Voiding Dysfunction

Are There Risk Factors for Persistent Urge Urinary Incontinence after the Transobturator Tape (TOT) Procedure in Mixed Urinary Incontinence?

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Purpose: We wanted to identify factors predicting persistent urge urinary incontinence (UUI) after the transobturator tape (TOT) procedure in patients with mixed urinary incontinence (MUI).

Materials and Methods: Of 293 patients who underwent a TOT procedure from May 2007 to August 2010, 175 MUI patients had at least one 6-month follow-up visit. Preoperative evaluations including history taking, physical examination, urinalysis, urine culture, uroflowmetry, postvoid residual (PVR), urodynamic studies (UDS), and symptom questionnaire were performed. After the operation, surgical outcome and patient satisfaction were assessed by symptom questionnaire, uroflowmetry, PVR, and stress test. Statistical analysis was carried out to determine the possible factors influencing persistent UUI after the TOT procedure.

Results: Of 175 patients with MUI, 51 (29.1%) had persistent UUI after the TOT procedure. In a univariate analysis, age (p=0.012) and previous anticholinergic use (p=0.040) were found to be associated with persistent UUI. However, only age (adjusted odds ratio, 3.317; 95% confidence interval, 1.015-12.060; p=0.036) was an independent risk factor in the multivariate analysis.

Conclusions: Our findings suggested that women who are older than 65 years may have an increased likelihood of persistent UUI after a TOT procedure. Clinicians should consider the possibility of persistent postoperative UUI in elderly women with mixed incontinence.

Key Words: Suburethral slings; Urinary urge incontinence

INTRODUCTION

Mixed urinary incontinence (MUI) is defined as a disease co-occurring with both urge urinary incontinence (UUI), in which involuntary urine leakage takes place as the result of urgency, and stress urinary incontinence (SUI), in which involuntary urine leakage takes place as abdominal pressure increases as the result of coughing or sneezing [1]. As women age, the prevalence rate of MUI or UUI gets higher, and MUI accounts for 30% to 50% of all incontinence [2,3]. The midurethral sling has been a main method in the treatment of SUI since tension-free vaginal tape (TVT) surgery was first introduced as a surgical treatment for that type of incontinence owing to its simpler and less invasive process. The transobturator tape (TOT) procedure, which was introduced to supplement defects in the TVT operation, has been widely used as well [4,5]. It is often reported that the TOT procedure has a high rate of success for SUI [4]. Although the success rate of operation for MUI varies according to the report, it is mostly reported as being lower than the success rate of surgery for SUI [6]. Also, there have been suggestions that surgical treatment for patients with MUI is not appropriate because of the possibility that UUI will continue despite surgery and that conservative treat-
The preoperative evaluation included history taking. Patients reporting such a complaint were distinguished as through history taking and a symptom questionnaire.

To distinguish MUI and SUI, patients with SUI symptoms being a woman, having MUI, and undergoing postoperative procedures were reviewed retrospectively. The study inclusion criteria were the presence of any malignancy or urinary tract infection and postoperative follow-up of less than 6 months. The study exclusion criteria were the absence of any episodes of involuntary urine leakage during stressful activities and a stress test. Success of SUI after the procedure was defined as the absence of any episodes of involuntary urine leakage until the postvoid residual was less than 100 ml.

4. Follow-up
Follow-up visits were scheduled at 1 week, 6 weeks, 3 months, 6 months, and yearly. Follow-up evaluation included questionnaire assessment, stress test, uroflowmetry, and postvoid residual measurement. Success of SUI after the procedure was defined as the absence of any episodes of involuntary urine leakage during stressful activities and a stress test. Success of UUI after the procedure was defined as the absence of any episodes of involuntary urine leakage mixed with urgency, and all cases except success were considered as failures.

5. Statistical analysis
To determine the possible factors influencing the persistence of UUI after the TOT procedure, we used univariate logistic regression analysis. Of those variables, only statistically significant variables were included in the multivariate model. The multivariate logistic regression was used to determine the independent risk factors for persistent UUI after the TOT procedure. A value of $p < 0.05$ was considered statistically significant. All statistical analyses were performed by using SPSS ver. 12.0 (SPSS Inc., Chicago, IL, USA).

