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EFFICACY OF TRANS-VAGINAL ULTRASOUND IN DIAGNOSIS OF NON-PREGNANT SEXUALLY ACTIVE FEMALES WITH DISTAL URETERIC CALCULI.

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ABSTRACT

Background: Around 85% of ureteric stones are located in the distal ureter. Our objective is to see efficacy of trans-vaginal ultrasound (TVS) in diagnosis of non-pregnant sexually active females with distal ureteric calculi.

Methods: A prospective study was done from September 2017 to December 2020 including nonpregnant sexually active females with suspected ureteric calculus. Trans-abdominal ultrasound was initially done in all patients. In those patients in whom trans-abdominal ultrasound was inconclusive or there was indirect evidence of lower ureteric calculus in form of ureteral dilation but no calculus was evident, trans-vaginal ultrasound was done.

Results: As per the study protocol, 186 out of the total 521 patients evaluated by transabdominal ultrasound were eligible for TVS. TVS was done in 175 patients, as 11 patients did not give consent. 61 patients were detected with a lower ureteric calculus on trans-vaginal ultrasound and 40 patients had gynaecologic or other cause for their symptoms. 74 patients had an inconclusive transvaginal ultrasound of which 61 underwent non-contrast computed tomography, among them 3 patients had a lower ureteric calculus.

Conclusions: Our study proves that TVS has a role in evaluation of sexually active female patients with suspected lower ureteric calculus. We feel that in sexually active female patients, initially TAS should be done and if there is still doubt, then one should not hesitate to proceed with TVS.

INTRODUCTION

Around 85% of ureteric stones are located in the distal ureter (1). Calculi in this location often cause pain that radiates to the labia majora in females. Menstrual pain, pelvic inflammatory disease, and ruptured or twisted ovarian tumors may mimic the symptoms of distal ureteral stones, and the full differential diagnosis of the acute abdomen should be considered (2). Sonography provides a rapid, non-invasive and repeatable examination in the evaluation of lower abdominal pain in women. The use of sonography to detect distal ureteral calculi appears promising and may have the potential for replacing conventional radiography and excretory urography for this purpose (3–5).

There are reports that show that many women prefer TVS (Trans vaginal sonography) to TAS (Trans Abdominal sonography) because there is no need for a filled urinary bladder, which saves time and is more comfortable to them (6). TVS has been demonstrated to be useful in evaluation of pregnant females with lower ureteric calculi (7). But we conducted this study to assess the utility of TVS in evaluation of non-pregnant sexually active females with lower ureteric calculi.

METHODS

A prospective study was conducted from September 2017 to December 2020. All consenting sexually active females with suspected ureteric colic were included in the study. Initial evaluation included TAS. In women where definite attributable cause for their symptoms could be detected no further study was done. In women with inconclusive TAS and had indirect evidence of ureteric calculus in form of ureteral dilation but inconclusive status of distal ureter, TVS was done.

Both TVS and TAS were performed using Philips EPIQ 5G ultrasound scanner by a single radiologist who had 10-year experience of doing both TAS and TVS. An endo-vaginal probe (4.0 - 9.0 MHz) was used for TVS and grey-scale ultrasound was used to detect calculi. TVS was done with the patient comfortably placed in supine position with thighs flexed and slightly abducted; a pillow was kept under the pelvis and probe was placed in the proximal vagina. The presence or absence of ureteral calculus, its size, location and presence or absence of ureteral jet was recorded on TVS. If the stone was not visible on TAS and TVS, then NCCT scan of the abdomen was done.

The ureteric calculi detected on TVS were divided into those <7 mm and those >7 mm. The patients who were diagnosed with a distal ureteric calculus <7 mm were given medical expulsive therapy (MET) for 10 days and then a repeat TVS was done to look for stone free status. If still the calculus persisted, the patient was advised ureterorenoscopy (URS) for stone removal. In stones >7 mm patients were counselled regarding possibility of higher failure rates with MET and an option for early URS was given. Immediate URS was done in patients who did not want MET or had intractable symptoms.

RESULTS

In our study period, 521 non-pregnant sexually active female patients with clinical features of ureteric colic were evaluated by ultrasound. Among 521 patients, 112 patients were diagnosed with renal calculus, 98 had a calculus in the ureter (30 in upper and 68 in lower ureter including uretero-vesical junction [UVJ]), 24 patients had appendicitis and 101 had a gynaecologic and 31 other cause for pain on TAS. The TAS was inconclusive in 155 patients and 31 out of 112 patients with renal calculus had unclear status of distal ureter on TAS.

