

Study of ultra-sonographic comparison of prostate size with post void residual urine volume at a tertiary care center

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Abstract

Background: As life expectancy increases, benign prostatic hyperplasia will be a significant cause of morbidity. About 50% of men with histologically proven BPH have moderate to severe lower urinary tract symptoms (LUTS) that are symptoms related to storage and voiding of urine. The urinary bladder ultrasound is a simple, accurate, safe, and clinically relevant method for evaluation of post void residual urine volume and prostate size in benign prostatic hyperplasia patients. In present study we aimed to compare prostate size with post void residual urine volume, both measured by transabdominal ultrasound. **Material and Methods:** Present study was observational, prospective, cross-sectional type conducted in symptomatic and asymptomatic male patients of 50 yrs or above. Patients were initially assessed for pre-void residual urine volume with transabdominal ultrasound. During same time prostate size was measured by transabdominal route. Immediately after micturition post void volume was measured with transabdominal ultrasonography. **Results:** After applying inclusion and exclusion criteria, total 80 patients were included in present study. 61-70 years age group was most common (43.75%). Most patients had 100-200 ml prevoid urine volume (55%), followed by 50-100 ml (21.25%) and 201- 300 ml (13.75%). Post-void urine volume was less than 60 ml in majority of patients (63.75%). In other patients post-void urine volumes were 61-80 ml (10%), 81-100 ml (7.5%), 101-120 ml (8.75%), 120- 400 ml (6.25%) and more than 400 ml (3.75%). Increase in post void residual volume with was noted with increasing prostate size. A statistically significant correlation was present between post void residual volume and prostate volume. **Conclusion:** Trans-abdominal estimation of prostate size and postvoid residual of urine are important in preliminary evaluation of benign prostatic hyperplasia patients.

Key Words: benign prostatic hyperplasia, post-void residual urine volume, prostate size, transabdominal ultrasound

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INTRODUCTION

Benign prostatic enlargement (BPE), bladder outlet obstruction (BOO) and lower urinary tract symptoms (LUTS) is the basic triad for clinical diagnosis of benign

prostatic hyperplasia (BPH)¹. The clinical diagnosis of benign prostatic hyperplasia is made by assessment of prostate size or volume and reduced urinary flow rate. Prostatic hyperplasia increases the resistance to the flow of urine. Compensatory changes in the urinary bladder function along with age related changes in nervous system function lead to urinary frequency, urgency and nocturia, the most troublesome benign prostatic hyperplasia related complaints. As life expectancy increases, benign prostatic hyperplasia will be a significant cause of morbidity. About 50% of men with histologically proven BPH have moderate to severe lower urinary tract symptoms (LUTS) that are symptoms related to storage and voiding of urine². The urinary bladder ultrasound is a simple, accurate, safe, and clinically relevant method for evaluation of post void residual urine

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volume and prostate size in benign prostatic hyperplasia patients³. Abdominal ultrasonography (USG) is the commonest modality for ascertaining prostate volume. The accurate determination of prostatic volume is important in determining the degree of hyperplastic enlargement, the resultant tendency toward urinary-tract outflow obstruction, and the preferred surgical treatment option. It is also important in determining which prostatic cancer patients are suitable for brachytherapy, as prostates with volumes above 50 mL are usually excluded⁴. In present study we aimed to compare prostate size with post void residual urine volume, both measured by transabdominal ultrasound.

MATERIAL AND METHODS

Present study was observational, prospective, cross-sectional type conducted in department of Radiodiagnosis, Department of Radiology, B.K.L. Walawalkar Rural Medical College, Kasarwadi. Study period was from October 2018 to August 2019. Approval

was taken from institutional ethical committee. Patients referred for estimation of prostate size and postvoid urine volume assessment were considered for present study. Inclusion criteria included symptomatic and asymptomatic male patients of 50 yrs or above. Exclusion criteria included below 50 yrs of age, bladder volume > 540 ml, critically ill subjects, patients on anticholinergics, patients with UTI or neuropathic bladder. Informed consent was obtained from all the subjects selected for study. Chief complaints, demographic profile, medical and surgical history of patients was collected in proforma. Complete physical examination was done for every patient. Patients were initially assessed for pre-void residual urine volume with transabdominal ultrasound. During same time prostate size was measured by transabdominal route. Patients were instructed to come immediately after micturition. After micturition, patients post void volume was measured with transabdominal ultrasonography. Statistical analysis was done using descriptive statistics.

RESULTS

After applying inclusion and exclusion criteria, total 80 patients were included in present study. 61-70 years age group was most common (43.75%), followed by 71-80 years age group (21.25%) and >80 years age group (18.75%).

