

Sub-urethral Mini Sling versus Transobturator Vaginal Tape for Treatment of Female Stress Urinary Incontinence, One Year Follow-up

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ABSTRACT

Background: Stress urinary incontinence (SUI) is a common problem in women, which accounts about 50% of all incontinent women and affects the quality of life. The mid-urethral sling is the mainstay of SUI treatment over the last years. Tension-free vaginal tape (TVT), has been used as minimally invasive procedure for SUI.

Objective: To compare outcomes of sub-urethral minisling and transobturator tape (TOT) for treatment of female SUI, one year follow up regarding operative time, length of hospital stays, postoperative pain perception, general postoperative complications, surgical site infections and early recurrence.

Patients and Methods: This comparative study has been conducted in Al-Hussein and Sayed Galal Hospitals; Al-Azhar University; Cairo; Egypt and it included 96 cases, 8 patients missed communication data, 9 refused to participate, 34 in minisling group and 45 in transobturator tape (TOT) group. This a retrospective study for follow up of operated cases during the period from July 2015 to June 2018 at the Urology Department, Al-Hussein, Sayed Galal University Hospitals; Cairo; Egypt.

Results: In our study, the minisling operation was associated with nearly the same hospital stay of transobturator tape (TOT). We had early recurrence rate among minisling operation. Finally, the transobturator tape (TOT) operation was associated with less recurrence rate and recurrence time postoperatively compared to the minisling.

Conclusion: Minisling when compared to transobturator tape (TOT) for treating SUI; transobturator tape (TOT) yielded better outcomes regarding the postoperative 1 year follow up compared to the minisling.

Keywords: Minisling, Transobturator Tape (TOT), SUI, 1 year follow up.

INTRODUCTION

Stress urinary incontinence (SUI) is a common problem in women, which accounts about 50% of all incontinent women and affects the quality of life ⁽¹⁾.

The mid-urethral sling is the mainstay of SUI treatment over the last years ⁽²⁾. Tension-free vaginal tape (TVT), was used as minimally invasive procedure for SUI⁽³⁾. It was associated with many serious complications because of the blind passage through the retropubic space, such as bladder perforation, vessel and bowel injuries ⁽⁴⁾.

Subsequently, transobturator slings were developed with comparable cure rates and relatively less complications compared with TVT ⁽⁵⁾. Transobturator approaches were associated with the risk of persistent groin and thigh pain ⁽⁶⁾. So tension-free mid-urethral vaginal sling, which is known as single-incision minislings (SIMS) is developed with the same efficacy and the advantage of avoiding both retropubic and groin muscle pain ⁽⁷⁾.

SIMS looks promising and as effective as TOT at short term evaluation, however, a clear statement in favor of the widespread use of SIMS cannot be made due to lack of studies comparing the efficacy of these techniques on long-term.

The prevalence of urinary incontinence in women ranges from 25 to 51 percent, using the inclusive definition of any leakage at least once in the past year ⁽⁸⁾.

Many procedures involved suspending and supporting the bladder neck and proximal urethra in retropubic space at high position, this method prevent their descent during times of increased intra-abdominal pressure. These techniques were effective, with mean 3-7-year continence rate of 77% ⁽⁹⁾.

Recently sub urethral pubovaginal sling operations have become more common among urologists and gynecologists. In 1942, **Aldridge** developed the first sub urethral sling using rectus fascia which avoided the need for a laparotomy, therefore decreasing morbidity, but a second incision was still required either abdominally (to harvest rectus fascia) or on the inner thigh (for fascia lata) ⁽¹⁰⁾.

The efficacy and less invasiveness of these procedures led to other procedures such as the trans obturator tape (TOT) technique, and more recently prepubic TVT. All of these procedures keep the same principles of mid-urethral, tension-free placement of a synthetic sling material ⁽¹¹⁾.

Minisling is the latest in the logical progression of synthetic slings used in the minimally invasive treatment of SUI. However, the next step toward a less invasive, tension-free, mid-urethral sling was to develop a system that could be placed through one small vaginal incision. The TVT-Secure™ device uses a single vaginal incision to place a sub urethral macroporous polypropylene mesh tape without exit wounds. The product can be placed either in a U-shape, similar to the trans obturator tape position, or a V-shape, similar to the retropubic tape position ⁽¹²⁾.

