Research Article

Uroflowmetry Evaluation of Lower Urinary Tract Symptoms in Patients with Benign Prostatic Hyperplasia an institutional study

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Abstract

BPH is one the common conditions found in an ageing man, presenting with LUTS. This study focused on comparison of IPSS score with prostrate size and uroflowmetry. We found the age group of 61-70 years were most commonly affected. Symptom score collected, co-related well with uroflowmetry than prostrate size obtained from ultrasound. The average flow rates co-relates well with IPSS score and also co-relates weakly with post void residual urine. Based on this study, the severity of BPH has nothing to do with prostratic size. IPSS score and uroflowmetry should be used to predict the severity of BPH.

Key words: IPSS score, Post void residual urine, Uroflowmetry.

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INTRODUCTION

Benign prostatic hyperplasia(BPH) has been a known cause of urinary obstruction and it is the most common disease which affects ageing men [1]. In patients with BPH, enlargement of the prostate generally leads to bladder outlet obstruction (BOO) and it causes a variety of bothersome lower urinary tract symptoms (LUTS) [2]. One should assess the severity of symptoms rather than the increase in the prostatic volume during the management of BPH [3]. The severity of lower urinary symptoms can be measured reliably by using a number of validated questionnaires, like International Prostate Symptom Score (IPSS), Boyarsky score, Madsen Iversen score and Danish prostatic symptom score. A questionnaire which is called International Prostate Symptom Score (IPSS) has been recommended as a symptom-scoring instrument which can be used for the baseline assessment of the symptom severity in men who present with LUTS. Von Garrelts introduced uroflowmeter in 1957 [4]. It is a useful, simple, non-invasive urodynamic tool which can be used for the objective assessment of intra-vesicular obstruction, and it is helpful in the decision-making process and management of benign prostatic hyperplasia [5,6]. Uroflowmetry is indicated in patients who have signs and symptoms which are suggestive of bladder outlet obstruction. A Q max (peak flow rate) of < 12 ml/s has been interpreted to be suggestive of BOO. Most of the clinical trials use this cut off value as inclusion criteria [7]. Q max is often used equivalently with pressure flow studies to define bladder outflow obstruction [8].

MATERIALS AND METHODS

A hospital based prospective study was carried out on patients who were admitted at Father Muller Medical College Hospital (FMMCH), Mangalore with lower urinary tract symptoms (LUTS) which were suggestive of benign prostatic hyperplasia (BPH). Due clearance from the ethical committee of the institution was taken prior to

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start of the study. Sixty consented patients with LUTS which were suggestive of BPH,were included in the study. All these patients were subjected to a detailed history taking, physical examinations, International Prostatic symptom score (IPSS) assessment, digital rectal examinations (DREs), renal function tests (blood urea, serum creatinine), complete urine analysis, ultrasound and Uroflowmetry.

Inclusion criteria

1) Patients presenting with LUTS.
2) Those with age > 50 years.

Exclusion criteria

1) Patients who had undergone prior urinary tract or pelvic surgeries.
2) Patients who had past history of prostatic surgery, prostatic carcinoma, urethral stricture, vesical calculus or neurogenic bladder.
3) Patients who had systemic disorders that could influence bladder function, such as neurological disorders, diabetes.
4) Patients whose voided urine volume was less than 180 ml.
5) Patients who were on medical treatment of BPH.

All included patients were evaluated by using IPSS questionnaire. The IPSS is the ideal instrument which can be used to grade baseline symptom severity. The IPSS is based on the answers to seven questions which concern urinary symptoms. Each question is assigned points from 0 to 5 which indicate increasing severity of the particular symptom and a total score which ranges from 0 to 35. Uroflowmetry is a simple procedure which is used to calculate the flow rate of urine over time. The machine gives the result in terms of peak flow rate (Q max), flow time, voided volume and average flow rate. Uroflowmetry is performed in patients with full bladders. Adequate privacy was provided and patients were asked to void when they felt a 'normal' desire to void. Uroflowmetry was performed, by having a person urinate into a special funnel that wasconnected to a measuring instrument. Patient urinated in a special urinal in toilet which was equipped with a machine, which had a measuring device. Patients were asked to press a button shortly before starting the urination. The machine gave the result as peak flow rate(Q max), voiding time, voiding volume and time to peak flow. The test involved normal urination and so patients didn't experience any discomfort. The data of the patients was analyzed and the patients were divided as per their symptom severities, as was assessed by IPSS. The results of uroflowmetry were obtained from these patients and compared by using various statistical techniques. Pearson's correlation co-efficient was used to assess correlation between various variables.

