



Comparative Study Between The Computerized Tomography and Ultra-Sound in The Diagnosis of The Renal Stones

KEYWORDS

CT, US.

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ABSTRACT *More than a half million currently have End Stage Renal Disease (ESRD), and an astounding 20 million have physiological evidence of chronic kidney disease. There is high rate of the renal stone among Taif population; the renal dialysis center in the King Faisal Hospital receives 100 patients daily. This study was prospective, descriptive and analytic study. The study followed the global protocol to achieve examination of the abdomen by ultrasound. The abdominal ultrasound was done by using direct adhesion technology with convex transducer with frequency ranges between 3.5 to 5 MHz. The CT machine used was Toshiba 64 slice. This study was prospective, descriptive and analytic study. The study followed the global protocol to achieve examination of the abdomen by ultrasound. The abdominal ultrasound was done by using direct adhesion technology with convex transducer with frequency ranges between 3.5 to 5 MHz. The CT machine used was Toshiba 64 slice. The study concludes that the CT is superior to the U/S in diagnosis renal stones. Continuous monitoring by lab examination such as urine general is so important, periodic U/S of the renal system is helpful in detecting early formation of the stones.*

Introduction:-

The National Kidney and Urologic Diseases Information Clearinghouse estimates that each year more than 100,000 Americans are newly diagnosed with kidney failure. More than a half million currently have End Stage Renal Disease (ESRD), and an astounding 20 million have physiological evidence of chronic kidney disease.¹ The United States has the highest incident rate of ESRD in the world, followed by Japan. As per NHANES III (Third National Health and Examination Survey), the prevalence of chronic kidney disease is a mind numbing 37.8% among patients older than 70 years.² And that's just in America. Internationally, the incidence rates of end-stage renal disease (ESRD) have increased steadily since 1989.^[1]

But it's not just End Stage Renal Disease. Kidney stones, one of the most painful conditions known to man, have beset humans for centuries. Scientists have found evidence of kidney stones in a 7,000-year-old Egyptian mummy. Unfortunately, kidney stones are one of the most common disorders of the urinary tract. Each year, people make almost 3 million visits to health care providers in the United States alone and more than half a million people go to emergency rooms for kidney stone problems.³ And worldwide the incidence of kidney stones, although less than that of the U.S. and Japan, has been steadily increasing.^[4]

And then, as we move on down the urinary tract, we find disturbingly high levels of conditions such as: Interstitial cystitis, Urinary tract infections, Incontinence.

According to a 2009 Rand study, as many as 8 million women in the U.S., or 3% of all U.S. women, suffer from interstitial cystitis and suffer from debilitating symptoms.⁵ And although the incidence in men is less, it is still afflicts over 1.5 million men in the U.S. alone.⁶ Urinary tract infections (UTIs) are considered to be the most common bacterial infection. Statistically, almost half of all women will experience one UTI during their lifetime.⁷ Approximately 75 percent of all women can look forward to experiencing at least one vaginal yeast infection during their lifetimes.⁸ And as for urinary incontinence, most studies report some degree of urinary incontinence in 25-45% of women and 11-34% of older men.^[9] Make no mistake, the urinary system may be treated like Rodney Dangerfield, but its impact on our lives is a lot more like Rambo.^[1]

Objective:

To compare between CT & U/S in the diagnosis of renal system stones.

**Material and method:
Ultrasound Equipment**

This study was performed using different ultrasound

scanners available at the areas of study such as Aloka-prosound SSD 4000 (Aloka holding Europe AG, Switzerland), Toshiba Nemio 20 (Toshiba, Japan), Siemens sonoline G60S (Siemens, USA), and Shimadzu SBU 2200 (Shimadzu Europe GmbH, Germany). All of these scanners drive convex probes produce a frequency of 3.5 MHz; also they were connected with printing facility through digital graphic printer (Mitsubishi Corporation, Japan).

Sample Size

Fifty renal stone patients scanned by U/S and CT scan in order to compare between the two modalities in the diagnosis the renal stones. The study was done in King Abd Elaziz Hospital and King Faisal Hospital Taif City.

Testing Procedure (Protocol)

The patients were told to prepare themselves carefully for the scan by abstaining from food for the last 6 hours with continuous taking their drugs, imposing dietary restrictions. Usually the examination was carried out with the patient in supine position. Additional scans in the lateral decubitus and prone were useful in some situations. A coupling agent gel was used to ensure good acoustic contact between the transducer and the skin. After informing the patients about the procedure and obtaining verbal consent from each of them, the area of interest in the abdomen was completely evaluated in at least two scanning planes. Surveys were used to set correct imaging techniques, to rule out pathologies, and to recognize any normal variants.

In the CT preparation the patient requested to fast 8 hours prior the exam, and renal function test.

Statistical Analysis Used

The data was analyzed using STATA8. The associations between the conclusion's different results and the body measurement are tested using chi-square test; level of significant 0.05 was used.

