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COMPARISON OF DIAGNOSTIC EFFICACY OF NON-CONTRAST ENHANCED HELICAL CT SCAN WITH ULTRASOUND TO DETECT URETERAL CALCULI IN PATIENTS HAVING ACUTE FLANK PAIN

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Abstract:

Objective: *To compare the diagnostic accuracy of ultrasound (USA) and non-contrast (CT) CT in the detection of ureteral stones in the determination of patients having acute flank.*

Study Design: *A standardized double-blinded study.*

Place and Duration: *In the Radiology Department of Holy Family Hospital, Rawalpindi for one year duration from June 2017 to June 2018.*

Methodology: *One hundred and twenty four patients with flank pain for 1 year were examined with non-contrast ultrasound and CT Scan. Both techniques have been used to determine the presence and location of the ureter stone and the presence or absence of secondary symptoms such as ureteral and calyceal dilatation, knitting of the periureteric fat, and the sign of soft tissue margin.*

Results: *86 of 124 patients were confirmed to be ureteral stones on urological intervention or on ultrasound confirmation. Ultrasound showed specificity of 95% and sensitivity of 93% in the diagnosis of ureterolithiasis. CT showed specificity of 95% and sensitivity of 91%, respectively.*

Conclusion: *Due to non-invasive and low cost modality, we recommend that ultrasound be used for the first time and ultrasound is not suitable than computerized tomography may be beneficial for diagnosis.*

Key words: *ultrasound, computed tomography, renal colic.*

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INTRODUCTION:

In the radiological diagnosis of ureter stones, renal collection system and radiological examination of the bladder, the gold standard investigation is Intravenous urography (IVU). For urinary tract imaging in patients with increased serum creatinine is limited to enhanced analysis without contrast. These deliberations results in adopting other methods, such as ultrasound of the kidney, ureter, and the US of the bladder, such as the combination of ultrasound KUB and simple abdominal radiography KUB. The most recent use of magnetic resonance urography (MRU) and helical uncontrolled CT (UHCT) in the determination of flank pain has increased. The study conducted over the last decade has shown that the UHCT is highly specific and sensitive. It is very sensitive to both ureteral and renal calculi. The possibility of wrong diagnosis with multiple phleboliths in the distal part of ureter is an important problem. The presence of tissue edge markings and the comet tail together with secondary obstruction symptoms are useful in cases. Ultrasound has various natural advantages, universal availability, lack of radiation, non-invasive and non expensive. It is useful in the diagnosis of kidney and ureteral stones. It has been shown as high echogenic foci with a characteristic acoustic shading. The biggest challenge for the US is the ureteral stone detection especially in the upper abdomen and pelvic course. Due to intestinal inflammation and bone structures, retroperitoneum is not discovered in some cases. The flat radiography of the abdomen also lacks specificity because the phlebolites are not easily distinguishable from ureteral stones. To radioactive stones, Plain radiographs are not sensitive. In this study, we differentiate the detective efficacy of UHCT with US for the ureteral stones diagnosis in acute flank pain patients.

MATERIALS AND METHODS:

This standardized double-blinded study was held in the Radiology Department of Holy Family Hospital, Rawalpindi for one year duration from June 2017 to June 2018.

One hundred consecutive patients in the emergency department for a 1-year-old renal colic were enrolled in a standard double-blind protocol consisting of an U.S examination and CT scan followed. There were 84 males and 40 females . 25 to 90 years was the age range. In the emergency room, within 6 hours of admission all imaging analysis were performed. After transabdominal drinking 2 cups of water, 5 MHz, 7.5 MHz and 3.5 MHz probes were used for the diagnosis of ureteral stones in the US. An hyperechoic intraluminal structure giving acoustic shadow was required. The presence of perinephric fluid and hydronephrosis was also observed. Improved helical CT scans were performed. From the superior kidney poles to the bladder base CT images were taken. Helical data collection consisted of 1.5: 1 step and 6.5 mm thick sections when IV or oral contrast agent was not given. CT examinations were evaluated by a senior radiologist and the ureteral stones presence, periureteric or hydronephrosis and perinephric stranding were evaluated. The ureteral stones CT diagnosis was made by imaging a high attenuation structure (more than 100 units of Hounsfield) in the lumen of ureter. 2 study groups were examined by radiologists independently who were not known to the identity of patient and recorded all facts, including stone indication, location and size of the stone, and symptoms of congestion. We also observed findings that were not related to the calculi.

RESULTS:

A total of 124 patients were included in the study. 86 of 124 patients have confirmed ureteral stones rely on urological interventions or stone recovery. In the U.S, 86 of 124 patients with ureteral stones had ureterolithiasis (93% sensitivity, specificity of 95%, negative predictive value of 86%, and positive predictive value of 98%) (Table 1).

