

Comparison of the short term outcomes between transobturator tape (TOT) and tension free vaginal tape (TVT) procedures in the treatment of urinary incontinence

Urinary incontinence

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Abstract

Aim: In this study we aimed to compare effectiveness transobturator tape (TOT) and tension free vaginal tape (TVT) procedures that we performed in our gynecology clinics in female patients with SUI and MUI.

Material and Methods: In this study, a total of 194 patients who presented to the gynecology clinic of our hospital with the complaint of urinary leakage, who were diagnosed with SUI/MUI, and operated using TOT and TVT were retrospectively evaluated. Patients' demographic data, examination findings, urodynamic test, stress test, Q-tip test, pad test, ultrasonography and operational outcomes were compared between the two groups.

Results: Of all patients, 128 were in the TOT and 66 in the TVT group. No statistically significant difference was found between both groups in terms of age, BMI, parity and duration of incontinence. The mean operation time was 20.3 ± 5.9 minutes in the TOT group and 30.4 ± 6.7 minutes in the TVT group, and the mean operation time was statistically significantly shorter in the TOT group. Postoperative residue values were significantly higher in the TVT group compared to the TOT group. The most common complication in both groups was pain in the postoperative 1st week, and it was found in 21 (16%) patients in the TOT group and 6 (9%) patients in the TVT group.

Discussion: There is no significant difference between the two procedure types in terms of continence and quality of life, although TOT procedure gave better results in terms of operation time, length of stay in the hospital and complication rates.

Keywords

Urinary incontinence, TOT, TVT, complications, QoL

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Introduction

Urinary incontinence (UI) is defined by the International Continence Society (ICU) as “the involuntary leakage of urine that can be shown objectively and becomes a social or hygienic problem” [1]. The symptoms of UI are highly prevalent among women and have a substantial impact on quality of life (QoL). The prevalence of UI has been reported between 5-72% in adult women [2]. Since it is observed frequently, UI leads to important social, hygienic, emotional and sexual problems and creates a significant economic burden, especially in societies where geriatric population is high. UI related comorbidities include decreased QoL and productivity, increased anxiety and depression, urinary tract and skin infections, risk of fall in elderly women and increased caregiver burden [3].

UI may be transient or chronic. Chronic UI is classified as stress UI (SUI), urge UI (UUI) and mixed UI (MUI), overflow and functional [4]. UI and subtypes are determined through medical history, physical exam, laboratory tests and imaging. UI is definitely a treatable disorder using appropriate methods. Because pathophysiologies of UI subtypes are different, highly different methods are used in the treatment. Two important problems that cause incontinence in 95% of UI patients are urethral sphincter insufficiency and involuntary detrusor contractions [5, 6]. UI is treated with conservative methods such as medical therapy, pelvic and periurethral muscle physiotherapy, mechanical devices and behavioral therapy as well as surgical methods especially in patients with sphincteric insufficiency. There is still no consensus on how to effectively treat UI, and superiority of one method over the other is debatable [7]. In addition, comparison of the methods used in different studies is difficult, because patient populations are not similar, different types and severity of incontinence is investigated, and there are differences among studies in terms of diagnostic method and criteria and surgical method performed. Finally, outcome and success of UI treatment depend on the experience of the practitioner [8]. It is important to decide the method to be used after the pathophysiology underlying incontinence and UI type are determined as a result of detailed urogynecological investigations. Each technique has unique application difficulties, risks, benefits and complications. In this study we aimed to compare the effectiveness of TOT and TVT procedures that we performed in our gynecology clinics in female patients with SUI and MUI.

Material and Methods

In this study, patients who presented to the gynecology clinic of our hospital with the complaint of urinary leakage, who were diagnosed with SUI/MUI, and operated using TOT and TVT were retrospectively evaluated. Patients were divided into two groups as TOT and TVT according to the procedure performed, based on the discretion of the surgeon and the patient's preference, and success of the treatment, short term complications, postoperative early period symptoms and QoL were compared between the groups.

Patients' demographic data, examination findings, urodynamic test, stress test, Q-tip test, pad test, ultrasonography and operational outcomes were obtained from the information system of our hospital and recorded. QoL and severity of the

symptoms were evaluated in the preoperative and postoperative period with the Urinary Distress Inventory (UDI-6).

Medical histories were received and the patients were questioned about age, parity, menopause status, regularly used drugs, systemic diseases (diabetes mellitus, neurologic diseases, COPD etc.), duration of incontinence, numbers of voiding at night and during day, and previous gynecological operations. All patients' height and weight were measured and BMI values were calculated (m²/Kg). In the gynecologic exam of the patients, cystocele, descensus uteri and presence of additional pathologies were investigated. Complete blood counts and urine culture were performed in all patients and those with infections detected were evaluated again after being treated.

