Ultrasonography and Plain X-Ray KUB in Diagnosis of Ureterolithiasis

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Research Article

Abstract: **Background:** Ultrasonography and Plain X-Ray KUB plays a very important role in in the Diagnosis and screening of Ureterolithiasis in countries with limited resources. Newer techniques like CT scan have replaced these techniques in developed countries. **Objective:** to know whether plain KUB with ultrasonography can replace excretory urography in the evaluation of patients with renal colic. **Methods:** A cross sectional hospital based study carried out during Jan 2011 to JUNE- 2012 include 130 cases of abdominal colic after clinical assessments referred to department of radiodiagnosis JIIU's Indian Institute of Medical Science and Research, Warudi, Badnapur, Maharashtra. Initially plain abdominal KUB radiograph was done then ultrasonography with hydration followed by excretory urography after proper patient preparation. Appropriate statistical tests were applied. **Results:** out of 130 patients, maximum number of patients was within the age group 21-30 years and about 80% of patients were above 11-20 years of age. Out of 130 cases 95 (73.07%) were males and 35 (26.92%) were females. There were 46 ureteric stones in 130 patients ((35.38%)). Only KUB could detect 44/46 (95%) and US could detect 9/46(19%) of ureteric stones among 130 patients. The combination of two methods could detect 44/46(95%) of stones while Excretory Urography detected all 46(100%) ureteric stones. **Conclusion:** US and Plain X-Ray KUB combined are a sensitive technique in viewing Uroterolithiasis.

Keywords: Ultrasonography, KUB, Ureterolithiasis.

Introduction

Lithiasis is the most frequent cause of renal colic, which is a common disease, approximately 10% of the general population having it at least once during their lifetime [1,2,3]. Ureterolithiasis is more frequent in men than in women (ratio 3:1) [1,4]. The clinical symptoms and laboratory tests do not always establish the diagnosis, renal colic has to be distinguished from other renal diseases, female genital pathology, obstructive, inflammatory and tumoral conditions of the digestive tract, thoracic diseases, neurological or testicular disorders etc. The accidental echographic detection of hydronephrosis, without typical clinical symptoms of renal colic, requires the identification of its etiology [4]. The ultrasonographical (US) examination has several advantages: it is a low cost technique, non-irradiating, does not require contrast administration, it does not de-pend on the renal function, and allows for multiple reex-aminations. Its disadvantages reside in the difficulty to examine the ureter in obese patients, as well as the need for an appropriate technique and expertise, particularly in viewing calculi located in the mid ureter. The universal opinion is that US is the main technique to use in suspected renal colic in children and pregnant women. For the rest of the patients, the opinions are divided, but most authors agree that US should be the initial method in all cases of ureteric colic, as it gives accurate answers for both positive and differential diagnosis [5- 8]. Imaging evaluation of patients with acute flank pain is traditionally based on intravenous urography (IVU) as the standard screening tool for detecting urinary calculi. IVU requires IV contrast medium, with its associated potential risks [9]. In addition, the length of this examination may preclude rapid evaluation of patients in an emergency setting. These considerations have led to the use of other techniques, such as the combination of plain abdominal radiography and ultrasound (US) [10], and more recently unenhanced helical CT [11]. Plain radiographs are not sensitive to nonradio-opaque calculi or to non-calculous obstruction. Plain radiography also lacks specificity, as phleboliths, which are common pelvic calcifications, are not always readily differentiated from urinary tract calculi [12]. Therefore, this study was under taken to evaluate the diagnostic methods like USG and KUB X ray for Ureterolithiasis.

Material and Methods

The permission from head of the institution and clearance from Institutional Ethics Committee was obtained. This study carried out during Jan 2011 to JUNE- 2012 include 130 cases of abdominal colic after clinical assessments. The cases were selected from the patients referred to department of radiodiagnosis JIIU's Indian Institute of Medical Science and Research, Warudi, Badnapur, Maharashtra with clinical diagnosis of abdominal colic. Initially plain abdominal KUB radiograph was done then ultrasonography with hydration

followed by excretory urography after proper patient preparation.

Radiographic Technique

1) Plain Abdominal Radiograph

Plain radiography of KUB region was done first, after evacuation of urinary bladder, radiograph was taken in supine position.

2) Excretory Urography

Written consent of the patient was taken before the procedure. Sensitivity to contrast was tested by injecting 1ml of contrast intravenously and observing the patient for any allergic reaction. The remaining contrast was injected as rapidly as possible. Then radiographs at 7min, 15min, 30min interval were taken. 60min, 3hrs, 6hrs, 12hrs and 24hrs radiographs were taken if necessary. Prone films and oblique films were taken as and when needed. Contrst medium: Contrast media used was Iopamiro 370. The dose administered was 50ml in adults and maximum of 20ml in children. (In adult the normal contrast dose 300mg of iodine per kilogram of body weight and in paediatric patient the dose is 600mg of iodine/kg body wt.

