ABSTRACT

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 diagnosis of the acute abdomen should be considered (2). The presence or absence of ureteral jet was recorded on TVS. If the stone was not visible on TAS and TVS, then 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. Around 85% of ureteric stones are located in the distal ureter including uretero-vesical junction (UVJ). 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.

INTRODUCTION

Around 85% of ureteric stones are located in the distal ureter. Our objective is to see efficacy of TVS in diagnosis of non-pregnant sexually active females with distal ureteric calculi. TVS has been demonstrated to be useful in evaluation of lower abdomen 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 vaginosonography) 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 5C 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 calculus. 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 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. Around 85% of ureteric stones are located in the distal 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 115 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 kg/m2.

A lower ureteric calculus could be identified in 61 patients on TVS. A gynecologic 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 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 calculus 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.

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<th>Table 1: Age and BMI of patients underwent TVS</th>
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DISCUSSION
Ultrasound has been advocated as a primary tool for diagnosis and imaging of urinary tract calculus. 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 calculus (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 has 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 gynecologic 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. (18) 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 94.28%. NCCT has been reported to have a sensitivity of 100% for detection of ureteric calculus >3 mm in size and with a sensitivity of 94.28% 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 calculi.

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 blind study to compare it with other modalities of initial imaging.

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REFERENCES