These 186 patients out of the total 521 were selected for TVS. 11 patients did not consent for TVS by an endo-vaginal probe and hence were excluded from the study. So, a total of 175 patients underwent TVS. The body mass index (BMI) of patients that underwent TVS (24.5 +/- 5.1 kg/m2) was

significantly higher than those who were diagnosed on TAS alone (22.8 +/- 4.9 kg/m2). Those who gave consent, their mean +/- SD Age was 35 +/- 9.3 years and mean +/- SD BMI was 24.5 +/- 5.1.

Table 1: Age and BMI of patients underwent TVS

Parameters	Mean +/- SD
Age	35 +/- 9.3 years
BMI	24.5 +/- 5.1 kg/m2

A lower ureteric calculus could be identified in 61 patients on TVS. A gynaecologic disease was found in 29 patients, 11 patients had some other identifiable cause for the symptoms and 74 patients had inconclusive result. 61 out of the remaining 74 patients with inconclusive TVS underwent an NCCT scan in which 3 patients had a calculus in lower ureter that could not be identified on TVS. Of the 31 patients with a renal calculus and inconclusive status of distal ureter, 6 were found to have distal ureteric calculus on TVS. 2 of these 6 patients with ureteric calculus had ureteral jet present on TAS. On TVS the average size of ureteral calculi was 6.9 +/- 3.1 mm. The sensitivity, specificity and positive predictive value of TAS in our study were 41.00%, 100% and 100% respectively, whereas the same for TVS were 94.25%, 100% and 100% respectively.

Table 2: Diagnosis on the basis of Scan

Diagnosis on TAS (n = 521)	Number of patients
Renal stone	112
Ureteric stone	98
Appendicitis	24
Gynaecologic cause	101
Others	31
Inconclusive	155
Diagnosis on TVS (n = 175)	
Ureteric calculus	61
Gynaecologic cause	29
others	11
Inconclusive	74

DISCUSSION

Ultrasound has been advocated as a primary tool for diagnosis and imaging of urinary tract calculi. Apart from being non-invasive and radiation-free, it is considered a cost-effective modality in many countries. In experienced hands, it is reproducible and is an effective modality for follow-up of patients with urinary tract calculi (8). Although NCCT has been found to be superior to TAS in evaluating patients with lower ureteric calculus, still TAS is usually done because there is no radiation exposure and it is cost-effective. Also, the TAS have a limited role in obesity and presence of excessive bowel gases (9).

TVS has already proven superiority over TAS for conditions like evaluation of infertility, early pregnancy, and various gynaecologic conditions such as tubo-ovarian lesions and endometriosis (10 – 12). Some studies have also shown the utility of TVS in conjunction with TAS for diagnosis of appendicitis (13,14). The utility of TVS in diagnosing ureteric calculus has been previously described in literature but most are either small studies or case reports (3,9,15).

A prospective study conducted by Pateman et al. (16) in 2013 demonstrated that even normal ureters can be visualized in 96% of patients and the status of distal ureters should be routinely reported in patients undergoing TVS for pelvic pathologies. This according to them was independent of the experience of the operator. This further emphasizes the utility of TVS in evaluation of patients with distal ureteric calculi.

TVS has been reported to be useful in patients with BMI >30 kg/m2 (17). In our study as well, the mean BMI of patients with inconclusive TAS was higher than patients who had a diagnosis made on TAS. One of the inherent flaws of TAS in detection of ureteric calculi has been its low sensitivity, which in literature is reported to be up to 45% (8,18). In our study as well the sensitivity of TAS was low at 41%. The addition of TVS increased this to 94.25%. NCCT has been reported to have a sensitivity of 100% for detection of ureteric calculi >3 mm in size and with a sensitivity of 94.25% in our study TVS comes close to this (8,19).

We found TVS to be of great value in evaluating patients with suspected ureteric calculus and based on our results will continue its use in sexually active female patients with suspected lower ureteric calculus. An important advantage we felt was no need of waiting for bladder filling that helped in early delivery of reports to the patient. In addition to that we could identify other pelvic pathologies, which were not seen on TAS. This would reduce the cost of investigations as well because NCCT is definitely costlier than ultrasound. We feel TVS is easy to perform and is reproducible and according to us a very handy tool in evaluation of patients with distal ureteric calculus.

CONCLUSION

Our study proves that TVS has a role in evaluation of sexually active female patients with suspected lower ureteric calculus. We feel that in sexually active female patients, initially TAS should be done and if there is still doubt, then one should not hesitate to proceed with TVS. Whether TVS should be made standard in the initial evaluation of sexually active female patients with suspected ureteric calculus can only be confirmed by a larger randomized blinded study to compare it with other modalities of initial imaging.

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