CLINICAL SIGNIFICANCE OF INTRAVESICAL PROSTATIC PROTRUSION IN PATIENTS WITH BENIGN PROSTATIC HYPERPLASIA

Ghanshyam Sigdel[1], WK Belokar[2]

ABSTRACT

INTRODUCTION: Intravesical prostatic protrusion is a morphological change due to excessive growth of the median and lateral lobes of the prostate into the bladder in benign prostatic hyperplasia. It causes a 'ball-valve' type of obstruction during voiding. It is a useful parameter to assess the severity of the disease process, selection of treatment modality and its possible outcome in benign prostatic hyperplasia.

MATERIAL AND METHODS: A prospective, non-randomized, observational study was carried out from January 2014 to June 2014 in the Department of Urology, College of Medical Sciences, Nepal. Total of 50 patients with benign prostatic hyperplasia were evaluated to assess the correlation of intravesical prostatic protrusion with international prostate symptom score, prostate volume, maximum flow rate and post void residual urine. Correlation between parameters of interest was quantified with Pearson correlation test.

RESULTS: A positive correlation was demonstrated between intravesical prostatic protrusion, international prostate symptom score, prostate volume and post void residual urine. There was a negative correlation between intravesical prostatic protrusion and maximum flow rate.

CONCLUSION: Intravesical prostatic protrusion is correlated with international prostate symptom score, prostate volume, maximum flow rate, and post void residual urine volume and hence can be used to assess the severity of benign prostatic hyperplasia.

KEY WORDS: Benign prostatic hyperplasia; International prostate symptom score; Intravesical prostatic protrusion, Maximum flow rate; Postvoid residual urine volume

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INTRODUCTION

Symptomatic Benign Prostatic Hyperplasia (BPH) is one of the commonest disease in elderly men, but there are no consensus or clear practical guidelines to define the presence and severity of obstruction, other than the pressure-flow study.[1,2] However, this technique is invasive, uncomfortable for the patient, time-consuming and expensive, especially in most developing countries.[3] Non urodynamics based parameters like intravesical prostatic protrusion (IPP), prostate volume (PV) and postvoid residual urine and non-invasive urodynamics like uroflowmetry are helpful tools to asses voiding disorders in BPH patient including prediction of bladder outlet obstruction.[4]

Intravesical prostatic protrusion is a morphological change due to excessive growth of the median and lateral lobes of the prostate into the bladder. IPP can be graded with ultrasonography.[3] IPP causes a 'ball-valve' type of obstruction, disrupting the funneling effect of the bladder neck, and causing dyskinetic movement of the bladder during voiding.[5] This would cause more obstruction than if there were no protrusion and just bilateral lateral lobes, as the strong bladder contraction could force open a channel between the lobes but tend to aggravate the ball-valve effect in IPP.[3] Several studies have shown the importance of anatomical factors in evaluating men with lower urinary tract symptoms (LUTS).[3,6,7] The current study aimed to investigate the clinical significance of intravesical prostatic protrusion in patients with benign prostatic hyperplasia in our setup.

MATERIAL AND METHODS

A prospective, non-randomized, observational study was carried out from January 2014 to June 2014 in the Department of Urology, College of Medical Sciences, Nepal. A total of 50 patients with the clinical diagnosis of BPH were included in the study. Informed consent was obtained from all participants. The study was approved by the institutional review committee. Patients with a known history of previous lower urinary tract surgery, prostate or bladder carcinoma, urethral stricture disease, urinary bladder/ urethral stone disease, neurological abnormality, urethral catheter in situ, on medicines that can alter voiding patterns (alpha blockers, anticholinergic, antiandrogens and diuretics),patients who voided less than 150 mL of urine during uroflowmetry, patients with poorly controlled diabetes mellitus were excluded from the study.

A thorough physical examination including a Digital Rectal Examination (DRE), and neurological examination to exclude neurological deficit and neurologically related bladder dysfunction was performed. IPSS questionnaire was filled up in two ways. Those who could fill up the IPSS chart were allowed to do themselves and those who could not do themselves, scoring was done with the help of attending doctor. Urinalysis including microscopic examination and culture sensitivity was done. Random blood sugar, serum Prostate Specific Antigen (PSA) and serum creatinine levels were assessed.

