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A SIMPLE CLINICAL TOOL FOR ASSESSMENT OF URETHRAL HYPERMOBILITY IN WOMEN WITH URINARY INCONTINENCE – THE X MEASURE

Hypothesis / aims of study

A loss of urethral support leads to urethral hypermobility (UH), which represents one of the risk factors for development of female stress urinary incontinence (SUI). In clinical practice, the UH is usually determined by means of the Q-tip testing, ultrasound (US) evaluation and by inspection of anterior wall descent during vaginal examination. At least in some women, the Q-tip testing may be unpleasant, even painful, and the US evaluation is expensive and not widely available. Therefore, 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 with the posterior vaginal speculum in-situ. The aim of our study was to test the feasibility and accuracy of measuring the X value in determination of UH in women with UI.

Study design, materials and methods

In this retrospective study we included all women with UI who were examined at our Urogynecology office between January and December 2013. In all patients, a thorough history was taken along with Q-tip testing, and 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.

Statistical analysis was performed with SPSS software using Mann-Whitney test, correlation, linear regression, and ROC curve analysis. Significance was set at $p<0.05$.

Results

Complete data was available for 437 patients. 122 among them were diagnosed with SUI, 150 with urge UI (overactive bladder – OAB) and 165 with mixed UI (MUI). Data for POP-Q measurements (Aa and Ba), Q-tip testing, and X value are presented in Table 1.

Table 1: Descriptive statistics for POP-Q measurements (Aa, Ba), Q-tip testing (Qv), and X value

	Aa [cm]	**Ba [cm]**	**Qv [°]**	**X [cm]**
Mean	-1.3	-1.2	51.1	3.6
SD	1.2	1.4	19.6	0.9
Minimum	-3.0	-3.0	0.0	1.0
Maximum	2.0	4.0	107.0	6.5

For the purpose of the analysis, two groups were formed, group 1 (N=61) representing patients without UH ($Qv<30^0$), and group 2 (N=376) representing patients with UH ($Qv\geq30^0$). Patients in group 2 (mean X=3.7cm) had significantly higher X values than patients in group 1 (mean X=2.7cm) ($p<0.001$).

In addition, a significant correlation was found between X value and Qv (Spearman's r =0.52, $p<0.001$), Aa (Spearman's r=0.64, $p<0.001$), and Ba (Spearman's r=0.64, $p<0.001$). Moreover, there was a significant linear relationship between X value and Qv ($p<0.001$, $R^2=0.30$). The equation of estimated regression line is: $Qv = 9.8 + 11.6(\pm1.7)*X$ (Figure 1).

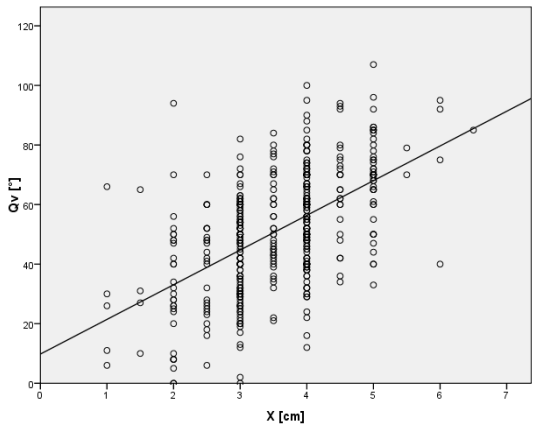

Figure 1: Linear regression of X value and Qv

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 (PPV) of 96.8%, and negative predictive value (NPV) 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. With X value ≥ 4.5cm, virtually all patients have UH.

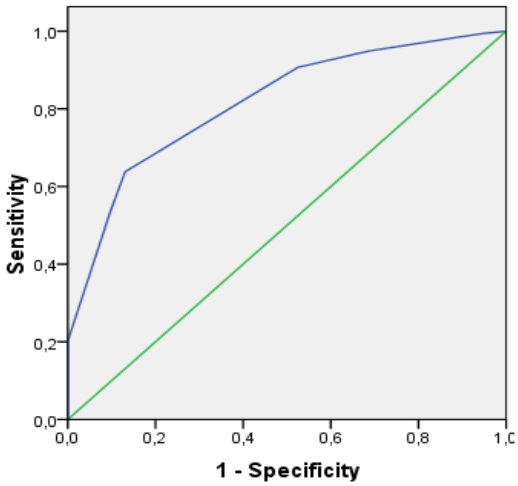

Figure 2: ROC curve for X value and urethral hypermobility

Table 2: Contingency table of cut-off value of X and UH

	X<3.5cm	**X≥3.5cm**	**Sum**
Qv<30^0	53	8	61
Qv≥30^0	136	240	376
Sum	189	248	437

Patients with SUI (mean X=3.7cm) have significantly higher X measurements than patients with OAB (mean X=3.4cm) (p=0.002). 97.5% of SUI patients with X value ≥3.5 cm have urethral hypermobility. For patients with symptoms of SUI, X value measurement is a test with a sensitivity of 69.6%, specificity of 80.0%, PPV of 97.5%, and NPV of 19.0%. There is also a linear correlation between X value and Qv ($p<0.001$, $R^2=0.27$) for patients with SUI. The equation of estimated regression line is: Qv = 12.2 + 10.8(±3.6)*X.

Interpretation of results

Based on the results we feel that 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. The normal X value is presently unknown (based on our data the proposed normal X value is set at 2cm) however, we feel that the normal value for X needs to be determined in young nulliparous women without UI.

Concluding message

We believe that the determination of X value represents a new simple tool for assessment of UH and could represent the additional, 10th point of POP-Q system.

Disclosures

Funding: No funding or grant **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics not Req'd:** This was a simple retrospective analysis of data obtained from medical records. The names of the patients were not disclosed. Our Ethical Committee felt that it is not necessary to obtain their approval to conduct this research. **Helsinki:** Yes **Informed Consent:** No