OP17.10 – Biometric and Morphological Features of the Fetal Bladder in Lower Urinary Tract Obstruction on Magnetic Resonance Imaging. New Perspectives for Fetal Cystoscopy.

Introduction
Inadequacy between currently available fetoscopes and anatomical constraints of the fetal bladder accounts for most technical difficulties during Fetal Cystoscopy (FC) in Lower Urinary Tract Obstruction (LUTO). The aim of this anatomical study was to assess by Magnetic Resonance Imaging (MRI) the variations in three bladder angles (bladder-neck angle (BNA), vesicourethral angle (VUA), dome-urethra angle (DUA)) with gestational age (GA), bladder volume and the presence of LUTO.

Methods
46 MRIs of male fetuses (17 LUTO at 28.1 weeks [17.3-35] and 29 controls at 29.9 weeks [21.9-35] matched for GA) were reviewed. Mann-Whitney's test was used to compare angle values between groups. Variations according to GA and bladder volume were determined using ANOVA. Measures reliability was assessed using Bland-Altman’s method.

Results
The BNA was higher in LUTO fetuses: 127° [102-162] versus 111° [89-157], p<0.01. There was no difference in the DUA, p=0.92. No statistical analysis was conducted on the VUA since it was not measurable in most controls. Variance analysis showed no variation of the three angles with bladder volume in LUTO (BNA: p=1.21, VUA: p=0.65, DUA: p=0.08) and in control fetuses (BNA: p=1.22, DUA: p=0.92). The BNA in LUTO fetuses was the only angle to vary with GA and was higher after 25 weeks (p=0.04). Reliability study showed an acceptable bias for both intra- and inter-investigator reproducibility for all three angles. Surgical difficulties could be anticipated from virtual MRI cystoscopy (Video).

Conclusion
The BNA is approximately 15° higher in LUTO fetuses and the angle between the posterior urethra and the bladder axis averages 117°. The development of a customized fetal cystoscope should help overcome the current technical challenges of FC.

Fig. 1: Angles (BNA, VUA, DUA) were measured on the sagittal plane on MRI for both LUTO and control fetuses.

Fig. 2: FC using a customized fetoscope compared with the current curved one.

Fig. 3: 3D reconstruction of a LUTO bladder at 29.5 weeks.