with a highly dangerous risk[13]. In addition to signs of upper urinary obstruction, patients may experience signs of pyelonephritis, such as elevated fever , chills and fatigue.[14],[15].

There is a chance of developing urosepsis as well as its complications in patients with persistent pyelonephritis, involving acute kidney injury and death. For all those undergoing surgical decompression, death rates for patients with persistent pyelonephritis and sepsis are estimated

at 9 percent and 19 percent for anyone without decompression.[16]

High-pressure mucus may develop throughout the blockage urinary system (pyonephrosis) when blocking and Urinary tract infection are simultaneous and cause bacteraemia through the renal vasculature (pyelovenous backflow). This can lead to devastating gram-negative sepsis, sometimes requiring referral to intensive care and sometimes causing death[17]. Urosepsis is a systematic reaction to urogenital tract infection and potentially life-threatening sequela [18].

Serum creatinine levels are normally common in patients with unilateral ureteral obstruction, as well as their contralateral kidneys stay unchanged and have adequate clearance ability to release the nitrogen waste produced daily[19]. Serum creatinine levels are frequently increased in patients with bilateral ureteral obstruction or single kidney obstruction, often causing acute postrenal kidney injury [17].

For several urological procedures, like the extracorporeal shock wave lithotripsy (SWL) and ureteroscopy[20], ureteral stent placement is necessary. Abnormalities may result from ureteral stents, and some management problems can arise from whose use. A number of complications varying from hematuria, stent occlusion, displacement, fracturing, incrustation, and stone forming to severe complications such as persistent urinary tract infection, urinary tract obstruction, and renal failure may be caused by forgotten ureteral stents[21],[22]. Also the development of fistulas in the iliac arteries[22] is established. Mortality [23] was also registered.

The occurrence of complications following ureteric stone operation is changeable and is correlated with operating time, calculus position, ureteroscope form, and surgeon experience[24],[25].

PATIENTS AND METHODS

In this hospital based cross sectional study , we respectively interviewed 150 cases during the period from April to the end of September 2020 . Information were retrieved from patients that are attending the urology department in Al-Diwanyiah teaching hospital, Al-Diwanyiah province, Mid-Euphrates region of Iraq .

patients with established diagnosis of ureteral stone were included in the present study, Children (less than 12 years) and pregnant female were excluded.

The study was approved by the institutional ethical approval committee and formal agreement was obtained from the directorate of Health in Al-Diwanyiah province, the formal representative of Iraqi Ministry of health.

Patients that are present with ureteric colic and confirmed to have ureteric stone by urologist were subjected to full assessment with detailed history intake and physical examination in addition to reviewing all investigations to fulfill the information variables in our assessment formula that is designed for this study which includes the following variables: age , sex, stone analysis (number, size, side, site, degree of HUN and frequency) , clinical feature (pain, hematuria, nausea, vomiting, fever, dysurea, and frequency) and complications (pyelonephritis, Pyonephrosis, Urosepsis, uremia, quit work, intervention, drugs side effects and other).

Patients are further followed up in their next visits for the development of any complications like pyelonephritis, Pyonephrosis, Urosepsis and uremia in addition to monitoring drugs adverse effects and the impact of patients illness on his work and life in short term.

Post operative assessment was done for those patients who undergo surgical intervention .

Communication with non recumbent patients was done by telephone call or through other audio or visual media.

The assessment form was established depending on information obtained from reviewing published articles and consultation specialists dealing with urologists.

Data were collected, summarized, analyzed and presented using statistical package for social sciences (SPSS) version 23 and Microsoft Office Excel 2010. Qualitative (categorical) variables were expressed as number and percentage,

whereas, quantitative (numeric) variables were first evaluated for normality distribution using Kolmogorov-Smirnov test, and then accordingly normally distributed numeric variables were expressed as mean (an index of central tendency) and standard deviation (an index of dispersion) in addition to range.

The following statistical tests were used: univariate regression analysis to find the predictors of clinical features and complications in association with ureteric stones.

