

VIDEOURODYNAMIC CHARACTERISTICS OF DETRUSOR UNDERACTIVITY IN WOMEN WITH VOIDING DYSFUNCTION

Hypothesis / aims of study

Voiding dysfunction has gained interest due to its high prevalence in the elderly. This study characterized different bladder dysfunctions in women with voiding dysfunction by videourodynamic study (VUDS), focused on detrusor underactivity (DU).

Study design, materials and methods

A total of 1914 female patients with voiding dysfunction failed first line medical treatment were recruited. All patients underwent VUDS. Age, comorbidities and the urodynamic parameters including bladder sensation, compliance, maximum flow rate, voiding detrusor pressure, voided volume, post-void residual volume, cystometric bladder capacity, voiding efficiency and bladder contractility index were analyzed. Linear regression was used to determine the association between bladder sensation and contractility.

Results

The proportion of each group was as following: normal tracing in 2.9% (n=56), detrusor underactivity (DU) in 23.1% (n=443), detrusor hyperactivity and inadequate contractility (DHIC) in 12.0% (n=231), hypersensitive bladder (HSB) in 17.0% (n=325), detrusor overactivity (DO) in 2.6% (n=49) and bladder outlet obstruction in 42.3% (n=810). The mean age in DU and DHIC patients was significantly older than in normal tracing and HSB groups (p<0.01). There was a trend toward higher prevalence of diabetes mellitus and hypertension in the DU and DHIC group compared to the normal tracing group. Linear regression analysis showed that bladder sensation (including FSF and FS) of the DU patients was negatively associated with bladder contractility (Fig. 1). When further stratified the patient in the DU group into very low detrusor pressure (Pdet < 5 cmH₂O) and low detrusor pressure (Pdet ≥ 5 cmH₂O), and compared these two subgroups in terms of age, urodynamic parameters, and co-morbidities, we found that bladder sensation, including FSF and FS, were significantly higher in the very low detrusor pressure group, and the prevalence of DM was significantly higher in the very low detrusor pressure group. The bladder contractility index and voiding efficiency were significantly lowest in DU and DHIC groups and lower in HSB and DO groups than the normal tracing group.

Interpretation of results

Previously, detrusor or neurogenic etiologies are considered to attribute to DU. In recent years, urotheliogenic etiology emerges as an important factor for DU. In our study, patients in the DU group had increased threshold of FSF and FS compared to the normal tracing group and other voiding dysfunctional groups, suggesting reduced bladder sensation may be specific to the etiology of DU. Negative association between detrusor contractility and bladder sensation in the linear regression, and increased threshold of FSF, FS and bladder capacity in the very low detrusor pressure DU group further support this hypothesis. Although patients in the DHIC group also had insufficient detrusor contractility and even urinary retention, the sensation of bladder did not decrease in this study. In contrast, the threshold of FSF and FS in the DHIC, HSB and DO group significantly decreased to different level compared to the normal tracing group.

DU is a multi-factorial symptom complex. Other than the bladder itself, aging and comorbidities also attribute to this condition. In the present study, the age in the DU group was significantly older than the normal and HSB group, but younger than the DHIC group. Diabetic bladder dysfunction involves both storage and voiding phase problem. In the early phase, hyperglycemia induced polyuria results in bladder hypertrophy, causing neurogenic and myogenic alteration. In the later phase, the accumulative oxidative stress leads to decompensated bladder, i.e., DU. In the current study, there was no difference in the prevalence of DM comparing the DU and normal tracing group. The prevalence of DM in general population of Taiwan was rather high. It is possible that the DM patients in the normal tracing group were in the early phase of DM, therefore, although they had LUTS the VUDS showed normal tracing.

Finally, we believe that accurate diagnosis of voiding dysfunction through VUDS is very important. In this study, all patients with voiding dysfunction and refractory to initial medication underwent VUDS. Among them 48.7% were diagnosed as having BOO including bladder neck dysfunction, dysfunctional voiding, PRES and urethral stenosis. Without VUDS, it is not possible to identify the site of BOO. In the present study, DU patients were characterized of decreased bladder sensation, very low Pdet, Qmax, VE and BCI on the urodynamic study. The bladder capacity is smaller than the normal tracing group, but larger than those in other voiding dysfunction groups. In contrast, DHIC, HSB and DO group had increased bladder sensation and normal Pdet. DHIC also exhibit high PVR, low VE and BCI, while those parameters remain normal in HSB and DO patients.

Concluding message

The bladder conditions of women with voiding dysfunction included DU, DHIC, HSB and DO. Bladder contractility index and voiding efficiency were significantly lowest in DU and DHIC groups and lower in HSB and DO groups than normal tracing group. Reduced bladder sensation was noted in DU and negatively associated with detrusor contractility.

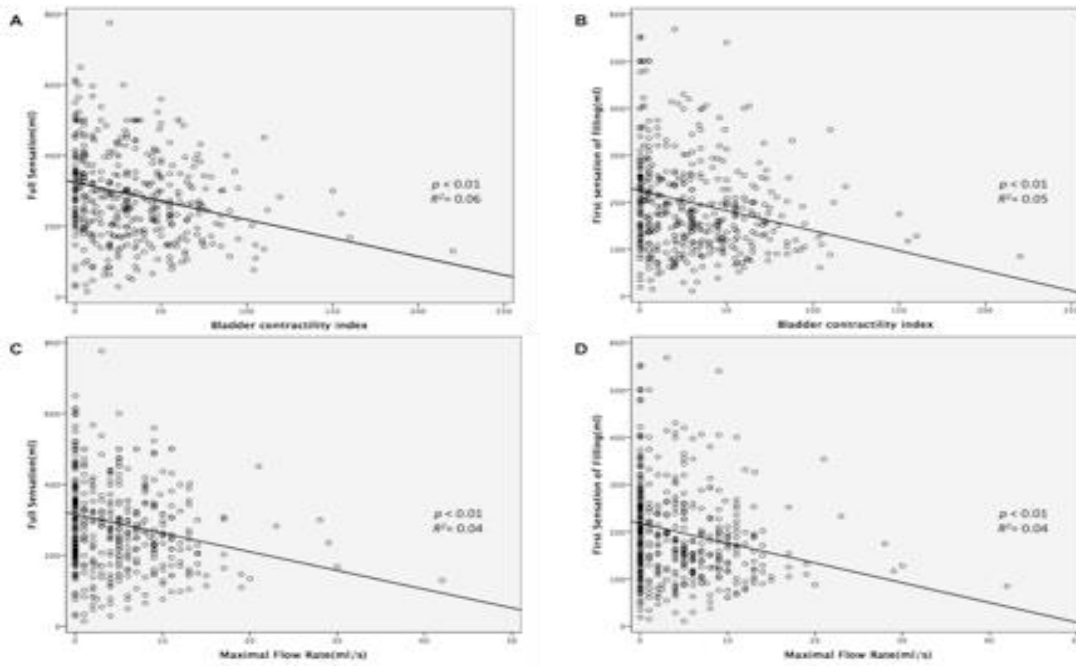


Fig.1. Negative association between bladder contractility and bladder sensation in patients with detrusor underactivity. (A) Bladder contractility index (BCI) vs full sensation (FS), (B) BCI vs first sensation of filling (FSF), (C) Maximum flow rate (Qmax) vs FS, (D) Qmax vs FSF.

Disclosures

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