KJU
Korean Journal of Urology

www.kjurology.org
http://dx.doi.org/10.4111/kju.2014.55.3.190

Original Article - Voiding Dysfunction/Female Urology

Effect of Preoperative Flow Rate on Postoperative Retention and Voiding Difficulty After Transobturator Tape Operation

Sungjune Kim, Jungbum Bae, Minchul Cho, Kwangsoo Lee, Haewon Lee, Taeyong Jun

Department of Urology, Dongguk University Ilsan Hospital, Dongguk University College of Medicine, Goyang, Korea

Purpose: Controversy exists over the preoperative risk factors for postoperative urinary retention after the midurethral sling procedure for stress urinary incontinence (SUI). We intended to analyze the effect of preoperative flow rate on postoperative urinary retention after the transobturator tape (TOT) operation.

Materials and Methods: A total of 322 patients who underwent TOT from June 2006 to May 2012 were included in this retrospective study. All patients were preoperatively investigated for urinary symptoms and underwent preoperative urodynamic studies including urine flow rate. Postoperative urinary retention, voiding difficulty, and uroflowmetry were checked. Urinary retention was defined as the need for additional catheterization longer than 1 day. Patients were divided by preoperative peak flow rate (Qmax) of 15 mL/s (low Qmax group and normal Qmax group).

Results: There were 3 cases of postoperative urinary retention (0.9%) and 52 cases of voiding difficulty (16.1%). The low Qmax group included 40 patients (12.4%) and the normal Qmax group included 282 patients (87.5%). Between the two groups, there were no significant differences in age, previous pelvic surgery history, or past medical history. The low Qmax group had higher scores for voided volume and detrusor pressure at Qmax. However, there was no significant difference in postoperative voiding difficulty between the two groups. Furthermore, three patients who experienced postoperative retention showed high flow rates preoperatively.

Conclusions: Our results suggest that voiding difficulty in the group with low preoperative flow was tolerable and the treatment success rate was comparable to that in patients in the normal flow group. According to our analysis, patients with a low flow rate preoperatively can be safely treated with TOT for SUI.

Keywords: *Transobturator tape; Urinary stress incontinence; Voiding dysfunction*

Article History:
received 4 October, 2013
accepted 18 October, 2013

Corresponding Author:
Haewon Lee
Department of Urology, Dongguk University Ilsan Hospital, Dongguk University College of Medicine, 27 Dongguk-ro, Ilsandong-gu, Goyang 410-773, Korea
TEL: +82-31-961-7440
FAX: +82-31-961-7457
E-mail: urmarine@duih.org

INTRODUCTION

In the treatment of female stress urinary incontinence (SUI), midurethral sling operations brought the latest technical advances. Tension-free vaginal tape (TVT) and transobturator tape (TOT) are simpler and more effective than previous anti-incontinence operations. Therefore, midurethral sling operations became the most popular procedures and showed exponential growth in cases. This operation is still evolving in materials and technique [1].

Theoretically, the midurethral sling involves a suburethral support mechanism [2,3]. Despite generally low complication rates, postoperative voiding dysfunction can be a problematic complication [4]. Inevitably, this procedure produces dynamic urethral compression during the voiding phase [1]. In previous studies in the literature, voiding dysfunction after midurethral sling operations was reported to occur in approximately 2% to 15% of patients [5]. SUI is a disease that is closely related to the quality of life; therefore, postoperative urinary retention has a profound impact on patient satisfaction [6].

Several studies have investigated predictive factors of

urinary retention after midurethral slings. Patient age, medical history, and voiding parameters including urodynamic study parameters are risk factors of postoperative urinary retention [7-9]. Generally, preoperative urodynamic study is not regularly recommended for routine evaluation of SUI. Clinically available dynamic voiding parameters are peak flow rate (Qmax) and postvoid residual (PVR) [10]. In cases with a low preoperative urinary flow rate, there is the possibility of postoperative retention. Therefore, some urologists may be reluctant to operate on patients with a low preoperative flow rate. In previous reports in the literature, however, there has been controversy over the influence of the preoperative flow rate on postoperative urinary retention [8,11].

In this study, we assessed whether patients with a low preoperative urinary flow rate could be safely managed by the TOT procedure without significant postoperative retention. Furthermore, we tried to analyze the urodynamic characteristics of patients with a lower preoperative flow rate.