RESULTS
This study included 175 women with MUI who underwent TOT procedures. The preoperative parameters of the 175 women are summarized in Table 1. The women’s mean age was 55.4±9.8 years; 139 patients (79.4%) were under 65 years old, and 36 patients (20.6%) were over 65 years old. The mean follow-up time was 15.9±0.4 months. The mean parity was 2.7±1.3, and the mean symptom duration was 4.86±4.15 years. Postoperative maximal flow rate (Qmax) and PVR were 27.1±2.0 ml/s and 30.4±15.8 ml, respectively.

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TABLE 1. Patient characteristics

| Variables                        | Mean or No. (%) |
|----------------------------------|----------------|
| Age (yr)                         | 55.4±9.8       |
| < 65 (%)                         | 139 (79.4)     |
| ≥ 65 (%)                         | 36 (20.6)      |
| Symptom grade (%)                |                |
| Grade I                          | 28 (16.0)      |
| Grade II                         | 107 (61.1)     |
| Grade III                        | 40 (22.9)      |
| Parity (no.)                     | 2.7±1.3        |
| Abortion (no.)                   | 1.8±1.6        |
| BMI (kg/m²)                      | 25.7±0.5       |
| Previous hysterectomy (%)        | 34 (19.4)      |
| Previous anticholinergics use (%)| 27 (15.4)      |
| Degree of cystocele (%)          |                |
| None                             | 89 (50.9)      |
| Grade I                          | 21 (12.0)      |
| Grade II                         | 58 (33.1)      |
| Grade III                        | 7 (4.0)        |
| Duration of symptom (yr)         | 4.86±4.15      |
| Usual pad apply (%)              | 88 (50.3)      |
| Anesthesia (%)                   |                |
| General                          | 90 (51.4)      |
| Spinal                           | 68 (38.9)      |
| Local                            | 17 (9.7)       |
| VLPP (cmH₂O)                     | 88.5±16.4      |
| < 60 (%)                         | 19 (10.9)      |
| ≥ 60 (%)                         | 156 (89.1)     |
| Maximal bladder capacity (ml)    | 365.3±40.2     |
| MUCP (cmH₂O)                     | 59.2±2.1       |
| Q-tip test (%)                   |                |
| <30°                             | 27 (15.4)      |
| 30-59°                           | 71 (40.6)      |
| ≥60°                             | 77 (44.0)      |
| Uninhibited detrusor contraction (%) | 49 (28.0)     |
| Preoperative maximal flow rate (ml/s) | 28.2±1.9  |
| Preoperative postvoid residual (ml) | 26.5±13.4  |

OR: odds ratio, CI: confidence interval BMI: body mass index, VLPP: Valsalva leak point pressure, MUCP: maximal urethral closure pressure, UUI: urge urinary incontinence

Those variables had not significantly changed in relation to the preoperative Qmax (28.2±1.9 ml/s) and PVR (26.5±13.4 ml). Postoperative urine retention occurred in 9 patients (5.1%), but all patients recovered within 3 days. Persistent SUI after the TOT procedure occurred in 16 patients (9.1%), and persistent UUI after the TOT procedure occurred in 51 patients (29.1%). In addition, absence of persistent UUI after the TOT procedure occurred in 124 patients (70.9%), and among the 124 patients, persistent urgency after the TOT procedure occurred in 25 patients (14.3%).

To determine the possible factors influencing the persistence of UUI after the TOT procedure, logistic regression analysis was performed. In the univariate analysis, old age and previous anticholinergics use were associated with persistence of UUI after the TOT procedure. Those two significant variables were analyzed in the multivariate model to determine the independent risk factors for the persistence of UUI. In the multivariate model, only old age was a significant risk factor for the persistence of UUI, and elderly age (over 65 years old) was associated with a 3.3-fold risk for persistence of UUI after the TOT procedure compared with middle age (under 65 years old) (Table 2).

As shown in Table 2, there was no association between the presence of uninhibited detrusor contractions and persistent UUI after the TOT procedure. We conducted statistical analysis to verify the factors that affected persistent UUI after the TOT procedure in 49 patients who showed uninhibited detrusor contraction in the UDS, but found no significant factors.

DISCUSSION

To date, data on factors predicting the persistence of urge incontinence or failure after the sling procedure in patients with MUI have been limited, and there are no consistent predictors of persistent UUI after the sling procedure in MUI. Segal et al reported that they found no factor to be related to surgical failure after the TVT operation [14]. Paick et al suggested that a low MUCP may be associated with persistent UUI after the TVT procedure in patients with MUI [15]. Jeong et al suggested that maximal cystometric capacity and involuntary detrusor contraction were important predictors of surgical failure in MUI [16]. Another study reported that women with stress-predominant MUI and without detrusor overactivity (DO) or with low pressure DO were more likely to be cured of their UUI after a midurethral sling procedure [5].

