Ureteric calculi: Ultrasonography or Unenhanced Computed Tomography ?

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ABSTRACT

Urolithiasis is a common finding in patients who present with acute flank pain or hematuria. The prevalence of urolithiasis is increasing everyday. Ureteric colic associated with ureteric calculi is severe and complex clinical problem. Radiological studies have an important role in the early diagnosis of ureteric calculi. The objective of this study was to compare the sensitivity of Ultrasound (USG) and Unenhanced Computed Tomography Kidney Ureter Bladder (CT KUB) for the diagnosis of ureteric calculi. This study was done in the department of Urology, Nepal Medical College Teaching Hospital (NMCTH) for a period of two years. A total of 106 patients of suspected ureteric calculi presenting to Urology out Patient Department (OPD) and undergoing USG and CT- KUB were included in this study. Patients were followed up with USG report and then CT KUB report. The findings of USG were correlated with CT- KUB. Ureteral stones were confirmed by CT-KUB in 103 cases. Sensitivity for USG and CT-KUB in detecting ureteric calculi was 51.5% and 98.1% respectively. CT KUB is the most reliable technique for the detection of ureteric calculi.

Keywords: Ureteric calculi, Imaging, Ultrasonography, Unenhanced Computed Tomography

INTRODUCTION

Ureteric colic is a pain associated with the presence of obstructed stone in ureter and it is a common and complex clinical problem. Ureteric colic starts suddenly with pain in the loin. The pain radiates to the lower abdomen and then moves down to the groin involving the testicles in men and labia in women. As the stone passes down the ureter it causes ureteric colic.[1] The stones are formed in the kidneys first and then later they get stuck up in the ureter or in the urinary bladder.[2,3] Clinical diagnosis is usually confirmed by imaging modalities. Ultrasonography (USG) is safe rapid access for diagnosis for most calculi. It can be considered as the primary imaging technique.[4,5] However, Unenhanced Computed Tomography Kidney Ureter Bladder (CT-KUB) is considered as the best diagnostic test due to its excellent accuracy for the diagnosis of urinary stones.[1,6] Studies have shown that sensitivities and specificities approaching almost 100%. However the risk of exposure to ionizing radiation is still there. Other limitations of CT-KUB include a high rate of incidental findings, increased cost per investigations and its lack of demonstrated correlation with improved patients outcomes.[4,7] The use of low dose protocol is essential in the patients having repetitive episodes of ureteric colic. There is an increase in the prevalence of ureteric stones in the last three to four decades. The increased utilization of imaging studies in recent years has contributed to greater detection of urolithiasis.

MATERIAL AND METHODS

This is a cross sectional study done in the Department of Urology, NMCTH from July 2014 to June 2016. All cases of suspected ureteric calculi presenting to Urology Out Patient Department (OPD) and undergoing USG and Unenhanced CT- KUB were included in this study. Consent was taken from patient. Patients were first sent for USG and then asked to follow up with report. Patients with suspected ureteric calculi and hydronephrosis (the only finding on USG) were sent for CT-KUB and called for follow up with reports. CT used in our hospital is Aquilion Toshiba with 64 slices. The findings of USG were correlated with CT- KUB. Patients coming to Urology OPD with suspected ureteric calculi under going USG and subsequently CT-KUB were included in this study.

Patients with suspected ureteric calculi under going USG but not undergoing CT-KUB were excluded from the study. Data were analysed subsequently.

RESULTS

A total of 106 patients with suspected ureteric calculi were sent for CT KUB. Male patients (66 cases, 62.3%) were more compared to female patients (40 cases, 37.7%).

The most common age group was 41- 50 years (34%) followed by 31- 40 years (24.5%). (Table 1)

Table 1. Patients with suspected ureteric calculi in different age group

Age group (years)	Number of patients	Percentage (%)
</= 10	0	0
11-20	12	11.3
21-30	14	13.2
31-40	26	24.5
41-50	36	34
51-60	12	11.3
61-70	04	3.8
71-80	02	1.9
Total	**106**	**100**

The youngest patient was 14 years old female and eldest patient was 76 years male. The mean age of the patient was 39.16 years. Out of 106 cases of suspected ureteric stones only 54 cases showed features suggestive of ureteric calculi on USG. There were 18 cases showing hydronephrosis (the only finding on USG) and these cases were taken as positive finding in USG and later confirmed ureteric stones on CT- KUB. In total, 103 cases were confirmed of having ureteric stones on CT-KUB. (Table 2)