MATERIALS AND METHODS

A retrospective study was performed of 329 consecutive patients who underwent the TOT procedure for SUI between June 2006 and May 2012. Seven patients who underwent reoperations for SUI were excluded from the analysis. Patients underwent preoperative evaluation of variables expected to be correlation factors for postoperative urinary retention. The preoperative examinations comprised a medical history, physical examination, urinalysis, Qmax, and PVR measurement. The urine leakage test was executed with the 1-hour pad test after intake of 500 mL of water. The Q-tip test was done to validate urethral hypermobility. The urodynamic study included maximal urethral closing pressure, cystometrogram, pressure-flow study, and measurement of abdominal leakage point pressure. For the measurement of abdominal leak point, Valsalva leak point pressure was recorded at a bladder volume of 200 mL. All definitions followed those of the International Continence Society [12].

Generally, the TOT procedure was performed under spinal anesthesia in most patients with the Monarc Subfascial Hammock System (American Medical Systems, Minnetonka, MN, USA). The general surgery procedure was performed as described by Mellier et al. [13]. Tape tension was adjusted by using long Mayo scissors or a right angle clamp by cautiously considering the patient's urethra and detrusor state. After a 16-Fr Foley catheter was indwelled, the vagina was packed with petrolatum gauze to prevent mucosal bleeding. The day after the operation, the Foley catheter and vaginal dressing were removed and the patient's voiding state was checked before discharge. Uroflowmetry with PVR was checked at the second voiding after Foley catheter removal. During follow-up, routine checkup of uroflowmetry and PVR were performed at 1 week and 1 month postoperatively.

Postoperative urinary retention was defined as the need for urethral catheterization more than 1 day after removal of the Foley catheter. Retention cases included bladder overload of more than 500 mL and failure to void even with voiding desire. The patients with postoperative retention underwent intermittent urethral catheterization or Foley catheter reinsertion and their voiding state was then checked the next day. Voiding difficulty was determined when the PVR was more than one third of voided volume or more than 150 mL. Surgical cure was defined as the absence of any complaint of urinary leakage in usual activities and a state that did not need further treatment. Patient satisfaction was surveyed by categorization as full satisfaction, satisfaction, so-so, dissatisfaction, and extreme dissatisfaction. Postoperative urgency was checked by patient report.

In the statistical analysis, the patients were divided into two groups by a preoperative peak flow rate of 15 mL/s. The patients with preoperative Qmax lower than 15 mL/s were assigned to the low Qmax group; the other patients were assigned to the normal Qmax group. The two groups were compared by use of Pearson chi-square test and t-test for differences in categorical and continuous variables, respectively. The patients' baseline and perioperative characteristics were compared between the two groups. Statistical analysis was performed with IBM SPSS ver. 19.0 (IBM Co., Armonk, NY, USA). Statistical significance was defined as $p < 0.05$.

RESULTS

The patients' mean age, body mass index (BMI; in kg/m^2), and incidence rate of previous pelvic surgery were 53.3 years, 25.2 kg/m^2, and 36.5%, respectively. General patient characteristics are presented in Table 1. Within 24 hours of the operation, 84% of the women achieved normal voiding and 16% of the women were assumed to have postoperative voiding difficulty. Only three patients (0.9%) showed retention and required additional catheterization for bladder emptying. Of the three retention cases, no patients were assigned to the low Qmax group. In these retention cases, the maximal catheter indwelling duration

TABLE 1. Preoperative patient demographics (n=322)

Parameter	Value
Age (y)	53.3±7.2
Pelvic operation history	49 (15.1)
Urgency	118 (36.5)
Peak flow rate (mL/s)	29.7±7.8
Voided volume (mL)	310±162
Postresidual urine volume (mL)	39.1±69.0
Maximal urethral closing pressure (cm H_2O)	72.6±30.1
Valsalva leak point pressure (cm H_2O)	88.0±20.3
Detrusor pressure at peak flow (cm H_2O)	26.8±14.7

Values are presented as mean±standard deviation or number (%).

was not more than 3 days after the operation. No cases required reoperation for tape cutting or urethrolysis.