In comparison with studies related to the TVT procedure, detailed outcomes and clinical factors predicting the persistence of UUI after the TOT procedure have yet to be sufficiently reported. Furthermore, there is no significant difference in the surgical results between TVT and TOT, but because there is some difference in postoperative voiding symptoms and complications between the two procedures [17], there remains a possibility that factors related to UUI lasting continuously after both TOT and TVT procedures do not correspond to each other. As a result, in this study we attempted to determine whether the clinical characteristics and preoperative examination results of MUI patients can predict the risk of persistence of UUI after the TOT procedure. Unlike previous studies, we found that old age is a risk factor for persistent postoperative UUI.

In other studies, factors related to the UDS were mainly suggested as risk factors for persistent UUI after surgery. Because some cases have reported that symptoms of MUI patients are not really reproduced as they are in UDS, or that DO appears in the UDS but UUI symptoms do not appear [18], there is a possibility that the accuracy of finding a risk group through factors related to the urodynamic study may be low. On the other hand, if risk factors are assumed on the basis of age as suggested by this study, it is possible to explain the chance of surgical failure by select-
TABLE 2. Univariate and multivariate predictors of postoperative UUI in mixed incontinence

|                              | OR (95% CI)    | p-value | Adjusted OR (95% CI) | p-value |
|------------------------------|----------------|---------|----------------------|---------|
| Age (yr)                     |                |         |                      |         |
| <65 (%)                      | 1.00           |         |                      |         |
| ≥65 (%)                      | 3.904 (1.348-14.397) | 0.012   | 3.317 (1.015-12.060) | 0.036   |
| Symptom grade (%)            |                |         |                      |         |
| Grade I                      | 1.00           |         |                      |         |
| Grade II                     | 0.974 (0.517-3.658) | 0.429   |                      |         |
| Grade III                    | 0.961 (0.572-4.104) | 0.517   |                      |         |
| Parity (no.)                 | 1.373 (0.875-2.083) | 0.126   |                      |         |
| Abortion (no.)               | 1.245 (0.799-1.781) | 0.130   |                      |         |
| BMI (kg/m²)                  | 0.909 (0.782-1.094) | 0.474   |                      |         |
| Previous hysterectomy (%)    | 0.904 (0.903-1.017) | 0.533   |                      |         |
| Previous anticholinergics use (%) | 3.975 (1.037-15.550) | 0.040   | 2.813 (0.652-11.701) | 0.113   |
| Degree of cystocele (%)      |                |         |                      |         |
| None                         | 1.00           |         |                      |         |
| Grade I                      | 1.214 (0.572-3.218) | 0.274   |                      |         |
| Grade II                     | 2.818 (0.473-12.371) | 0.691   |                      |         |
| Grade III                    | 2.073 (0.474-10.362) | 0.593   |                      |         |
| Duration of symptom (yr)     | 1.543 (0.966-1.935) | 0.495   |                      |         |
| Usual pad apply (%)          | 1.723 (0.788-3.994) | 0.131   |                      |         |
| Anesthesia (%)               |                |         |                      |         |
| General                      | 1.00           |         |                      |         |
| Spinal                       | 0.891 (0.644-2.311) | 0.653   |                      |         |
| Local                        | 0.633 (0.482-1.565) | 0.421   |                      |         |
| VLPP (cmH₂O)                 |                |         |                      |         |
| <60 (%)                      | 1.00           |         |                      |         |
| ≥60 (%)                      | 0.876 (0.763-1.983) | 0.363   |                      |         |
| Maximal bladder capacity (ml)| 0.868 (0.713-1.105) | 0.214   |                      |         |
| MUCP (cmH₂O)                 | 1.005 (0.993-1.126) | 0.526   |                      |         |
| Q-tip test (%)               |                |         |                      |         |
| <30°                         | 1.00           |         |                      |         |
| 30-59°                       | 1.693 (0.942-2.017) | 0.218   |                      |         |
| ≥60°                         | 1.436 (0.926-2.316) | 0.194   |                      |         |
| Uninhibited detrusor contraction (%) | 2.791 (1.008-7.047) | 0.095   |                      |         |
| Preoperative maximal flow rate (ml/s) | 0.954 (0.938-1.120) | 0.093   |                      |         |
| Preoperative postvoid residual (ml) | 0.987 (0.974-1.013) | 0.214   |                      |         |

