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CHANGES IN URETHRAL CLOSURE FUNCTION AFTER TENSION-FREE VAGINAL TAPE, MEASURED WITH URETHRAL PRESSURE REFLECTOMETRY (UPR) DURING INTRA-ABDOMINAL PRESSURE INCREASE

Hypothesis / aims of study

Tension-free Vaginal Tape (TVT) is a commonly used treatment for stress urinary incontinence (SUI) with a high cure rate. However, until now it has not been possible to demonstrate consistent changes in the urethral closure function after TVT. Thus the mechanism of action remains unknown.

UPR measurements during intra-abdominal pressure increase by strain have indicated that the continence mechanism is dependent on both the resting urethral opening pressure and "Abdominal to urethral pressure Impact Ratio" (APIR) measured in the high pressure zone.
As TVT does not affect the resting urethral opening pressure or maximal urethral closure pressure (MUCP) we expect the continence mechanism to be improved by an increased APIR.
The aim of this study was to investigate if the APIR increased after TVT.

Study design, materials and methods

Twenty-one women with bothersome SUI, positive cough stress test, urodynamically proven SUI and scheduled for TVT were consecutively included in the study via the outpatient clinic.
In addition to UPR measurements, the pre- and postoperative assessment included a comprehensive medical history, the International Consultation on Incontinence Questionnaire on Urinary Incontinence Short Form (ICIQ-UI-SF), uroflowmetry, measurement of post-void residual urine volume and cough stress test. The patients were requested to complete a 48-hour pad test and keep a 2-day bladder diary and a 7-day incontinence diary in the week up to each visit. Cystometry was performed at enrolment if not previously conducted within the 3 months before enrolment.
The UPR technique enables simultaneous measurement of pressure and cross-sectional area along the entire length of the urethra, and the opening pressure can be obtained exactly in the high pressure zone. UPR avoids the common artefacts encountered with conventional catheters (1). The method has been developed to measure the urethral opening pressure within just 7 seconds and therefore allows measurements during intra-abdominal pressure increase by strain.
The UPR polyurethane bag was placed in the urethra and connected to a syringe and an acoustic transmitter. The bag was inflated by means of the syringe, distending it accordingly, the cross-sectional area within the bag, and thus the urethra was measured with acoustic reflectometry, and the opening pressure was recorded. The abdominal pressure was measured with an air filled catheter in the rectum. All measurements were conducted in the supine position.
At rest, measurements were conducted 10 times with a few seconds pause in between. The mean urethral opening pressure was used as result.
During intra abdominal pressure increase by strain, measurements were conducted 10 times at different levels of intra abdominal pressure. The urethral opening pressure and the simultaneous abdominal pressure were recorded at all ten levels strain, and the results were inserted in the Pressuregram (figure 1). Linear regression was conducted and the slope (APIR) of the linear regression line found.
The TVT procedure was carried out under local anaesthesia, with no concomitant surgical procedures, using the technique described by Ulmsten et al.
Subjective cure was defined as no reported incontinence on ICIQ-UI-SF, and objective cure was defined as negative stress test and < 5g leakage on pad test.

Results

Subjective and objective cure rates were 81% and 100%, respectively.
The mean resting urethral opening pressure was unchanged after TVT (41.45 cm H_2O before TVT, 41.76 cm H_2O after TVT, p=0.75).
APIR increased in all subjects (figure 2), and mean APIR increased from 0.67 to 1.34 ($p<0.0001$).

Interpretation of results

The increased APIR after TVT adds to our understanding of the mechanism of action behind the TVT. The opening pressures measured during intra-abdominal pressure increase includes permanent and adjunctive closure forces of the urethral closure mechanism; hence both known factors (e.g. the support structures and the vasculature) and unknown factors are comprised in the APIR.

Concluding message

UPR measurements showed a highly statistically significant increase in APIR after TVT and added to our knowledge about the mechanism of action behind the procedure.

Figure 1: Pressuregram with corresponding measures of intra-abdominal pressure and urethral opening pressure. APIR: Abdominal to urethral Pressure Impact Ratio

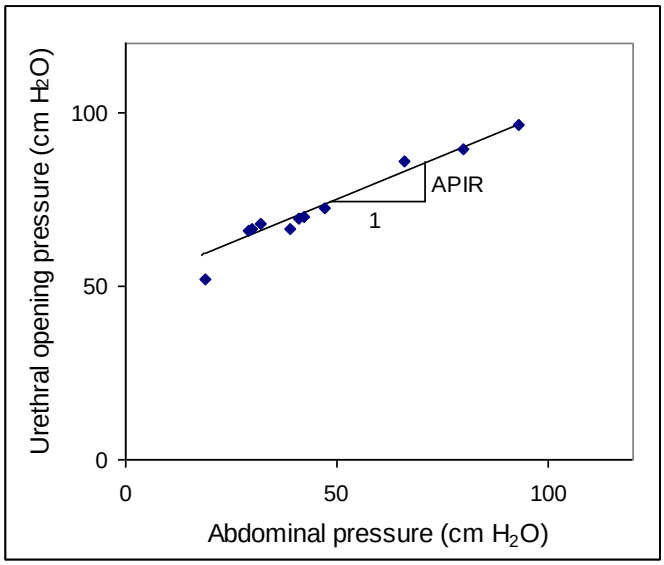
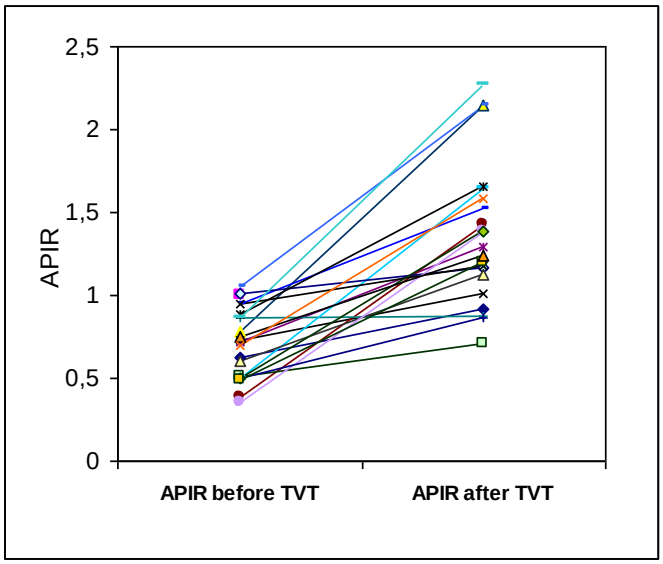


Figure 2: APIR before and after TVT (n=21)



References

1. Klarskov N, Lose G. Urethral pressure reflectometry vs urethral pressure profilometry in women: a comparative study of reproducibility and accuracy. BJU Int 2007 Aug;100(2):351-6.

Disclosures

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