Original article

Uroflowmetry in bladder outflow obstruction evaluating sensitivity and specificity- A clinical study

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Abstract

A study was conducted to explore the relationship between uroflowmetry variables and Bladder Outflow Obstruction (BOO) suggestive of BPH and to compare with those of control group and analyzed to define performance statistics (sensitivity, specificity, positive predictive value, negative predictive value). 28 subjects with BOO suggestive of BPH and 23 controls having no voiding dysfunction were randomly selected at Khwaja Yunus Ali Medical College and Hospital in Bangladesh, from October 2006 to March 2008. Average values of different uroflowmetry variables of the patients and controls were compared to each other to see the value of uroflowmetry as initial test.

Results: The average age in years for subject of BOO and controls were 66.96±9.46, 62.26±9.42 respectively. Average peak flow rate (Qmax) and mean flow rate (Qave) for subjects and controls were 15.54±11.20, 6.32±4.35 ml/sec and 21.57±15.8, 9.47±7.92 ml/sec respectively. Average voiding time (VT) for subject of BOO and control were 65.37±55.58 sec and 56.26±42.96 sec respectively. We found sensitivity 79 %, specificity 35 %, prevalence 54 %, positive predictive value was 70 %; negative predictive value was 31 %, correlation coefficient between peak flow and voiding time was - 0.19522, mean flow and voiding time was -0.50534 respectively. Results shows uroflowmetry is more sensitive but less specific for initial diagnosis of BOO. Conclusion: These findings should be considered if uroflowmetry is to be used as the basis for deciding further evaluation for clinical management of men with BOO/LUT's or voiding dysfunction and may be particularly useful for Urologists with limited facilities. Uroflowmetry can widely be used in routine evaluation of BOO as noninvasive, simple inexpensive procedure in urology practice.

Key words: Uroflowmetry, Bladder Outflow Obstruction (BOO). Peak flow (Qmax), Mean flow (Qave). Voiding time (VT).

Introduction:

When evaluating patients with, LUT's or BOO, noninvasive, simple and inexpensive Urodynamic test such as uroflowmetry can help to determine whether additional testing is warranted. Although, uroflowmetry has some limitations like circadian changes, psychological distress, and use of abdominal straining, pinching of the

penis and the wag effect that is change of direction of the urinary stream, producing upward downward artifacts in the flow curve, still now consider as screening test.1 We compared the various uroflowmetry variables of subjects having BOO with control and tried to see the sensitivity and specificity of this test.

Materials and Methods:

Among the subjects who underwent initial evaluation for voiding dysfunction or BOO suggestive BPH between October 2006 to March 2008, a total of 28 subjects age ranged 50 to 83 years (mean age 66.9± 9.46 years) enrolled in this study. Consequently, 23 subjects age ranged 50 to 84 years (mean age 62.26±9.42 years) who came for urology consultation in this institute, other than voiding dysfunction was enrolled as control. Approval of the Institutional Ethics Committee and inform consent was taken. The inclusion criteria were the following:All patients presenting to this institute for urological consultation, who will undergo prostatectomy or medical management for BOO was eligible for the study. Exclusion criteria were the following : Patients who were less than 50 years of age or presented with urinary complaints for stricture urethra, neurogenic bladder, septic on presentation or nonambulatory wheelchair bound. All patients were divided into 3 age groups, to see any age related change in uroflowmetry variables. From 50 to 60 yrs of age in group I, from 61 to 70 yrs of age in group 2 and from 71 to 84 yrs of age in group 3. The ICS recommended uroflowmetry variables were recorded for patients and controls by the same uroflowmeter and compared to each other .

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Statistical analysis:

The data were computed for comparison and calculated sensitivity, specificity, positive predictive value, negative predictive value . Correlation coefficient among Qmax and VT, Qave and VT were calculated by Pearson's correlation formula.

Results:

Patients characteristics are shown in table 1. ICS recommended uroflowmetry variables are shown in table 2. The mean Qmax and Qave of BPH patients were 15.54±11.20 ml/sec, 6.32±4.35 ml/sec and in control were 21.57±15.8 ml/sec, 9.47±7.92 ml/sec respectively ($p > 0.05$) which is higher than that of patient population indicating informative results by Qave. Average voiding time for BPH and control were 65.37±55.58 sec, 56.26± 42.96 sec respectively ($p > 0.05$). No statistical significance was found when compared mean Qmax and Qave of BPH and control but Qmax and Qave were lower and VT was prolonged than those of control ($p>0.05$). After statistical analysis of the test results , the sensitivity 79%, specificity 35%, positive predictive 70%, negative predictive value 30% was found . Correlation coefficient between Qmax and VT (-0.19522), Qave and VT were negatively correlated for BPH patients.