OR: odds ratio, CI: confidence interval, BMI: body mass index, VLPP: Valsalva leak point pressure, MUCP: maximal urethral closure pressure, UUI: urge urinary incontinence

Risk Factors for Persistent Urge Urinary Incontinence after TOT

The following explains why the persistence of UUI after operation appears high for elderly women with MUI. First, older women often experience an outlet obstruction effect [19]. As a result, voiding problems, like incomplete emptying and overactive bladder symptoms, lead to DO, further leading to a possibility that UUI occurs more often [20,21]. Second, elderly women are more likely to suffer from severe intrinsic sphincter deficiency [22,23]. Such patients may not experience urgency because of severe stress incontinence. However, after a TOT operation, their urethral resistance can be reestablished, and their masked UUI is more likely to reoccur. Third, it is said that out of patients with MUI, those with urge-predominant MUI are more likely to have a surgical failure than are those with stress-predominant MUI [24,25]. This study does not clarify which factor is more serious, stress or urge, but the younger the patients are, the more likely they are to have SUI, and the older the patients are, the higher the prevalence rate of MUI or UUI [2,26,27]. The failure rate of the operation will appear higher for patients of old ages, on the premise that there are lots of older patients with urge-predominant MUI. Fourth, because old women tend to have shorter functional urethras, smaller urethral mobility, and larger urethral rigidity, such characteristics can influence the effect of the tape after the operation and are more likely to worsen the surgical result, although it is not clear how the mechanism works [28].

We suggest that old age can function as a factor useful enough to predict the result of treatment for MUI patients who want the TOT procedure. Furthermore, explaining the possibility of persistent UUI to elderly women ahead of sur-
gery will lower their expectation for a successful operation, which can increase the patients’ overall satisfaction. In addition, the possibility of postoperative complications with anesthesia is found to be higher in older patients [29,30]. It is essential to carefully choose the surgical treatment by comprehensively considering all the possibilities of surgical failures and nonsurgical complications if the patient is an elderly woman with MUI who has severe or multiple medical problems.

A limitation of this study is that the follow-up period was as short as only 6 months, and the study was not really prospective. To confirm our findings, we need to do additional research, including a large population and long-term follow-up. In addition, more studies on the effect mechanism of old age should be conducted.

CONCLUSIONS

Our results suggest that elderly women (over 65 years old) have a higher possibility of persistence of UUI after the TOT procedure than do middle-aged women (under 65 years old). Therefore, elderly women with MUI should be sufficiently informed of the possibility of persistent UUI after the TOT procedure, which will lead to an increase in patient satisfaction after surgery.

Conflicts of Interest
The authors have nothing to disclose.

