ORIGINAL ARTICLE

Sonographic Assessment of Post Void Residual Urine Volume in Patients with Lower Urinary Tract Symptoms

TANVEER MAHMOOD, KHALID FAROOQ

ABSTRACT

Significant post void residual urine volume is commonly seen in patients with bladder outflow obstruction e.g. patients with enlarged prostate. Accurate measurement of post void residual urine volume forms an important first line investigation and carries significant diagnostic value. This study was conducted to determine the accuracy of post void residual urine measurement in patients presenting to the Urology outpatient department with lower urinary tract symptoms. Ultrasound was done with full bladder and pre void bladder volume was noted. Patients were then asked to empty their bladder and come back immediately for the second examination, when the post void urine volume was recorded. PMRU measurements done in patients with bladders filled to maximum capacity resulted in false high estimations of PMRU. For reliable measurements of PMRU in patients with Lower urinary tract symptoms it is recommended that PMRU measurements be done on moderately filled urinary bladders.

Key words: PMRU, LUTS, Ultrasonography

INTRODUCTION

Significant post void residual urine volume is a common finding in patients presenting with Lower Urinary Tract Symptoms. Accurate assessment of this volume forms an important first line investigation, and contributes significantly towards diagnosing voiding dysfunction and in the diagnosis and management of patients with lower urinary tract symptoms (LUTS).Urethral catheterization is considered the gold standard for measurement of post void residual urine volume, but it may lead to urethral trauma and infection.Transabdominal ultrasound on the other hand is non invasive, relatively cheaper, and easy to perform. In addition ultrasonography has been reported to have high sensitivity and specificity for the estimation of PMRU[1, 3]. Others have reported it to be variable and unreliable [2]. The patients whose PMRU is to be measured are instructed to drink large amounts of fluids before the examination. According to Alivizatos etal [1,3] this is not a realistic situation, and fluid intake in such large amounts may stress and temporarily decompensate the urinary bladder leading to unreliable PMRU measurements especially in patients with LUTS. Keeping in view this background we present our experience in PMRU measurements in patients with lower urinary tract symptoms.

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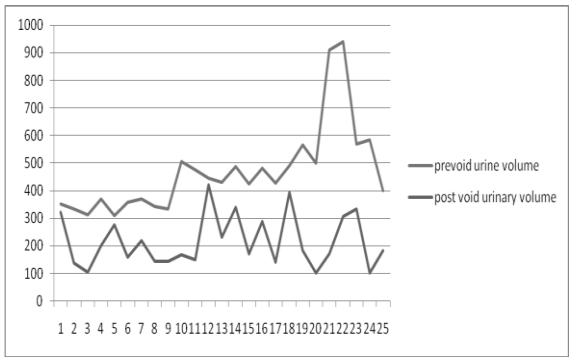
MATERIAL & METHODS

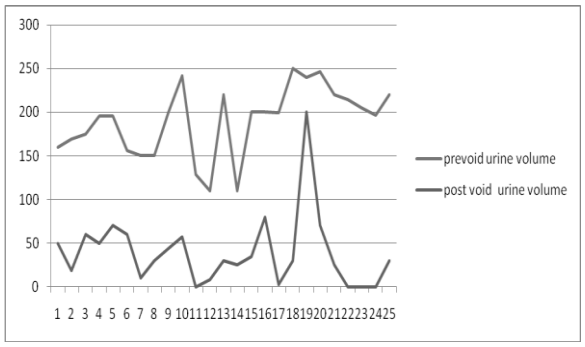
This study was conducted jointly by the Department of Urology, and Department of Radiology, Ghurki Trust Teaching Hospital, Jallo More, affiliated with Lahore Medical & Dental College, Lahore.
50 male patients presenting to urology OPD with LUTS were included in the study. Patients with indwelling Foleys catheters either due to acute urinary retention or due to neurologic bladders were not included in the study. In 25 patients pre void urine volume was up to 250 ml while in rest of the 25 patient's pre void urine volume was more than 300 ml. Trans abdominal Ultrasound was done first with full bladder. The status of kidneys and bladder and size of prostate were noted. The pre void urine volume was also recorded. Patients were then instructed to pass urine and come back immediately after voiding for the second examination.