The bladder was assessed with trans abdominal ultra sonography by a single radiologist to avoid the inter observer variations. The extent of IPP was measured as the vertical distance from the tip of the intravesical protrusion to the circumference of the bladder at the bladder neck (Figure 1 and 2).

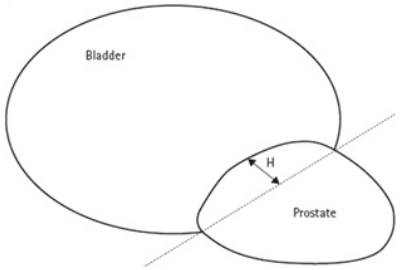

Figure 1: Measurement of IPP

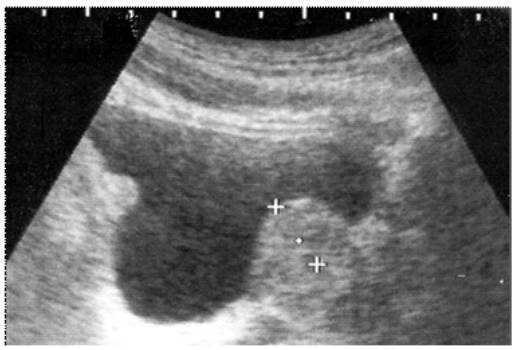

Figure 2: Measurement of IPP with transabdominal ultrasonography

Measurement of IPP was taken with the urine volume of 150 to 250 ml in the bladder. Grading of the IPP was done as grade I-less than 5 mm, grade II - 5 to 10 mm and grade III-more than 10 mm. After the initial transabdominal ultrasonography patients were subjected to standard uroflow metry study which recorded the maximum flow rate (Q max) and then immediately taken for transabdominal ultrasonography to

measure the postvoid residual urine volume. Those patients who voided less than 150 ml of urine during uroflowmetry were excluded from the study. Patients who were found to have urinary tract infections during the initial evaluation were treated with appropriate antibiotics and subsequently reevaluated once infection was eradicated.

Statistical analysis was done by using Statistical Package for the Social Sciences (SPSS) software for windows® version 18. Correlations between IPP and other parameters (IPSS, prostate volume, PVR and Qmax) was quantified with Pearson correlation test. Statistical significance was accepted at the 5 percent level (p- value <0.05).

RESULTS

Fifty patients with the clinical diagnosis of BPH were evaluated over the period of six months. The mean age of the patient was 68.3 ±9.2 years (Table 1). The mean IPSS, prostate volume, IPP, PVR and Qmax was 19.3 ±7.6, 42.9 ±18.3 mL, 14.6±8.6 mm, 79.5±69.3 mL and 13.8 ±6.6mL/sec respectively. (Table 1)

Table 1: Clinical and demographic characteristics

Variable(s)	Mean± SD	Range
Age (years)	68.3±9.2	50-92
IPSS	19.3±7.6	3-33
Prostate volume (mL)	42.9±18.3	21-109
IPP (mm)	14.6±8.6	3-38
PVR (mL)	79.5±69.3	4-285
Q max (mL/sec)	13.8±6.6	3-29

Four patients had grade I IPP; whereas fifteen and thirty patients had grade II and III IPP respectively. There was a rise in the mean IPSS and prostate volume with the increasing grade of IPP. Similarly, the mean Qmax showed a decreasing trend with the increase in IPP grade. However, there was no definite trend in the post void residual urine changes with the changing IPP grade.

There was a positive correlation between IPP and IPSS, but it was statistically not significant (Pearson correlation 0.26; p=0.5) (Table 2).There was a positive correlation (Pearson correlation 0.59) with prostate volume, which was statistically significant (p< 0.001). IPP correlated positively with the PVR (Pearson correlation 0.1); however it was statistically not significant (p=0.46). IPP had a negative correlation with Qmax (Pearson correlation 0.14) which was again statistically not significant (p=0.33). (Table 2)

Table 2: Correlation of IPP with different test parameters

Parameters	Pearson Correlation	p-Value
IPP with IPSS	0.26	0.56
IPP with prostate volume	0.59	<0.001
IPP with PVR	0.10	0.46
IPP with Qmax	-0.14	0.33

DISCUSSION

Several clinical and radiological parameters have been developed to assess the severity of bladder outlet obstruction and select the most appropriate modality of treatment in BPH. The pressure-flow study is the reference standard for diagnosing BOO caused by BPH. However, the technique is invasive, uncomfortable to the patient and time-consuming. It is expensive and readily not available, especially in the developing countries.

