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REPRODUCIBILITY OF URETHRAL PRESSURE REFLECTOMETRY IN WOMEN WITH PELVIC ORGAN PROLAPSE.

Hypothesis / aims of study

There is a great need for knowledge regarding the mechanism of continence in women with pelvic organ prolapse (POP) before and after surgery. De novo stress urinary incontinence (SUI) is often associated with anterior vaginal wall prolapse but it may be just as prevalent after surgery for posterior vaginal wall prolapse. The most common indicator for the risk of developing postoperative de novo SUI is the presence of occult SUI upon POP reduction, in the preoperative assessment. Unfortunately, occult SUI is associated with poor predictive values and so, the presence of preoperative occult SUI does not predict the need for treatment for SUI, after surgery. Regardless of this matter, some will argue that occult SUI is indicative for whether or not a woman should undergo prophylactic anti-incontinence surgery at the time of POP repair.

It has been shown that women with SUI can be separated from continent women by measuring urethral opening pressure at an abdominal pressure of 50 cmH_2O (1) by means of urethral pressure reflectometry (UPR) (2). The authors suggested that it might be used as a diagnostic test for SUI. Thus, UPR might possibly help identify women with POP who are at risk of developing postoperative de novo SUI. The aim of this study was to investigate the reproducibility of UPR at rest, during squeezing and straining, in women with POP.

Study design, materials and methods

We conducted a prospective, observational study where women with either anterior or posterior vaginal wall prolapse were recruited from the outpatient clinic. The women were examined with UPR on two different occasions. At the first appointment, we also performed POP staging according to the Pelvic Organ Prolapse Quantification (POP-Q) System.

The women were measured at rest, during squeezing and straining with simultaneous recordings of abdominal pressure. The related values of urethral and abdominal pressures were plotted into an abdomino-urethral pressuregram (fig. 1). By using linear regression (y = ax + b), we could calculate the slope of the line and the intercept of the y-axis. The slope, called APIR (abdominal to urethral pressure impact ratio), expresses the effect that abdominal pressure increase has on urethral pressure. By using APIR, opening pressure can be calculated at any given abdominal pressure. Measurements during straining were evaluated by assessing the reproducibility of both APIR and opening pressure at a standardized abdominal pressure of 50 cmH_2O, $P_{O\text{-}Abd\ 50}$.

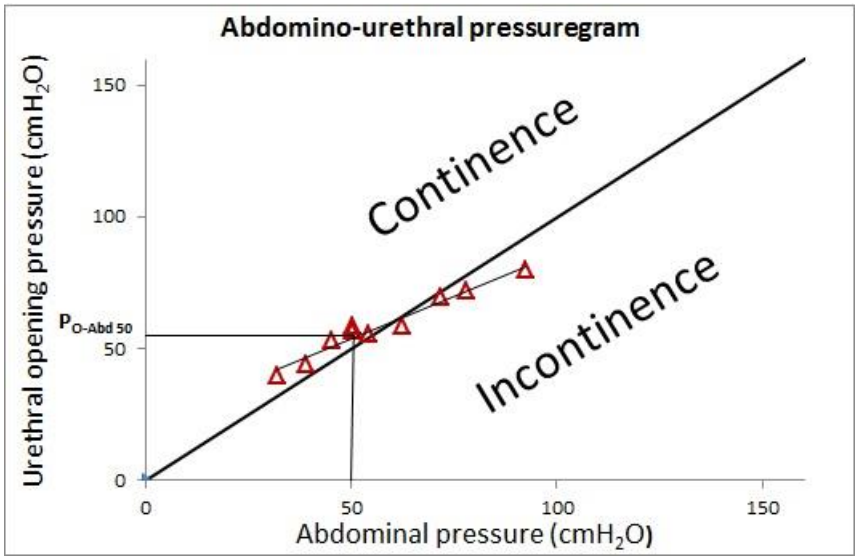

Figure 1. Abdomino-urethral pressuregram with opening pressures (y-axis) plotted against abdominal pressures (x-axis). The patient will become incontinent if the abdominal pressure exceeds the urethral pressure. The tracing is from a patient with SUI; her $P_{O\text{-}Abd\ 50}$ is 54 cmH_2O. APIR: abdominal to urethral pressure impact ratio, SUI: stress urinary incontinence, $P_{O\text{-}Abd\ 50}$: opening pressure at abdominal pressure of 50 cmH_2O.

Principles of UPR:

UPR allows for simultaneous measurements of pressure and cross sectional area in the urethra, using a polyurethane bag, connected to a 45 cm long PVC tube, inserted into the urethra. The cross sectional area along the entire length of the urethra is measured continuously by means of acoustic reflectometry. As a result, the opening pressure, which is the pressure needed to open the collapsed urethra, is measured.

Limits of agreement and coefficients of variation were used to show the agreement between the two measurements.

Results

Our study group consisted of 19 women with anterior vaginal wall prolapse and 11 women with posterior vaginal prolapse, all with POP-Q grade ≥ 2. Table I displays the results.

Table I. The reproducibility of parameters. The bias is the mean difference between the first and second measurement. The results show no significant differences between the two measurements or between the two groups (anterior and posterior vaginal wall prolapse).

All women	Mean	Bias (difference)	Limits of agreement (2SDs)	CV (%)
$P_{O\text{-}rest}$, cmH_2O	51.7	0.9	11.7	11.3
$P_{O\text{-}squeeze}$, cmH_2O	65.3	2.0	13.3	10.2
$P_{O\text{-}Abd\ 50}$, cmH_2O	77.1	1.7	15.3	9.9
APIR	0.8	0.03	0.7	41.0

SD: Standard deviation, CV: Coefficient of variation, calculated as the standard deviation of the mean difference between the two measurements, divided by the mean, and multiplied by 100. $P_{O\text{-}rest}$: opening pressure at rest, $P_{O\text{-}squeeze}$: opening pressure during squeezing, $P_{O\text{-}Abd\ 50}$: opening pressure at an abdominal pressure of 50 cmH_2O, APIR: abdominal to urethral pressure impact ratio.

Interpretation of results

Measurements at rest and during squeezing were highly reproducible, as expected from previous findings. Measurements during straining were evaluated by assessing the reproducibility of APIR and $P_{O\text{-}Abd\ 50}$, which has not been done previously. $P_{O\text{-}Abd\ 50}$ was highly reproducible with a narrow SD and a confirming CV. $P_{O\text{-}Abd\ 50}$ represents the permanent and adjunctive closure forces that act on urethra, striving to keep it closed during stress. It may be considered a severity measure of incontinence, much like leak point pressure (LPP) has been in the literature. However, LPP can only be measured in women with incontinence whereas $P_{O\text{-}Abd\ 50}$ assesses urethral function regardless of diagnoses. APIR expresses the relationship between urethral pressure and abdominal pressure but the results showed poor reproducibility of the parameter in women with POP.

Concluding message

This study has shown that $P_{O\text{-}Abd\ 50}$ is highly reproducible and is therefore a reliable parameter for the assessment of urethral function in women with (or without) POP.

References

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Disclosures

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