THE RESULTS:-

Table (1): The mean of the age distribution:

parameters	Age
Frequency	N.A
percentage	N.A
Mean	35.56
STD±	8.293494

N.A=Not Available

Table (2): The age distribution:

parameters	Gender	
	Male	Female
Frequency	33	17
percentage	66%	34%
Mean	N.A	N.A
STD±	N.A	N.A

N.A=Not Available

Figure (1)The age distribution

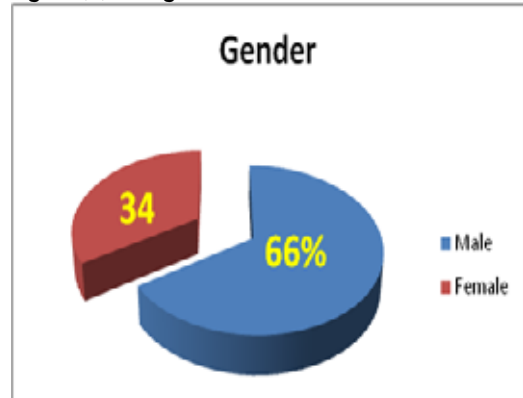


Table (3): Comparison between CT & U/S in detecting kidney stones.

parameters	CT Kidney Stone	U/S Kidney Stone
Frequency	24	22
percentage	48%	44%
total	24	22

Figure(2):Comparison between CT & U/S in detecting kidney stones.

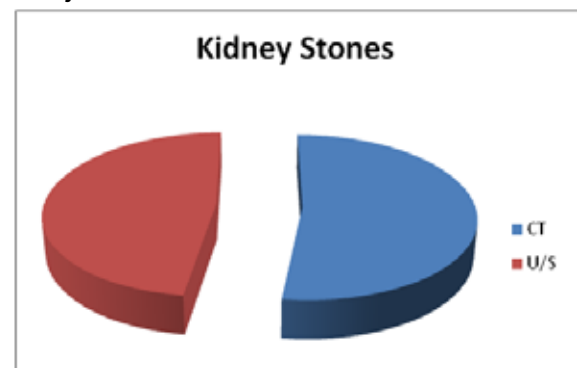


Table (4):Comparison between CT & U/S in detecting ureteric stones.

parameters	CT Ureter Stone	U/S Ureter Stone
Frequency	18	6
percentage	36%	12%
total	18	6

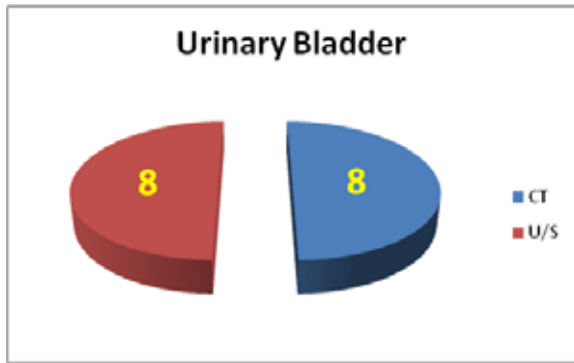
Figure (3):Comparison between CT & U/S in detecting ureteric stones.



Table (5):Comparison between CT & U/S in detecting urinary bladder stones.

parameters	CT Urinary bladder Stone	U/S Urinary bladder Stone
Frequency	8	8
percentage	16%	16%
total	8	8

Figure (4):Comparison between CT & U/S in detecting urinary bladder stones.



Discussion

The results shows that the mean of the age of the patients is 35.56 and the gender distribution male 33 (66%), and the female 17 (34%), this result agree with the study of Ather MH et al which shows the mean age was 48 +/-15.8 years and 59% of patients were males.

When comparing between CT and U/S in detecting the kidney stones the CT is superior the percentage is likely the same 48%, 44% respectively, as the study mentioned above,

CT identified renal stones in 21 (62%), whereas 17 of these were identified on US, with a sensitivity of 81%. Of the four patients with renal stones missed on US, three were

identified on plain x-ray; the mean size of stones missed was 6.3 mm. Of the 22 (65%) patients with ureteric stone on UHCT, US could only identify 10; a further 7 were identified on x-ray KUB, giving a sensitivity of 45% (US alone) and 77% (US with x-ray KUB).(41)

In the comparison between CT and U/S in detecting the ureteric stones the CT is superior but the percentage is 36%, 12% respectively, as the study of S. Oner et al 34 of 57 stones (59.6%) were detected by US, and all stones were detected by CT (100%). Difference between US and CT rates of stone detection was statistically significant (chi-square, $p < 0.01$). While spiral CT showed 45 stones in 28 kidneys and 12 stones in 11 ureters, US was able to localize 31 stones (68.9%, 31/45) in 21 kidneys (75%, 21/28), 3 stones (25.0%, 3/12) in 3 ureters (27.2%, 3/11). Difference between US and CT rates of renal and ureteral stone detection was significant (chi-square, $p < 0.05$). US detected urinary stone at least in one localization in 18 of 23 patients (78.2%). CT detected all the patients with stones but there was no statistically significant difference between US and CT in detection of the patients with stone ($p = 0.34$). However US failed to localize all of the stones in those 18 patients and spiral CT showed 6 renal and 5 ureteral.(42)

Conclusion:

When comparing between CT and U/S in detecting the kidney stones the CT is superior the percentage is likely the same 48%, 44% respectively. CT identified renal stones in 21 (62%), whereas 17 of these were identified on US, with a sensitivity of 81%. Of the four patients with renal stones missed on US, three were identified on plain x-ray; the mean size of stones missed was 6.3 mm. In the comparison between CT and U/S in detecting the ureteric stones the CT is superior but the percentage is 36%, 12% respectively.

Recommendation

Continuous monitoring by lab examination such as urine general is so important, periodic U/S of the renal system is helpful in detecting early formation of the stones.

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