The 40 patients (12.4%) who had preoperative Qmax lower than 15 mL/s (low Qmax group) were compared with the 282 patients (87.5%) who had preoperative Qmax of 15 mL/s or more (normal Qmax group). Between the two groups, there were no significant differences in age, previous pelvic surgery history, or past medical history. In postoperative parameters, hospital stay and catheter indwelling duration were not significantly different. The low Qmax group had a smaller voided volume (p=0.001) and higher scores for detrusor pressure at peak flow rate (PdetQmax, p=0.008) (Table 2). The bladder outlet obstruction index (PdetQmax–2Qmax) was statistically different between the two groups; however, the outlet obstruction pattern was not significantly different. The bladder contractility index (PdetQmax+5Qmax) showed no significant difference in this study.

Immediate postoperative Qmax decreased significantly in the normal Qmax group but increased in the low Qmax group. At postoperative 1 month, Qmax reached preoperative status in the normal Qmax group and remained steady in the low Qmax group. However, the difference in mean Qmax between the two groups did not taper. According to the cutoff value of Qmax for female bladder outlet obstruction, the percentage of patients showing a postoperative flow rate below 12 mL/s was higher in the low Qmax group (p=0.024) [14]. Postoperative urgency was not significantly different between the two groups. At more than 6 months after the operation, the cure rate and general satisfaction rate were 83.6% and 91.5% in the normal Qmax group and 71.8% and 78.5% in the low Qmax group, respectively (Table 3).

DISCUSSION

The integral theory and hammock hypothesis provide good insight into the pathophysiology of female SUI. Despite the

TABLE 2. Comparisons between the preoperative normal peak flow rate group and the low peak flow rate group

Parameter	Qmax ≥ 15 (n=282)	Qmax < 15 (n=40)	p-value
Preoperative parameters			
Age (y)	52.9±9.58	55.0±10.6	0.212
Previous pelvic operation	16 (18.0)	2 (11.1)	0.732
Preoperative urgency	33 (37.1)	7 (38.9)	0.885
Qtip > 30°	28 (34.1)	4 (25.0)	0.475
Qmax (mL/s)	32.4±12.9	11.2±2.6	< 0.001
Voided volume (mL)	343±193	179±129	0.001
PVR (mL)	36.9±40.5	56.0±103.0	0.267
UDS parameters			
MUCP (cm H_2O)	71.1±30.7	75.8±29.6	0.550
VLPP (cm H_2O)	85.7±23.3	97.6±16.1	0.062
PdetQmax (cm H_2O)	24.8±12.8	36.2±18.0	0.008
BOOI	−11.4±25.4	−0.27±22.1	0.023
BOO pattern (obstructed/unobstructed)	6 (2.9)	1 (3.4)	0.601
BCI	115.0±42.4	100±31.4	0.059
Bladder contractility grade (weak/normal & strong)	96 (42.3)	17 (56.7)	0.171
IDC (yes/no)	5 (5.6)	2 (11.1)	0.335
Postoperative parameters			
Catheter duration (d)	1.0±0.21	1.0±0	1.000
Postoperative Qmax (mL/s)	21.2±9.7	15.7±8.9	0.002
Postoperative VV (mL)	258±78	217±75	0.064
Postoperative PVR (mL)	37.0±42.9	44.3±55.6	0.369
Pre-Qmax–post-Qmax (mL/s)	11.6±14.7	−4.9±9.6	< 0.001
Pre-PVR–post-PVR (mL)	0.68±55.6	−7.6±74.8	0.446
Pre-Qmax–Qmax1W (mL/s)	4.3±14.1	−7.8±11.0	< 0.001
Pre-PVR–PVR1W (mL)	0.68±54.3	−6.0±86.0	0.597
Pre-Qmax–Qmax1M (mL/s)	−0.08±14.0	−7.7±7.4	0.026
Pre-PVR–PVR1M (mL)	0.2±62.6	18.8±131	0.329

Values are presented as mean±standard deviation or number (%).

Qmax, peak flow rate; PVR, postvoid residual; UDS, urodynamic study; MUCP, maximal urethral closing pressure; VLPP, Valsalva leak point pressure; PdetQmax, detrusor pressure at peak flow rate; BOOI, bladder outlet obstruction index; BOO pattern, bladder outlet obstruction pattern; BCI, bladder contractility index; IDC, involuntary detrusor contraction; VV, voided volume; Pre-Qmax, preoperative peal flow rate; Post-Qmax, postoperative peak flow rate; Pre-PVR, preoperative postvoid residual; Post-PVR, postoperative postvoid residual; Qmax1W, peak flow rate at 1 week after procedure; PVR1W, postvoid residual at 1 week after procedure; Qmax1M, peak flow rate at 1 month after procedure; PVR1M, postvoid residual at 1 month after procedure.

