

Correlation of International Prostate Symptom Score with Intravesical Prostatic Protrusion in Men with Lower Urinary Tract Symptoms

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Abstract: ***Introduction:** Bladder outlet obstruction (BOO) is defined as the obstruction of urinary flow at the base of the urinary bladder. In men, this is usually due to an enlarged prostate gland, which is one of the causes of lower urinary tract symptoms (LUTS). Gold standard for evaluation of BOO is urodynamics, but it is invasive and time consuming. In this study we would like to investigate the use of the transabdominal measurement of intravesical prostatic protrusion (IPP) with severity of LUTS in men. **Methods:** In a cross-sectional study, 76 male patients presenting with LUTS to Department of Genitourinary surgery, Govt. T D Medical college, Alappuzha were analysed. Patients brief history and clinical examination were recorded in a proforma. LUTS were quantified using IPSS questionnaire. Ultrasound scanning was done with the urinary bladder between 100 – 200 ml volume with a transabdominal probe in the transverse plane. IPP was measured in millimetre's as the distance from the tip of the prostate's protrusion into the vesical lumen to the bladder neck. **Results:** 76 patients were considered for final analysis. Mean age in our study population was 71.08 years, they had a mean IPP of 9.6 mm with mean IPSS of 17.08. IPP showed strong positive correlation with IPSS ($r = 0.674$), irritative ($r = 0.615$) and voiding ($r = 0.544$) sub scores. Significant IPP (i. e., IPP > 10mm) had statistically significant higher IPSS compared to IPP < 10 mm group (non significant IPP). IPP showed only a weak positive correlation with quality of life index and total prostate volume. **Conclusion:** Intravesical prostatic protrusion is a non-invasive test that can be used in the evaluation of men with LUTS due to BPE. It is strongly associated with higher symptom scores. Addition of IPP to the current stratification process of BPE can aid in the evaluation and choosing of appropriate therapy for patients.*

Keywords: Intravesical prostatic protrusion, Lower urinary tract symptoms, Benign Prostatic enlargement

1. Introduction

Benign prostatic enlargement (BPE) is one of the commonest cause of lower urinary tract symptoms (LUTS) in elderly men. It can adversely affect the quality of life and can cause major morbidity including retention. Urodynamics is the gold standard test for evaluation of bladder outlet obstruction. However it is invasive, time consuming and embarrassing to the patient. It is not practical to do urodynamics for every patient presenting with LUTS. There is need for a non-invasive alternative for the evaluation of BPE. Intravesical prostatic protrusion refers to the median lobe of the prostate that protrudes into the bladder lumen. It is proposed that rather than the total prostate volume it is the median lobe that causes the symptoms of BPE due to the ball valve effect. Hence identifying IPP and stratifying patients into various grades based on the severity of IPP could help us in identifying patients who requires early and aggressive intervention. In this study we aim to assess the correlation between intravesical prostatic protrusion with international prostate symptom score. In this way we hope to identify patients a who are most likely to have clinical progression and offer them appropriate treatment without any unnecessary delay.

2. Methods

Male patients presenting with LUTS to the Department of Genitourinary Surgery, TD Medical College, Alappuzha will be consecutively assigned to the study after obtaining an informed written consent. An initial evaluation is done with

complete history (with International Prostate Symptoms Score [IPSS] determination) and physical examination (including Digital rectal examination [DRE]), Prostate Specific Antigen (PSA) and urine analysis. IPSS will be graded as 0 - 7 Mildly symptomatic; 8 - 19 moderately symptomatic; 20 - 35 severely symptomatic. Ultrasound scanning will be done with the urinary bladder between 100 – 200 ml volume. Scanning will be done with the patient in supine position, using an ultrasound device (MINDRAY model UMT - 350, Shenzhen, China) and a convex abdominal 3.5 MHz probe. The bladder will be scanned in transverse and longitudinal planes and patients will be stratified into 3 groups by IPP grade, including grade I—IPP less than 5 mm, grade II— IPP between 5 and 10 mm, and grade III—IPP greater than 10 mm.

Inclusion Criteria:

Male patients with age more than 18 years presenting with LUTS to the Department of Genitourinary Surgery, TD Medical College, Alappuzha during the study period.

