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ORIGINAL ARTICLE

Can intravesical prostatic protrusion predict bladder outlet obstruction even in men with good flow?



Alvin Lee ^a, Han Jie Lee ^a, Kok Bin Lim ^b, Hong Hong Huang ^a, Henry Ho ^{a,*}, Keong Tatt Foo ^a

^a Department of Urology, Singapore General Hospital, Singapore

^b Urology Centre, Raffles Hospital, Singapore

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Abstract *Objective:* Men with benign prostate hyperplasia (BPH) with good urinary flow may still have bladder outlet obstruction (BOO). Intravesical prostatic protrusion (IPP) has been shown to be able to predict BOO. We aim to investigate the use of IPP to predict BOO in men with good urinary flow.

Methods: One hundred and fourteen consecutive men (>50 years old) presenting with lower urinary tract symptoms suggestive of BPH were recruited in 2001 and 2002. They were evaluated with serum prostate specific antigen (PSA), uroflowmetry and transabdominal ultrasound measurement of IPP and prostate volume (PV). Pressure-flow urodynamic studies were performed on all men and BOO was defined by BOO index > 40. Men with $Q_{max} \geq 12.0$ mL/s were considered to have good flow.

Results: Among the 114 men, 61 patients had good urinary flow. Their median age, PV and Q_{max} were 66 years, 32.9 mm³ and 14.5 mL/s respectively. 14/61 (23.0%) patients had BOO and their distribution of IPP were as follows: Grade 1 – 0/20 (0%) obstructed, Grade 2 – 6/22 (27.3%) and Grade 3 – 8/19 (42.1%). Sensitivity of Grade 2/3 IPP for BOO was 100% while specificity of Grade 3 IPP was 76.6%. The area-under-curve (AUC) for IPP was greater than that for PV (0.757 vs. 0.696).

Conclusion: Even in men with good flow, high grades of IPP were more likely to have BOO and hence, may be a useful adjunct to predict BOO.

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* Corresponding author.

E-mail address: henry.ho.s.s@sgh.com.sg (H. Ho).

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1. Introduction

Benign prostate enlargement (BPE) is a common cause of bladder outlet obstruction with increasing incidence in men over 50 years of age [1]. Urodynamic study is the international gold standard for diagnosis of bladder outlet obstruction (BOO), but its routine use has been limited by its invasive nature [2]. Currently, several markers identified to be of useful significance in the evaluation of BOO include uroflowmetry, post-void residual urine (PVR), prostate volume (PV), prostate-specific antigen (PSA) and intravesical prostatic protrusion (IPP) [3,4].

Uroflowmetry studies have become established as a non-invasive and routine investigation in men suspected to have BPE. However, peak urinary flow rate (Q_{\max}) has limited sensitivity and specificity for BOO depending on the cut-off used [5]. A threshold value of Q_{\max} of 10 mL/s has good specificity but poor sensitivity for BOO while a threshold value of Q_{\max} of 15 mL/s has good sensitivity but poor specificity [6].

Anatomical configuration of the prostate in the form of IPP has been proven to have good correlation to BOO [2,3]. Studies have shown that the grade of IPP is able to predict success of trial without catheter [7,8], efficacy of α -blocker therapy [9] and clinical progression [10]. In this study, we aim to investigate the use of IPP to predict BOO in men with good urinary flow rate.

2. Patients and methods

From November 2001 to November 2002, 114 consecutive men older than 50 years presenting with lower urinary tract symptoms (LUTS) suggestive of BPE were recruited. Their evaluation included digital rectal examination, uroflowmetry (Q_{\max}) and serum PSA measurement.

Transabdominal ultrasound scan by a single operator (F.K.T.) measured the IPP, PV and PVR. The method of measurement for IPP and grading system was as previously reported [11]. The degree of IPP was measured in millimeters perpendicularly from the intravesical edge of the prostate to the base of the bladder in the mid-sagittal

plane, by transabdominal ultrasound (Fig. 1) [12]. The extent of IPP was classified as Grade 1 = 5 mm or less, Grade 2 = greater than 5–10 mm and Grade 3 = greater than 10 mm. As a general rule, the IPP is to be measured with the bladder slightly distended with 100–200 mL of urine [11]. The exclusion criteria included previous lower urinary tract or pelvic surgery, previous pelvic trauma, radiation therapy, diabetic cystopathy or neurological bladder with voiding dysfunction. Patients with raised PSA underwent transrectal ultrasound guided prostate biopsy to exclude malignancy before inclusion. Those with incomplete datasets were excluded from statistical analysis.

Pressure-flow urodynamic studies (UDS) were performed on all patients according to the ICS recommendations. The extent of BOO was calculated using the BOO index (BOOI of >40 indicates definite obstruction, 20–40 is equivocal and <20 indicates no obstruction).

Complete datasets of IPP and BOOI were available in 112 of the patients. In our study, we are looking at patients with $Q_{\max} \geq 12.0$ mL/s which we will be referencing as a good flow.

Statistical analysis was performed using SPSS version (IBM, Chicago, IL, USA). Any significant differences in median were analysed using Kruskal–Wallis test while correlations were analysed using Spearman's rho (r_s). Differences are significant if $p < 0.05$. Local Domain Specific Review Board ethics approval was granted (Reference: 2012/311/D).

3. Results

Sixty-one patients had $Q_{\max} \geq 12.0$ mL/s. Their median age was 66 years (range: 53–83 years). The median Q_{\max} was 14.5 mL/s (range: 12.1–30.7 mL/s), median PVR was 49.4 mL (range: 8–120 mL), and median PV was 32.9 mm³. Their IPP grade is distributed as follows: 20 had Grade 1 IPP (0–5 mm), 22 had Grade 2 IPP (6–10 mm) and 19 had Grade 3 IPP (>10 mm). PV, detrusor pressure (at peak flow) and BOOI were all significantly different between grades 1 to 3 IPP (Table 1).

Of the patients with $Q_{\max} \geq 12.0$ mL/s, only 14/61 (23.0%) of them had BOO, 28/61 (45.9%) had equivocal BOOI

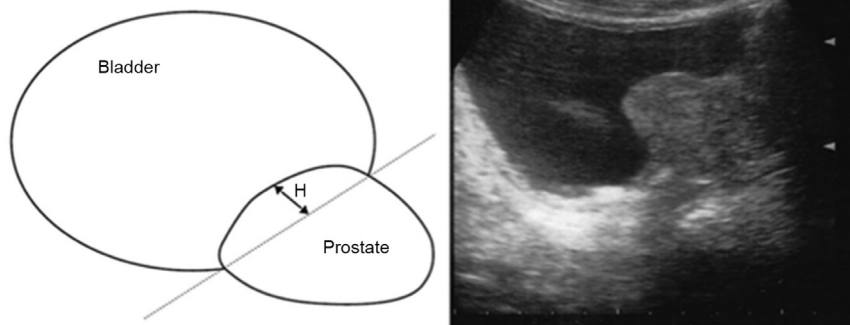


Figure 1 Measurement of intravesical prostatic protrusion (IPP). The vertical distance between the point of highest protrusion to the base of the bladder in the sagittal view using transabdominal ultrasonography. Reproduced with permission of the authors [12].

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