The diagnosis of SUI was first made subjectively by stress test, by evaluating the sensation of the urine in the bladder in lithotomy position. Mobility of the bladder neck was evaluated with the Q-tip test; the amount of change between straining and resting angles of a cotton swab with the tip inserted in the urethral meatus with 200 mL of urine in the bladder was recorded. Mobility of the bladder neck was accepted as positive where this angle was ≥ 30 degrees. The severity of UI was determined with the standard one-hour pad test. Preoperative and postoperative residual urine volumes were measured in all patients.

The UDI-6 survey that was developed in 1994 as 19 items and then shortened to 6 items was used in order to determine the effect of urinary leakage on QoL [9]. In addition, in the postoperative subjective evaluation, the patients were asked how they were compared to the past, and they answered as worse, the same, better and I have no complaints.

Ethics Considerations

Before the beginning, the study protocol was approved by the Local Ethics Committee of our hospital with the 2021/904 numbered decision. This study was performed in line with the ethical principles of the Declaration of Helsinki.

Statistical Analysis

Data obtained in the study were statistically analyzed using SPSS (Statistical Package for Social Sciences) for Windows v 15.0 software. When study data were evaluated, in addition to descriptive statistics (Mean, Standard deviation), Student t test was used for the comparison of normally distributed quantitative parameters and Chi-square test for the comparison of qualitative parameters. $p < 0.05$ values were considered statistically significant.

Results

A total of 194 patients who underwent TOT or TVT for treatment of UI were included in the study. Of all patients, 128 were in the TOT and 66 in the TVT group. Seventy-three (57%) patients in the TOT group underwent TOT operation alone, while 55 (43%) patients underwent additional operations in addition to TOT. Nine (13.6%) patients in the TVT group underwent TVT operation alone, while 57 (86.4%) patients underwent additional operations in addition to TVT. When subtypes of UI were examined, SUI was found in 108 (84.3%) patients in the TOT group and 35 (53%) patients in the TVT group, while MUI was detected in 20 (15.7%) patients in the TOT and 31 (47%)

patients in the TVT group.

The mean age of all patients was 47.9±5.78 years. The mean age was found as 46.1±7.9 years in the TOT group and 51.4±1.6 years in the TVT group, and the difference was not statistically significant (p>0.05). No statistically significant difference was found between both groups in terms of BMI, parity and duration of incontinence (for all p>0.05). Distribution of the demographic and clinical features according to the groups is given in Table 1. The mean operation time was 20.3±5.9 minutes in the TOT group and 30.4±6.7 minutes in the TVT group, and the mean operation time was statistically significantly shorter in the TOT group (p<0.05). Again length of stay in hospital was significantly shorter in the TOT group (1.3±0.3 days) compared to the TVT group (2.1±0.6 days) (p<0.05). Comparison of the operational data between the groups is given in Table 2.

Table 1. Comparison of demographic and clinical features between the groups

	TOT Mean±SD n:128	TVT Mean±SD n:66	p
Age (years)	46.1±7.9	51.4±1.6	>0.05
BMI (kg/m ²)	29.4±4.6	29.5±4.3	>0.05
Parity	3.4±1.9	3.7±2.1	>0.05
Duration of Incontinence (years)	4.5±0.7	6.2±1.0	>0.05
	n (%)	n (%)	
Menopause	Premenopause	48 (37.5)	33(50)
	Menopause	54(42.1)	25(37.8)
	Reproductive period	26 (20.3)	8 (12.2)
Type of Incontinence	SUI	108 (84.3)	35 (53)
	MUI	20 (15.7)	31 (47)

Table 2. Evaluation of operational data according to the groups

	TOT Mean±SD	TVT Mean±SD	p
Operation time (min)	20.3±5.9	30.4±6.7	<0.05
Length of stay in hospital (days)	1.3±0.3	2.1±0.6	<0.05
	n (%)	n (%)	
Anesthesia	General	59 (46)	22 (33.3)
	Spinal	69 (54)	44 (66.7)
Additional gynecologic operation	Yes	55 (43)	57 (86.4)
	No	73(57)	9 (13.6)

Table 3. Distribution of the complications according to the groups

	TOT n (%)	TVT n (%)
Permanent urinary retention	0	4 (6)
Opening of the mesh	0	4 (6)
Bladder and urethra injury	4 (3)	5 (7.5)
Hemorrhage-Hematoma	2 (1.5)	3 (4.5)
UTI	3 (2.3)	3 (4.5)
Postop pain in the 1st week	21 (16)	6 (9)
Postop pain in the 3rd month	0	0
De novo urgency	6 (4.6)	5 (7.5)
Mesh erosion	0	0