AIM OF THE WORK

The aim of this study is to compare TOT and minisling outcome in cases of females with stress urinary incontinence (SUI) after one year follow up.

PATIENTS AND METHODS

Study Design

This is a comparative study that was conducted in Urology Department, Al-Hussein and Sayed Galal University Hospitals; Cairo; Egypt and had 96 cases, 8 patients missed communication data, 9 refused to participate, 34 in minisling group and 45 in transobturator tape (TOT) group. We follow up the patients for 12 months postoperatively during the period from July 2015 to June 2018. A comprehensive assessment program was carefully structured so that a disciplined routine was followed in each patient. Operations were conducted by one team who performed both procedures. Informed consent was conducted to the patients.

METHODS

The documented preoperative, operative and postoperative follow up data for all patients were collected and reviewed and the outcome of surgery was evaluated.

The study was approved by the Ethics Board of Al-Azhar University.

Preoperative assessment

All patients were diagnosed as SUI by history of leakage of urine during cough, clinical assessment by PV examination, stress test, investigated by us to assess postvoiding residue and urodynamics for detrusor overactivity.

Postoperative follow up

Early outcomes were assessed through follow up in the immediate postoperative care, at 3 months, 6 months and 12 months. Full clinical examination was done at each visit. Pelviabdominal US was done at 12 months. Urodynamic study was done for recurrent cases, deteriorated cases, or cases failed from the start.

Data collection

Standardized data collection was performed which included:

- Preoperative data: Demographic and clinical data: e.g. age, parity, co-morbidities, body mass index, degree of SUI, etc. Preoperative urodynamic findings
- Operative data: Operative time, urethral or urinary bladder injury during procedure.
- Postoperative care data: The duration of hospital stay, postoperative pain score, and complications (Bleeding, UB injury, etc.) or recurrence.

Data Management and Analysis

Data were analyzed using Statistical Program for Social Science (SPSS) version 15.0. Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done

Independent-samples t-test of significance: was used when comparing between two means.

Chi-square test: was used when comparing between qualitative data.

- Probability (P-value)
- P-value < 0.05 was considered significant.
- P-value < 0.001 was considered as highly significant.
- P-value > 0.05 was considered insignificant.

RESULTS

Our study involved ninety-six patients who presented to our outpatient clinic in Al-Azhar University Hospitals, 8 patients missed communication data, 9 refused to participate, 34 in minisling group and 45 in transobturator tape TOT group.

Out of the 34 patients operated upon by minisling procedure, 8 of them were co-morbid in the form of 2 were hypertensive and 6 were type II diabetic. On the other side, for patients operated upon by TOT, 12 patients were hypertensive and the other 13 were type II diabetic.

In minisling-operated patients, 15 patients were preoperatively diagnosed as mixed urinary incontinence and 19 as pure stress incontinence.

In minisling operated patients, 24 patients were preoperatively diagnosed as mixed urinary incontinence and 21 as pure stress incontinence.

Table (1): Demographic data

Variables		Minisling (N = 34)	TOT (N = 45)	P-value
Age (years)	Mean	46.71	41.47	0.006**
	±SD	9.09	7.39	
NVD	Mean	3.76	3.07	0.07
	±SD	1.89	1.50	
CS	Mean	0.44	0.53	0.68
	±SD	1.11	0.89	
menopausal status	Pre	18 (52.9%)	30 (66.7%)	0.16
	Post	14 (41.2%)	15 (33.3%)	
	Amenorrhea	2 (5.9%)	0 (0%)	
Medical histories	Free	26 (76.5%)	42 (93.3%)	0.014**
	DM	6 (17.6%)	0 (0%)	
	HTN	2 (5.9%)	3 (6.7%)	
Surgical histories	Free	28 (82.4%)	12 (26.7%)	< 0.001*
	Cystocele repair	2 (5.9%)	0 (0%)	
	Hysterectomy	2 (5.9%)	0 (0%)	
PV examination	normal	4 (11.8%)	9 (20%)	< 0.001*
	mild cystocele	25 (73.5%)	3 (6.7%)	
	moderate cystocele	1 (2.9%)	6 (13.3%)	
	moderate cystorectocele	1 (2.9%)	6 (13.3%)	
	rectocele	0 (0%)	3 (6.7%)	
Grading of SUI	G I	18 (52.9%)	24 (60%)	0.28
	G II	14 (41.2%)	18 (40%)	
	G III	2 (5.9%)	0 (0%)	
Concomitant procedure	No	31 (91.2%)	24 (53.3%)	0.001**
	Cysto5 repair	1 (2.9%)	6 (13.3%)	
	5 repair	2 (5.9%)	0 (0%)	
	ant. Colporrhaphy	0 (0%)	9 (20%)	
	posterior colporrhaphy	0 (0%)	3 (6.7%)	
Operative time	Mean	13.32	36.0	< 0.001*
	±SD	3.13	18.84	