Table 1: Distribution of patients according to age group

Age group	No. of patients	percentage
51-60	13	16.25%
61-70	35	43.75%
71-80	17	21.25%
>80	15	18.75%
Total	80	

Most patients had 100-200 ml prevoid urine volume (55 %), followed by 50-100 ml (21.25%) and 201- 300 ml (13.75%).

Table 2: Distribution of pre-void urine volume

Pre-void urine volume	No. of patients	Percentage
Less than 50	3	3.75%
50-100 ml	17	21.25%
101 – 200 ml	44	55.00%
201- 300 ml	11	13.75%
301- 400 ml	2	2.50%
More than 400 ml	3	3.75%
Total	80	100.00%

Post-void urine volume was less than 60 ml in majority of patients (63.75 %). In other patients post-void urine volumes were 61-80 ml (10 %), 81-100 ml (7.5 %), 101-120 ml (8.75%), 120- 400 ml (6.25%) and more than 400 ml (3.75%).

Table 3: Distribution of post-void urine volume

Residual urine volume	No. of patients	percentage
0-20 ml	12	15.00%
21-40 ml	16	20.00%
41- 60 ml	23	28.75%
61-80 ml	8	10.00%
81-100 ml	6	7.50%
101-120 ml	7	8.75%
120- 400 ml	5	6.25%
more than 400 ml	3	3.75%
Total	80	

We assessed relationship of post void residual urine volume with prostate volume. Increase in post void residual volume with was noted with increasing prostate size. A statistically significant correlation was present between post void residual volume and prostate volume.

Table 4: Relationship of post void residual urine volume with prostate volume

Prostate volume (gms)	post void residual urine volume (in ml)							Total	
	0-20	21-40	41-60	61-80	81-100	101-120	121-400		>400
<25	8	11	17	0	0	0	0	0	36
25-34	3	5	4	0	0	0	0	0	12
35-49	1	0	2	7	1	3	0	0	14
50-79	0	0	0	1	5	4	2	0	12
>80	0	0	0	0	0	0	3	3	6
Total	12	16	23	8	6	7	5	3	80

($p = 0.002, r = 0.367$)

DISCUSSION

European countries routinely use post void residual measurement as a diagnostic test and most suggest that high values of post void residual are an indication for surgery. Accurate determination of intravesical residual urine is of significant importance and serves as an index of the adequacy of bladder emptying. The ability to confirm this measurement by USG, avoids discomfort, urethral trauma and urinary tract infection. Also it avoids the need for catheterization and permits more physiological assessment and allows for repeated examination without fear and anxiety for the patient⁵. Trans abdominal sonography is easy to perform, and provides reliable measurements of prostate size and its intravesical extension, post-void residual volume, also allowing simultaneous assessment of bladder and upper urinary tract. Edmund K *et al*⁷ stated that “our experience over the past 13 years has shown that the prostate can often be adequately visualised and measured with smaller urinary bladder volumes (150 mL or less) than the full bladder (300–400 mL) stated in available instruction manuals”. This fact has been partly confirmed by Bapat *et al*.⁸ They showed that a minimal urinary bladder volume of 100–200 mL is essential for near accurate estimation of prostate volume by TAUS. The study also revealed that with increasing bladder volume, the volume of the prostate increases disproportionately to its actual volume. We noted a statistically significant correlation between post void residual volume and prostate volume. Similar results were noted by Joshi BR and Dwivedi SK⁵. They further stated that, in patients with lower urinary tract symptoms, knowing the relationship between prostate volume, inner gland volume and its relationship with postvoid residual urine volume can help a lot to predict the degree and cause of obstruction. Larger the size of the gland, greater the post void residual urine volume. It will help the clinicians to determine the severity of the symptoms and line of management to be undertaken.

Higher the inner gland volume and prostate volume, higher is the possibility of benign prostatic hyperplasia being the cause of increased post void residual urine volume. It has been proven that the diagnosis of bladder outlet obstruction cannot be made by symptomatic assessment alone. Size of prostate and postvoid residual of urine are important in evaluation of BPH. Prostatic volume is an important determinant for selecting the treatment, with surgeons preferring open resection for larger prostatic volumes⁹. Studies shown that ultrasound estimated prostate weight or prostate transition zone volume can also predict obstruction¹⁰.

CONCLUSION

We conclude that trans-abdominal estimation of prostate size and postvoid residual of urine are important in preliminary evaluation of benign prostatic hyperplasia patients. Patients with advanced symptoms may require further evaluation.

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