

ULTRASOUND STUDY OF THE EFFECT OF TVT OPERATION ON THE MOBILITY OF THE WHOLE URETHRA.

Aims of Study

Tension-free vaginal tape (TVT) has become an important method for the treatment of stress urinary incontinence. Various studies of the mechanism of TVT have been published.

Ultrasound is one of the methods used in monitoring the lower urinary tract. The TVT operation was designed to support the middle and distal urethra. For evaluation of the effect of this operation it is important to provide assessment of the position and mobility of the whole urethra before and after surgery. Colour Doppler imaging was able to demonstrate urine leakage through the urethra, and it is possible to ascertain exactly the onset of the leakage, to measure the Valsalva leak point pressure (VLPP) and to ascertain the position of the urethra when the leakage occurs.

The aim of our study was to evaluate the mobility and the changes in mobility of the whole urethra before and after TVT procedure; to evaluate the changes between the position of the urethra at pressure when the leakage occurred before the operation, and the position of the urethra at the same pressure after the operation; and to evaluate the relationship between the position and mobility of TVT and the mobility of the urethra.

Methods

15 women with urodynamically proved stress incontinence after successful TVT operation were included in the prospective pilot study. Their mean age was 53.4 years (SD-10.4), mean BMI was 25.3 (SD-1.82), and mean parity was 2 (SD-0.447). Ultrasound examination was performed before TVT procedure and approximately two months after surgery. Before the ultrasound examination the urinary bladder was filled to 300 ml with sterile saline. The measurements were taken in supine position at rest and during Valsalva. For the perineal examination a curved array probe 5 (3.5) MHz was used (Acuson 128 XP 10). For all women, we assessed the position and mobility of the whole urethra. Because the anatomical length of the urethra varies, measurement was performed at previously defined points. Mobility of the urethra was measured at urethrovesical junction (UVJ), 17 mm below UVJ (middle of the urethra) and one centimetre above and below this point (upper and lower third). Simultaneously measurement of intraabdominal pressure was performed.

Before subsequent surgery we performed a perineal examination using an ultrasound contrast medium (Levovist, Shering). We performed CDV for detection of urine leakage and simultaneous recording of abdominal pressure to detect VLPP, and we measured the position of the urethra at VLPP/Fig.1/.

After surgery ultrasound examination was performed with simultaneous measurement of the intraabdominal pressure. The position of the urethra was assessed at rest, at maximal Valsalva and at identical pressure as VLPP before surgery/Fig.2/. The position and mobility of the tape at rest and during Valsalva was also evaluated.

Fig.1 The position of the urethra at VLPP

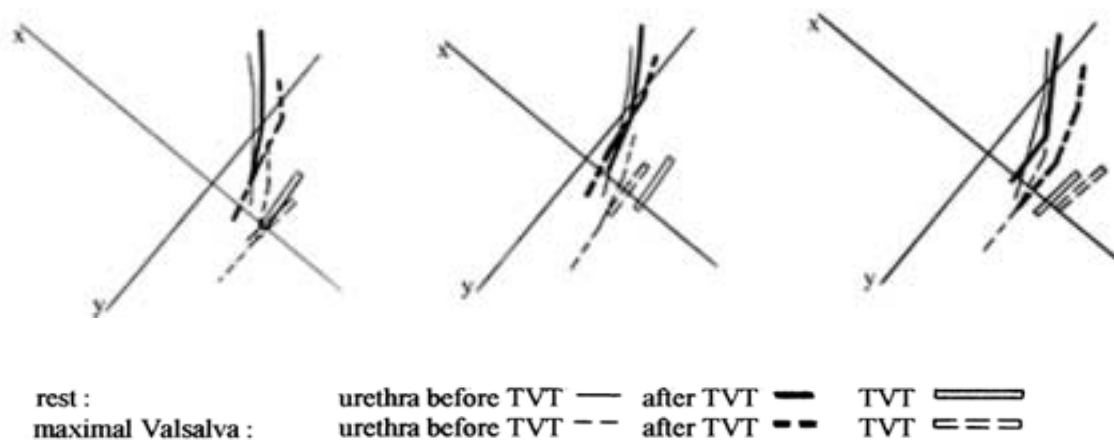
Fig.2 The position of the urethra after TVT at identical pressure as VLPP



Results

Mobility of the urethra before surgery did not differ from values common in incontinent patients as published in previous studies. For all patients VLLP was obtained (range 33-99 cm H₂O). After surgery the urethra is slightly elevated /Fig.1/ (even if tension free operation is provided). During the Valsalva mobility of all parts of the urethra was significantly decreased, and the middle urethra moved towards the lower edge of symphysis (Fig. 1). In none of the patients was descent of the UVJ observed to the point where leakage of urine occurred before the operation. The mobility of the tape was assessed (Fig.3). The movement is rotational, and the tape pushes the middle urethra against the lower edge of the symphysis. After further evaluation of the mobility of the tape, two different mobility types were observed. The first was typical for patients with low VLPP and low mobility before surgery /Fig. 2/, and the second was observed in those patients with hypermobile urethra and VLLP over 60cm /Fig.3/.

Fig.3-5 Position and mobility of the urethra before and after TVT operation, position and mobility of the tape
Fig. 3 For all patients **Fig.4** For patients with low VLPP **Fig.5** For patients with high VLLP



Conclusions

Continence after TVT is achieved by different mechanisms. TVT significantly decreases the mobility of the urethra, ensuring compression of the urethra against the symphysis during Valsalva manoeuvre. The next mechanism is the kinking of the urethra around the tape. We suppose that the mechanisms differ according to the group of operated patients. For patients with low mobility of the urethra and low VLPP, compression of the urethra is important. We assume that for this group of patients it is also necessary to provide higher tension of TVT to achieve continence. For patients with hypermobile urethra, decrease of mobility and kinking is important.

Combining these mechanisms is important to maintain continence after TVT operation.

References:

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