

INTRAVESICAL PROSTATIC PROTRUSION AS A USEFUL PREDICTIVE PARAMETER FOR BLADDER OUTLET OBSTRUCTION IN PATIENTS WITH LOWER URINARY TRACT SYMPTOMS SUGGESTIVE OF BENIGN PROSTATIC HYPERPLASIA

Hypothesis / aims of study

Conventional urodynamic study is the gold standard for the diagnosis of bladder outlet obstruction (BOO) in spite of its invasiveness and high costs. By contrast, Transrectal ultrasonography (TRUS) imaging using power Doppler ultrasonography has been demonstrated to be a well-accepted and useful tool for evaluating BOO or for predicting a favorable surgical outcome [1]. However, there is little evidence suggesting which parameters are useful factors to predict urodynamically-diagnosed BOO [2]. Thus, the aim of this study was to examine the efficacy of various parameters obtained from TRUS as predictors of urodynamically-diagnosed BOO in patients with lower urinary tract symptoms (LUTS) suggestive of benign prostatic hyperplasia (BPH).

Study design, materials and methods

Between January 2009 and December 2011, 301 patients who presented with complaints of LUTS suggestive of BPH were enrolled in this study. Patients with evident prostate cancer, prostatitis, urethral stenosis, neurogenic bladder, or a history of transurethral resection for BPH were excluded. We assessed the international prostate symptom score (IPSS), the IPSS quality of life (QOL) score, and examined uroflowmetry, postvoid residual urine volume (PVR), PSA, TRUS and conventional urodynamic study. All patients were asked to fill a self-evaluating IPSS questionnaire, and maximum urinary flow rate (Q_{max}) and average urinary flow rate were recorded. TRUS (Prosound α7, ALOKA) was performed to measure the total prostate volume (TPV), the transition zone volume (TZV), bladder wall thickness (BWT), intravesical prostatic protrusion (IPP), transition zone index (TZI = TZV/TPV) and resistive index (RI = [peak systolic flow velocity – end-diastolic flow velocity]/ peak systolic flow velocity). IPP, measured at sagittal view by TRUS, was defined by the distance from the tip of the prostatic protrusion into the vesical lumen to the bladder neck. A conventional urodynamic study (Urovision Janus system V, Life Tech) was performed to obtain several parameters, including first desire to void (FDV), maximal desire to void (MDV) and detrusor pressure at Q_{max} (P_{det}Q_{max}). We defined BOO when BOO index (BOOI = P_{det}Q_{max} – 2Q_{max}) was more than 40.

Multiple regression analysis was used to test the linear effect of the TPV, TZV, TZI, BWT, RI, IPP and age in predicting the IPSS, PSA, Q_{max} and PVR. The positive predictive value, negative predictive value, sensitivity, and specificity for detecting BOO were calculated for the PVR, TZI, RI and IPP. Receiver-operator characteristic (ROC) curves were plotted with the sensitivity (true positive fraction) on the Y-axis versus 1 minus the specificity (false positive fraction) on the X-axis. To compare the usefulness of the PVR, TZI, RI and IPP, the area under the corresponding ROC curve (AUC) was calculated using GraphPad Prism 4 software. For all statistical tests, a P value of less than 0.05 was defined significant.

Results

In total, we assessed 298 of 301 patients with a mean age of 68.9 years-old. One hundred forty one patients (47.3%) had BOO, and one hundred fifty seven patients (52.7%) did not have BOO.

The mean values of PVR, TZI, RI and IPP with BOO were 80.4, 0.582, 0.763 and 1.35, respectively. By contrast, the mean values of PVR, TZI, RI and IPP without BOO were 69.1, 0.489, 0.709 and 0.79, respectively.

The AUC was 0.780 for IPP, 0.700 for TZI, 0.681 for RI, and 0.543 for PVR, respectively. As IPP was the most useful parameter for the diagnosis of BOO, a cut-off value of IPP was determined to provide the most equivalent sensitivity and specificity and retained the greatest efficiency [(sensitivity × specificity)/100]. Thus, its cut-off value was set at 0.99cm. Finally, the sensitivity, specificity, positive predictive value and negative predictive value of IPP was 74.4%, 81.5%, 78.4%, and 78.0%, respectively.

Interpretation of results

The present study demonstrated that PVR, TZI, RI and IPP were useful predictive parameters for BOO in patients with LUTS suggestive of BPH, and IPP might be the most useful parameter among them. The parameters obtained from conventional urodynamic study are currently the most reliable parameters for evaluating BOO; however, urodynamic study is invasive, expensive, and has not been consistently performed in patients with LUTS suggestive of BPH. Therefore, we should perform research to diagnose BOO or estimate the severity of BOO using non-invasive or less invasive techniques than conventional urodynamic studies provide. TRUS can be performed in outpatient clinics and is less invasive than conventional urodynamic studies. Thus, to increase the positive and negative predictive value, sensitivity, and specificity, we should perform additional analysis of combination with useful parameters (i.e. IPP, RI, TZI) in predicting BOO.

Concluding message

We suggested that IPP was a useful predictive parameter for BOO in patients with LUTS suggestive of BPH. We may need not to perform an invasive conventional urodynamic study in patients with an IPP over 0.99cm.

References

1. Urology (2010) 76;1440-45.
2. Int Braz J Urol (2008) 34;627-37.

Disclosures

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Helsinki: Yes **Informed Consent:** Yes