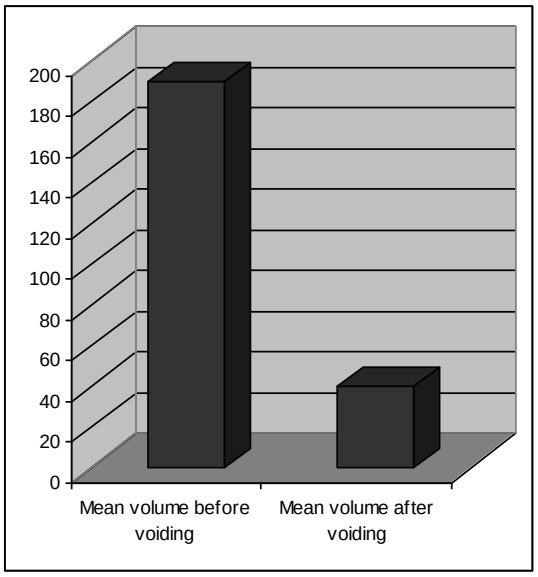
RESULTS

Mean pre void urine volume in the first group was 190 ml.Range 246 -110 ml. while mean pre void urine in the second group was 468 ml. Range 941 -312 ml. Post void residual urine volume in the first group ranged from 0 ml (4 Pts.) to 200 ml (1 Pt.)Range 0-200 ml. Mean volume 19ml.PMRU in the second group ranged from 100ml–420ml. Mean volume was 215 ml.

=n	Mean Age	Mean Pre void Bladder volume	Mean post void residual urine volume
25	60 years	190 ml	39 ml
25	56 years	468 ml	215 ml







DISCUSSION

High amounts of post void residual urinary volumes can lead to lower urinary tract symptoms such as frequency, nocturia, overflow incontinence, and recurrent urinary tract infections. Long term effects of high post void residual urine volumes include upper tract problems such as hydronephrosis, bladder calculi and in neglected cases ultimately leading to chronic renal failure. Due to this reason accurate measurement of PMRU is vital for the diagnosis and managements of patients with LUTS, especially those with bladder outflow obstruction secondary to enlarged prostate.

Patients with significant amounts of post void residual urine volume are generally considered for surgical management of bladder outflow obstruction, whereas patients with low post void residual urine volumes are managed conservatively.

Urethral catheterization has been accepted as the gold standard for PMRU measurement[4], but it may lead to urethral trauma and urinary tract infection. Although some studies suggest poor correlation between the bladder volumes predicted by ultrasonography and those obtained by urethral catheterization, ultrasonography is a reliable cheap, noninvasive and simple method that is routinely used for this purpose[5].

In clinical practice patients waiting for PMRU measurement ultrasound are instructed to drink large amounts of fluids in order to fill their bladder before examination. Also due to a large number of patients waiting for ultrasonography on a busy working day, sometimes these patients have to wait for long periods of time for their turn, resulting in overfilling of their bladders. Consequently when they are asked to micturate after the first assessment, they are unable to empty their bladders fully, thereby resulting in large amount of residual urine volume. Eriz Ozden et al[6] have reported significant amount of residual urine volume even in young healthy subjects without any LUTS. High pre void urine volumes in these subjects cause high false positive PMRU values.

In a study by Alivizatos et al[7], the authors tested the consistency of PMRU measurements after filling the bladder to maximum capacity, with an increased fluid load, and PMRU measurements after the bladder was filled under normal circumstances, in which the patients emptied their bladders at the first desire to void. Accordingly the mean PMRU value was 195mL, when the patients voided after a full bladder, compared to a mean PMRU value of only 41mL when they voided after the first desire to void.

This is in accordance with our study where we found high PMRU values in patients examined with bladders filled to maximum capacity.Blankers et al[8] stated that people often void before the maximum bladder capacity has been reached. This also indicates that PMRU should be measured before the bladder is filled to maximum capacity.

Milleman et al[9] states that PMRU represents the summation effect of the functions of the bladder and urethral sphincter mechanism. Over distended bladders may temporarily result in acutely stressed and decompensated detrusor muscles leading to incomplete emptying resulting in high PMRU values.

Our findings match those of Alivizatos et al, but in their study the authors have recommended that PMRU measurements should be performed at the first desire to void. In these patients however pre and post void urine volumes may be too low to be of any diagnostic value. On the other hand patients who have over distended bladders may be unable to fully empty their bladders again resulting in unreliable PMRU measurements.

Eric Ozden et al[10] in their study have concluded that a minimum pre void bladder volume of 200mL and no greater than 540ml leads to optimum evaluation of PMRU. Their study was carried out in healthy young men where pre void bladder volumes above 540ml led to false high PMRU values. This problem is compounded in patients with LUTS leading to false high estimations of PMRU. This results in errors in diagnosis and further management problems for both the patient and the treating physician.

Benacerraf et al[11] has stated that due consideration must be given to the discomfort caused to patients who have to wait to maintain a full bladder resulting in unnecessary distress and false high PMRU values.

CONCLUSION

In conclusion patients with LUTS who have an uncomfortably full bladder before ultrasonography may end up with false high estimations of PMRU values. To prevent this scenario it is recommended that ultrasonography in these patients be done with moderately full bladders.

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