*: p-value < 0.05 is considered significant.

Table (2): Comparison between studied operations as regard preoperative pad/day, dysuria, nocturnal enuresis, pain and dyspareunia.

Variables		Preoperative	Mini-sling (N = 34)	TOT (N = 45)	P-value
Pad/day	Mean		3.4	2.9	0.13
	±SD		1.5	1.6	
Dysuria	No		23 (67.6%)	30 (66.7%)	0.93
	Yes		11 (32.4%)	15 (33.3%)	
Nocturnal enuresis	No		32 (94.1%)	42 (93.3%)	0.88
	Yes		2 (5.9%)	3 (6.7%)	
Pain	No		20 (58.8%)	33 (73.3%)	0.009*
	Pelvic		11 (32.4%)	3 (6.7%)	
	LBP		3 (8.8%)	9 (20%)	
Dyspareunia	No		34 (100%)	45 (100%)	-----
	Yes		0 (0%)	0 (0%)	

*: p-value < 0.05 is considered significant.

This table shows: No statistical significant difference (**p-value > 0.05**) between studied operations as regard preoperative pad/day, dysuria, nocturnal enuresis and dyspareunia. Statistically significant difference (**p-value < 0.05**) between studied operations as regard preoperative pain.

Table (3): Comparison between minisling follow up as regard urine leakage.

1 year	Variables	Pre-op	3 months	1 year	P-value
How often do you leak urine?	Never	0 (0%)	25 (73.5%)	12 (35.3%)	< 0.001*
	Once / week or less	0 (0%)	6 (17.6%)	9 (26.5%)	
	2 times / week	2 (5.9%)	3 (8.8%)	4 (11.8%)	
	About once / day	7 (20.6%)	0 (0%)	4 (11.8%)	
	Several times / day	11 (32.4%)	0 (0%)	3 (8.8%)	
	All the time	14 (41.2%)	0 (0%)	2 (5.9%)	
How much urine do you think you leak?	None	0 (0%)	7 (20.6%)	7 (20.6%)	< 0.001*
	Small amount	0 (0%)	20 (58.8%)	11 (32.4%)	
	Moderate amount	7 (20.6%)	4 (11.8%)	9 (26.5%)	
	Large amount	27 (79.4%)	3 (8.8%)	7 (20.6%)	
How much does leaking urine interfere with your everyday life?	Mean	6.6	2.5	4.4	< 0.001*
	±SD	3.08	1.9	3.2	
sum of scores	Mean	16.3	5.05	8.8	< 0.001*
	±SD	3.7	3.8	6.3	

*: p-value < 0.001 is considered highly significant.

This table shows highly statistical significant difference (p-value < 0.001) between TOT follow up as regard (How often do you leak urine?), (How much urine do you think you leak?) and (How much does leaking urine interfere with your everyday life? and sum of scores).

Table (4): Comparison between TOT follow up as regard urine leakage.

1 year	Variables	Pre-op	3 months	1 year	P-value
How often do you leak urine?	Never	0 (0%)	36 (80%)	39 (86.7%)	< 0.001
	Once / week or less	0 (0%)	9 (20%)	0 (0%)	
	2 times / week	0 (0%)	0 (0%)	3 (6.7%)	
	About once / day	18 (40%)	0 (0%)	0 (0%)	
	Several times / day	18 (40%)	0 (0%)	0 (0%)	
	All the time	9 (20%)	0 (0%)	3 (6.7%)	
How much urine do you think you leak?	None	0 (0%)	33 (73.3%)	33 (73.3%)	< 0.001
	Small amount	1 (2.2%)	7 (15.6%)	3 (6.7%)	
	Moderate amount	32 (71.1%)	2 (4.4%)	6 (13.3%)	
	Large amount	12 (26.7%)	3 (6.7%)	3 (6.7%)	
How much does leaking urine interfere with your everyday life?	Mean	6.6	1.08	1.5	< 0.001*
	±SD	3.08	2.08	2.9	
Sum Of Scores	Mean	16.3	2.17	2.9	< 0.001*
	±SD	3.7	4.1	5.8	

*: p-value < 0.001 is considered highly significant.

