

## USE OF A THREE-DIMENSIONAL SIMULATION MODEL TO DETERMINE THE ETIOLOGY OF VOIDING DYSFUNCTION

**Hypothesis / aims of study:** Urinary tract examination using a three-dimensional (3D) model and virtual endoscopy (VES) provides entirely different information from conventional radiological imaging and endoscopic examinations. For example, VES video imaging of the bladder and urethra enables observation of the morphology of the lumen of the bladder neck and urethra in the same direction as urine flow during voiding, which previously had not been possible. In this study, we used quantified 3D simulation technology to investigate the etiology of voiding dysfunction.

**Study design, materials and methods:** Of 20 boys who presented with a chief complaint of nocturnal enuresis or daytime urinary incontinence and in whom stenosis was suspected based on obstructive patterns on uroflowmetry and voiding cystourethrography, 18 who underwent CT during voiding and for whom a 3D model and a VES video were obtained were included in the study. VES videos were created using a DICOM viewer and a CAD application for medical use. Quantification was performed using data such as the curvature of the walls of the interior of the urethra determined from a structural analysis of VES videos.

**Results:** The morphology of the bladder and urethra of the subjects was classified into three types based on the three-dimensional model. Comparison of quantitative data among the types showed clear differences. In particular, a morphology in which the bladder was anteflexed was observed in many cases, and 3D data confirmed that flexion of the urethra due to structural abnormality of the bladder and urethra increased intravesical pressure and bladder wall thickness. This was caused by the positional relationship between the pubic bone and the bladder and urethra. In other words, a structural abnormality of the bladder and urethra that differs from urethral stenosis was observed at a high frequency. Interpretation of results

**Concluding message:** These findings suggest that a structural abnormality of the bladder neck and urethra is often involved in cases of childhood-onset refractory voiding dysfunction of non-neurological origin. This finding may have a great effect on treatment strategies for patients with this condition.

### Disclosures

**Funding:** none **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** IRB in Dokkyo Medical University Koshigaya Hospital **Helsinki:** Yes **Informed Consent:** Yes