

THE ASSOCIATION OF ULTRASOUND-ESTIMATED BLADDER-WALL THICKNESS WITH CLINICAL PARAMETERS IN MALE PATIENTS OVER 50 YEARS OLD WITH LOWER URINARY TRACT SYMPTOMS

Hypothesis / aims of study

Measuring the thickness of the urinary bladder's muscle layer is carried out by transabdominal ultrasonography. It has been clearly demonstrated that the urinary bladder wall thickens in response to bladder outlet obstruction (BOO), and that relief of BOO by prostatectomy or alpha-adrenoceptor blockers decreases the thickness of the bladder wall. Although bladder-wall thickness is obviously associated with BOO, little is known about the association between bladder-wall thickness and clinical parameters other than BOO. We investigated the relationship between ultrasound-estimated bladder-wall thickness and clinical parameters such as prostate volume, age, uroflowmetry results, and lower urinary tract symptoms (LUTS) in male patients over 50 years of age with LUTS due to possible benign prostatic enlargement (BPE).

Study design, materials and methods

The bladder-wall thickness of consecutive male patients over 50 years old with LUTS was estimated using transabdominal ultrasonography. Patients were excluded from the study if they had neurogenic bladder dysfunction, prostate cancer, urinary tract infection, bladder stones, previous prostatic surgery, previous anti-androgen therapy, or other prostatic medication within a month of visiting our hospital. Patients with poor visualization of the anterior bladder wall by ultrasound and those with an intravesical urine volume of less than 50 ml at measurement of bladder-wall thickness were also excluded from the study so as to avoid inaccurate measurements. Finally, 77 patients were included into the analysis. Bladder-wall thickness is expressed as the mean of values obtained by three-point measurements of the anterior bladder wall on transabdominal ultrasonography.

The correlation between bladder-wall thickness and the following clinical parameters was evaluated; prostate volume, age, maximum flow rate (Q_{max}), and voided volume (VV) at free uroflowmetry, post-void residual (PVR), %PVR (PVR/(PVR+VV)×100), and the total score as well as the score for each symptom of the international prostate symptom score (IPSS). The significance of correlation was determined using the Pearson test. Multivariate analysis was carried out using commercially available software.

Results

Mean values of age, prostate volume, and the IPSS total score of patients analyzed were 67.8 years, 35.9 ml, and 16.6 points, respectively.

Bladder-wall thickness correlated positively with prostate volume ($p=0.0011$), age ($p=0.022$), and %PVR ($p=0.001$). Multivariate analysis demonstrated that all three parameters independently correlated to bladder-wall thickness. The score of straining of IPSS was likely to be associated with bladder-wall thickness ($p=0.083$).

The correlation was also tested in subgroups divided by their prostate volume, i.e., BPE group (prostate volume of 30 ml or more, $n=43$), and non-BPE group (prostate volume less than 30 ml, $n=34$). In patients of the BPE group, bladder-wall thickness correlated positively to age ($p=0.01$), %PVR ($p=0.012$), and the score of straining ($p=0.042$). In contrast, patients of the non-BPE group had no significant correlation between bladder-wall thickness and age, %PVR, or the score of straining.

Interpretation of results

A thickened bladder wall was found to be associated with an enlarged prostate, aging, and a decrease in voiding efficiency, which may indicate that the duration of suffering from BOO and/or the degree of BOO is responsible for generation of a thickened bladder wall, and that bladder with a thickened wall cannot efficiently expel urine. Therefore, measurement of the bladder wall must be considered critical in evaluating male patients with LUTS. The symptom of straining was found to be associated with bladder-wall thickness in patients with BPE, but

the other voiding symptoms of IPSS, intermittency and weak stream, were not. These results suggest that the pathophysiology behind straining is different from that behind intermittency or weak stream, and the symptom of straining can be indicative of a detrusor change due to BOO in patients with BPE. However, the etiology of straining in patients without BPE remains to be determined.

Concluding message

A thickened bladder wall was found to be associated with BPE, aging, and voiding insufficiency. Straining, a symptom of LUTS, is associated with a thickened bladder wall, and can be indicative of detrusor changes due to BOO.