Predictability of Computerized Tomography as Compared to Ureteroscopy in Detection of Ureteric Stone in Patients with Indwelling Stents

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Abstract

Objective: The current gold standard for the diagnosis of ureteric stones in patients with a stent in situ is ureteroscopy but this study is planned to determine the positive predictive value of computerized tomography (CT) scan among such patients.

Methods: This study involved patients who had ureteral stent in situ and were referred for re-evaluation of residual stones after extracorporeal shock wave lithotripsy. These patients underwent CT-scan for detection of ureteric stone. Later on, ureteroscopy was performed and ureteric stone was confirmed on direct visualization.

Results: The mean age of the patients was 32.2±8.9 years. Male to female ratio of 1.7:1. CT scan shows a stone in 252 patients (70.2%) out of which 165 (46.0%) were confirmed on ureteroscopy. This yielded a sensitivity of 88.7%, specificity of 49.7%, positive predictive value of 65.5%, negative predictive value of 80.4% and diagnostic accuracy of 69.9% of CT for detecting ureteric calculi in patients with ureteric stents (p value < 0.0001).

Conclusion: CT scan owing to its limited diagnostic accuracy cannot replace ureteroscopy for detection of ureteric stones in patients with ureteric stents.

Key Words: Ureteric stone, Ureteral stent, Ureteroscopy, Computerized tomographic Scan

Introduction:

The overall prevalence of urinary tract stones has been estimated to range from 2% - 20% which has been increasing over the last 2 decades. Around 20% of these occur in the ureter.

Ureteric calculi are associated with significant morbidity ranging from hydronephrosis and hydroureter to infection and even renal failure. Timely intervention can save the patient from these morbidities. Different treatment options are available for this purpose including ureteroscopic lithotripsy (URL), extracorporeal shock wave lithotripsy (ESWL), medical therapy, percutaneous nephrolithotomy and laparoscopic surgery. Out of these, URL and ESWL are the most widely used and successful options.

Ureteral stents are one of the most common and versatile tools used by urologists. Ureteral stents are routinely placed in patients encountering extracorporeal shock wave lithotripsy in order to reduce the morbidity caused by ureteral trauma by this procedure although the evidence for this remains controversial.

Tang et al. in 2011 assessed the use of CT scanning versus ureteroscopy in detecting ureteric calculi in patients with stents and found that the positive predictive value (PPV) of computed tomography (CT) in diagnosing ureteral stone in such patients was 63%.

While CT scan is more sensitive, specific and accurate than ureteroscopy in detection of ureteric stones preoperatively, its value post intervention is unclear. This is due to difficulty in perceiving stone from the stent on CT when using soft tissue window settings. Using bone window settings may improve accuracy, but this met-
The aim of this study was to decide the positive predictive value of computed tomography in diagnosing ureteral stones with ureteral stent in situ taking ureteroscopy as gold standard.

**Methods:**

This was a cross-sectional study carried out at a tertiary care center. The center was funded by the government so majority of the cases belonged to the poor socio-economic status. After approval from ethical review committee of the hospital, patients with ureteric stents who had suspicion of ureteric stone based on clinical history or ultrasound, were enrolled by the Radiology Department, Mayo Hospital Lahore. Written informed consent and detailed history was taken from each patient at the time of enrollment. Patients were selected consecutively by using nonpurposive consecutive sampling method. Sample size of this study was calculated as 359 by WHO calculator taking an expected percentage of positivity as 63%.

It was made sure that only those patients were included in the study who had strong suspicion of the ureteric stone on clinical examination irrespective of the gender and age. Patients who were pregnant at the time of study and visible hip graft (due to difficulty in imaging interpretation from artefacts), were excluded from the study. Patients not willing to undergo ureteroscopy were also excluded.

Patients underwent helical CT using a 1mm slice collimation without intravenous or oral contrast. The CT scans were then assessed on standard abdomen and bone window settings to look for ureteric stones (Figures I and II).

The patients then underwent ureteroscopy to look for ureteric calculi and their presence or absence was noted. All the data was recorded into the attached proforma along with demographic details of the patient. All the ureteroscopic examinations were performed by the same consultant of the Urology department having 5 years post fellowship experience and all the computerized tomography scans were performed on the same machine and were reported by the same radiologist.
having 5 years post fellowship experience to eliminate bias. Confounding variables were controlled by exclusion criteria.

The data were then entered into SPSS. Mean and standard deviation of quantitative variables was calculated. 2x2 table was constructed to tabulate true and false positives and negatives. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy was then calculated.

**Results:**

The mean age of the patients was 32.2±8.9 years (20 years to 50 years). There were 224 (62.4%) males and 135 (37.6%) females in the study population.

CT scan showed a stone in 252 patients (70.2%) out of which 165 (46.0%) were true positive. There were 82 (22.8%) true negative patients. This yielded a sensitivity of 88.7% and specificity of 49.7% of CT in detecting the presence of ureteric calculi in patients with stents in place. The positive and negative predictive values were 65.5% and 80.4% respectively. Overall diagnostic accuracy was 69.9% with p value < 0.0001. (Table 1)

**Discussion:**

Diagnosis of ureteric stones prior to any intervention is relatively straightforward but it is not so in post operative patients such as ones having indwelling catheters. Ureteroscopy is considered gold standard, however has a number of disadvantages such as invasiveness, need for procedure room arrangement, anesthesia and cost. CT overcomes these advantages although it is less specific having a PPV of 65.5% as compared to ureteroscopy.

There is dearth of local as well as international data on comparison between CT scan and ureteroscopy for stone detection in patients having catheters.
Detection of ureteric calculi in patients with indwelling catheters presents a diagnostic challenge, yet is important for patient management. The current gold standard - ureteroscopy is an invasive and expensive procedure with limited availability. CT overcomes these disadvantages however has a limited PPV and NPV and cannot currently replace ureteroscopy for this purpose.

Conclusion:

CT over different stone sizes which is a significant impact modifier and ought to be tended to.

Ethical Approval: Given

Conflict of Interest: The authors declare no conflict of interest.

Funding Source: None

References:


