

IS ULTRASOUND THE NEXT DIMENSION IN PREDICTING THE OUTCOME OF CONTINENCE SURGERY?**Hypothesis / aims of study**

At present there is no objective method to predict the outcome of surgery for Urodynamic Stress Incontinence (USI). Urethral Pressure Profilometry (UPP), whilst not diagnostic, is useful in the assessment of urethral function and previous work has demonstrated that women with a 'low pressure urethra' have an increased risk of failure following continence surgery (1). Three-dimensional ultrasound (3D) has previously been shown to be an accurate and reproducible method of assessing urethral sphincter volume in women (2) and a decrease has been associated with USI (3). In addition ultrasound assessment of Bladder Wall Thickness (BWT) has been shown to be a good screening test for detrusor overactivity although the effect of continence surgery remains unknown. The aim of this study was to determine whether pre-operative ultrasound of the lower urinary tract is prognostic for outcome following continence surgery.

Study design, materials and methods

Women were recruited prospectively from a tertiary referral urodynamic clinic. All complained of troublesome lower urinary tract symptoms and all underwent videocystourethrography including uroflowmetry, cystometry and pressure/flow voiding studies using a Laborie Aquarius urodynamic system. UPP assessment was performed using a standard technique with a Gaeltec microtip transducer. Those women with an objective urodynamic diagnosis of USI who failed to respond to conservative measures were offered continence surgery and all underwent modified Burch colposuspension using a standard technique under the direct supervision of the senior author. Pre-operative two-dimensional transvaginal ultrasound (2D) was performed in the supine position to assess BWT in three places with the bladder empty. Subsequently 3D ultrasound assessment of the urethral sphincter was performed using a Kretztechnik ultrasound machine with a 5MHz 3D probe and a transperineal approach. The total urethral sphincter volume, urethral volume and cross sectional area were measured and rhabdosphincter volume calculated. Post-operative clinical assessment was performed using repeat videocystourethrography at 6 months follow-up. Statistical analysis was performed using SPSS (v10, USA) and means compared using an independent sample t test. Ethical committee approval was granted for this study.

Results

In total 87 women were recruited to the study of which 32 (36.8%) had had previous continence surgery. The mean age was 56.1 yrs (range: 37-88). Pre-operatively all women had objective evidence of USI on videocystourethrography. The overall objective cure rate in women undergoing primary surgery at 6 months was 95%. In the group having 'redo' surgery the cure rate was 68.8%. Overall the rates of 'de novo' detrusor overactivity were 11.5% and 9.5% respectively. Those women with recurrent USI were found to have a significantly smaller urethral sphincter than those who had an objective cure [Table 1].

	Post Op Dry	Post Op USI	p value
Mean Total sphincter Volume (cm³)	4.23	1.94	0.000
Mean Rhabdosphincter Volume (cm³)	3.75	1.09	0.000
Mean Cross Sectional Area (cm²)	2.57	2.05	0.007

TABLE 1: URETHRAL SPHINCTER AS A PREDICTOR OF CONTINENCE SURGERY OUTCOME

Whilst there was a tendency for those women with recurrent USI to have a lower Mean Maximum Urethral Closure Pressure (MUCP) there was no statistically significant difference between groups (46.6cmH₂O Vs 41.0 cmH₂O; **p = 0.429**). When considering postoperative complications mean bladder wall thickness was found to be significantly greater in those women who subsequently developed detrusor overactivity in the postoperative period

(6.65mm Vs 3.68mm; $p = 0.004$) [Figure 1]. All cases were found to have a mean BWT >5mm and there was none in those women who had a BWT<4mm.

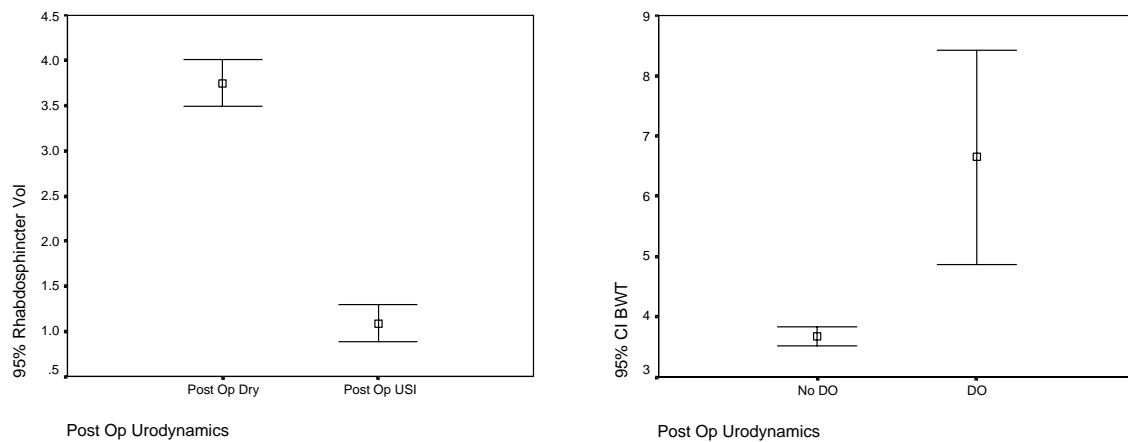


FIGURE 1: PREDICTION OF OUTCOME BY RHABDOSPHINCTER VOLUME (LEFT) AND BLADDER WALL THICKNESS (RIGHT)

Interpretation of results

To the best of our knowledge this is the first study to assess the predictive value of 3D urethral sphincter volumes in women having continence surgery. Our findings would suggest that women who have failed surgery have significantly smaller sphincters than those who are dry and that this is a more useful diagnostic test than using traditional measures of urethral function such as MUCP. Conventional 2D assessment of mean bladder wall thickness has also been shown to be predictive of postoperative detrusor overactivity, using a cut-off of 5mm, and this supports the findings of previous studies.

Concluding message

Three dimensional ultrasound assessment of the urethral sphincter is predictive of outcome following continence surgery. When combined with conventional assessment of bladder wall thickness it provides a useful tool to predict outcome and may be useful in counselling women prior to surgery.

References

1. Neurourol Urodyn 1997; 16: 354-355.
2. Ultrasound Obstet Gynaecol 2001; 17: 421-424.
3. Neurourol Urodyn 1996; 15: 339-340.