This table shows highly statistical significant difference (p-value < 0.001) between TOT follow up as regard (How often do you leak urine?), (How much urine do you think you leak?) and (How much does leaking urine interfere with your everyday life? and sum of scores).

Table (5): Comparison between studied operations as regard 1 year follow up urge and SUI.

		Minisling (N = 34)	TOT(N = 45)	P-value
Urge (%)	Mean	68.2	81.3	0.098
	±SD	33.3	35.2	
SUI (%)	Mean	72.9	90	0.025*
	±SD	37.1	25.8	

*: p-value < 0.05 is considered significant.

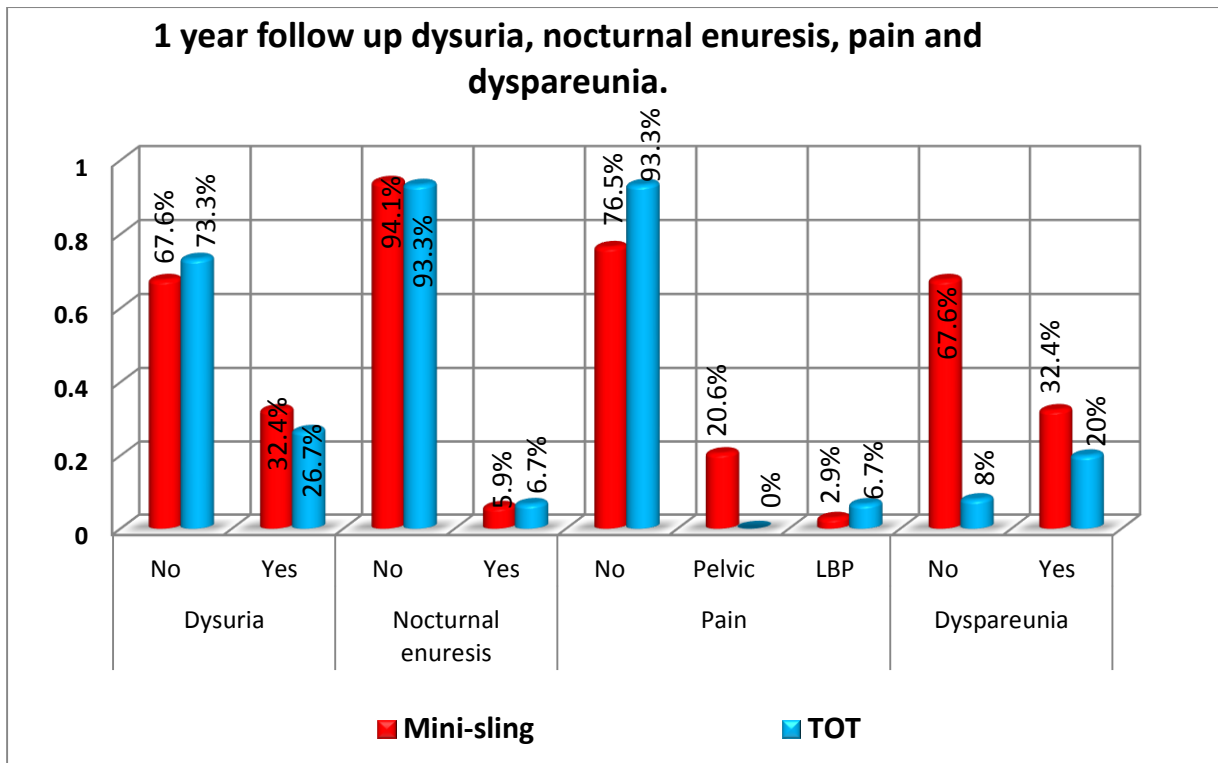


Figure (1): Comparison between studied operations as regard 1 year follow up dysuria, nocturnal enuresis, pain and dyspareunia.