RESULTS

The mean age of the patients was 67.8 years. A majority of the patients (43.3%) were in the age group of 61-70 years. As per IPSS scoring, out of 60 patients, 41 patients had severe symptoms, while 19 had mild to moderate symptoms.The mean prostatic size was 31.9 cc, with a range of 16 – 58cc. When the patients were divided as per their symptom severity scores, the mean prostatic size in patients with moderate symptoms was 33.7cc and that in patients with severe symptoms, it was 30.4cc. The p-value was found to be more than 0.05, which was not significant. The correlation co-efficient of prostatic size in patients with moderate symptoms was 0.25, whereas in patients with severe symptoms, it was 0.087. The overall correlation co-efficient of IPSS with prostatic size was found to be 0.18. The mean post voiding residual urine (PVRU) in patients was 212ml. With a range of 60-480mlTable/Fig-1. In our study, the mean value of peak flow rate was found to be 10.6ml/sec, with a minimum recording of 3ml/sec and a maximum recording of 19ml/sec Table/Fig-2. The mean average flow rate was found to be 6.8ml/sec, with a minimum recording of 0 ml/ sec and a maximum recording of 12 ml/ secTable/Fig-3. In our study, the mean time to peak flow, voided volume, voiding time and flow time were found to have an insignificant relationship with symptom severity.

Table 1: Showing post voiding residual urine

PVRU (ml)	Mean (SD)	212.10
	Range	60-480
	Correlation co-efficient (r) with IPSS	0.01
	IPSS Moderate Mean (SD)	33.73
	IPSS Severe Mean (SD)	30.43
	t- test; p-value*	0.24; >0.05, NS

*NS: Non-Significant; S: Significant; HS: Highly Significant
Correlation co-efficient (r)
ranges from –1 to +1, with –1 describing a perfect negative linear relationship and
+1 describing a perfect positive linear relationship

Table 2: Showing peak flow rate

Flow Rate (ml/sec)	Mean (SD)	10.6
	Range	3-19
	Correlation co-efficient (r) with IPSS	-0.67
	IPSS Moderate Mean (SD)	13.4
	IPSS Severe Mean (SD)	8.9
	t- test; p-value*	4.7: <0.001 HS

*NS: Non-Significant; S: Significant; HS: Highly Significant
Correlation co-efficient (r)
ranges from –1 to +1, with –1 describing a perfect negative linear relationship and
+1 describing a perfect positive linear relationship

Table 3: Showing average flow rate

Average Flow Rate	Mean (SD)	6.8
	Range	0-12
	Correlation co-efficient (r) with IPSS	-O.62
	IPSS Moderate Mean (SD)	9.4
	IPSS Severe Mean (SD)	4.6
	t- test; p-value*	3.8; <O.OO1, HS

*NS: Non-Significant; S: Significant; HS: Highly Significant
Correlation co-efficient (r)
anges from –1 to +1, with –1 describing a perfect negative linear relationship and +1
describing a perfect positive linear relationship

