

Comparative Outcomes of Surgical Treatments for Primary Stress Urinary Incontinence in Women: A Retrospective Cohort Study

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Introduction: The study evaluates the outcomes of different surgical techniques, including Tension-free Vaginal Tape (TVT), Trans-Obturator Tape (TOT), Burch Colpopexy (BC), and Anterior Vaginal Wall Prolapse Repair (APR), in treating primary stress urinary incontinence (SUI) in women.

Materials and Methods: A retrospective cohort study was conducted in a tertiary care center, comprising 62 women diagnosed with primary SUI who underwent one of the aforementioned surgical procedures. Demographic and clinical variables were analyzed, including age, BMI, menopausal status, reproductive history, incontinence types, anticholinergic use, and preoperative assessments.

Results: No differences were found in age ($p=0.227$), weight ($p=0.943$), height ($p=0.333$), and BMI ($p=0.642$) among the four treatment groups. The distribution of menopausal patients and reproductive history variables did not differ among the groups. Postoperative anticholinergic prescription rates ($p=0.769$) and duration of use ($p=0.531$) were not different across the groups. The majority of patients in the TVT, TOT, and BC groups had a grade 2 cystocele ($p=0.065$). The BC group had 100% grade 1 rectocele, which was not significant compared to other groups ($p=0.126$).

Conclusion: Our results showed no potential difference of comparable outcomes among TVT, TOT, BC, and APR for the surgical treatment of primary SUI.

Keywords: Stress urinary incontinence, tension-free vaginal tape, trans-obturator tape, burch colpopexy

Introduction

Stress urinary incontinence (SUI) is defined as the involuntary loss of urine during physical exertion or activity that increase intraabdominal pressure, such as coughing, sneezing, or lifting (1). It is a highly prevalent condition in women, affecting up to 35% of the female population (2). Despite its widespread occurrence, SUI remains underdiagnosed and undertreated,

causing impairments in quality of life, self-esteem, and social interactions (3).

Several factors contribute to the development of SUI in women, including aging, obesity, parity, and hormonal changes (4). The condition arises from a complex interplay of anatomical, neurological, and hormonal factors that weaken the pelvic floor and urethral

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support structure (5). Conservative approaches, including lifestyle modifications, pelvic floor muscle training, and behavioural therapies, are usually the first-line treatment options (6). However, surgical interventions may be necessary for cases of moderate-to-severe SUI unresponsive to conservative measures (7).

Among the surgical techniques for SUI, transobturator tape (TOT), tension-free vaginal tape (TVT), Burch Colpopexy (BC) and Repair of Anterior Vaginal Wall Prolapse (ARP) are widely used (8). These procedures aim to reinforce the weakened pelvic support structures and restore the anatomical and functional integrity of the urinary continence system (9). While each of these approaches has its merits, the selection of the most suitable technique depends on patient factors, surgeon experience, and the specific clinical context.

Comparative studies on the outcomes of these surgical techniques for SUI are sparse and limited in scope. Therefore, this study aims to assess and compare the outcomes of TOT, TVT, BC and ARP in SUI.

Materials and Methods

Study Design

We conducted a retrospective cohort study using data from 62 adult women who had primary SUI at a single tertiary care centre. We compared demographic and clinical characteristics among four groups of patients who underwent various surgical treatments for pelvic organ prolapse or urinary incontinence, including Tension-free Vaginal Tape (TVT), Trans-Obturator Tape (TOT), Burch Colpopexy (BC), and Anterior Vaginal Wall Prolapse Repair (APR). Included were adult women aged 18 years or older, with a primary diagnosis of SUI who received one of the 3 surgical treatments. Exclusion criteria were previous surgery for SUI, concurrent pelvic organ prolapse surgery, neurogenic bladder, insufficient medical records and unwillingness to join to study.

Ethical Statements

This study was conducted in accordance with the Declaration of Helsinki and its later amendments. The research protocol was reviewed and approved by the Institutional Review Board (IRB) of the tertiary care centre where the study was conducted.

Data Collection

For the collection, we systematically reviewed medical records and extracted relevant patient information. We collected demographic information, including age, weight, height, and body mass index (BMI). The reproductive history parameters comprised menopausal status, age at menarche, gravidity, parity, difficult urination, caesarean section, abortion, and total abdominal hysterectomy + bilateral Salpingooforectomy (TAH+BSO). We gathered information on the patient's medical history, such as enuresis status and thyroid hormone levels, as well as incontinence characteristics, including the type of incontinence. The use of anticholinergic medications and the duration of use were recorded. In addition, we collected information on the preoperative assessment, including daily pad count and the presence of cystocele and rectocele.

Surgical Techniques

Transobturator tape (TOT): A synthetic mesh tape was placed under the mid-urethra via the transobturator route from the thigh. Tension-free vaginal tape (TVT): A similar synthetic mesh tape was placed under the mid-urethra using a retropubic approach. Burch Colpopexy (BC): This procedure involved partial closure of the vaginal canal using the LeFort technique, which preserves the uterus and is generally reserved for older women.

