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Slack M[1], Tracey M[2], Hunsicker K[2], Patel B[2], Godwin A[2]
1. Addenbrooke Hospitals , 2. Ethicon, Inc.

ASSESSMENT OF URETHRAL FUNCTION USING URETHRAL RETRO-RESISTANCE PRESSURE IN WOMEN WITH AND WITHOUT STRESS URINARY INCONTINENCE

Hypothesis/Aims of the study:

Urethral function has been assessed for over 75 years by a variety of methods. The clinical utility of commonly used measures of urethral function including maximal urethral closure pressure (MUCP) and leak point pressure (LPP) remains to be established. One study demonstrated that a low MUCP was associated with a poorer outcome following retropubic urethropexy [1]. The Urethral Retro-resistance Pressure (URP) is a new retrograde measurement of urethral function. URP is the pressure required to achieve and maintain an open sphincter.

The aims of this study were as follows. 1) We compared the average URP value in women without SUI (asymptomatic) to the average URP value in women with SUI (symptomatic). 2) We evaluated the within-subject variation of the URP measurement at a single visit and the within-subject change in URP over time using test and retest values. 3) We explored the effect of baseline covariates on URP. 4) Using the URP values derived from populations of asymptomatic and symptomatic women, we determined the likelihood that a given URP value indicates SUI.

Study design/Materials & Methods

Four centres enrolled 61 women without symptoms of urinary incontinence and negative standing stress tests. Fifty-six of these women were premenopausal. In a separate study, 23 centres enrolled 79 premenopausal women with symptoms of SUI. Each centre performed three consecutive URP measurements on each subject. At two centres, 32 asymptomatic women returned in 3 to 7 days for three additional URP measurements. Each patient emptied her bladder, was positioned in a semi-lithotomy position and instructed to relax her pelvic floor. The URP was measured by placing a cone-shaped meatal plug 5mm into the external urethral meatus, creating a seal. The device infused sterile fluid at a controlled rate of 1 mL per second. The device displayed the pressure (cm H_2O) required to open the sphincter over a period of 20 seconds. The curve plateau represented the pressure at which the open sphincter was maintained (Figure 1). The URP is a catheter-less procedure and avoids catheter-induced systemic artifact. Test and retest correlation analysis on the URP measurement was performed and "limits of agreement" were established using Bland-Altman approach.
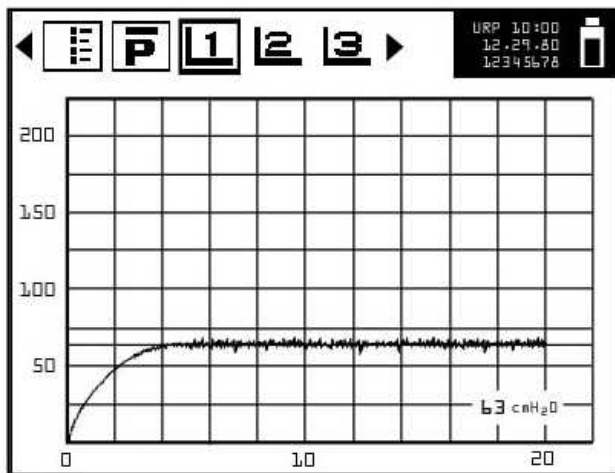

Figure 1: URP curve

Results:

The mean age of the asymptomatic group was 33 (± 9) years and the mean body mass index (BMI) was 24 (± 6). The symptomatic group had a mean age of 44 (±6) years and BMI of 27(±6). The URP values were normally distributed in both groups. The mean URP for the asymptomatic group (n=56) of 111.9±40.1 cmH$_2$O was significantly higher than the mean URP of 76.7±26.7 cmH$_2$O for the symptomatic group (n=79) [p<0.0001]. The mean within-subject standard deviation of URP values measured at visit 1 was 12.6±12.6 cmH$_2$O (n=60) and at retest visit was 9.3±6.2 cmH$_2$O (n=32). For the retest cases, the mean URP at visit 1 was 113.9±39.9 cmH$_2$O (n= 32) and 125.5±33.9 cmH$_2$O (n=32) at the retest visit (Wilcoxon Signed Rank Test, p=0.145). The correlation between test and retest URP values was 0.65 (90%CI 0.44-0.80). Interpretation of URP values is detailed in Table 1.

Table 1: Interpretation of URP value*

URP Results	Interpretation	P-value
≤ 46	SUI	< 0.05
47 – 61	Very likely to have SUI	0.05 – 0.10
62 – 79	Likely to have SUI	0.10 – 0.20
80 – 99	Results Inconclusive	
100 – 110	Unlikely to have SUI	0.10 – 0.20
111 – 120	Very unlikely to have SUI	0.05 – 0.10
≥ 121	No SUI	< 0.05

*Based on 79 women with SUI and 56 women without SUI

Interpretation of results:

The URP measurement in premenopausal asymptomatic women has a normal distribution curve, good test-retest correlation, and demonstrates a distribution that is significantly different from the distribution of URP values in premenopausal women with SUI. Avoidance of a urethral catheter eliminates the possibility of catheter artifact. This, along with the finding of a normal distribution curve for URP values in both groups is consistent with URP being a physiological measure of urethral function. The URP measurement has the potential to discriminate between women with and without SUI. However, more data is needed on asymptomatic postmenopausal women in order to determine the true overlap of URP in asymptomatic and symptomatic women. Additionally, outcome studies are required to establish the role of URP in the assessment of urethral function.

Concluding message:

The data suggest that URP measurement shows promise in aiding in the diagnosis of urinary incontinence and in assessing urethral function.

Reference:

[1] The low pressure urethra as a factor in failed retropubic urethropexy. Obstet Gynecol 1987; 68: 399-402