DISCUSSION

The present study which was done on 60patients was designed to determine the relationship among the parameters of uroflowmetry and symptom severity. The mean age of patients in this study was 67.8 years. Most of the patients (46%) were in the age group of 61-70 years. Mebust *et al*., in their study, displayed almost similar results with patients who had an average age of 69 years, for benign prostatic hyperplasia. Similarly, Iqbal T *et al*., and Saleem M *et al*., reported patients with mean ages of 63.4 and 65.6 years respectively.[9] In our study which was conducted on 60 patients, mean prostatic size in patients was 37.0cm^3, with a range of 16-58cm^3. An estimation of prostate volume is very useful in a variety of ways. It can help in deciding upon the appropriate therapy. The average prostate volume which was measured by Vesely *et al*., which was conducted on 354 patients was 40.1 cm^3, while Dicuio *et al*, found average prostate volume to be 41 cm^{3}which was done on 25 men [10, 11]. When the patients were divided as per their symptom severity scores, the mean prostatic size in patients with moderate symptoms was found to be 31.7cm^3, while in patients with severe symptoms, it was 68.3cm^3. The p-value was found to be more than 0.05, which was not significant. The correlation co-efficient of prostatic size in patients with moderate symptoms was 0.25, whereas in patients with severe symptoms, it was 0.08. The overall correlation co-efficient of IPSS with prostatic size found to be 0.24. Hence, no correlation was found in between prostatic volume and IPSS. This data was further supported by other studies which were done by Ezz *et al*., on 803 patients [12] In our study, PVRU had a weakly positive correlation with severity of urinary symptoms. Consistent with our results, Kolman C *et al*., found that PVRU had a statistically significant association with prostate volume, severity of symptoms [13]. Similarly, Barry *et al*., demonstrated in an analysis which was done on 198 patients after treatment of BPH, that reduction of the symptoms score was significantly correlated with improvement of uroflowmetry, including PVRU [14]. The mean value of peak flow rate was found to be 10.6 ml/sec, with a minimum recording of3ml/sec and a maximum recording of 19ml/sec. The peak flow rate had a strongly positive correlation with symptom score. Various other studies also observed similar results. Hideaki Itoh *et al*.,studied 206 males and concluded that among the parameters which were obtained by uroflowmetry, maximum flow rate was the most representative, and that it was adopted both in estimate criteria for the diagnosis and severity of BPH, and for the efficacy of treatment of BPH. Barry *et al*., have reported weakly positive correlations between peak flow rate and symptom scores [14-16]. In this study, the mean time to peak flow rate was found to be 11.8, with a minimum recording of 1secand a maximum recording of 71sec. On comparing the variables by using Student's t-test, the p-value found to be >0.05, which was non-significant. Most of the studies showed similar results and no correlation were found between symptom score and time to peak flow rate. In our study, the mean voided volume was found to be 190, with a range of 171-586. On comparing the variables by using Student's t-test, the p-value found to be >0.05, which was non-significant. Hence, no correlation was found between symptom score and voided volume. Multivariate logistic regression analyses revealed that the presence of moderate to severe symptoms (International Prostate Symptom Score greater than 7) was independent of prostate volume, but that it was dependent on age, a reduced flow rate, postvoid residual volume, and voided volume. The mean flow time was found to be 51.9sec, with a range of 16- 111sec. On comparing the variables by using Student's t-test, the p-value found to be >0.05, which was non-significant. Hence, no correlation was found between symptom score and mean flow time. In our study, the mean voiding time was found to be 67.4sec, with a range of 17-250sec. The mean value of voiding time which was found in patients with moderate symptoms was 60.6sec and in patients with severe symptoms, it was found to be 71.6sec. On comparing the variables by using Student's t-test, the p-value found to be >0.05, which was non-significant. Hence, no correlation was found between symptom score and voiding time. However, there is no data on voiding time and its association with LUTS or symptom scores. The mean Average Flow Rate was found to be6.8ml/sec, with a minimum recording of 0 ml/secand a maximum recording of 12ml/sec. The mean value of Average Flow Rate which was found in patients with moderate symptoms was 7.0 ml/secand in patients with severe symptoms, it was found to be 3.8ml/sec. On comparing the variables by using Student's t-test, the p-value found to be <0.001, which was highly significant. Hence, a strongly positive correlation was found between symptom score and average flow rate. Hideaki Itoh *et al*., studied

206 males and obtained relatively high correlation co-efficients of over 0.3 between average flow rate and symptom scores. These results strongly suggested that the time-dependent factors in micturition considerably influenced LUTS in elderly patients [15]. Barry *et al*., reported no significant correlation (r = 0.13) between average flow rate and symptom score [14]. In contrast, a statistically significant correlation (r = 0.16, p < 0.01) between average flow rate and IPSS was reported by Wadie *et al*.[16]

CONCLUSION

On the basis of data which was obtained after evaluation of 60 patients with benign prostatic hyperplasia, it can be concluded that prostate size has no correlation with Lower Urinary Tract Symptoms. As the prostatic size which is measured by ultrasound does not consider zonal enlargement, to judge the severity of the disease, uroflowmetry and IPSS should be considered. Post void residual urine has a strongly positive correlation with the severity of lower urinary tract symptoms. Among the parameters which were obtained by uroflowmetry, peak flow rate was the most representative of the symptom severity of the patient. Parameters like time to peak flow, flow time, voiding time, voided volume had no correlation with the symptoms of the patient. So, the findings has to confirmed with a larger number of patients.

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