

## COMPARISON AT SHORT FOLLOW-UP OF THE CHANGES IN THE VOIDING PHASE INDUCED BY SUB-URETHRAL TAPES (TVT® AND TVT-O®).

### Hypothesis / aims of study

Synthetic slings have become the preferred surgical method for treatment of stress urinary incontinence (SUI). In a recent study, it has been shown that TVT® induces a dynamic obstruction characterized by a compressive process due to the kinking of the urethra on the sling [1]. The aim of this study was to compare the changes in the voiding phase following the cure of stress incontinence with one of the 2 devices, TVT® and TVT-O®.

### Study design, materials and methods

The population consisted of 44 female patients with SUI complaint. In all patients, a sub-urethral tape (Gynecare®) was inserted by one single surgeon. Twenty two patients (mean age  $56.4 \pm 10.9$  years) underwent a TVT® procedure and 22 (mean age  $54.8 \pm 11.4$  years) a TVT-O® procedure. Criterion of exclusion was a prolapse of grade > II. They had urogynaecological examination and urodynamic tests before surgery and at 1-month follow-up (some had also follow up of 3 to 10 months). Parity was similar in the 2 groups ( $2.0 \pm 1.2$  vs  $2.0 \pm 1.0$ ). Five patients had undergone previous pelvic surgery in the TVT group and 3 in the TVT-O group.

Modelled analysis of free uroflows (FF) was performed using the VBN® micturition model [2]. To increase the accuracy of the analysis, both manual and automated software were used. Criteria of exclusion were a voided volume < 100 mL or/and an interrupted flow. As voiding pressures were not recorded, analysis was performed assuming a normal detrusor force. Two parameters described the status of the urethra: the first,  $g$ , characterized the effective cross section area and so a constrictive obstruction ( $g < 1$ ) or a gaping ( $g > 1$ ) and the second,  $\sigma$ , a local compressive obstruction exerted on the urethra. Any voiding depends on these 2 parameters and on possible circumstantial parameters (fading of detrusor excitation, delayed opening of the sphincter...).

### Results

Maximum flow rate  $Q_{max}$  decreased significantly after surgery in the 2 groups:  $35 \pm 10$  vs  $29 \pm 14$  mL/s in the TVT group and  $33 \pm 13$  vs  $23 \pm 12$  mL/s in the TVT-O group while the voided volumes did not differ. Neither the maximum urethral closure pressure nor the functional profile length was significantly modified after surgery in the 2 groups. Excepted in 4 files (TVT group), the shape of the flow curve was notably modified (prolonged flow time or quasi polyphasic curve).

One file in the TVT group and 6 files in the TVT-O group did not allow a reliable analysis (polyphasic voiding, lack of agreement between manual and automated analysis). In the other files, the criterion required for the fitting of recorded and computed flow curves (quadratic error < 2%) was obtained. When more than one value of the urethral parameter was found from the preoperative FF (5 files in the TVT group and 10 files in the TVT-O group) the choice of the best value was made from the postoperative FF analysis (because only obstruction could appear).

Before surgery, urethra was normal in 5 files, gaping in 7 files and with a constrictive obstruction in 9 files for the TVT group while it was normal in 2 files, gaping in 7 files, with a constrictive obstruction in 6 files and with a compressive obstruction in 1 file for the TVT-O group. After surgery, urethra was described with the same (or no significantly decreased)  $g$  value but with an additional compression in 18 TVT files (81.2%) and 12 TVT-O files (75.0%). In the TVT group,  $\sigma = 11.0 \pm 6.7$  cm H<sub>2</sub>O and in the TVT-O group  $15.2 \pm 10.1$  cm H<sub>2</sub>O. In the only case where a preoperative compression was found, TVT-O procedure led to a decrease of  $\sigma$  from 16.3 to 10.0 cm H<sub>2</sub>O.

### Interpretation of results

At short follow-up, the abnormality of the flow pattern is more important after TVT-O, perhaps due to an irritative phenomenon.

TVT and TVT-O tapes appear to have similar effects on the mechanics of the voiding phase as they don't induce a constrictive obstruction (decrease of the urethra cross section) but a local compression. It has been proposed that TVT achieves continence by a compressive effect due to the proximal urethra mobility. This study shows a higher percentage of patients whose voiding phase is modified by a compression in the TVT group while the magnitude of the counter-pressure is higher in the TVT-O group. The reasons for that difference could be the position and the direction of the tape.

### Concluding message

Modelling allows by simulation of pathophysiological hypothesis to identify and quantify the consequences of insertion of a sub-urethral tape TVT or TVT-O for cure of urinary incontinence. Both imply the development of an external compression on the urethra to achieve continence. This preliminary study must be continued in order to precise the mechanism of action and to study the effect at long follow-up of TVT-O.

[1] Progr Urol 14: 197-202 (2004)

[2] Neurourol Urodyn 19: 153-176 (2000)