RESULTS

Demographic characteristics of patients enrolled in this study: The total number of cases was 150. The mean age was 38.83 ± 13.42 years and the range of age was 13 -72 years. Most of cases were between 20-40 years of age. The study included 99 (66.0 %) males and 51 (34.0 %) females.

Chronic medical illness in patients enrolled in this study: Diabetes mellitus was seen in 9 (6 %), systemic hypertension was seen in 16 (10.7 %) and ischemic heart disease was seen in 5 (3.3 %) of cases.

Characteristic of stones:The characteristics of stones are shown in table 1. Single stone was seen in 128 (85.3 %) whereas, multiple stones were seen in 22 (14.7 %). The mean size of stone was 8.14 ± 3.04 mm with a range of 3 -22 mm. Most of cases were unilateral and located in the upper ureter. Hydronephrosis was mild in the majority of cases. Most of patients were suffering from stone disease for the first time.

Table 1: Characteristic of stones

Stone characteristic	Value
Number	
Single, n (%)	128 (85.3 %)
Multiple, n (%)	22 (14.7 %)
Size	
Mean \pm SD (mm)	8.14 ± 3.04
Range (mm)	3 -22
Side	
Unilateral, n (%)	136 (90.7 %)
Bilateral, n (%)	14 (9.3 %)
Site	
Upper, n (%)	68 (45.3 %)
Middle, n (%)	32 (21.3 %)
Lower, n (%)	50 (33.3 %)
Hydronephrosis	
Mild, n (%)	83 (55.3 %)
Moderate, n (%)	52 (34.7 %)
Severe, n (%)	15 (10.0 %)
Frequency	
First time, n (%)	97 (64.7 %)
Recurrent, n (%)	53 (35.3 %)

n: number; *SD*: standard deviation

Clinical features associated with ureteric stones: Clinical features associated with ureteric stones are shown in figure 1. The most common symptom was pain (100%) followed by nausea and vomiting (76%) then by hematuria (75%),

dysuria (74%) and frequency (61%). Other less common manifestations includes fever (33%), hypertension (5%) and edema (0.6%) was reported.

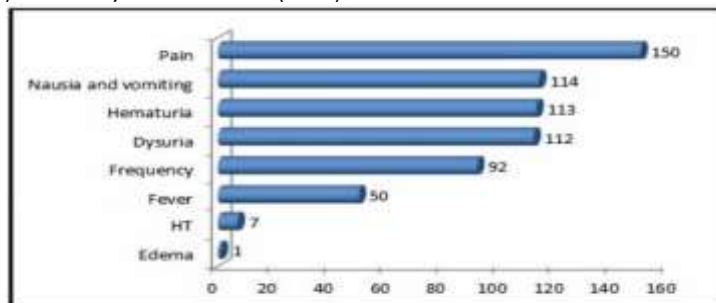


Fig.1: Clustered horizontal cylinder graph showing the frequency distribution of patients according to clinical features

Complications in association with ureteric stone: Complications in association with ureteric stone are shown in table 2. Pyelonephritis is the most encountered complication in our studied patients(27.3 %) followed by morbidity associated with surgical intervention that includes anesthesia adverse effects, catheter and stent harmful effects and post-operative pain and fever. 12.7% of our patients were unable to continue with their usual work because of morbidity associated with their ureteric stone. Drugs side effects were noticed in

19 patients (12.7 %) after medical therapy to induce stone passage and include epigastric pain,diarrhea,dizziness and NSAID hypersensitivity. Uremia occur in 11 patients (7.3%) with blood urea ranging from 85 to 177 mg/dl and serum creatinine from 2.3 to 9.9 mg/dl and is mostly due to ureteric obstruction in single kidney or bilateral obstruction. one patient unfortunately developed urosepsis but his condition is controlled finally.

Table 2: Complications in association with ureteric stone

Complications	<i>n</i>	%
Pyelonephritis	41	27.3
Uremia	11	7.3
Pyonephrosis	5	3.3
Intervention	21	14.0
Quit job	19	12.7
Drugs side effects	19	12.7
Urosepsis	1	0.7

Univariate regression analysis for the prediction of stone characteristics: It appears that number, size, side and site of stone is correlated o

advancing age so that multiple stone, larger size stone, bilateral stone, hydronephrosis and frequent attacks correlated with advancing age.