Table (6): Comparison between studied operations as regard 1 year follow up post-voiding residual urine and urodynamics.

1 year		Variables	Minisling (N = 34)	TOT (N = 45)	Pvalue
Post-voiding residual urine	Mean		16.2	18.7	0.62
	±SD		22.7	22.4	
Urodynamics	No need		27 (79.4%)	39 (86.7%)	0.56
	OAB		4 (11.8%)	3 (6.7%)	
	Inc. sensation		2(5.9%)	3(6.7%)	
	Small UB Cap.		1 (2.9%)	0 (0%)	

DISCUSSION

Surgical treatment of female SUI is necessary. In addition to open techniques such as Burch colposuspension, currently the most often used are minimally invasive methods. Their aim is the suspension of the bladder neck and urethra using synthetic materials, the so-called sling. Abnormal positioning of the urethra and the bladder neck implied the possibility of introducing the method of correcting this condition.

In 1996 Ulmsten and colleagues published the report describing the TVT (tension-free vaginal tape) technique in the treatment of SUI (13). A few years later, TOT (trans-obturator tape) method was described in which the tapes were carried out between the obturator holes (14). Both methods are widely accepted methods of surgical treatment of SUI. The trans-obturator variant, however, became more popular due to similar cure rate with relatively less complications. TOT sling procedure is considered the gold standard for management of female SUI (15).

With objective to simplify the previous techniques and minimize the complication rates related to the pass of needles, a new technique was developed maintaining the principle of a tension-free sling (minisling) and introducing the concept of application of the sling without needles through a sub-urethral single vaginal incision (16).

The current study included all available cases with complete medical record and accepted follow-up with us. The primary objective of this study was to compare one year follow up of single incision TOT to the standard TOT procedures in terms of safety and efficacy, which was shown in terms of comparable subjective and objective cure rates as well as comparable intraoperative and postoperative complications, yet with significantly less operative time, blood loss and postoperative pain score for the single incision TOT procedure. The initial preoperative diagnosis of urodynamic stress incontinence was based on recurrence, a positive cough stress test and the urodynamic criteria for the "genuine" type of stress

incontinence [positive involuntary leakage during forceful coughs on the bladder filling, along with the absence of uninhibited detrusor contractions during a cystogram] ⁽¹⁷⁾.

A final number of 79 women (34 in group I and 45 in group II) continued their follow up and were included in the statistical analysis of this study. There were no significant differences between women of both groups, regarding initial data [age, weight, height, BMI]. There was no significant difference in parity or menopausal status between women of both groups. There was significant difference between women of both groups regarding medical co-morbidities or previous surgeries.

Among women of group I, 17.6% reported previous surgeries while 73.3% of women included in group II reported previous surgeries. There were significant differences in results of pelvic examination or cough stress test between women of both groups before surgery.

Among women of group I, 34% showed a positive cough stress test while 36% of women in group II showed a positive cough stress test. Some authors demonstrated that clinicians and patients may indeed view the impact of incontinence on the quality of life differently, while the patients focusing more on emotional well-being and disruption of routine activities ⁽¹⁸⁾.

Therefore, in addition, a short-form of a validated quality of life questionnaire, which was the short form of the International Consultation on Incontinence Questionnaire on Urinary Incontinence (ICIQ-UI-SF), was used. The score ranges between 0 and 21; with the higher score implying more severe incontinence with worse impact on quality of life. It is a brief questionnaire that measures the impact of symptoms on quality of life and outcome of treatment ⁽¹⁹⁾.

There was a highly significant difference between both procedures regarding operative time. Minisling needed a mean operative time of 8.3 minutes, which was significantly less than the mean operative time (16.5 minutes) needed by the standard TOT procedure. The mean operative time of the single incision TOT procedure was 9 minutes in the studies conducted by **Cabrera et al.** ⁽²⁰⁾ and **Navazo et al.** ⁽¹⁶⁾, 7 minutes.

There was a highly significant difference between both groups regarding the intraoperative procedure-related blood loss. Women of group I lost a mean of 51.5 ml of blood, which was significantly less than the mean blood loss (123.1 ml) of Group II. The difference in blood loss could be explained by the difference in operative time. The mean blood loss in standard TOT was estimated to be 78.76 ml in the study conducted by Magon and Chopra on 51 patients. In the study conducted by Dobson et al., the blood loss was

more than 100 in 71% of cases. **Moore et al.** reported an average intraoperative blood loss of 57 ml (SD 22 ml), whereas **Moore et al.** reported 36 ml in their study ⁽²¹⁾.

