The X Value – a New Measure for Assessment of Urethral Hypermobility in Women with Urinary Incontinence

Introduction
Urethral hypermobility (UH) is an important preoperative criterion in patients with stress urinary incontinence (SUI) and is usually determined by means of the Q-tip testing (QTT), ultrasound (US) evaluation, or inspection of anterior wall descent during vaginal examination. The QTT may be unpleasant, even painful, and the US evaluation is expensive and not widely available. We were aiming to determine UH in patients with urinary incontinence (UI) during vaginal examination by a simple measurement of the X value, which represents the distance (in centimeters) between external urethral meatus and maximum descent of the anterior vaginal wall (Figure 1), and to test the feasibility and accuracy of measuring the X value.

Methods
• Retrospective study.
• Women with UI who were examined at our Urogynaecology office between January and December 2013.
• Thorough history was taken along with QTT, POP-Q measurements (Aa, Ba), and X value during the Valsalva maneuver were determined. Based on the history and the results of the examination, the diagnosis of UI was set.

Results
Complete data was available for 437 patients (122 of them with SUI, 150 with urge UI, 165 with mixed UI). Data for POP-Q measurements (Aa and Ba), Q-tip testing, and X value are presented in Table 1.

Patients with UH had significantly higher X values than patients without UH (mean X 3.7cm vs. 2.7 cm, respectively, p<0.001).

A significant correlation was found between the X value and Qv (Spearman's rho=0.52, p<0.001), Aa (Spearman's rho=0.64, p<0.001), and Ba (Spearman's rho=0.64, p<0.001).

There was a significant linear relationship between X value and Qv (p<0.001, R2=0.30).

In order to investigate the cut-off value of X for UH, a ROC curve was plotted (Figure 2). The X cut-off value set at 3.5cm represents a test with sensitivity of 63.8%, specificity of 86.9%, positive predictive value of 96.8%, and negative predictive value of 28.0%. The area under the ROC curve is 0.82 (95% CI = 0.76 - 0.87, p=<0.001). 96.8% of patients with X value ≥3.5cm have UH (Table 2). With X value ≥ 4.5cm, virtually all patients have UH.

Conclusions
• The X measure is a valuable discriminator between patients with and without UH.
• With X value ≥3.5cm, UH was confirmed in almost all patients.
• If the X value was <3.5cm, then the UH should be confirmed by Q-tip testing.

Future Challenges
• Standardization of the method?
• Determination of the X-value in young, nulliparous women?
• X-value in pre- and post-op patients?
• X value as the additional, 10th point of POP-Q system?