

Shibata C<sup>1</sup>, Sakakibara R<sup>2</sup>, Ishii T<sup>3</sup>, Kaga K<sup>4</sup>, Uchiyama T<sup>4</sup>, Awa Y<sup>5</sup>, Oikawa S<sup>6</sup>, Igarashi T<sup>3</sup>, Yamanishi T<sup>4</sup>

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

## THE CHANGE OF BLADDER SHAPE DURING FILLING PHASE - DO BLADDER DURING FILLING BECOMES VERTICAL LIKE VOIDING BLADDER

### 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, at supine position 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

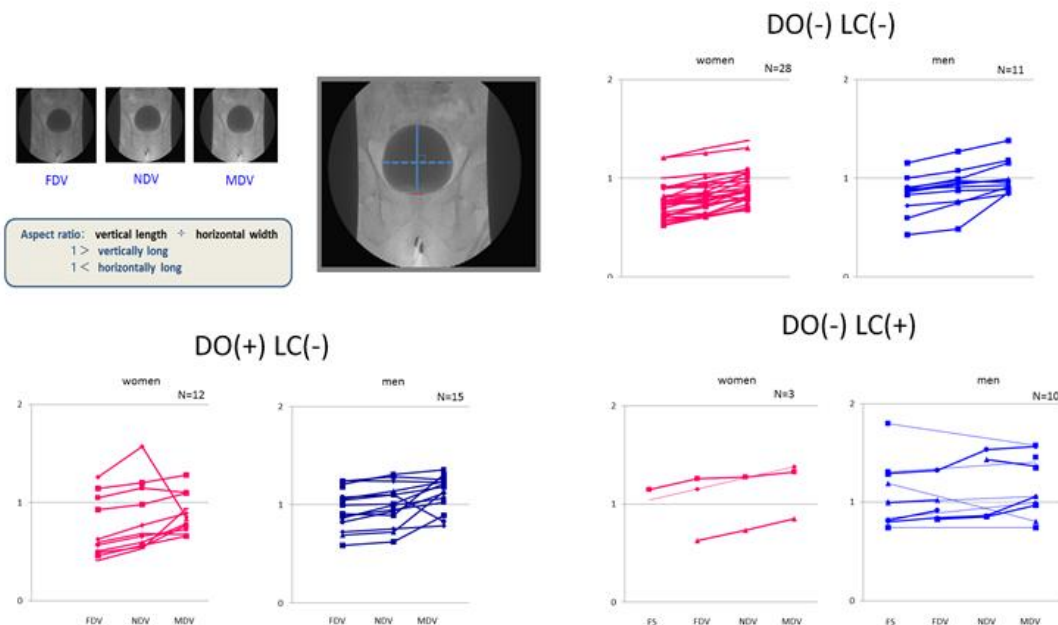
Men showed more common aspect at MDV > 1.0 (vertically long shape) than women (p<0.01). 12 female and 15 male patients had DO. 3 female and 10 male patients had LC. We divided into three groups: normal group (without DO and LC), DO group, LC group. During slow bladder filling, aspect ratio at MDV > 1.0 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.





### References

1. Lots HT et al. Reproducibility of the bladder shape and bladder shape changes during filling. Med phys.2005 Aug;32(8):2590-7.
2. Bih LI et al. Bladder shape impact on the accuracy of ultrasonic estimation of bladder volume.

### Disclosures

**Funding:** none **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** Dokkyo Medical University Ethics Committee **Helsinki:** Yes **Informed Consent:** Yes