

## URETHRAL PRESSURE PROFILE REVISITED: ITS USEFULNESS IN PATIENTS WITH LUTS/BPH

### Hypothesis / aims of study

To date, urethral pressure profilometry (UPP) is still being performed as a routine urodynamic investigation in many institutions. We aimed to compare UPP and clinical parameters in elderly men with LUTS and determine whether it helps to diagnose bladder outlet obstruction BOO in patients with lower urinary tract symptom (LUTS)/ benign prostatic hyperplasia (BPH).

### Study design, materials and methods

Urodynamic database of a consecutive 1,134 patients with LUTS/BPH older than 45 between May 2011 and May 2014 was included for analysis. Patients with a history of previous genitourinary surgery, pelvic radiation therapy, urinary tract infection, urethral stricture, interstitial cystitis, and neuropathy suggesting neurogenic bladder or incomplete evaluations were excluded. All UDS were performed using a multichannel video system (UD-2000 or Solar, Medical Measurement System) according to International Continence Society recommendations. UPP parameters include maximum urethral pressure (MUP), maximum urethral closure pressure (MUCP) and functional urethral length (FUL). The BOO index (BOOI) was used to determine BOO. Patients with BOOI <20, 20-40, and ≥40 were considered as unobstructed, equivocally obstructed, and obstructed, respectively. Pearson's and Spearman's correlations were performed for continuous and rank data, respectively. ROC curve was used to study the practical value of UPP parameters in diagnosing BOO. All comparisons were two-tailed, and p-values <0.05 were considered significant. Statistical analysis was performed by using IBM SPSS ver. 21.0 (SPSS Inc., Chicago, IL, USA).

### Results

The mean age of patients was 67.6 (±7.5, SD) years. The TPV and PSA were 57.1 (±34.0) ml and 3.1 (±3.9) ng/ml, respectively. The International Prostatic Symptom Score (IPSS)-total, IPSS-storage, IPSS-emptying, and IPSS-QoL were 17.9 (±8.1), 7.2 (±3.6), 10.7 (±5.6), and 4.0 (±1.2), respectively. The Mean BOOI was 40.1 (±26.8), and 468 patients (42.8%) were classified as having BOO. The mean total prostate volume (TPV), transition zone of prostate volume (TZV), serum PSA level, free uroflowmetry (FF)-postvoid residual (PVR), BOOI, bladder contractility index (BCI), PdetQmax, and involuntary detrusor contraction (IDC) were significantly higher in the patients of the obstructed group than those of the other two groups (P<0.05). The storage IPSS score was significantly higher in the obstructed group than the equivocally obstructed group (P<0.05). Pearson's correlation analysis showed that each UPP parameters correlated significantly with age, PSA, and PdetQmax, but not to total IPSS or Qmax. Moreover, FUL was significantly correlated with TZV, PVR, or BOOI (P<0.01, P=0.001, and P<0.01, respectively) (Table 1). As for the ROC curves of UPP parameters in diagnosing BOO, only FUL was found to correlate with the diagnosis of BOO in men with BPH (P<0.01). However, the sensitivity was only 53.2% and the specificity was 63.2% when FUL ≥74.5 mm was set as BOO standard (Fig. 1).

### Interpretation of results

Compared with patients with unobstructed pattern, our results showed that, the obstructed patients had significantly higher age, larger TPV and TZV, and higher serum PSA levels, confirming that prostate volume and serum PSA concentration were significantly and positively correlated with advanced age, as previously reported [1]. Our results showed that the FUL of obstructed group was significantly longer than that of the unobstructed group. There was no significant correlation between UPP parameters and total IPSS. FUL was significantly correlated with TZV, PSA, PVR, and BOO index (P < 0.01). It is thus obvious that the prolongation of the prostatic urethral tract is another reason for increase in urethral resistance. ROC curve was used to compare the sensitivity and specificity of all UPP parameters in diagnosing BOO, PFS result was set as standard. When FUL ≥67.5 mm was set as BOO standard, the sensitivity was 76.4%, but the specificity was only 38.9%, while when FUL ≥74.5 mm was set as BOO standard, the sensitivity was 53.2% and the specificity was 63.2%, indicating that FUL≥74.5 mm is a standard to evaluate BOO due to BPH. However, the diagnosis value was low.

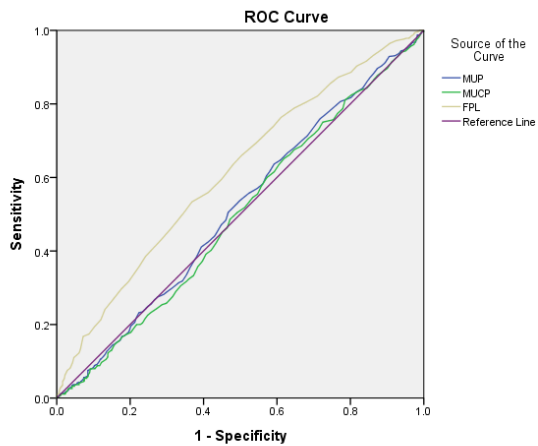
### Concluding message

FUL on UPP was useful in assessing the BOO due to BPH, but the diagnosis value was low. Our results showed that poor correlation between UPP and the diagnosis of BOO.

Table 1. Correlations between clinical parameters and UPP

Variables	MUP P value	MUCP P value	FUL P value
Age (yr)	<0.01 <sup>a)</sup>	<0.01 <sup>a)</sup>	<0.01 <sup>a)</sup>
TZV (ml)	0.242 <sup>a)</sup>	0.052 <sup>a)</sup>	<0.01 <sup>a)</sup>
PSA (ng/ml)	0.016 <sup>a)</sup>	0.005 <sup>a)</sup>	<0.01 <sup>a)</sup>
Total IPSS	0.734 <sup>a)</sup>	0.920 <sup>a)</sup>	0.319 <sup>a)</sup>
PdetQmax (cmH <sub>2</sub> O)	0.028 <sup>a)</sup>	0.039 <sup>a)</sup>	<0.001 <sup>a)</sup>
Qmax (ml/s)	0.874 <sup>a)</sup>	0.288 <sup>a)</sup>	0.246 <sup>a)</sup>
Voided volume (ml)	0.761 <sup>a)</sup>	0.351 <sup>a)</sup>	0.637 <sup>a)</sup>
PVR (ml)	0.177 <sup>a)</sup>	0.010 <sup>a)</sup>	0.001 <sup>a)</sup>
BOOI	0.174 <sup>b)</sup>	0.600 <sup>b)</sup>	<0.01 <sup>b)</sup>

MUP, maximum urethral pressure; MUCP, maximum urethral closure pressure; FUL, functional urethral length; TZV, transitional zone volume; PSA, prostate specific antigen; IPSS, International Prostate Symptom Score; PdetQmax, maximal detrusor pressure; Qmax, maximum flow rate; PVR, postvoid residual; BOOI, bladder outlet obstruction index. a), Pearson's correlation; b), Spearman's correlation.



Diagonal segments are produced by ties.

Fig 1. ROC Curves of UPP parameters in diagnosing BOO

#### References

1. Vesely S, Knutson T, Damber JE, Dicuio M, Dahlstrand C. Relationship between age, prostate volume, prostate-specific antigen, symptom score and uroflowmetry in men with lower urinary tract symptoms. *Scand J Urol Nephrol* 2003;37:322-8.

#### Disclosures

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