**Evaluation of per-operative cough stress test during transobturator mid-urethral sling surgery**

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**Summary**

**Purpose:** Currently, it is unclear how the mesh tension should be adjusted on the transobturator tape surgery (TOT) for improving incontinence. The aim of this study was to evaluate the effects of per-operative cough stress test on TOT.

**Materials and methods:** Between March 2007 and December 2011, 206 women with SUI were enrolled in this study. Patients were randomly categorized to treatment with TOT (96) or TOT with cough stress test (110). The HQL-7 and the UDI-6 were used to identify satisfaction level. At the end of 1 year, two groups were compared patient characteristics, operation time, duration of hospital stay, cure and complication rates.

**Results:** The cure rate was 84.37% (81/96) versus 83.63% (92/110) in TOT and TOT with cough test groups, respectively. Postoperatively ten patients (110/110, 9.09%) suffered voiding difficulties (> 250 mL residual urine) in TOT with cough stress test group. Five patients were discharged with transurethral catheter, whereas, in traditional TOT group, two patients (2/96, 2.1%) had transient postoperative voiding difficulty and two patients were treated with repeated catheterization for 1 week (p < 0.05). Postoperative groin pain was present in 7/96 (8%) versus 24/110 (22%) in TOT and TOT with cough test groups, respectively (p < 0.05). TOT with cough stress test group had a higher rate of complications like, retention of urine, necessitating to cut the tape, mesh erosion and pain in groin or leg. No patient had resistant voiding difficulty or prolonged urinary retention (> 1 week) in traditional TOT group.

**Conclusions:** We believe that per-operative cough stress test leads to overtreatment of stress urinary incontinence when the complication rates were considered.

**Key words:** Cough stress test; Transobturator tape; Stress urinary incontinence (SUI).

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**Introduction**

Stress urinary incontinence (SUI) is a condition of involuntary urine leakage due to increased abdominal pressure without detrusor muscle contraction and affect nearly 25% women population all around the world (1-2). Further, 4% of women will undergo SUI surgery in their lifespan (3). Since introduction of urology practice by Delorme, transobturator tape (TOT), has become a most preferred method for the treatment of SUI (4-5). In addition to short learning curve, decreased operative time and hospitalisation time, TOT has a high success rate up to 90% with lower complication rate (6-7). Although TOT is a safe and favorable for surgery for SUI, success of procedure is related with age, body mass index (BMI), diabetes mellitus, intrinsic sphincter deficiency and concomitant prolapsus surgery (8-9). Also urodynamic parameters including Qmax, maximum urethral closure pressure and Valsalva leak point pressure have effects on operation success (10). Additionally, achieve adequate mesh tension is the one of most important point to prevent urinary incontinence. For assessment of the mesh tension, cough stress test (CST) is used inoperative while TOT procedure (11). As less tension is associated with leaving the patient incontinent, more tension may cause voiding disorders (12).

In this study, we evaluated affect of CST on TOT procedure success rate and patients quality of life with using the Incontinence Impact Questionnaire and Urinary Distress Inventory Questionnaire. Also we assessed the effect of the adjustment of mesh tension with using CST on postoperative voiding disorders.

**Materials and methods**

From March 2007 to December 2011, 206 patients diagnosed with either pure SUI or mixed incontinence with predominance SUI symptoms in two urogynecologic centers were enrolled into the study. Patients were randomly categorized to two groups as TOT procedure without using CST (Group 1) and TOT procedure with using CST (Group 2).