Exclusion Criteria:

- 1) Patients with history of lower urinary tract injury
- 2) Patients with prior lower urinary tract or prostate surgery
- 3) Patients on per urethral or suprapubic catheter
- 4) Patients with urethral stricture
- 5) Patients with suspected prostate cancer based on digital rectal examination (DRE) or elevated PSA >4 ng/dL
- 6) Patients with urinary tract infection
- 7) Presence of bladder calculi

3. Results

Age

Mean age in our study population was 71.08 years (+/- 8.68). Age ranged from 50 to 90 years.

Table 1: Age distribution in study sample

Age distribution	N (Percentage)
50 - 60 years	7
61 - 70 years	30
71 - 80 years	26
81 - 90 years	13

AUA IPSS

Mean IPSS of the sample was 17.08 (+/- 5.29), with range from 9 - 33. Majority of the patients (75%) had moderate symptomatology according AUA IPSS.

Table 2: Patient distribution with respect to AUA IPSS

AUA IPSS CATEGORY	N (Percentage)
0 - 7 (Mild symptoms)	0
8 - 19 (Moderate symptoms)	57 (75)
20 - 35 (severe symptoms)	19 (25)

IPSS Subscores

Obstructive/Irritative Sub scores

Table 3: Patient distribution with respect to AUA IPSS sub score

Obstructive/ Irritative Score	N (Percentage)
<1 (Predominantly Irritative)	31 (40.8)
>1 (Predominantly Obstructive)	45 (59.2)

Quality of Life Score

Mean QoL score was 3.18 +/- 1.029.

Majority of the patients were mostly satisfied with their quality of life.

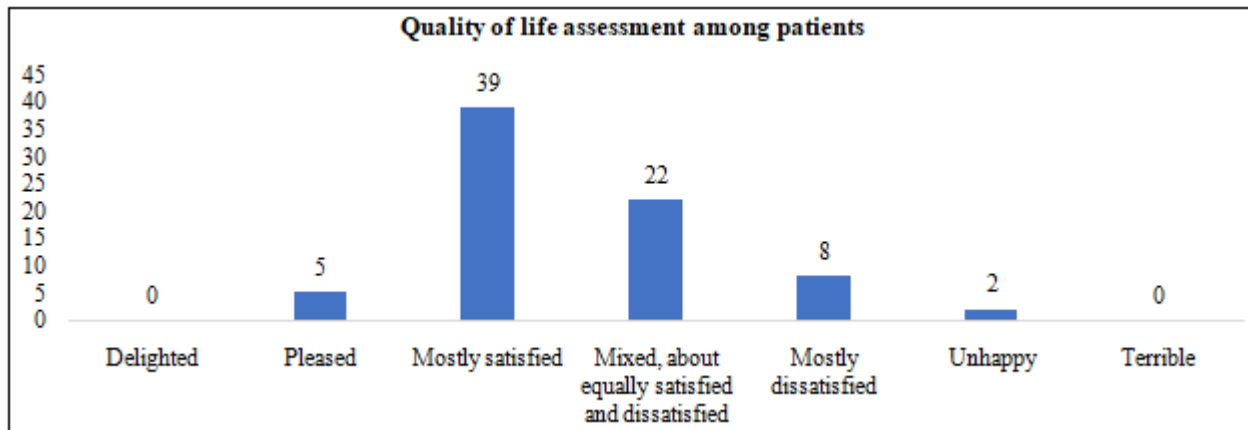


Figure 1: Quality of life assessment among the study population

Prostate Volume

Mean prostatic volume was 66.54 +/- 19.109, with range from 28 to 112 cc

Table 4: Patient distribution with respect to prostate volume

Prostate volume (cc)	N (Percentage)
20 - 40	8 (10.5)
40 - 60	21 (27.6)
60 - 80	32 (42.1)
>80	15 (19.7)

Intravesical Prostatic Protrusion

Mean intravesical prostatic protrusion was 9.66 mm (+/- 9.002), with range from 1 to 39 mm.

IPP Grades

40% patients had grade 1 IPP (less than 5mm)

Table 5: IPP grades among the study sample

AUA IPSS Category	N (Percentage)
Grade 1 (<5mm)	30
Grade 2 (5 - 10mm)	23
Grade 3 (>10mm)	23

Correlation between IPP and AUA IPSS Score

IPP has strong positive correlation with IPSS using Spearman's correlation (r = 0.6745, p value <0.0001). Both

Irritative (r = 0.615 and Obstructive IPSS (r = 0.544, p value <0.0001) sub scores has a positive correlation with IPP.