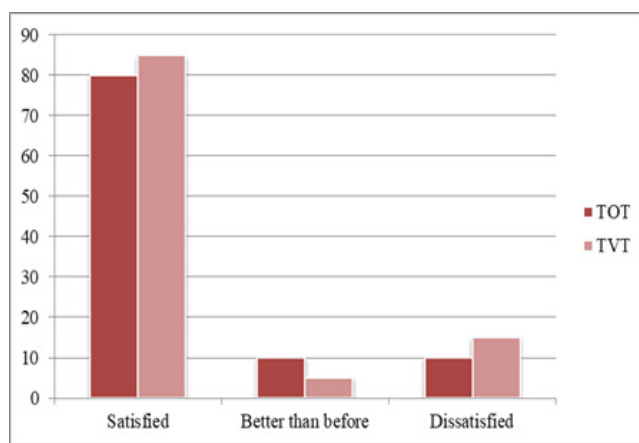


Figure 1. Evaluation of preop and postop Q-tip test, ped test and hematocrit outcomes according to the groups

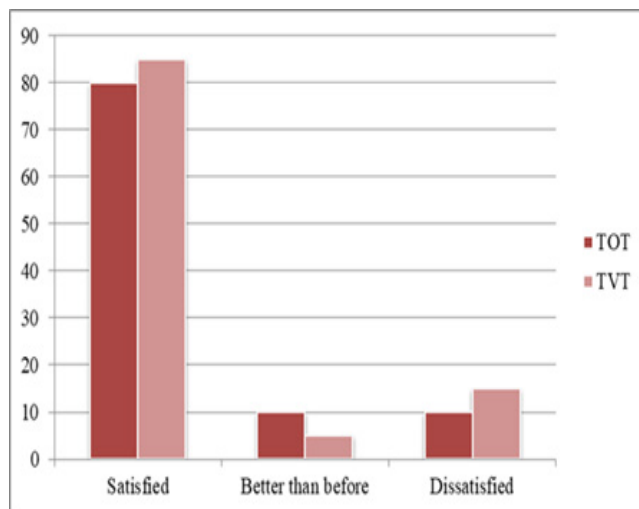


Figure 2. Results of the subjective satisfaction evaluation

Two (1.5%) patients in the TOT group and 2 (3%) patients in the TVT group had been operated previously for UI, while 20 (15.6%) patients in the TOT group and 31 (46.9%) patients in the TVT group had received medical therapy due to incontinence. In the pelvic examination, pelvic organ prolapse was found in 62 (48.4%) patients in the TOT group and 37 (56.1%) patients in the TVT group based on the POP-Q system. The difference between preoperative and postoperative hematocrit values was found as 5.1±0.8 in the TOT group and 7.6±1.1 in the TVT group (p<0.05). Although Q tip test (degree) and ped test (gram) values decreased in both groups postoperatively compared to before operation (p<0.05), no statistically significant difference was found between the two groups (p>0.05) (Figure 1). Postoperative residue values were significantly higher in the TVT group compared to the TOT group. On the other hand, significant decreases were found in postoperative UDI-6 scores in both groups (p<0.05). However, the difference between the groups was not statistically significant (p>0.05). When perioperative and postoperative complications were examined, the most common complication in both groups was pain in the postoperative 1st week, and it was found in 21 (16%) patients in the TOT group and 6 (9%) patients in the TVT group. Distribution of the perioperative and postoperative complications according to the groups is presented in Table 3. Finally, satisfaction of the patients for the operation was

postoperatively evaluated and the results are shown in Figure 2.

Discussion

UI is a common but less diagnosed and treatable disease in women. More than 200 million people are estimated to have UI problem worldwide [10]. In the USA, approximately 32 billion USD is spent for the treatment of UI each year, and this figure is greater than the amount spent for dialysis and by-pass surgery [10]. The disease has numerous etiological causes and the most common subtype of UI is SUI, which is in the form of pure in 50% and mixed in 36% of the patients. In our study population, pure SUI was found in 73.7% and mixed SUI in 26.3% of the patients. Among many methods used for the treatment of UI, synthetic grafts have been proven to be superior over biomaterials in terms of durability and long-term success. With the introduction of TVT, which was developed by Petros and Ulmsten in 1995, and TOT, which was developed by Delorme in 2001, UI treatment has evolved with healing rates up to 80% [11]. In our study, we analyzed the outcomes and complications of TOT and TVT.

UI is almost always resulted from an underlying treatable condition, it is underreported to medical staff [12]. In our study, 52.9% of the patients presented to the hospital due to other reasons, but the diagnosis of UI was established as a result of investigation and examination. However, only 2% of the patients had been operated for UI previously, and 26.3% had received medical therapy, but surgery was planned due to failure of the previous treatments.