Table.1: Results of imaging with us for detection of ureteric calculi

	Ureteric calculi present	Ureteric calculi absent	Total
Ultrasound			
Positive for ureteric calculi	80	2	82
Negative for ureteric calculi	6	36	42
Total	86	38	124

Eight cases have the upper thirds of the ureter stones, 8 of the pelvic stones, and 64 has distal ureter stones. In 88 cases, hydronephrosis was observed. In the US examination, the hydronephrosis degree can be observed. At least 44 patients were evaluated as mild in 22 patients and 22 patients have moderate hydronephrosis. The perinephric fluid in Six patients, 86 patients with stone had a CT score of 78 (91% sensitivity, specificity of 95%, negative predictive value of 82%, positive predictive value of 98%) (Table 2).

Table.2: Results of imaging with ct for detection of ureteric calculi

	Ureteric calculi present	Ureteric calculi absent	Total
CT			
Positive for ureteric calculi	78	2	80
Negative for ureteric calculi	8	36	44
Total	86	38	124

In the proximal ureter, there were 10 stones and 8 in the middle ureter and 60 in the distal ureter. In 52 cases, Perinephric stranding was noted and in 10 cases periureteric stranding.

Table.3: Percentage validity of the diagnosis of urolithiasis from us and CT

Validity	US	CT
Sensitivity	93%	91%
Specificity	95%	95%
Negative predictive value	86%	92%
Positive predictive value	98%	98%

In 12 patients, urinary calculus-related pathologies were shown, and two patients had cholelithiasis, cholecystitis, appendicitis and adnexial mass, and 4 had ovarian cysts. All these conditions were detected by the United States. U. CT except for appendicitis diagnosed only by CT.

DISCUSSION:

Recent studies have shown that non-contrast helical CT is an excellent method for demonstrating ureteral stones in patients with suspected renal colic. In a study by Smith et al8, non-contrast CT has been shown to be more effective than IVU in the definition

of ureteral stones. In another comparative study by Sommer et al, re-shaped helical helical CT images were found to be superior to a combination of abdominal radiography. Images of ureteral stones are easy to obtain. In this study, a comparison was made between helical CT and U.S in 124 patients, comparable results for two methods of demonstrating ureteral stones. In some cases, it was difficult to determine whether calcification was present in the urinary tract or elsewhere Calcified blebs or calcified seminal vesicles are present. In two cases, the interpretation of CT was found to be false positive for the ureter stone and retrospectively showed that the calcification was pelvic phlebolitis. Stone (2 to 5 mm in size), none of which was seen on CT, was applied to 8 patients. The visualization of the stones can be explained by the average volume, the small size of the stones and the attenuation of the stones. Some radiologists prefer US is the first method to evaluate kidneys and bladder, universally available, non-invasive, inexpensive and without radiation. However, the US is thought to have a limited value to demonstrate the pathological conditions of the ureter. All of the ureterothiasis patients described herein had a degree of ureterohydronephrosis. In the middle third of the analysis, when evaluating the ureter, technical problems can often occur in an area concealed by intestinal gas; We solve this problem by changing the position of the patient by compressing the area to be examined. Dalla Palma 11 evaluated 120 patients with renal colic with simple radiographs and US had 95% sensitivity, but 67% specificity. When stones or hydronephrosis occurred, the study was classified as positive for ureteral colic. In this study, only cases with definite ureteral stone imaging were classified as positive and our results showed a high specificity of 95%. In our study, CT and ultrasound were equally sensitive in the detection of ureteral stones; 91% and 93%, respectively. In the study of Sommer et al., False negative tests were performed in the US due to the lack of significant hydronephrosis can be detected in the examination. US were true in defining stones in cases of minimal hydronephrosis. Extraurinary causes that mimic renal colic have been demonstrated by both methods, except for two cases of appendicitis diagnosed by CT alone. However, the low number of cases with extra urinary causes prevented statistical analysis.

CONCLUSION:

In summary, we found that both helical CT and US are excellent methods for representing ureteral stones, but we recommend US because of the high cost, radiation of CT scan. U.S must first be done in each case and CT scan must be reserved for situations where US is not available to give diagnostic accuracy.

REFERENCES:

1. Tillman, B. G., J. D. Gorman, J. M. Hru, M. H. Lee, M. C. King, C. B. Sirlin, and R. M. Marks. "Diagnostic per-lesion performance of a simulated gadoxetate disodium-enhanced abbreviated MRI protocol for hepatocellular carcinoma screening." *Clinical radiology* 73, no. 5 (2018): 485-493.
2. Sertorio, Fiammetta, Michela Cing Yu Wong, Veronica Incarbone, Angela Pistorio, Girolamo Mattioli, Gian Michele Magnano, and Maria Beatrice Damasio. "Non-contrast-enhanced magnetic resonance angiography for detecting crossing renal vessels in infants and young children: comparison with contrast-enhanced angiography and surgical findings." *Pediatric radiology* (2018): 1-9.
3. Repplinger, Michael D., Perry J. Pickhardt, Jessica B. Robbins, Douglas R. Kitchin, Tim J. Ziemlewicz, Scott J. Hetzel, Sean K. Golden, John B. Harringa, and Scott B. Reeder. "Prospective Comparison of the Diagnostic Accuracy of MR Imaging versus CT for Acute Appendicitis." *Radiology*(2018): 171838.
4. Usman, S., L. Smith, N. Brown, and V. Major. "Diagnostic accuracy of Magnetic Resonance Imaging using liver tissue specific contrast agents and contrast enhanced Multi Detector Computed Tomography: A systematic review of diagnostic test in Hepatocellular Carcinoma (HCC)." *Radiography* (2018).
5. Liu, Jianfang, Zhu Wang, Huafei Shao, Dong Qu, Jian Liu, and Libo Yao. "Improving CT detection sensitivity for nodal metastases in oesophageal cancer with combination of smaller size and lymph node axial ratio." *European radiology*28, no. 1 (2018): 188-195.
6. Della Pepa, Roberta, Claudio Cerchione, Novella Pugliese, Roberta Colicchio, Paola Salvatore,

Cesare Sirignano, Ernesto Soscia et al. "Diagnostic-driven antifungal approach in neutropenic patients at high risk for chronic disseminated candidiasis: preliminary observations on the role of 1, 3-β-D-glucan antigenemia and multiphasic contrast-enhanced computed tomography." *Supportive Care in Cancer* 26, no. 6 (2018): 1691-1694.

7. Daamen, Lois A., Vincent P. Groot, Lucas Goense, Frank J. Wessels, Inne H. Borel Rinkes, Martijn PW Intven, Hjalmar C. van Santvoort, and I. Quintus Molenaar. "The diagnostic performance of CT versus FDG PET-CT for the detection of recurrent pancreatic cancer: a systematic review and meta-analysis." *European journal of radiology* 106 (2018): 128-136.
8. He, Yunfeng, Shenjun Luo, Xiaohou Wu, Haitao Yang, Bruce B. Zhang, Michael Bleyer, and Gang Chen. "Computed tomography angiography with 3D reconstruction in diagnosis of hydronephrosis cause by aberrant renal vessel: A case report and mini review." *Journal of X-ray science and technology* 26, no. 1 (2018): 125-131.
9. Sandhu, Manavjit Singh, Ajay Gulati, J. Saritha, and Brusabhanu Nayak. "Urolithiasis: Comparison of diagnostic performance of digital tomosynthesis and ultrasound. Which one to choose and when?." *European Journal of Radiology*105 (2018): 25-31.
10. Lim, Robert S., Trevor A. Flood, Matthew DF McInnes, Luke T. Lavallee, and Nicola Schieda. "Renal angiomyolipoma without visible fat: Can we make the diagnosis using CT and MRI?." *European radiology* 28, no. 2 (2018): 542-553.
11. Weinrich, Julius Matthias, Peter Bannas, Marc Regier, Sarah Keller, Luis Kluth, Gerhard Adam, and Frank Oliver Henes. "Low-Dose CT for Evaluation of Suspected Urolithiasis: Diagnostic Yield for Assessment of Alternative Diagnoses." *American Journal of Roentgenology* 210, no. 3 (2018): 557-563.
12. Xu, Peng, Lulu Lyu, Muhammad Umair Sami, Xin Lu, Haitao Ge, Yutao Rong, Chunfeng Hu, and Kai Xu. "Diagnostic accuracy of magnetic resonance angiography for Budd-Chiari syndrome: A meta-analysis." *Experimental and therapeutic medicine* 16, no. 6 (2018): 4873-4878.
13. Tatar, Gamze, Tevfik F. Cermik, Yesim Karagoz, Cihan Gundogan, Didem Karacetin, Elif Yildiz, and Ozgur Yigit. "The value of whole-body contrast-enhanced 18F-FDG PET/CT imaging in the diagnosis and staging of patients with laryngeal carcinoma." *Nuclear medicine communications* 39, no. 4 (2018): 334-342.
14. Čelutkienė, Jelena, Carla M. Plymen, Frank A. Flachskampf, Rudolf A. de Boer, Julia Grapsa, Robert Manka, Lisa Anderson et al. "Innovative imaging methods in heart failure: a shifting paradigm in cardiac assessment. Position statement on behalf of the Heart Failure Association of the European Society of Cardiology." *European journal of heart failure* 20, no. 12 (2018): 1615-1633.
15. Harifi, Ghita, Wared Nour-Eldine, Mohammad Hassan A. Noureldine, Mohammad Baker Berjaoui, Romy Kallas, Rita Khoury, Imad Uthman, Jamal Al-Saleh, and Munther A. Khamashta. "Arterial stenosis in antiphospholipid syndrome: update on the unrevealed mechanisms of an endothelial disease." *Autoimmunity reviews* (2018).