There was also no significant difference between both groups regarding iatrogenic organ injury. In group I, there was one case 2.9% of urinary bladder injury and was immediately repaired using Vicryl 2-0 sutures in 2 layers. In group II, no cases (0%) of urinary bladder injury.

There were no cases of urethral injury. Consistent results were reported by **Amati et al.** ⁽²²⁾ in a study conducted, where only one patient was reported to have a bladder injury in each group which was attributed to the concomitant surgery.

In group I, there was one case (2.9%) catheterized for 2 weeks due to intraoperative bladder injury. The mean catheterization time was 2.02 days for the single incision TOT in the study conducted by **Navazo et al.** ⁽¹⁶⁾, who also reported one out of 120 cases of urinary retention in a patient who underwent anterior repair as a concomitant procedure, and 5 out of 230 cases of acute retention that resolved by temporal catheterization were reported by **Cabrera et al.** ⁽²⁰⁾.

The mean catheterization time was 1.52 days after the standard TOT. Magon and Chopra reported one case out of 59 of urinary retention that required catheterization for more than 24 hours after standard TOT that resolved spontaneously in less than 2 days ⁽²³⁾.

In a study conducted by Magon and Chopra, 45.8% patients were discharged within 24 hours of surgery, another 50.8% were discharged between 24 and 72 hours postoperatively, and only 3.4% patients had to stay hospitalized for more than 3 days and these were the patients who had intraoperative complications. Average stay of 57 patients in that study (excluding the two extremes with prolonged stay because of bladder/urethral injury) was 1.6 days. Our results were consistent with the study conducted by **Amati et al.** ⁽²²⁾ that reported no significant difference between both procedures regarding postoperative hospital stay, with a mean duration of 1.04 days for both procedures with no concomitant operations, while the mean duration was 2.65 days for the single incision TOT and 2.95 days for the standard TOT when associated with a concomitant operation ⁽²²⁾.

Patient-reported cure/failure outcomes were judged, in the current trial, using a simple question whether the patient has felt cured, improved or neither. The patient was categorized as "subjectively cured" if no episodes of urine leakage was reported; "subjectively improved" if the episodes of urine leakage are much less and no more treatment was necessary; and "subjectively failed" if the patient reported maintenance of urine leakage and was unsatisfied with the result of the surgery. The importance of the inquiry about the patient-reported impact lies in the largely subjective

nature of urinary incontinence. The true impact of the surgery is not solely based on discriminate variables but rather on the composite effect of numerous factors on patient's symptoms and patient's overall lifestyle. Objective physical findings retrieved from a single examination at some time may not reveal the full impact of a therapeutic intervention on a patient's ability to resume and enjoy a normal routine⁽²⁴⁾.

Regarding the cough stress test, 47.1% of assessed patients from group I showed no leakage, while 86.7% of those assessed from group II showed no leakage.

The validity of the ICIQ-UI-SF in assessing the impact of anti-incontinence procedure on symptoms and patient's quality of life was proven by many authors⁽²⁵⁾. It was used as patient-reported outcome to assess the result of surgery after 1 year through calculating the postoperative change of score. In this study there was highly significant difference between both groups regarding the mean ICIQ score 1 year after surgery. The mean score was 8.8 for group I with SD of 6.3, and the mean score was 2.9 for group II with SD of 5.8.

In the study conducted by **Cabrera et al.**⁽²⁰⁾ on 230 women who underwent single incision TOT, the objective cure rate was 86% after 1 year, 6% improved and 8% were classified as failures, while in the study conducted by Navazo et al. on 120 women who underwent single incision TOT, the cure rate was 84%, 8% improved and failure rate was 8% after 1 year⁽¹⁶⁾.

Delorme et al. conducted the first case series on 32 women who underwent the standard TOT, the subjective cure rate at 1 year was 90.6%, the subjective improvement rate was 9.4% and no failed cases were reported.⁽¹⁴⁾ In literature, the objective and subjective cure rates, at 1 year after the standard TOT procedure, ranged between 88-92% and 68-90% respectively⁽²⁶⁾.