Table 1. Result of USG and CT- KUB of suspected nephrolithiasis

Diagnosis	USG	CT-KUB (ureteric calculi)
Ureteric calculi	36	103
Hydronephrosis	18	
Total	**54**	**103**

One case which showed calculus on USG did not show calculus on CT-KUB. Two cases which were negative on USG but have clinical symptoms of ureteric calculi also did not show calculus on CT-KUB. The sensitivity of USG and CT- KUB in detecting ureteric calculi is 51.5% and 98.1% respectively in our study. Since we took all disease positive cases and our study was not a screening test, specificity could not be evaluated. (Table 3 and 4)

Table 3. Statistical validity of USG

CT-KUB		Ureteric stone	No. ureteric stone	Total
USG	Ureteric stone including hydronephrosis	53	1	54
	No ureteric stone	50	2	52
	Total	103	3	106

Table 4. Statistical validity of CT-KUB

CT-KUB		Ureteric stone	No. ureteric stone	Total
CT-KUB	Ureteric stone including hydronephrosis	53	50	103
	No ureteric stone	1	2	3
	Total	54	52	106

DISCUSSION

Ureteric colic due to ureteric calculi is one of the common emergencies faced in urological practice. USG sensitivity in detection of ureteric calculi is quite low as compared to unenhanced CT- KUB. In our study, male patients (62.3%) were more compared to female patients (37.7%). Many studies done in different parts of the world suggest male preponderance for ureteric calculi.[8-13] This holds true for another similar study done in Nepal where number of male patients were more than females.[14] The mean age of the patient in our study was 39.16 years (range 14-76 years). Chand *et al,*[14] also showed wide age range (9- 83 years) in his study. In a study done by Ather *et al,* [8]the mean age was 48+/- 15.8 years and in another study done by Bozdar *et al,*[9]the mean age was 29.5 years. In a study done in Baghdad, the mean age of the patients was almost similar (38.3 years) to our finding.[13] The most common age group presenting with ureteric colic in our study was 41- 50 years (34%) followed by 31- 40 years (24.5%). The same finding was seen in studies done by Abdalla *et al* ,[10] in Sudan and Reddy *et al* in India.[15] Prstojevic *et al,*[11] showed that urinary calculi were more common in the age group 35- 45 years. Papadoukakis *et al,*[12] showed the peak age in men was 30 years and bimodal age distribution in women with peaks at 35 and 55 years. In another study done in Nepal, it was seen that the urinary calculi were common in patients with age range of 20- 60 years.[15] Out of 106 cases of suspected ureteric stones,103 cases were confirmed of having ureteric stones on CT-KUB. Only 54 cases showed features suggestive of ureteric calculi on USG which includes hydronephrosis. We considered hydronephrosis as a positive finding on USG as suggestive of ureteric calculi. The similar criteria were used by Abu- Ghazzeh et al[16] in his study of renal colic. It has also been mentioned that when there is hydronephrosis the detection rate of Ureteral stones with USG rises.[17] The sensitivity of USG and CT- KUB in detecting ureteric calculi in our study was 51.5% and 98.1% respectively. Similar sensitivity pattern (52.6% and 54%) of USG for picking up the ureteric calculi was seen in a study done by Faiq *et al* and Ganesan *et al*.[1,18] Studies have shown sensitivity as low as 12%,45%

and 44% in picking up ureteric calculi on USG.[5,8,19]In contrast to our and the above studies, Patlas *et al*[7] in his study showed USG sensitivity as high as 93%.CT- KUB is found to be the best modality for depicting ureteric calculi with high sensitivity pattern. Our study showed the sensitivity of 98.1%. Three different studies showed sensitivities of CT-KUB in detecting ureteric calculi as 95%, 91% and 94%.[6,7,20] Two studies done by Faiq *et al*[1] and Bozdar *et al*[9] showed 100% sensitivity in detection of ureteric calculi. Unenhanced CT-KUB has now become the imaging technique of choice for most patients with flank pain because of its ability to directly visualise ureteric stones, and where facilities are available, CT-KUB should be used as the investigative tool to expedite our treatment.

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