Age alone is not a risk factor for UI. However, age-related changes in the urinary system are associated with a higher risk of developing UI. UI is associated with changes in physiology, comorbidities, medications and functional impairment, especially in elderly. As the age increases, changes characterized by the increased frequency of contractions that can not be inhibited, abnormal relaxation patterns of the detrusor and decreased bladder capacity are seen. Yalcin et al. reported increased incidence of UI complaints after 40 years of age [13]. In our study, the mean age of the patients was found as 47.9 years.

Obesity is one of the risk factors associated with incontinence. Possibly, increased intraabdominal pressure with obesity worsens SUI. In a study by Ross et al., TOT and TVT methods were compared and the mean BMI value of all patients was found as 28 kg/m² [14]. The mean BMI value of our patients was 29.4 kg/m². In our study, no significant difference was found between the TOT and TVT groups in terms of age, BMI, parity, type and duration of incontinence.

In their randomized controlled study, de Tayrac et al. compared TOT and TVT, and the mean operation time was found as significantly shorter with TOT (27 vs 15 minutes) [15]. In the present study, consistent with the literature, the mean operation time was found as 30.2 minutes in the TVT group and 20.8 minutes in the TOT group, and the difference was statistically significant in favour of the TOT method ($p < 0.05$). We think that the most important factor affecting operation time is education and experience of the surgeon.

In our study, postoperative residue value was found to be significantly higher with TVT compared to the TOT method. Similar results were reported in the literature [11].

In a study, duration of hospitalization was found as 1.6 days in the TVT group and 1.2 days in TOT group [11]. In our study, the mean length of stay in the hospital was found as 2.1 days in the TVT group and 1.3 days in the TOT group. In the studies by Zhang et al. [16] and Oliveira et al. [17], TOT significantly decreased the length of stay in the hospital.

Complications encountered during surgical treatment of UI can be intraoperative and postoperative. Intraoperative complications include the need for blood transfusion, bladder injury, vaginal wall perforation, urethral injury, bowel injury, cardiac arrhythmias etc. The most common postoperative complications are infections requiring antibiotics, urinary tract infection, myocardial infarction, pelvic abscess, re-admissions and emergency service presentations. In recent years, TOT has replaced TVT as a preferred method with shorter operation time and length of stay and less complications [18]. In addition, since TVT is a blindly performed method, it is open to vascular, gastrointestinal and urethral injuries [19]. Theoretically TOT sling is located in a more acute angle compared to TVT and it is not possible to prevent urine flow during voiding with TOT. However, this procedure does not completely eliminate the risk of bladder perforation and nerve injury [20]. Therefore, studies in the literature have focused on comparison of these two techniques. In a study by Potic et al. comparing the complications with TVT and TOT, overall rate of complications was reported to be lower with TOT method [11]. In the same study, the most common complications in the TVT group were reported as intraoperative hemorrhage, bladder perforation, pain, infection and de novo urgency [11]. In a meta-analysis by Huang et al. including 11 studies with 2515 patients, pooled results indicated that TOT decreased complication rates compared to TVT method [21]. Similarly, in our study overall complication rate was higher in the TVT group. The most common complications included bladder and urethra injury, de novo urgency, pain, permanent urinary retention and opening of the mesh.

Questionnaires for the evaluation of patient outcomes for the treatment of UI should be fully understandable to patients so that the results can be interpreted correctly. Studies have reported significant decreases in UDI-6 scores after surgery compared to preoperative values in both TOT and TVT groups, while the decrease in UDI-6 scores was significant in favour of the TOT group as the follow-up duration increased [11, 22]. Similarly, in our study although dramatic decreases were observed in UDI-6 scores, no significant difference was found between the groups.

In a study with 82 patients in the TOT group and 58 patients in the TVT group, subjective and objective SUI healing rate was found as 86.6% in the TOT group and 84.5% in the TVT group [23]. We evaluated the success of TOT and TVT operations that we have performed for the treatment of UI with subjective evaluations of our patients. In our study, consistent with the literature, the subjective success rate was found as 90% in the TOT group and 85% in the TVT group.

Study Limitations

The main limitation of this study is its retrospective design. In addition, long-term outcomes could not be studied. We hope that our findings will provide contribution to the debate in the

literature regarding superiority of these methods over each other.

Conclusion

The results of this study indicate that there is no significant difference between the two procedure types in terms of continence and quality of life, although TOT procedure gave better results in terms of operation time, length of stay in the hospital and complication rates. However, further studies with wide series and longer follow-up are needed to draw more definitive conclusions.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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