

The Validity of Ultrasound KUB; in the Diagnosis of Ureteric Calculus

FAIZA AKRAM¹, WALEED KHAN², MUHAMMAD FAYYAZ³, SYED KOMAL SIRAJ⁴, FAIZAN BANARAS⁵

¹Associate Professor Radiology department, Ayub Medical Teaching and Institute, Abbottabad

²Assistant Professor, Ayub Medical Teaching and Institute, Abbottabad

³Professor prosthodontics, Dentistry department, Ayub Medical College Abbottabad

⁴TMO radiology department Ayub Teaching Hospital

⁵PGR Medicine and Allied Ayub Teaching Hospital

Corresponding author: Waleed Khan, Email: drwaheedkhan1212@gmail.com

ABSTRACT

Background: Diagnostic techniques have utilized to diagnose ureteric calculus in patients presenting with ureteric calculus. The availability, cost and expertise of these techniques varies greatly from region to region. Among them ultrasound is the widely available, can be rapidly performed and also can be repeated without any exposure to radiation. We conduct this study which helps to establish the level of sensitivity, the specificity level, the value of Positive Prediction and the value of the negative prediction KUB ultrasound in the diagnosis of ureteric calculus.

Methods: They collect this data from 193 patients from suspected ureteric calculus. All these 193 patients underwent for Ultrasound KUB followed by non-contrast CT KUB. These results of ultrasound are compared with CT KUB, which helps to report and to determine the accuracy level of ultrasound.

Results: The USG enables and helps diagnose 105 number of cases in 193 patients with the accuracy of 62.60%. Number of cases diagnosed as having ureteric calculus on CT KUB, were 171 out of total 193 patients with 22 cases being missed.

Conclusions: This ultrasound is a key to the preliminary test for the diagnosis of ureteric calculus. These results show some significant relationship for the last and final CT KUB report. The Professional level of experts used to perform this task.

INTRODUCTION

Ultrasound emerges and is available widely, used on a common basis and safe investigation for diagnosing ureter calculus. They do not use the intravenous contrast of media; no⁴ they do not take any type of test as ionizing radiation before the proper digestion of food. They wait for 30 minutes to get the bladder empty. The one and only problem with ultrasound is that the detection of Ureteric stones can in some cases can cause trouble, when calculus obscures the ultrasound beam of action-attenuation. They use tissues such as the fat of renal sinus, mesenteric fat or bowel. They use Ultrasounds which has demonstrated the diagnostic level of accuracy, which vary in different number of studies ranges from low to the high level of 91% for the detection ureteric calculus¹.

Conventionally; the diagnosis of ureteric calculus was established and worked with some plain radiography systems and some values of intravenous urography among the patients with ureteric colic².

Renal calculus is very common in a human being, its prevalence rate is up to 10%. The most renal stones between them was symptomatic stone, when it falls into the ureter, it causes pain known as ureter colic. In the case of Ureter calculus, the early establishment of diagnosis of ureters and measurable treatment was essential¹. We use Non-contrasted CT which is highly sensitive and effective for stone detection in humans. We can perform it rapidly and does not need intravenous iodine in contrast. It helps to identify the Urinary tract of pathology. These studies have shown a higher sensitivity level (97%) and the level of higher specificity (95%) for CT scan for the stone. This disease is called as alternative diagnosis which is found in 11% to 25% of patients with acute pain. CT helps to detect the most stones regardless of size, their composition and its location³. However, in routine, it was also showing risk factors. There used to expose the doses with the higher or lower level of radiation in a single or double CT scan. They use some associative radiation doses and show its hazardous effects, which can become particularly effective to patients with ureter calculus. Some Patients from them also need the repetitive type of CT scans as almost 51% of the patients will suffer from rehabilitated stone issues from the last five to six years of initial occurrence, 52-62% in the last 11 years and 75% in 21 years¹.

A Stone disease, which is getting common in humans, does not only affects the patient, but also the economical values on the national basis, as the prevalence of diseases occur in the productive age of a specific group. There is a need to investigate it properly with the high level of diagnostic accuracy, less number of

radiation hazards and some financial acceptability in the way of context of a developing country⁴

The main and a major reason of this study is demonstrated the level of sensitivity, some specific level, positive prediction and the value of negative prediction, some ultrasounds were used in diagnosing of ureter calculus. These findings of ultrasounds were correlated with CT KUB and their results which were taken as the gold standard for study purpose. The results of this study were assessed on a statistical basis and were compared with several studied on the previous basis and used it in terms of outcomes. We consider it on the reasons of these results, we derive some conclusions from some valid points of Ultrasounds, KUB for the treatment and diagnosis for ureteric calculus

METHODOLOGY

A cross-sectional study was (validation), conducted and held at the Radiological Department, for an alliance with the Surgery and Accidental department and in emergency patients, at the Ayub Hospital, Abbottabad from January 2019 to July 2020.

