The change of bladder shape during filling phase - DO bladder during filling becomes vertical like voiding bladder

Shibata C¹, Sakakibara R², Ishii T³, Kaga K⁴, Uchiyama T⁴, Awa Y⁵, Oikawa S⁶, Igarashi T³, Yamanishi T⁴

¹. Continence Center / Clinical laboratory center, Dokkyo Medical University Hospital, ². Neurology, Internal Medicine, Sakura Medical Center, Toho University, ³. Center for Frontier Medical Engineering, Chiba University, ⁴. Continence Center, Dokkyo Medical University Hospital, ⁵. Funabashi Clinic, ⁶. Clinical laboratory center, Dokkyo Medical University Hospital

Hypothesis / aims of study
Bladder shape during videourodynamics has not long been attracted interest. We quantitatively measured bladder shape of normal and detrusor over activity (DO) bladder during videourodynamics.

Study design, materials and methods
We had 87 patients who underwent videourodynamics at supine position, according to the ICS standards, in our hospital from August to December 2014: 45 female, 42 male, mean age 68.0±14.6 years. We measured first bladder sensation volume (FS, ml), first desire to void volume (FDV, ml), normal desire to void volume (NDS, ml), maximum desire to void volume (MDV, ml), DO, low compliance (LC), together with bladder photos. We measured bladder shape at each sensation using aspect ratio (vertical length, mm / horizontal width, mm). Statistical test were analysed by Mann-Whitney test.

Results
Men showed more common aspect ratio at MDV > 1.0 (vertically long shape) than women (p<0.01). 12 female and 15 male patients had DO. 3 female and 10 male patients had LC. We divided into three groups: normal group (without DO and LC), DO group, LC group. During slow bladder filling, aspect ratio at MDV > 1.0 was seen in 8 normal women (25.5%) and 3 normal men (27.3%). In contrast, aspect ratio at MDV > 1.0 was seen in 3 DO women (25.0%) and 12 DO men (80%), mostly along with DO, being more common than those in normal group. DO men showed more common aspect ratio at MDV > 1.0 than DO women (p<0.01). Aspect ratio at MDV > 1.0 was seen in 2 LC women (66.7%) and 7 LC men (70%), being small change from FS or FDV to MDV.

Interpretation of results
Previously, bladder shape is well described as vertical during voiding phase in urodynamic textbooks. In contrast, bladder shape during filling phase has not been well documented so far. This is the first study to quantitatively show, by videourodynamics, that bladder shape changed to vertical during bladder filling in 97.4% normal bladder and 85.2% DO bladder, 84.6% LC bladder. The change to vertical bladder was observed mostly along with DO in DO patients. The vertically long bladder is more common in men than in women. Since this phenomenon simulates voiding bladder, DO bladder might share not only elevated pressure, but also morphological changes with voiding bladder. This further implies that DO might be the exaggerated micturition reflex that normally occurs in the voiding phase.

Concluding message
We quantitatively showed that DO bladder during filling becomes vertically long as compared with normal group, particularly in men. The sex difference was noted in the change of bladder shape during filling phase. Since this phenomenon simulates voiding bladder, DO bladder might share not only elevated pressure, but also morphological changes with voiding bladder.

In connection with this presentation, there is no COI to be disclosed with any companies.