Full medical histories and bladder diary were requested from all patients. Demographic characteristics of patients, including age, BMI, number of pregnancies and comorbidities were recorded. Physical examination including stress test and Q-tip test were performed. Urine analysis, urine culture and urinary ultrasonography for measurement of post voiding residue were completed. In the urodynamic assessment, filling cystometry, uroflowmetry and abdominal leak point pressure were evaluated before the TOT procedure. Intrinsic sphincter deficiency (ISD) was defined as maximal urethral closure pressure of 20 cm H2O or less and urethral mobility is defined as Q-tip test results of 300. The 1 h pad
A cough stress test was used to define SUI as a loss of 1 gr of urine in 1 h, as explained by the EAU guidelines on urinary incontinence. Severity and impact of incontinence on quality of life were analysed by using Incontinence Impact Questionnaire (IIQ-7) and the Urinary Distress Inventory (UDI-6). Patients with overactive bladder, neurogenic bladder, immobile urethra, gynecologic malignancies and concomitant prolapsed surgeries were excluded from the study. All procedures were performed by two experienced surgeons under spinal or epidural anesthesia. After placing mesh, mesh tension was adjusted using a right angle clamp or long scissors. Mesh tension was assessed by CST in group 2 and if necessary mesh tension was reduced or increased. Duration of operation, hospitalisation day, intraoperative and postoperative complications were registered as well. The first day after operation, the Foley catheter was removed. Uroflowmetry and post voiding residue were evaluated before discharge. If patient inability of voiding or post voiding residue was > 250 cc, Foley catheter was indwelled again for a week. Voiding disorders were defined as postoperative voiding difficulties and pain while voiding, high post voiding residue (> 250 ml) and retention of urine needed catheterization or mesh cutting. Follow up visits were scheduled on 7th day, 1st month and 1st year. At the end of 1st year, the two groups were compared in relation to patients characteristics, operation time, cure and complication rates.

Statistical analysis
Data analysis was performed using the software SPSS® version 13.0 for Windows (SPSS Inc., Chicago, IL, USA). Data are presented as number, mean, and standard deviation, and comparisons were performed using the Chi-square test and Mann Whitney U test.

Results
In 96 patients TOT procedure was performed without CST (Group 1) and in other 110 patients CST was done (Group 2). The mean age and BMI of 206 patients was 52.3 ± 9.2 years and 27.8 ± 3.6 kg/m², respectively. Most common comorbidities were smoking (52/206, 25.2%) and diabetes mellitus (DM) (in 27/206, 13.1%).

Preoperative characteristics of patients and physical examination findings were summarized in Table 1. The mean operation time was 26.4 ± 8.4 minutes. None of patients required blood transfusion. Duration of hospital stay was similar between two groups. Any lethal intraoperative or postoperative complication occurred. The most common postoperative complaints were voiding difficulties and pain. Postoperatively, ten patients (9.09%) suffered voiding difficulties in group 2, five patients were discharged with transurethral catheter, whereas, in group 1, two patients (2.1%) had transient voiding difficulty and two patients were treated with repeated catheterization for 1 week (p < 0.05).

Postoperative groin pain was present in 7 patients (8%) versus 24 patients (22%) in group 1 and in group 2, respectively (p < 0.05). No patient had resistant voiding difficulty or prolonged urinary retention (> 1 week) in group 1. Mesh excision was performed in 2 patients in group 2. The mean follow up period was 16.4 (12.2-21.3) months with no significant difference between groups. The cure rate was 84.37% (81/96) versus 83.63% (92/110) in group 1 and group 2, respectively (at the end of 1st year). All women completed the IIQ-7 and UDI-6 questionnaire at the first year follow up. The symptoms scores were significantly better at follow up, when compared to preoperative assessment (Table 2).

Discussion
According to DeLancey and Ashton-Miller, damage of pelvic floor muscle and endopelvic fascia, the supportive layer under urethra, is related with delayed closure of urethral lumen (13, 14). If abdominal pressure increase as in cough, urethra is displaced in a dorsocaudal line and the anterior edge of urethra move longer interval than posterior edge of urethra, so SUI would be occur (15). To prevent the movement of urethra and support urethra against increased abdominal pressure, polypropylene mesh is placed in the obturator foramen in TOT procedure with a route of the trocar that avoid potential complications as bladder, bowel and vessels injuries (16). Stav et al. demonstrated a 86% success rate after TOT surgery in their series of 1225 patients (17). Some surgeons reported up to 91% cure rate after one year follow up (18). In this study, we achieve 84% cure rate after one year follow up period.