During the period of study, a total of 193 patients who suffers from suspected ureteric calculus were studied. Consecutive sampling techniques were used to recruit patients into the study. There were some techniques and tests such as TOSHIBA, Xario 100 with the level of low to the medium frequency range with these probes, were used for the purpose and reason of ultrasounds. 193 patients presenting with signs and symptoms of ureteric colic/calculus were included in this study, according to inclusion and the criteria of exclusion. After reading history, it takes initial physical examination and assessments by the Surgeon or urologist and some other doctors who were on duty at the time of accident and emergency and were performing duties in these departments. These patients were referred to the other department. In this study we include only those patients in our study whose ages were between 18-60 years and patients who had solitary kidney disease, CRF on dialysis and those undergone for ureteric surgery were excluded from this study. They start the study of all types of processes. They also take permission from the committee of the hospital. These Patients who were selected for study from the surgical department of patients and accident or emergency departments according to the criteria of inclusion or exclusion. Confounding these variables can be controlled by adhering the criteria of exclusion. They use bias for performing some ultrasounds in the presence of another Radiologist who were senior in rank, by using 3MHZ probe. The patients were scanned on full bladder both in supine and prone positions for visualization

of ureteric calculus. All these patients were then subjected to non-CT KUB. The Results were collected from the CT scan section, entered on Performa and both the results were compared. This data was entered and analyzed in this study, on the basis of SPS with version 20. A 2 X 3 table was used and calculate the best performance with the characteristics of certain ultrasound.

Sensitivity: 41.90%
 Specificity: 46.59%
 PPV: 48.35%
 NPV: 40.20%
 Accuracy: 44.04%

RESULTS

If we measure the age of included patients, it will be between 37.19±10.836 years (age range: 18-60years).The level of sensitivity, the specificity level, the positive values was predicted. The value negative prediction and the diagnostic efficacy of ultrasound, in detection of ureteric calculus was measured. It can be determined by the following standard formulas.

Sensitivity	Specificity	PPV	NPV	Diagnostic accuracy
58.48%	77.27%	95.24%	19.32%	60.62%

PPV
 NPV
 Sensitivity level = (TP by TN + FN X 100 = 58.48%)
 Specificity level = (TN by TP + FP X 100 = 77.27%)
 The Positive Prediction of Value = (TP/TN+ FP multiply 100= 95.24%)
 The Negative Prediction of Value = (TN/TN+ FN multiply by 100 = 24÷ 25 x 100 = 19.32%)
 Diagnostic efficacy =(TP+TP / TN+ TN +FP+FN multiply by 100 = 60.62%.)

193 patients who took part in that study were reported. The distributions among these patients, according to age group, patients were between 18 to 60 years. USG enables itself to correctly diagnose these 105 cases in 171 patients with the accuracy level of 60.62%. Out of 193 patients, 22 were not detected on both ultrasound and CT KUB.

Table 1: The Diagnostic accuracy of urinary tract calculus on ultrasound KUB with respect to urinary tract calculus on CT KUB:

Urinary tract calculus on ultrasound KUB	Urinary tract calculus on CT KUB	No	Total
Yes	Yes	05	105
No	71	17	88
Total	171	22	193

Sensitivity: 58.48%
 Specificity: 77.27%
 PPV: 95.24 %
 NPV: 19.32%
 Accuracy: 60.62%

Table 2: The Diagnostic accuracy of urinary tract calculus on ultrasound with respect to age group:

Age group (years)	Urinary tract calculus	On ultrasound	Total
	Yes	No	
18 to 40	78	50	128
41 to 60	27	38	65
Total	105	88	193

Sensitivity: 74.29%
 Specificity: 43.18%
 PPV: 60.94%
 NPV: 58.46%
 Accuracy: 60.10%

Table 3: The Diagnostic accuracy of urinary tract calculus on ultrasound with respect to gender:

Gender	Urinary tract calculus	On ultrasound	Total
	Yes	No	
Male	44	47	91
Female	61	41	102
Total	105	88	193