Table 3: Univariate regression analysis for the prediction of stone characteristics

Characteristic	Age		Gender		DM		HT		IHD	
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>
Number	0.196	0.016	0.060	0.462	-0.105	0.202	-0.021	0.797	-0.077	0.349
Size	0.282	<0.001	0.040	0.630	0.034	0.678	-0.076	0.358	-0.033	0.685
Side	0.268	0.001	0.012	0.888	0.015	0.851	0.038	0.648	-0.060	0.469
Site	0.039	0.640	0.050	0.544	0.098	0.231	0.096	0.241	0.068	0.411
Hydronephrosis	0.195	0.017	0.171	0.037	0.087	0.288	0.137	0.094	-0.152	0.064
Frequency	0.361	<0.001	-0.118	0.149	0.048	0.558	0.151	0.065	0.096	0.243

Univariate regression analysis for the prediction of complications in association with stone characteristics:

Uremia correlated significantly with age, systemic hypertension and IHD. Quit work correlated with

DM. intervention also correlated with DM. Drug side effects correlated with hypertension and IHD. Urosepsis correlated with systemic hypertension and IHD.

Table 4: Univariate regression analysis for the prediction of complications in association with stone characteristics

Characteristic	Age		Gender		DM		HT		IHD	
	r	P	r	P	r	P	r	P	r	P
Pyelonephritis	0.124	0.130	0.002	0.982	-0.092	0.263	-0.115	0.161	-0.114	0.165
Pyonephrosis	0.152	0.063	-0.055	0.505	0.109	0.182	0.056	0.495	-0.034	0.675
Uremia	0.292	<0.001	0.014	0.865	0.144	0.078	0.234	0.004	0.233	0.004
Quit work intervention	-0.015	0.860	0.065	0.428	0.241	0.003	0.063	0.442	-0.071	0.390
Drugs side effects	0.159	0.052	0.075	0.359	0.222	0.006	0.110	0.182	-0.075	0.362
Urosepsis	0.006	0.938	-0.146	0.074	0.073	0.377	0.193	0.018	0.264	0.001
	0.099	0.228	0.114	0.164	0.324	<0.001	0.237	0.003	-0.015	0.853

DISCUSSION

This study included 99 (66.0 %) males and 51 (34.0 %) females. The mean age was 38.83 ±13.42 years and the range of age was 13 -72 years and most of cases were between 20-40 years of age. According to one preceding learn about [26], the ages ranged from 3 to 87 years with a median of 42; males were the majority (79%). Age is any other hazard factor, with a considerable up ward job in incidence of urolithiasis cited after the age of 40 years .Gender is every other significant danger aspect with men predisposed to creating urolithiasis compared to women [27],[28]. It was once reported that male-to-female ratio used to be three with a top onset of symptomatic nephrolithiasis in the third and fourth along time of lifestyles[29]. The results of some previous find out about gave approximate figures (male-to-female ratio 3:1 and imply age 31.1 ± 7.0) [30].

Among our studied patients, diabetes mellitus was seen in 9 (6 %), Similar up ward thrust in incidence of urinary stones has been subjectively cited in many Indian centers, even though the right facts are not available. This up ward jostle in incidence may want to possibly be explained via the afflition that exists among diabetes, obesity, and urinary stone disease. Two recent research have printed an multiplied occurrence of nephrolithiasis in sufferers with diabetes mellitus (DM) as in contrast with patients except diabetes, [31],[32].

In our study, systemic hypertension was seen in 16 (10.7 %) .Data from number of observational research advised achance of hypertension in nephrolithiasis sufferers of 1.24–1.96 compared to the popular population [33],[34],[35]. A preceding assessment carried out by way of Cupisti et al. has shown the modern-day perception of the

viable hyperlink between nephrolithiasis and the occurrence of hypertension, however no meta-analysis has been used to look at the relationship [36] .