In the current trial, we noticed the increasing satisfaction rate and cure rates among women of both groups as time passed. The subjective cure rate for the single incision TOT increased from 74.6% at 1 month to 88.1% at 6 months, with an increase in satisfaction rate from 83.6% at 1 month to 91% at 6 months, which was associated with an increase in the objective cure rate from 86.6% at 1 month to 97% at 6 months.

One year after surgery, there were no significant differences between both groups regarding adverse outcomes. There were 6 cases (17.6%) of vaginal infection in group I and 9 cases (20%) in group II. There were 14 cases (41.2%) of significant UTI in group I and 3 cases (6.7%) in group II. No cases (0%) of vaginal erosion was encountered in group I, while there were 2 cases (4.7%) of vaginal erosion in group II. One case resolved 2 weeks later on local treatment and the other was persistent and required removal of the mesh after 1 month. There were no cases of urinary retention, voiding difficulty, urge incontinence, wound

infection, pelvic infection, bladder or urethral erosions among any of the groups.

Regarding the rate of mesh erosion after single incision TOT, 2 out of 230 cases were reported in the study conducted by **Cabrera et al.**⁽²⁰⁾ to have vaginal erosions that resolved on local estrogen creams. In the study conducted by Navazo et al.⁽¹⁶⁾, one case out of 120 was reported to have vaginal erosion that resolved on local estrogen treatment.

Our overall results indicate the non-inferiority of the single incision TOT procedure to the standard TOT procedure as a treatment for female stress urinary incontinence as proved by the overall cure rate and patient satisfaction reported at 6 months after surgery. Our study also showed a significantly less operative time and less intraoperative procedure-related blood loss with the single incision minisling compared to the standard TOT, with significantly less pain reported postoperatively. There were no significant differences regarding the overall incidence of the adverse outcomes between both procedures during the follow up period. A Cochrane review published in 2014 analyzing the results of single incision minisling procedures showed comparable results to our trial when comparing the single incision minisling to the standard TOT technique⁽²⁰⁾.

LIMITATIONS

Include the relatively short follow-up period.

CONCLUSION AND RECOMMENDATIONS

In our study, it was reviewed that minisling when compared to TOT for treating SUI. The TOT approach yielded better outcomes regarding the postoperative recovery compared to the minisling approach. Finally, we recommend the TOT approach for the treatment of SUI.

We need more training and standardization of the technique to bring about fewer operative times. We need to adopt a structured enhance recovery program for each patient. We also need high volume study to study at least the 5 year recurrence rate between the 2 operations.

REFERENCES

1. **Swift SE, Bent AE (2008):** Basic evaluation of incontinent female patient. In: Bent AE, Cundiff GW, Swift SE, eds. Ostegard's Urogynecology and Pelvic Floor Dysfunction 6Th ed. Philadelphia, PA, USA: Lippincott Williams and Wilkins, Pp. 69-76.
2. **Fong ED, Nitti VW (2010):** REVIEW ARTICLE: mid-urethral synthetic slings for female stress urinary incontinence. *BJU Int.*, 106(5):596-608.
3. **Nilsson C, Palva K, Aarnio R et al. (2013):** Seventeen years' follow-up of the tension-free vaginal tape procedure for female stress urinary incontinence. *Int Urogynecol J.*, 24(8):1265-9.