Correlation between IPP and QOL

Quality of life score has a weak positive correlation with IPP. (r = 0.351, p = 0.0072)

4. Discussion

This was a cross sectional study done in the Department of Genitourinary Surgery, TD Medical College, Alappuzha over a period of eighteen months. The study group consisted of 76 male patients with benign prostatic enlargement presenting with lower urinary tract symptoms.

In our study, we found that intravesical prostatic protrusion correlates with quality of life and IPSS.

The mean age in our study population was 71.08 years. The mean Intravesical prostatic protrusion in our study was 9.6 mm. 30% had IPP more than 10mm. In a community study in Minnesota, only 10% of population had a mean IPP more than 10mm. Compared to western literature the mean IPP in our study is on the higher side probably due to late presentation and also higher mean prostate volumes in our study population. In a 2001 study by Lim et al in Japan the

mean IPP was 11mm. Studies in African population by Eze et al 3 and Sigdel et al 4 showed majority had an IPP more than 10mm. Choi et al proposed that this is due to the relatively larger sized prostates in African men compared to other population.⁵

Correlation between IPP and AUA IPSS

Our study showed strong positive correlation between IPSS and IPP with a Spearman coefficient of 0.674 ($p < .0001$). Agbo et al found statistically significant positive correlation between IPP and IPSS ($r = 0.808$, $p.0001$). In our study we also found statistically significant positive correlation between IPP and irritative & voiding IPSS sub scores ($r=0.615$, $p =.0001$ & $r =0.544$, $p =.0001$). However the Obstructive/irritative IPSS score showed no significant correlation with IPP. This is similar to studies done by Park et al 5 in Korea, Tjahjodjati et al 6 in Indonesia and Eze at al in Nigeria.³

However certain studies have shown no significant correlation between IPP and IPSS sub scores.^{7,8} Kuei et al⁷ in Taiwan found no significant correlation between IPP and irritative IPSS. The subjective nature of IPSS may have been responsible for the insignificant relationship between IPP and IPSS reported in these studies. Tjahjodjati et al 6 attributed this to the different bladder volume used for measurement of IPP. Too little urine in bladder (volume < 100 ml) has shown to overestimate IPP while a bladder volume > 400 ml has been shown to underestimate IPP.⁹

Obstructive LUTS is affected as the median lobe obstructs the outlet like a ball valve disrupting the funnelling effect of the bladder neck, which increases urethral resistance. Irritative IPSS affection could probably be due to the premature filling sensation, irritation of bladder neck and trigone, along with decreased bladder capacity caused by the protruding median lobe. Keqin et al 10 suggested that the greater the protrusion was, the more severe was the detrusor impairment possibly as a result of the increased detrusor pressure caused by the IPP.

The mean IPSS in the significant IPP group was significantly higher than the nonsignificant IPP group. This is in agreement with several previous investigators.^{11, 2, 10} Lee et al 12 found no statistically different correlation between the initial IPP and AUA IPSS score, however they found that higher IPP suggested clinical progression. The mean prostate volume in their study was 24 g, 33 g and 48 g for Grade 1, 2 and 3 IPP cohorts respectively. The absence of statistical significance could be due to the low prostate volumes in their study population.

Correlation between IPP and prostate volume

In the current study there is a significant positive correlation between IPP and prostate volume ($r = 0.300$, $p =.008$). Prostate volume in the IPP > 10 mm group was higher than the non - significant IPP group and the difference was found to be statistically significant. ($p =.007$)

Studies have reported similar findings of positive correlation between IPP and prostate volume.^{2, 13} Lee et al 13 found a strong positive correlation between IPP and PV ($r = 0.747$, $p < 0.001$). Aganovic et al 14 while analysing the correlation of

IPP with other clinical and radiological factors reported a very good correlation between intravesical prostatic protrusion and prostate volume ($r = 0.53$, $p < 0.0001$). Lim and Franco et al 15, 2 also found significant correlation between IPP and PV. ($r = 0.614$ and 0.45 respectively)

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