Intravesical Prostatic Protrusion is better than Prostate Volume in Predicting Symptom Severity in Benign Prostatic Hyperplasia: A Prospective Clinical Study

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ABSTRACT

INTRODUCTION: To study the relationship between intravesical prostatic protrusion (IPP) and prostate volume (PV) and to determine which one of them is the better in assessment of symptoms in benign prostatic hyperplasia (BPH).

METHOD: In this prospective study, 60 men with lower urinary tract symptoms (LUTS) were included. They were evaluated with digital rectal examination, International Prostate Symptoms Score (IPSS), Quality Of Life (QOL), Uroflowmetry, Residual Urine Volume (RUV) measurement, IPP and PV using transabdominal ultrasound scan. IPP and PV were correlated with IPSS using Pearson’s correlation coefficient. One-way ANOVA was used to measure association between ordinal variables.

RESULTS: Of 60 men with LUTS due to BPH, the mean IPSS was 18.33 ± 6.736 with quality of life (QOL) score of 4.07 ± 1.148. IPP correlated well and positively with IPSS (r=0.354, p=0.006) and QOL (r=0.429, p=0.001). PV correlated weakly with IPSS (r=0.270, p=0.0370) however there was no correlation with IPP, QOL.

CONCLUSION: The IPP assessed by transabdominal ultrasound is more accurate than PV in evaluating bothersome symptoms in men with BPH.

KEY WORDS: Intravesical protrusion of prostate, International prostate symptom score, Lower urinary tract symptoms.

INTRODUCTION

Benign prostatic hyperplasia in the aging male is a progressive condition associated with worsening of lower urinary tract symptoms that affects quality of life (QOL) by interfering with normal daily activities and sleep patterns.

The chief complaint of the patient with BPH is usually bothersome LUTS typified by urinary frequency, urgency, nocturia, decreased and intermittent force of stream and the sensation of incomplete bladder emptying. Approximately one half of all men who have a histologic diagnosis have moderate to severe LUTS. LUTS are bothersome to many patients, and the amount of bother may differ greatly among individuals with the same degree of symptom frequency and severity. Since the impact of LUTS on the patient’s quality of life is highly variable and not directly related to any measurable physiological factors, the patient’s perception of the severity of the condition, as well as the degree to which it interferes with his lifestyle or causes embarrassment, should be the primary consideration in choosing therapy.

The severity of lower urinary tract symptoms associated with BPH can be measured reliably, from the patient’s perspective, with a number of validated questionnaires- International Prostate Symptom Score (IPSS).

Prostate size is usually assessed by digital rectal examination (DRE) and ultrasonography. The accuracy of DRE for assessing prostate size is poor. The
relationship between total prostate volume and BOO has been investigated in several studies. With the failure of total prostate volume alone to diagnose BOO attempts have been made to diagnose BOO using prostate shape and the relative proportions of the different prostate zones.

Recently several studies reported the importance of anatomical factors in evaluating men with LUTS. Prostatic configuration - Intravesical protrusion of prostate (IPP), bladder weight and bladder wall thickness are new clinical indices which are helpful in predicting BOO. IPP is caused by the enlarging lateral lobes and the median lobe. This protrusion of the prostate causes a “ball-valve” type of obstruction. As the strong bladder contraction force could open a channel between the lobes but tend to aggravate the ball-valve effect in IPP.

**METHODE**

This prospective study included men presenting with LUTS and seen over the period of 12 months from May 2007 to April 2008 in Urology unit of Tribhuvan University Teaching Hospital. Patients with lower urinary tract infection, bladder calculus, carcinoma prostate, carcinoma urinary bladder, urethral stricture, any history of previous lower urinary tract surgery and neurogenic bladder were excluded from the study.

The initial evaluation consisted of the IPSS and quality-of-life (QoL) score, a physical examination including a DRE, neurological examination to exclude any neurological deficit and neurologically related bladder dysfunction. The bladder was next assessed by transabdominal ultrasonography, which was performed using 3.5 MHz curvilinear transducer by a single final year radiology resident to measure the IPP, PV and RUV. Prostate scan was done with the bladder volume of 100-200ml and prostate volume was measured.

The bladder was assessed with transabdominal ultrasonography by moving the sagittal scan of the ultrasound probe both horizontally and longitudinally and examining the bladder neck for protrusion of the prostate into the bladder. By measuring the vertical distance from the tip of the protrusion to the circumference of the bladder at the base of the prostate gland, one of three grades was assigned according to the degree of IPP. The bladder with an IPP of 5mm or less were classified as grade 1 (unobstructed), those with 5 to 10 mm as grade 2 (equivocal), and those greater than 10 mm as grade 3 (obstructed).

Statistical analysis was performed using SPSS version 12.0. Scatter plots together with Pearson’s correlation coefficients were used to assess the relationships between IPP, IPSS and PV. One-way ANOVA was used to measure association between ordinal variables.