To assess mesh tension intraoperatively, some maneu-
vers were developed. Some authors apply manual supra-
pubic pressure or the Crede maneuver on full bladder to
create conditions simulating increased intra-abdominal
pressure (19). However, standardization of this methods
is difficult and affected by surgeon experience and
patients BMI. To date, CST is the most preferred method
to adjust mesh tension intraoperatively in mid urethral
sling surgeries until patient does not leak urine (20).
There only few reports about the effect of CST on TOT
success but technique and results of CST on TVT are
well described and there is no reason to believe CST will
have different characteristic between TVT and TOT.
Murphy has demonstrated significant improvement in
SUI after TVT procedure with CST (21). In contrast,
Lavy et al. compared women who undergone TVT with
CST and without CST and reported no difference in suc-
cess rate (22). In this study we found 84.37% (819/96)
versus 83.63% (92/110) success rate of TOT without
and with CST, respectively. Our results demonstrated that
CST does not affect on TOT success.
Voiding dysfunction is one of the most common compli-
cation of mid urethral sling surgeries that requires surgi-
cal intervention (23). However, there is no standard de-
ition of voiding dysfunction after TOT making difficult
to compare the results of different studies. In literature,
postoperative retention rates in TOT were between 2.0%
and 10% (1, 10, 19). According to Ulmsten, minimal tis-
sue dissection, appropriate positioning of the sling and
proper mesh tension were the essential for prevention of
urinary retention (24). Schreiner et al. reported that per-
foming Valsalva maneuver during preoperative assess-
ment increased voiding dysfunction nearly seven fold
(25). Similarly, we believe that intraoperative CST leads
to more mesh tension with associated postoperative
voiding disorders.
Preoperative urodynamatic parameters are considered
important to estimate TOT success and voiding disorders.
Kawashima et al. reported that preoperative detrusor con-
tractility failure is significantly related with postoperative
voiding difficulty (26). Dawson found that preoperative
flow urine flow and low peak urinary flow were associat-
ed with postoperative voiding disorders (27). On the
other side, Mostafa and Lemaître showed that there were no
urodynamic parameter to predict postoperative voiding
disorders (28, 29). In our study urodynamatic assessment
were evaluated before the TOT procedure.
Most voiding dysfunction after TOT are transient and
improved with intermittent catheterization, behavioral
or drug therapy (30). If these treatments fail, tape inci-
sion is the best way to solve voiding problem. However,
SUI recurs in almost 60% of patients (31). In our study,
among patients who had TOT performed without CST,
two patients (2.1%) had transient voiding difficulties and
two patient were treated with repeated catheterization
for 1 week. Postoperatively ten patient (9.09%) suffered
voiding difficulties in TOT with CST group and five
patients were discharged with transurethral catheter.
Mesh excision was performed in two patients and these
patients suffered from SUI again.
Incontinence-related quality of life is measured with
UDI-6 and IQ-7, as they can be validated in the Turkish
population (32). Heinonen et al. used them to assess the
outcome of TOT, and confirmed a significant improve-
nent in quality of life (33). Another large study evaluat-
ed quality of life in women who underwent TOT, with a
1-year follow-up. Postoperatively, UDI-6 and IQ-7 were
shown to be improved, so the authors concluded that the
TOT procedure significantly improved health-related
symptoms during daily life (34). In this study, there were
benefits in postoperative scores with each assessment
tool. We also concluded that TOT surgery improved
quality of life at the first year follow-up.
This study had some limitations. First we did not assess
preoperative incontinence grade and included it in stati-
cal analysis. Further we did not have postoperative uro-
dynatic parameters such as detrusor pressure, flow rate
and urethral resistance to compare with preoperative
assessment. Small number of patients and short-term fol-
low-up are other limitations of the study.
Our study showed that TOT is a safe and effective treat-
ment modality for SUI. Additionally, we believe that
perioperative CST leads to overtreatment of stress uri-
inary incontinence when the complication rates were
considered.

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