IPP is a morphological change due to excessive growth of the median and lateral lobes of the prostate into the bladder. IPP causes a 'ball-valve' type of obstruction, disrupting the funneling effect of the bladder neck, and causing dyskinesia movement of the bladder during voiding.[5] IPP would cause more obstruction than if there were no protrusion and just bilateral lateral lobes, as the strong bladder contraction could force open a channel between the lobes but tend to aggravate the ball-valve effect in IPP.[3] Measurement of IPP through transabdominal ultrasound is noninvasive, readily available, cost-effective and without radiation hazards. Several studies have shown a good correlation of IPP with the urodynamic findings of BOO due to BPH.

IPP has variable correlations with other clinical and ultrasonographic parameters used to assess the severity of effects of BPH. In this study there was a positive but statistically insignificant correlation between IPP and IPSS (Pearson correlation 0.26; p=0.5). In a study by Park et al.[8] there was no correlation between IPP and IPSS. Similarly, there was no significant correlation between the degree of IPP and IPSS (p = 0.299).[9] It seems that IPP is a better marker to assess the severity of BOO due to BPH as compared to IPSS because IPP has significant correlation with urodynamic parameters of BOO.

The degree of IPP may be associated with the prostatic volume

of BPH patients. The IPP showed a good correlation with the prostate volume ($r = 0.61$, $p = 0.0000$).[10] The degree of IPP was correlated positively with the prostate volume ($r = 0.534$, $p<0.01$).[9] In this study there was a statistically significant positive correlation between IPP and prostate volume (Pearson correlation 0.59, $p< 0.001$).

In this study there was a negative correlation between IPP and Qmax, which is as expected and as per the results of other studies; however it was statistically not significant (Pearson correlation -0.14; p=0.33). In a study by Park et al.[8] there was no significant correlation of IPP with Qmax, Han et al.[9] found that the degree of IPP was negatively correlated with the Qmax ($r = -0.364$, $p < 0.01$) in BPH patients. Similarly, IPP had a significant negative correlation with the Qmax ($r = -0.27$; $p = 0.004$).[10] In this study there was no significant correlation between IPP and PVR (Pearson correlation 0.10, $p= 0.46$); however Han et al.[9] reported a significant correlation of IPP with PVR.

IPP is significantly correlated with greater prostate volume, higher obstructive symptoms and lower Qmax, suggesting that it may have clinical usefulness in predicting the need for treatment.[11] With the cut off at IPP ≥10 mm for the diagnosis of benign prostatic obstruction, the sensitivity, specificity and accuracy of the diagnosis were 89.9%, 97.5% and 92.7%, respectively.[12]

IPP is not only helpful in assessing the severity of BOO due to BPH, but also helps to choose the appropriate treatment modality and predict the outcome. Alpha blocker (tamsulosin) therapy may be more effective in improving symptom scores and Qmax in patients with mild IPP than in those with moderate or severe IPP.[13] IPP can predict the outcome of trial without catheter in patients presenting with acute retention of urine related to BPH.[14] IPP may have role in predicting the changes in postoperative IPSS, quality of life (QoL), Qmax and PVR. Postoperative changes in IPSS and QoL score were higher in the significant IPP group (IPP≥5 mm) than in the group with no significant IPP (IPP <5mm).[15]

This study has some limitations. First, the sample size of 50 is a small number to give a definitive conclusion or recommendations on the utility of IPP in assessment of BPH, though many studies were also conducted with the similar sample size. Second, due to the low level of education, and poor understanding about the disease process and questionnaires most of the time the IPSS was assessed by interview method rather than asking patients to fill up the IPSS questionnaires themselves. This might have lead to erroneously low or high IPSS in some patients. Third, the radiologist involved in this study was not accustomed with IPP measurement before this study, which could have led to measurement errors at times. Finally, due to unavailability the findings of different non- invasive parameters could not be compared or correlated with the gold standard test “pressure flow study" in lower urinary tract symptoms.

CONCLUSION

Intravesical prostatic protrusion correlates well with the international prostate symptom score; prostate volume, maximum flow rate and post void residual urine volume. Measurement of intravesical prostatic protrusion through transabdominal ultrasonography is an easy and readily available measure to assess the severity of benign prostatic hyperplasia.

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