TABLE 3. Comparisons of postoperative voiding symptoms and operative results surveyed at 6 months

Parameter	Qmax > 15	Qmax < 15	p-value
Voiding difficulty	46 (16.9)	6 (15.0)	0.969
Peak flow rate < 12 mL/s (yes/no)	42 (15.4)	18 (45.0)	0.024
Retention (yes/no)	3 (1.0)	0 (0)	1.000
Urgency	56 (20.5)	18 (45.0)	0.803
Satisfaction rate	221 (91.5)	22 (78.5)	0.225
Cure rate	204 (83.6)	23 (71.8)	0.109

Values are presented as number (%).

hammock theory, however, many surgeons observe postoperative urinary retention after anti-incontinence surgery [2]. Conventional anti-incontinence surgery such as Burch colposuspension and pubovaginal sling show significant postoperative retention rates of close to 20% [15,16]. With the midurethral sling operation, postoperative urinary retention rates have decreased [17]. Postoperative retention rates were 2.3% to 19.5% in TVT and 2.0% to 5.4% in TOT [1]. In a comparison between TVT and TOT, TVT showed a slightly higher retention rate than TOT but with no difference in the cure rate [18]. Retention rates in our data (0.9%) were significantly low compared with previous results, whereas in one study the retention rate was similar [19]. However, concerning voiding difficulty, our data showed considerable differences with other studies [20].

There is no standard definition of postoperative voiding dysfunction in anti-incontinence surgery [11]. With various definitions of postoperative retention, it is difficult to compare the data from various studies. However, postoperative retention is generally managed by intermittent catheterization or urethral catheter indwelling. In the present study, the definition of retention was restricted to the need for postoperative catheterization for 1 day.

After anti-incontinence surgery, several components are assumed to affect transient and chronic urinary retention. Clinical characteristics such as increasing age and high BMI are conventionally associated with retention risk [7]. Ulmsten et al. [21] insisted that surgical techniques such as minimal dissection, trauma, and proper positioning of the tape are essential for the prevention of urinary retention. Sander et al. [22] reported that the midurethral sling operation increased urethral resistance during the voiding phase postoperatively. This obstruction affects the urinary flow rate; however, urodynamic obstruction is rare. In the aspect of urethral resistance after the operation, the type of operation such as colposuspension, TVT, and TOT can be a determinant of postoperative retention [9,18]. In our study, postoperative urinary flow rates generally decreased and were gradually restored. However, in the low Qmax group, postoperative Qmax increased. This increase in flow could be interpreted as a minimal increase of urethral resistance.

Some investigators have shown that detrusor contractility is important in postoperative voiding. Kawashima et al. [23] insisted that preoperative detrusor contractility is significantly correlated with postoperative retention. This study implies that patients with lower detrusor pressure have a higher risk of retention. However, Kawashima et al. [23] indicated special parameters (detrusor pressure X average flow rate) as a predictor. Still other studies evoke debate on the effect of detrusor pressure on postoperative retention. Sander et al. [22] found that both pre- and postoperative detrusor pressure were the same in 1 year. Those authors insisted that urethral resistance was more important than detrusor pressure. In our study, detrusor pressure was higher in the low Qmax group; however, the bladder obstruction pattern and bladder contractility did not differ. Furthermore, urethral resistance was not significantly different between the groups. With our data, it is difficult to interpret the impact of detrusor contractility.

Some studies claim that the preoperative flow rate is correlated with postoperative voiding dysfunction [7,24]. Dawson reported that values below the 10th percentile have a strong association with voiding dysfunction [25]. However, other studies insist that the preoperative flow rate has no relation with postoperative retention [26,27]. Mostafa et al. [11] concluded that there were no urodynamic parameters that were predictive of postoperative retention in patients who underwent TOT. Lemack et al. [28] also showed that parameters of uroflowmetry and urodynamics were not predictive of postoperative retention in a colposuspension and pubovaginal sling cohort. In our study, the preoperative urinary flow rate had no correlation with postoperative retention.