REFERENCES

1. Abrams P, Cardozo L, Fall M, Grifiths D, Rosier P, Ulmsten U, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. Neurourol Urodyn 2002;21:167-78.
2. Simeonova Z, Milsom I, Kullendorff AM, Molander U, Bengtsson C. The prevalence of urinary incontinence and its influence on the quality of life in women from an urban Swedish population. Acta Obstet Gynecol Scand 1999;78:546-51.
3. Karram MM, Bhatia NN. Management of coexistent stress and urge urinary incontinence. Obstet Gynecol 1989;73:4-7.
4. Tsivian A, Mogutin B, Kessler O, Korczak D, Levin S, Sidi AA. Tension-free vaginal tape procedure for the treatment of female stress urinary incontinence: long-term results. J Urol 2004;172:998-1000.
5. Delorme E, Droupy S, de Tayrac R, Delmas V. Transobturator tape (Uratape): a new minimally-invasive procedure to treat female urinary incontinence. Eur Urol 2004;45:203-7.
6. Kim JJ, Bae JH, Lee JG. Preoperative factors predicting the outcome of a midurethral sling operation for treating women with mixed incontinence. Korean J Urol 2008;49:1112-8.
7. Artibani W. Difficult to manage patient populations—mixed symptomatology. BJU Int 2000;85(Suppl 3):53-4.
8. Koonings P, Bergman A, Ballard CA. Combined detrusor instability and stress urinary incontinence: where is the primary pathology? Gynecol Obstet Invest 1988;26:250-6.
9. Rezapour M, Ulmsten U. Tension-free vaginal tape (TVT) in women with recurrent stress urinary incontinence—a long-term follow-up. Int Urogynecol J Pelvic Floor Dysfunct 2001;12(Suppl 2):S9-11.
10. Jeffry L, Deval B, Birsa A, Soriano D, Darai E. Objective and subjective cure rates after tension-free vaginal tape for treatment of urinary incontinence. Urology 2001;58:702-6.
11. Mahajan ST, Elkadyr EA, Kenton KS, Shott S, Brubaker L. Patient-centered surgical outcomes: the impact of goal achievement and urge incontinence on patient satisfaction one year after surgery. Am J Obstet Gynecol 2006;194:722-8.
12. Stamey TA. Endoscopic suspension of the vesical neck for urinary incontinence in females. Report on 203 consecutive patients. Ann Surg 1980;192:465-71.
13. Juma S, Little NA, Raz S. Evaluation of stress urinary incontinence. In: Buchsbaum HJ, Schmidt JD, editors. Gynecologic and obstetric urology. 3rd ed. Philadelphia: Saunders; 1993;251-63.
14. Segal JL, Vassallo B, Kleeman S, Silva WA, Karram MM. Prevalence of persistent and de novo overactive bladder symptoms after the tension-free vaginal tape. Obstet Gynecol 2004;104:1235-9.
15. Paick JS, Ku JH, Shin JW, Son H, Oh SJ, Kim SW. Tension-free vaginal tape procedure for urinary incontinence with low Valsalva leak point pressure. J Urol 2004;172:1370-3.
16. Jeong SJ, Hwang IS, Kim SS, Lee ST, Min KE, Han BK, et al. Are risk factors for failure after mid-urethral sling operation different between patients with pure stress and those with mixed urinary incontinence in the short-term follow-up? Korean J Urol 2009;50:573-80.
17. Zuger V, Labanaris AP, Rezaei-Jafari MR, Hammerer P, Dembowski J, Witt J, et al. TVT vs. TOT: a comparison in terms of continence results, complications and quality of life after a median follow-up of 48 months. Int Urol Nephrol 2010;42:915-20.
18. Radley SC, Rosario DJ, Chapple CR, Farkas AG. Conventional and ambulatory urodynamic findings in women with symptoms suggestive of bladder overactivity. J Urol 2001;166:2253-8.
19. Anger JT, Litwin MS, Wang Q, Pashos CL, Rodriguez LV. The effect of age on outcomes of sling surgery for urinary incontinence. J Am Geriatr Soc 2007;55:1927-31.
20. Carr LK, Walsh PJ, Abraham VE, Webster GD. Favorable outcome of pubovaginal slings for geriatric women with stress incontinence. J Urol 1997;157:125-8.
21. McGuire EJ. Identifying and managing stress incontinence in the elderly. Geriatrics 1990;45:446-9, 51-2.
22. Pajoncini C, Costantini E, Guercini F, Bini V, Porena M. Clinical and urodynamic features of intrinsic sphincter deficiency. Neurourol Urodyn 2003;22:284-8.
23. Horbach NS, Ostergard DR. Predicting intrinsic urethral sphincter dysfunction in women with stress urinary incontinence. Obstet Gynecol 1994;84:188-92.
24. Scotti RJ, Angell G, Flora R, Greston WM. Antecedent history as a predictor of surgical cure of urgency symptoms in mixed incontinence. Obstet Gynecol 1998;91:51-4.
25. Kulseng-Hanssen S, Hursley S, Schiøtz HA. Follow-up of TVT operations in 1,113 women with mixed urinary incontinence at 7 and 38 months. Int Urogynecol J Pelvic Floor Dysfunct 2008;19:391-6.
26. Hannestad YS, Rortveit G, Sunagka S. A community-based epidemiological survey of female urinary incontinence: the Norwegian EPINCONT study. Epidemiology of Incontinence in the County of Nord-Trøndelag. J Clin Epidemiol 2000;53:1150-7.
27. Samuelsson E, Victor A, Tibblin G. A population study of urinary incontinence and nocturia among women aged 20-59 years. Prevalence, well-being and wish for treatment. Acta Obstet Gynecol Scand 1997;76:74-80.
28. Ku JH, Oh JG, Shin JW, Kim SW, Paick JS. Age is not a limiting factor for midurethral sling procedures in the elderly with urinary incontinence. Gynecol Obstet Invest 2006;61:194-9.

29. Gordon D, Gold R, Pauzner D, Lessing JB, Groutz A. Tension-free vaginal tape in the elderly: is it a safe procedure? Urology 2005;65:479-82.

30. Verborgh C. Anaesthesia in patients with dementia. Curr Opin Anaesthesiol 2004;17:277-83.