Table 1. Patients Characteristics

	BPH	Control
No. of patients	28	23
Age ranged (yrs)	50-83	50-84
Mean	66.96±9.64 SD	62.26±9.42 SD
Duration of study	October 2006 to March 2008	

Table 2. ICS recommended Uroflowmetry variables

Variables	BPH	Control
Qmax (ml/sec	15.54±11.20 SD	21.57±15.8 SD
Qave (ml/sec)	6.32±4.35 SD	9.47±7.92 SD
Voiding time (sec)	65.37±55.58 SD	56.26±42.96 SD ($p>0.05$)

Table 3. Average Qmax according to ages (ml/sec)

Age groups	BPH Control	
50-60 yrs (group-1)	18.33±4.78 SD	24.40±16.17 SD
61-70 yrs (group-2)	15.07±13.53 SD	16.13±16.05 SD
71-84 yrs (group-3)	14.25±11.54 SD	32.75±22.68 SD

Table 4. Average Qave according to age (ml/sec)

Age groups	BPH	Control
50- 60 yrs (group-1	8.83±43 SD	8.27±3.88 SD
61-70 yrs (group-2)	6.36±5.12 SD	6.13±4.45 SD
71-84 yrs (group- 3)	5.13±2.42 SD	13.75±13.6 SD

Table 5. Average voiding time according to age (sec)

Age groups	BPH	Control
50-60 yrs (group-1)	61.33±35.4 SD	61±50.41 SD
61-70 yrs (group-2)	54.79±32.21 SD	58.5±46.18 SD
71-84 yrs (group-3)	86.88±93.63 SD	38.75±14.22 SD

Discussion :

Pressure flow study, ultrasonography and post void residual urine measurement and many other invasive and noninvasive model have been made for predicting BOO suspecting BPH patients. BOO is correlate well with the intraprostatic pressure because, hyperplastic prostate is like a closed system in which outer capsule closes the inner glandular tissue. As the prostate grows, intraprostatic pressure rises. This has been supported by the correlation of urethral pressure profile2,3. In a study used transperineal ultrasonography to measure the velocity flow of urine at the prostatic urethra and sphincter urethra (Doppler urodynamics) to diagnose BOO with high sensitivity and specificity3,4.One of the simplest and most useful urodynamic investigation is the measurement of urine flow rate using uroflowmeter. This correlation of the flow rate

with the post-micturition bladder residual volume adds useful information about bladder out flow obstruction.6,7 Uroflowmetry has a good specificity, a high negative predictive value and a good diagnostic value such as to make it useful as the first diagnostic approach in urogynaecological patients 6,8. One study group investigated the validity of the cuff-uroflow method as a diagnostic technique for BOO in males and the results were related to the presence of BOO. According to the provisional ICS nomogram, the method showed a better sensitivity than specificity for the diagnosis of BOO. In our study we found uroflowmetry more sensitive than specific when compared with normal population.9 find relationship between uroflow variables and LUTS one study concludes that uroflowmetry can provide a valuable improvement over symptoms alone in the diagnosis of the cause of lower urinary tract dysfunction in men presenting LUTS. The study also provides performance statistics for Qmax with respect to BOO. They also showed that low-volume uroflowmetry can provide useful diagnostic information as well. The results found in our study also emphasize the uroflowmetry result for preliminary information for lower urinary tract dysfunction with high positive predictive value and 79% sensitivity9. In our study population the age was similar to those of control. We divided the population of both BPH and control into 3 age groups to see any influence on the uroflow variables in different ages. Average Qmax according to age groups are shown in table 3. The results showed no significant difference in Qmax but a lower trend was observed with prolonged voiding time in 3 age groups of BPH and control. Mean Qave in 2 age groups (group 1 and 2) as shown in table 4, were lower than that of control. In age group 3, the Qmax and Qave were lower with prolonged voiding time than that of control. Average VT according to age is shown in table 5. It is true that gold standard to evaluate grade of lower urinary tract symptoms is urodynamic studies with pressure- flow studies. Uroflowmetry is regarded as one of the most useful urodynamic techniques for

objective assessment of obstructive uropathy.For decades, uroflowmetry has played a major role in the evaluation of voiding complaints and helps in making decision about the need for therapeutic intervention to relieve LUTS. As we more into an era when alternatives to surgery are increasingly used to treat BPH, the times has come to consider the minimum diagnostic criteria that should be established before any medical or surgical treatment is recommended.

Conclusion :

Uroflowmetry had higher sensitivity (95 % confident interval), that can widely be used for routine evaluation of BOO suggestive of BPH as noninvasive and simple procedure. It is clear that the Qave and voiding time are more informative for BOO. These findings should be considered if uroflowmetry is to be used as the basis for deciding the clinical management of men with LUTS and may be particularly useful for urologist with limited facilities.Conflict of interest : none.

This study underwent after approval of the Institutional Ethics Committee and inform consent.

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