DISCUSSION

The study was conducted at the Radiology unit of Ayub Teaching Hospital Abbottabad, from the total sample of 193 patients take part in this type of study was used to determine the diagnostic accuracy of some ultrasounds in the form of detection and identification of ureteric calculus in patients presenting with the pain of flank, keeping it non-contrasted CT KUB as a gold standard. This study shows the initial age of some patients which were between the ranges of 37.19±10.836 and is ranging from 18 to 60 years including 128(66.3%) from 18 to 40 years and 65(33.7%) from 41 to 60 years of age group⁶. This shows the frequency of urinary tract calculus on ultrasound. Calculus found on ultrasound was 105(54.4%) in remaining 88(54.6%), no calculus found on ultrasound and in frequency of urinary tract calculus on CT. Calculus found on CT was 171(88.6%) remaining were 22(11.4%), no calculus found on the CT. These results are also almost similar to the study conducted by Faiq SM et al⁶. In this study the diagnostic accuracy of urinary tract calculus on ultrasound KUB with respect to urinary tract calculus on CT KUB, out of 193 patients, 171 were found on CT while 22 were not found calculus. The sensitivity for urinary tract calculus on ultrasound was 58.48% 74 while specificity was 77.27%. PPV was 95.24% of and NPV was 19.32%. The diagnostic accuracy was found to be 60.62%. The result of our study with regard to outcome, i.e. diagnostic accuracy of urinary tract calculus on ultrasound KUB with respect to urinary tract calculus on CT KUB was almost similar to the study conducted by Faiq SM et al⁶. This study shows the diagnostic accuracy of urinary tract calculus on ultrasound KUB with respect to age group, out of 193 patients, 105 were found on ultrasound in both age group from 18 to 40 and 41 to 60 years while 88 were not found calculus in both age group from 18 to 40 and 41 to 60 years. The sensitivity for urinary tract calculus on ultrasound was 74.29% while specificity was 43.18%. PPV was 60.94% of and NPV was 58.46%. The diagnostic accuracy was found to be 60.10%. In our study the diagnostic accuracy of urinary tract calculus on ultrasound KUB with respect to gender, out of 193 patients, 44 male and 61 female patients were found on ultrasound, while 47 male and 41 female patients were not found calculus. The sensitivity for urinary tract calculus on ultrasound was 41.90% while specificity was 46.59%. PPV was 48.35% of and NPV was 40.20%. The diagnostic accuracy was found to be 44.04%. These results are almost similar to the study conducted by Abdel-Gawad M, et al⁵. Our research confirms the value of the unachievable CT scan, which is an accurate tool for the determination of acute pain⁸. Since 1996, the unpredictable level of helical based CT scan was considered as the most accurate, they use several techniques such as Gold standard technique. The images of CT scan can be superior to the US and some X-ray and KUB. They also show lots of advantages, there is no need of any other process. In Comparison, they perform some experiments and conduct results during the phase of acute pain. We can also detect some extra urologic disease, which is fast and is relatively easy to learn⁹. CT scans also show some negative impacts, the main negative impact from them was being the ionized level of radiation. It is not available to the other level of facilities which were related to the hospital. They pay a high cost as compared to the X-ray KUB and the US¹⁰. The specific amount of some radiations which were used as non-contrasted CT scan is approximately twenty times than X-ray. These results confirmed that the CT scan is an effective treatment to visualize the lithiasis in the form of urinary tract infection, which is showing the best results significantly then the US and X-ray. This CT scan detects 191 ureter lithiasis (110%), whereas the US detects only 110 from 192 (53.6%). Observation of hydro nephrosis is shown on the other side of the

uterus. It strongly suggests the obstruction, and the cause of stone appearance. The large size of that stone is the main reason for CT scan, since it also determine some types of treatments (calculus less than 7 mm which usually needs the intervention level of techniques). It is a unique level of opinion which detects some ureteral stones cannot be seen by the US number. However, this study, they report and visualize the conducted ureteral lithiasis in an area up to 95% cases. Some other techniques were allowed to find out the ureter, especially presence of hydronephrosis was considered, dilation of urethra, or a full term bladder⁶. The most difficult part of the kidney to visualize and explore the mid of the urinary tract, due to dilation of a specific gas. This study was showing some effective results with the US, it helps to see lithiasis in the condition of ureter with the help of the urinary bladder. We were showing agreement, these assumptions which are fully explained and visualized the bladder, it will help to increase identification of lithiasis linked with the main portion of ureter⁷. The detection of stone was related to the size of stone. Some of these stones were misplaced and linked to the US, was small in size. Small calculus (<3mm) seems to fail to demonstrate the level of shadowing in urethra. The correct time and date of examination, which was the main disadvantage of the US, sometimes, when we compared it with the CT scan. The Time of examinations for CT scan, ranges from 6 to 16 minutes, whereas the US take from 6-32 minutes. It is imperatively effective to shorten the US time of examination to make it more powerful and relatable with the CT¹⁰. CT was considered and showing as the good level of similarity as compared to other results, with the level of sensitivities from 89 to 93% for readers. Some Computerized level of tomography sometimes make mistakes at ureter calculus related to the phlebitis uterus. Some facts related to stone shows that all the lithiasis was confirm with the help of scan or with the help of expulsion for the specificity of human. It shows that all the US, X-ray and KUB results do not influence the higher rate of prevalence related to lithiasis for these series. On the other basis, these results show that the setting of the negative or positive X-ray, KUB and US exams, the level of unreliable CT scan will not add any useful information related to this study. In some cases, the CT scan will only add some cost and exposure to radiation¹⁰.

CONCLUSIONS

The study was conducted in clinical practice. This US have almost same level of patient outcomes as compared to the CT scan.

These stones are misplaced and used in the US, usually small in size. It should pass spontaneously with the help of some stones that are missed. This study depends upon variability of each and every technique and have some experience to become a Radiologist. This CT scan will help to detect more number of lithiasis, but mutual understanding of X-ray and the US. They obtain results from the reports of x rays and CT scan. They show some results related to these patients and they show some clinical effects a major disease as colic, who have the negative effect related to the US, X-ray and KUB.

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