4. **Kroon N, Smith K, Gill J (2007):** Bowel injury at TVT: an issue of consent. *Journal of Obstetrics & Gynecology*, 27(7):741-741.
5. **Serati M, Braga A, Cattoni E et al. (2013):** Transobturator vaginal tape for the treatment of stress urinary incontinence in elderly women without concomitant pelvic organ prolapse: is it effective and safe? *Eur J Obstet Gynecol Reprod Biol.*, 166(1):107-10.
6. **Bozkurt M, Yumru A, Salman S (2014):** Assessment of perioperative, early, and late postoperative complications of the inside-out transobturator tape procedure in the treatment of stress urinary incontinence. *Clin Exper Obstet Gynecol.*, 42(1):82-9.
7. **Neuman M, Sosnovski V, Kais M et al. (2011):** Transobturator vs single-incision suburethral mini-slings for treatment of female stress urinary incontinence: early postoperative pain and 3-year follow-up. *J Minim Invasive Gynecol.*, 18(6):769-73.
8. **Buckley BS, Lapitan MC (2010):** Epidemiology Committee of the Fourth International Consultation on Incontinence, Paris, 2008. Prevalence of urinary incontinence in men, women, and children—current evidence: findings of the Fourth International Consultation on Incontinence. *Urology*, 76:265.
9. **Walters M, Daneshgari F (2004):** Surgical management of stress urinary incontinence. *Clin Obstet Gynecol.*, 47(1):93-103.
10. **Aldridge AH (1942):** Transplantation of fascia for relief of urinary stress incontinence. *Am J Obstet.*, 44:398-411.
11. **Shindel AW, Ruiz AC, and Klutke CG (2005):** Transobturator approach to suburethral sling placement in the treatment of stress urinary incontinence in women (Review). *Expert Rev Med Devices*, 2(5): 613-622.
12. **Salz SM, Haff RE and Lucente VR (2007):** Short-term assessment of patients undergoing the new tension free vaginal tape: Secur procedure for SUI, *Int Urogynecol J Pelvic Floor Dysfunc*, 18:S27.
13. **Ulmsten U, Henriksson L, Johnson P et al. (1996):** An ambulatory surgical procedure under local anesthesia for treatment of female urinary incontinence,” *International Urogynecology Journal and Pelvic Floor Dysfunction*, 7(2): 81-86.
14. **Delorme E (2001):** Transobturator urethral suspension: mini-invasive procedure in treatment of stress urinary incontinence. *Prog Urol.*, 11:1306.
15. **Khan FN, Hamid A, Wazir BS et al. (2008):** An Evaluation of Use of Trans-Obturator Tape (TOT) Sling Procedure in the Current Surgical Management of Female Stress Urinary Incontinence. *International Journal of Health Sciences*, 2(2): 118-122.
16. **Navazo R, Moreno J, Hidalgo C et al. (2009):** Contasure Needleless: A single incision TOT for the surgical treatment of stress urinary incontinence *Neurological and Urodynamic Urology. Arch Esp Urol.*, 62 (9): 719-723
17. **Abrams P, Cardozo L, Fall M (2003):** The standardization of terminology in lower urinary tract function: Report from the standardization subcommittee of international continence society. *Urology*, 61: 37-49.
18. **Chene G, Tardieu AS, Cotte B et al. (2009):** Health-related quality of life in women operated on by surgical anti-incontinence procedures: comparison of three techniques. *Gynecol Obstet Fertil.*, 37(1): 3-10.
19. **Avery L, Donovan J, Peters TJ et al. (2004).** ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodyn.*, 23(4): 322-330.
20. **Cabrera J, Puyol M, Sousa A et al. (2007):** Minimal invasive surgical technique without needles (Contasure Needleless) for the surgical treatment of stress urinary incontinence: multicentric trial. <https://www.ics.org/Abstracts/Publish/47/000786.pdf>
21. **Moore RD, Miklos JR and Cervigni M (2006):** Monarc Transtobturator sling: Combined analysis of one-year followup in nine countries with 266 patients, *Int Urogynecol J Pelvic Floor Dysfunc.*, 17:203-207.
22. **Amati LT, Martínez EF and Lailla JM (2001):** Contasure-Needleless® compared with transobturator-TVT® for the treatment of stress urinary incontinence. *Int Urogynecol J.*, 22(7):827-33.
23. **Magon N, Chopra S (2012):** Transobturator Tape in Treatment of Stress Urinary Incontinence: It is Time for a New Gold Standard. *North American journal of Medical Sciences*, 4(5): 226-230.
24. **Ghoniem G, Stanford E, Kenton K et al. (2008):** Evaluation and outcome measures in the treatment of female stress urinary incontinence: IUGA guidelines for research and clinical practice. *Int Urogynecol J Pelvic Floor Dysfunc.*, 19(1): 5-33.
25. **Karantanis E, Fynes M, Moore KH et al. (2004):** Comparison of the ICIQ-SF and 24-hour pad test with other measures for evaluating the severity of urodynamic stress incontinence. *Int Urogynecol J Pelvic Floor Dysfunc.*, 15(2): 111-116.
26. **Deval B, Ferchaux J and Berry R (2006):** Objective and subjective cure rates after trans-obturator tape (OBTAPE) treatment of female urinary incontinence. *Eur Urol.*, 49(2): 373-377.