Patient satisfaction after midurethral sling surgery is associated with postoperative improvement of incontinence and distress of micturition [14]. There were no statistical differences in the cure rate and the general satisfaction rate in our study. However, a disparity in patient number would result in statistical insignificance. It is possible that the actual cure rate and the satisfaction rate were lower in the low Qmax group than in the normal Qmax group.

It is important to understand patient voiding status such as detrusor contractility and urethral resistance [21]. If patients have intrinsic sphincter deficiency, a higher urethral resistance profile, or neuropathic bladder, tape placement should be cautiously adjusted [28,29]. Surgeons

should consider the patient's micturition state to determine the minute tension of the sling [30]. Therefore, the reason for the lower rate of retention in the low Qmax group in our study might be lower tension adjustment compared with the normal Qmax group.

Our study had some limitations. There were few urinary retention cases compared with other studies. This point may imply that our cohort consisted of unintended selected cases. It was presumed that patients with severe comorbidity or adverse voiding parameters would be excluded during the decision to operate. Therefore, a small number of low Qmax cases could influence the statistical analysis. Second, there were not many voiding symptoms. Preoperative incontinence grade (e.g., Stamey grade) was not included in the analysis. Several questionnaires for surveying voiding symptoms (e.g., overactive bladder questionnaire, International Consultation on Incontinence Modular Questionnaire) were not used. Furthermore, postoperative urodynamic data were not represented. Objective data on postoperative detrusor pressure and urethral resistance can provide urologists with the patients' postoperative voiding status. Finally, clinical data were insufficient, such as types of anesthesia, concomitant surgery, and patient comorbidities.

CONCLUSIONS

There are still controversies concerning the influence of preoperative urodynamic parameters on urinary retention after midurethral sling operations. In particular, the effect of the preoperative Qmax on postoperative retention is still in debate. In the present study, patients with a low Qmax did not experience voiding dysfunction more frequently than did patients with a normal flow rate. A cautious TOT procedure can be securely performed in patients with a low preoperative flow rate.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