3) Ultrasonography

Equipment: state of art real time ultrasound equipment SIEMENS SONOLINE G 50 with 3.5mHz sector probe was used.

Method

1: Patients with abdominal colic whose plain abdominal radiograph of KUB region was done and was asked to take about 500ml of water and later on subjected to detailed ultrasonographic scanning of kidneys, ureters and urinary bladder.

Lubricating jelly was used in all instances for transduced coupling.

There were three possible abnormalities on KUB + US:

1: Detection of stones on KUB.

2: Detection of stones by US

3: Detection of hydronephrosis by US.

KUB +US has been considered together as a single test which was classified as positive when one or more of the three abnormal findings were present. Excretory urography was used as a gold standard.

Observations

Age Distribution

In this series we have included 130 patients of various age and sex referred to Radio-diagnosis department with clinical diagnosis of abdominal colic. Youngest patient in the series was 5 years old and eldest patient was 60 years old. Maximum number of patients was within the age group 21-30 years and about 80% of patients were above 11-20 years of age. Out of 130 cases 95 (73.07%) were males and 35 (26.92%) were females with male is to female ratio 2.71:1.

Table 1: Age distribution of study subjects

Sr No.	Age Groups in Year	No. of Patients	Percentage
1.	00-10	08	06.15
2.	11-20	20	15.38
3.	21-30	48	36.92
4.	31-40	25	19.23
5.	41-50	23	17.69
6.	51-60	06	04.61

Table 2: KUB AND US Detection Of Ureteric Stones In 130 Patients

Part of Ureter	Number of Stones	KUB Detection	US Detection	KUB+US Detection
Abdominal Part	20	18(90%)	3(15%)	18(090%)
Pelvic Part	26	26 (100%)	6(23%)	26(100%)
Total	46	44(95%)	9 (19%)	44 (095%)

In our series there were 46 ureteric stones in 130 patients ((35.38%)). Only KUB could detect 44/46 (95%) and US could detect 9/46(19%) of ureteric stones among 130 patients. The combination of two methods could detect 44/46(95%) of stones. KUB could detect 18/20(90%) stones in the abdominal part of ureter and 26/26(100%) stones in the pelvic part of ureter while US could detect only 3/20 (15%) stones in the abdominal part of ureter and 6/26/(23%) in the pelvic part of ureter.

Discussion

The present study included 130 cases with clinical diagnosis of abdominal colic referred to radio-diagnosis department during the study period. This study was carried out with the aim to know whether plain KUB with ultrasonography can replace excretory urography in the evaluation of patients with renal colic. The 130 patients included in the present study were in the range of 5 yrs.to 60 yrs. Of age. of the 130 patients 95 were male and 35 were female. Male:Female ratio was 2.71:1. This higher incidence in males is well documented. As regards

the detection of ureteric stones, in our series we found that KUB alone had sensitivity of 96% where as US had a sensitivity of 55% in diagnosing ureteric stones. The sensitivity of US for detection of stone in our series was low. Higher sensitivity (i.e. 93%) was reported by Patlas M[13] and Seon Jin Park(98.3%)[14]. We found that KUB is far superior to US in detection of stones in abdominal part(90%Vs15%) as well as pelvic part (100% Vs 6%). The combination of KUB and US is essential to detect maximum number of ureteric calculi. Some stones however required excretory urography for detection. In this series two stones which were not demonstrated by KUB and US were identified subsequently on excretory urography as stone shadow in contrast opacified ureter. They were missed on KUB probably because of low calcium content of stone and on US because the stones were in abdominal part of ureter. US remain at a disadvantage in diagnosing stone in the ureter and advocate the addition of plain abdominal radiography to improve their detection. Urography remains the preferred investigation in acute renal and ureteric colic because in early or subacute ureteric obstruction,there may be know proximal dilatation despite reduced or absent excretion of contrast medium from the kidney at urography. Thus we found that excretory urography is more sensitive method than KUB + US for determination of cause and level of obstruction. Thus we found that excretory urography cannot be replaced by KUB + US in the evaluation of patients of renal colic due to calculi. However we found that KUB + US can be used in the initial evaluation of patients of renal colic due to calculi because of its high sensitivity(97%), less amount of radiation, noninvasiveness, independence from organ functional status, economy of time and money and absence of contrast media reactions.

Conclusion

US and Plain X-Ray KUB combined are a sensitive technique in viewing Uroterolithiasis during the abdominal colic and may be used as the initial imaging method in investigating these patients.

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