**RESULT**

A total 72 patients were enrolled; of these patients 60 men fulfilled the selection criteria for this study. Patient demographics are described in Table 1. Majority of patients had moderate to severe IPSS. Out of 60 only 2 (3.3%) patients had mild IPSS, whereas 31 (51.7%) and 27 (45%) of them had moderate and severe IPSS respectively. The mean IPSS was 18.33 (range 6–32) and quality of life index was 4.07 (range 2–6). Most of the patients were “unhappy” or “mostly dissatisfied” with their quality of life due to current urinary symptoms.

Pearson’s correlation coefficient revealed no correlation between PV and IPP ($r=0.210; p=0.107$). IPP did not correlate with age ($r =0.149, p= 0.257$). However, PV correlated well with age ($r=0.417, p=0.001$).

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IPSS. Majority of patients with IPP grade III had severe symptom score (12 out of 17) with mean of 21. 82 ± 6.031. While correlating IPP with different components of IPSS, intermittency was found to have strongest correlation (Table 2).

Table 2. Correlation between intravesical protrusion of prostate and scores of individual symptoms scores

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Pearson’s Correlation Coefficient (r)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incomplete voiding</td>
<td>0.274</td>
<td>0.034</td>
</tr>
<tr>
<td>Frequency</td>
<td>0.239</td>
<td>0.066</td>
</tr>
<tr>
<td>Intermittency</td>
<td>0.349</td>
<td>0.006</td>
</tr>
<tr>
<td>Urgency</td>
<td>0.066</td>
<td>0.615</td>
</tr>
<tr>
<td>Weak stream</td>
<td>0.175</td>
<td>0.181</td>
</tr>
<tr>
<td>Hesitancy</td>
<td>0.168</td>
<td>0.200</td>
</tr>
<tr>
<td>Nocturia</td>
<td>0.297</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Mean PV with mild, moderate and severe symptom score were 34.5, 36.5 and 41.5 gms respectively. Comparing mean values between the severity of symptoms was not significant (p=0.366).

IPP showed strong correlation with QOL score (r=0.429, p=0.001) but PV didn’t correlate with QOL score (r=0.242, p=0.62).

DISCUSSION

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Symptomatic BPH is one of the commonest diseases in elderly men, but there is no clear practical guidelines to define the presence and severity of obstruction, other than the pressure-flow study,9, 10 which has been regarded as the ‘reference’ standard but the technique is invasive, uncomfortable for the patient, time-consuming and expensive, especially in most developing countries.

Although BPH is not a life-threatening illness, it adversely affects quality of life. The majority of patients seek medical treatment because they would like to be relieved of bothersome urinary symptoms. Therefore, many urologists use symptoms to diagnose BPH, while the most common indication for treatment is to relieve these symptoms.11,12

Recently several methods have been reported to evaluate men presenting with LUTS. Since measurement if IPP by transabdominal USG is not only easy and reproducible but also economic and non invasive. Transrectal ultrasound (TRUS) measurement of IPP has also been reported in evaluation of men with BPH but patient’s compliance towards TRUS is not always good.

Of the seven symptoms assessed, weak stream was rated to be the most bothersome followed by nocturia and sense of incomplete voiding, which is similar to the findings of the study done by Maskey P13, whereas hesitancy was most common in the study by Chalise PR et al.14

The correlation between IPSS and IPP was significant (r = 0.354, p = 0.006). While correlating different symptoms with IPP, intermittency was found to have the strongest correlation at r =0.349, p=0.006, followed by nocturia and incomplete voiding (r =0.297 & 0.274, p=0.021 & 0.034 respectively). With this we can say that increasing IPP will predominantly give rise to more of obstructive symptoms. These symptoms are due to ball-valve type of obstruction and disruption of the funnelling effect of the bladder neck, which increases urethral resistance. In addition, the presence of median lobe enlargement causes dyskinetic movement during micturition.15 These would cause more obstruction in the high grade IPP group than in the lower grade. In the study done by Chia SJ et al the degree of IPP correlated with BPH obstruction. Of grade III IPP cases, 94% had obstruction while 79% grade I cases had no obstruction on pressure flow study.8

In our study IPP showed better correlation with IPSS than PV and there was no correlation between PV and QOL whereas IPP and QOL correlated strongly. While in past decades an increase in prostate size was assumed to be the single most important pathophysiological entity underlying the onset of LUTS in aging men, this assertion is no longer supportable. Jacobsen SJ et al. also found there is a poor correlation between prostate size, as measured by transrectal ultrasound or magnetic resonance imaging, and other parameters, such as symptom severity, frequency, bother, quality of life, urinary flow rate, residual urine, or pressure-flow parameters.16

Even small prostate can have severe symptoms.16.6% of men with small prostate (<40 gms) presented with severe IPSS and 20% of men having prostate smaller than 40 gms had QOL score of 5 and more. This will explain the fact of weak correlation between prostate size and symptom severity.

In evaluation of men with LUTS, IPP stands up well against PV. Our study suggests that IPP may be more important than PV. IPP measurement can easily be obtained with the transabdominal ultrasound scan in the outpatient setting without the need for transrectal probe. As such, greater emphasis on IPP is warranted in the evaluation of benign prostatic enlargement and decision-making in offering surgical options.

CONCLUSION

PV and IPP do not correlate with each other. Men with high grade IPP are more likely to be bothered of symptoms due to BPH independent of prostate size.

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