REFERENCES

1. Bullock TL, Ghoniem G, Klutke CG, Staskin DR. Advances in female stress urinary incontinence: mid-urethral slings. BJU Int 2006;98 Suppl 1:32-40.
2. DeLancey JO. Structural support of the urethra as it relates to stress urinary incontinence: the hammock hypothesis. Am J Obstet Gynecol 1994;170:1713-20.
3. Petros PE, Ulmsten UI. An integral theory of female urinary incontinence. Experimental and clinical considerations. Acta Obstet Gynecol Scand Suppl 1990;153:7-31.
4. Nitti VW. Complications of midurethral slings and their management. Can Urol Assoc J 2012;6(5 Suppl 2):S120-2.
5. Karram MM, Segal JL, Vassallo BJ, Kleeman SD. Complications and untoward effects of the tension-free vaginal tape procedure. Obstet Gynecol 2003;101(5 Pt 1):929-32.
6. Deval B, Jeffry L, Al Najjar F, Soriano D, Darai E. Determinants of patient dissatisfaction after a tension-free vaginal tape procedure for urinary incontinence. J Urol 2002;167:2093-7.
7. Salin A, Conquy S, Elie C, Touboul C, Parra J, Zerbib M, et al. Identification of risk factors for voiding dysfunction following TVT placement. Eur Urol 2007;51:782-7.
8. Hong B, Park S, Kim HS, Choo MS. Factors predictive of urinary retention after a tension-free vaginal tape procedure for female stress urinary incontinence. J Urol 2003;170:852-6.
9. Moore C, Paraiso MF. Voiding dysfunction after the tension-free vaginal tape procedure. Curr Urol Rep 2005;6:356-9.
10. Chapple CR, Milson I. Urinary incontinence and pelvic prolapse: epidemiology and pathophysiology. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, editors. Campbell-Walsh urology. 10th ed. Philadelphia: Saunders; 2011. p. 1872-3.
11. Mostafa A, Madhuvrata P, Abdel-Fattah M. Preoperative urodynamic predictors of short-term voiding dysfunction following a transobturator tension-free vaginal tape procedure. Int J Gynaecol Obstet 2011;115:49-52.
12. Abrams P, Cardozo L, Fall M, Griffiths 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.
13. Mellier G, Benayed B, Bretones S, Pasquier JC. Suburethral tape via the obturator route: is the TOT a simplification of the TVT? Int Urogynecol J Pelvic Floor Dysfunct 2004;15:227-32.
14. Wai CY, Curto TM, Zyczynski HM, Stoddard AM, Burgio KL, Brubaker L, et al. Patient satisfaction after midurethral sling surgery for stress urinary incontinence. Obstet Gynecol 2013;121: 1009-16.
15. McLennan MT, Melick CF, Bent AE. Clinical and urodynamic predictors of delayed voiding after fascia lata suburethral sling. Obstet Gynecol 1998;92 (4 Pt 1):608-12.
16. Chan PT, Fournier C, Corcos J. Short-term complications of pubovaginal sling procedure for genuine stress incontinence in women. Urology 2000;55:207-11.
17. Klutke C, Siegel S, Carlin B, Paszkiewicz E, Kirkemo A, Klutke J. Urinary retention after tension-free vaginal tape procedure: incidence and treatment. Urology 2001;58:697-701.
18. Long CY1, Hsu CS, Wu MP, Liu CM, Wang TN, Tsai EM. Comparison of tension-free vaginal tape and transobturator tape procedure for the treatment of stress urinary incontinence. Curr Opin Obstet Gynecol 2009;21:342-7.
19. Nilsson CG1, Kuuva N, Falconer C, Rezapour M, Ulmsten U. Long-term results of the tension-free vaginal tape (TVT) procedure for surgical treatment of female stress urinary incontinence. Int Urogynecol J Pelvic Floor Dysfunct 2001;12 Suppl 2:S5-8.
20. Cho ST1, Song HC, Song HJ, Lee YG, Kim KK. Predictors of postoperative voiding dysfunction following transobsturator sling procedures in patients with stress urinary incontinence. Int Neurourol J 2010;14:26-33.
21. Ulmsten U, Johnson P, Rezapour M. A three-year follow up of tension free vaginal tape for surgical treatment of female stress urinary incontinence. Br J Obstet Gynaecol 1999;106:345-50.
22. Sander P, Moller LM, Rudnicki PM, Lose G. Does the tension-free vaginal tape procedure affect the voiding phase? Pressure-flow studies before and 1 year after surgery. BJU Int 2002;89:694-8.
23. Kawashima H, Hirai K, Okada N, Takahara Y, Kurisu T, Sumi T, et al. The importance of studying pressure-flow for predicting postoperative voiding difficulties in women with stress urinary incontinence: a preliminary study that correlates low Pdet x Qave with postoperative residual urine. Urol Res 2004;32:84-8.
24. Jang HA, Bae JH, Lee JG. Incidence and risk factors of post-

operative de novo voiding dysfunction following midurethral sling procedures. Korean J Urol 2009;50:762-6.
25. Dawson T, Lawton V, Adams E, Richmond D. Factors predictive of post-TVT voiding dysfunction. Int Urogynecol J Pelvic Floor Dysfunct 2007;18:1297-302.
26. Miller EA, Amundsen CL, Toh KL, Flynn BJ, Webster GD. Preoperative urodynamic evaluation may predict voiding dysfunction in women undergoing pubovaginal sling. J Urol 2003;169:2234-7.
27. Kobak WH, Walters MD, Piedmonte MR. Determinants of voiding after three types of incontinence surgery: a multivariable analysis. Obstet Gynecol 2001;97:86-91.
28. Lemack GE, Krauss S, Litman H, FitzGerald MP, Chai T, Nager C, et al. Normal preoperative urodynamic testing does not predict voiding dysfunction after Burch colposuspension versus pubovaginal sling. J Urol 2008;180:2076-80.
29. Ghezzi F, Serati M, Cromi A, Uccella S, Salvatore S, Triacca P, et al. Tension-free vaginal tape for the treatment of urodynamic stress incontinence with intrinsic sphincteric deficiency. Int Urogynecol J Pelvic Floor Dysfunct 2006;17:335-9.
30. Oh TH, Shin JH, Na YG. A comparison of the clinical efficacy of the transobturator adjustable tape (TOA) and transobturator tape (TOT) for treating female stress urinary incontinence with intrinsic sphincter deficiency: short-term results. Korean J Urol 2012;53:98-103.