Ischemic heart disease was seen in 5 (3.3 %) of our cases. Increasing proof suggests that kidney stones might also be associated with cardiovascular disease. In 2014, Cheungpasitporn et al [37] published their meta-analysis of four cohort studies, and indicated that kidney stones are associated with elevated danger for coronary heart disease (CHD) or stroke incidents, particularly in women. Another meta-analysis posted in the identical 12 months via Liu et al was primarily based on four cohort research and one cross-section study, and also determined that kidney stones are related with considerably elevated hazard of CHD in women [38] .

In this study, single stone was seen in 128 (85.3 %) whereas, multiple stones were seen in 22 (14.7 %). The mean size of stone was 8.14 ±3.04 mm with a range of 3 -22 mm. Most of cases were unilateral and located in the upper ureter. Hydronephrosis was mild in the majority of cases. Most of patients were suffering from stone disease for the first time.

It has been regarded throughout numerous many years hat ureteral stones have an effect on at three narrowing sites: the ureteropelvic junction (UPJ), ureteral crossing of the iliac vessels (CUIV), and ureterovesical junction (UVJ) [39],[40]. Ordon et al. [40] recognized 2 peaks in stone distribution as the UPJ/upper ureter and intramural ureter/UVJ by reviewing KUB films of 622 sufferers with a solitary ureteral stone referred for SWL.

Previous studies have shown that stone dimension is a most powerful single predictor that influences stone area[39],[40],[8]. Consistent with effects of preceding studies, smaller stones have been more

probable to lodge at the decrease part of the ureter [41].

Pain was the most common symptoms that affect all our enrolled patients, According to previous reports, the most common manifestations of patients with ureteric colic in the emergency department is facet pain or flank pain accompanied by using belly pain, back pain, and groin pain [42],[43]. The most common presenting symptom in association with ureteric stone was pain in one African study [26].

For our patients, other associated symptoms have been reported in less frequency: nausea and vomiting (76%) , hematuria (75%), dysuria (74%) and frequency (61%). Gross or microscopic haematuria occurs in approximately 90% of patients; however, the absence of haematuria does not avert the presence of stones [44].

In the current study, pyelonephritis is the most encountered complication in our studied patients (27.3 %) followed by morbidity associated with surgical intervention in 14% while 12.7% of our patients were unable to continue with their usual work .Drugs side effects were noticed in 19 patients (12.7 %) after medical therapy. Uremia occur in 11 patients (7.3%) and is mostly due to ureteric obstruction in single kidney or bilateral obstruction. one patient unfortunately developed urosepsis but his condition is controlled finally.

Complications of ureteric stones include hydronephrosis, renal damage and contamination of the urinary tract [11],[12]. Independent threat element for UTI among patients with urinary stones include presence of obstruction and higher number of kidney stones [45]. Loss of renal function in patients with kidney stones may appear as a complication of obstruction via a stone lodged in the ureter, a complication of the urological method to dispose a stone, or from the disordered pathophysiology underlying some stones [46].

The greatest threat of problems following ureteroscopic extraction would show up to be as end result of instrumentation of the urinary tract. The risk of complications from ureteroscopic extraction was once appreciably increased than shockwave lithotripsy. Most of the problems had been minor, but charges of post-procedure urinary tract infection were greater within ureteroscopic extraction patients [47].

Side consequences of α -1 blocker therapy encompass dizziness, nasal congestion, ejaculatory disturbances, and hypotension [48]. The use of NSAIDS has been proven to induce gastrointestinal destructive reactions result in increasing gastric acid secretion and decreasing bicarbonate and mucous secretion [49].

CONCLUSION

Ureteric stones are a common urological emergency owing to its considerable symptoms and serious complication that include pyelonephritis, uremia and sepsis.

The severity of ureteric stone morbidity is variable depending on patient age, sex, general health condition and status of renal function in addition to stone related factors such as stone number, size, location and degree of hydronephrosis caused by obstructing stone.

Treatment strategies added further morbidity as surgical intervention is associated with anesthesia adverse effects, catheter and stent harmful effects and post-operative pain and fever. Medical treatment may result in adverse drugs side.

Ureteric stones have economic impact on patients as it interfere with their ability to continue with their usual work

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