Statistical Analysis

All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics, including means, standard deviations, and percentages, were used to summarize demographic and clinical variables. The Shapiro-Wilk test was

used to assess normality of the distribution. For continuous variables, the student's t-test was used to compare means between two groups if the data were normally distributed; otherwise, the Mann-Whitney U was used. For categorical variables, the chi-square test was used, or the Fisher's exact test was employed when expected cell counts were less than 5. Analysis of variance (ANOVA) or the Kruskal-Wallis test was used to compare means among the three surgery groups (TOT, TVT, BC and APR),

followed by post-hoc tests to evaluate pairwise comparisons. For all analyses, a p-value of less than 0.05 was considered statistically significant.

Results

Our findings revealed no differences in age, weight, height, and BMI among the four groups (p-values 0.227, 0.943, 0.333, and 0.642, respectively). Furthermore, the distribution of menopausal patients, those with a history of difficult birth, caesarean section, abortion, TAH-BSO surgery, and infection did not significantly

Table 1. Comparison of demographic and clinical characteristics among TVT, TOT, LAP, and APR groups

Variable	TVT [n:16]	TOT [n:38]	BC [n:4]	APR [n:4]	p value
Age, years	47±8	48±7	53±7	53±4	0.227
Weight, kg	78±17	80±25	76±6	74±4	0.943
Height, cm	163±7.5	147.02±35.6	157.3±4.6	161.25±3.4	0.333
BMI, kg/m ²	29±5	28±5	32±3	28±3	0.642
Menopause (yes)	8 (57.1%)	15 (48.4%)	1 (33.3%)	1 (25%)	0.665
Difficult Birth (yes)	13 (81.3%)	17 (54.8%)	4 (100%)	3 (75%)	0.131
Cesarean (yes)	1 (6.3%)	5 (16.1%)	0 (0%)	1 (25%)	0.465
Abortion (yes)	6 (35.3%)	9 (29%)	1 (25%)	2 (50%)	0.824
TAH-BSO Surgery (yes)	2 (11.8%)	6 (20%)	0 (0%)	0 (0%)	0.535
Infection (yes)	4 (23.5%)	4 (13.3%)	0 (0%)	1 (25%)	0.606
Incontinence - Stress	9 (56.3%)	12 (25.8%)	1 (25%)	0 (0%)	0.081
- Stress+Urge	7 (43.8%)	25 (74.2%)	3 (75%)	4 (100%)	
- Urge	0 (0%)	1 (0%)	0 (0%)	0 (0%)	
Post-op Anticholinergic (yes)	14 (77.8%)	33 (80.5%)	4 (100%)	3 (75%)	0.769
Anticholinergic Duration	6±8	4±5	2±1	2±0	0.531
Pre-op Daily Pad Usage	5±5	4±2	3±0	3±1	0.61
Cystocele - 0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0.065
- 1	6 (38%)	9 (23.7%)	0 (0%)	1 (25%)	
- 2	9 (55.3%)	25 (65.8%)	2 (50%)	1 (25%)	
- 3	0 (0%)	4 (10.5%)	2 (50%)	2 (50%)	
Rectocele - 0	7 (42.9%)	14 (36.8%)	0 (0%)	1 (25%)	0.126
- 1	6 (35.7%)	20 (52.6%)	4 (100%)	1 (25%)	
- 2	3 (21.4%)	3 (7.9%)	0 (0%)	1 (25%)	
- 3	0 (0%)	1 (2.6%)	0 (0%)	1 (25%)	

The values presented in the table, unless otherwise indicated, are represented as mean ± standard deviation or as numbers with percentages in parentheses. Continuous variables were probably compared among the four groups using ANOVA for normally distributed data or Kruskal-Wallis test for non-normal data. Categorical variables were likely analyzed using Chi-square or Fisher's Exact test, depending on sample size and expected frequencies. A p-value less than 0.05 was likely considered statistically significant. Abbreviations: TVT: Tension-free Vaginal Tape, TOT: Trans-Obturator Tape, BC: Burch Colpopexy, APR: Repair of Anterior Vaginal Wall Prolapse, BMI: Body Mass Index, TAH-BSO: Total Abdominal Hysterectomy with Bilateral Salpingo-Oophorectomy.

differ among the four groups. The prevalence of patients who had experienced stress, Stress+Urge, and urge incontinence types also showed no significant differences among the groups (Table-1).

In the TVT group, 14 patients (77.8%) were prescribed postoperative anticholinergic care, compared to 33 patients (80.5%) in the TOT group, 4 patients (100%) in the BC group, and 3 patients (75%) in the APR group. However, the differences were not significant ($p=0.769$). Similarly, the mean duration of anticholinergic use showed no differences across the groups ($p=0.531$). Preoperative daily pad usage was similar across the four groups, with no statistically significant differences ($p=0.61$).

In terms of cystocele grading, no differences were found among the groups ($p=0.065$). The majority of the patients had a grade 2 cystocele in the TVT, TOT, and BC groups. In the rectocele grading, although the BC group showed 100% grade 1 rectocele, this difference was not statistically significant compared to the other groups ($p=0.126$).

Discussion

Our retrospective cohort study evaluated various surgical treatments for primary stress SUI in adult women, including TOT, TVT, BC, and APR. Our findings revealed no differences in demographic and clinical characteristics, including age, weight, BMI, menopausal status, reproductive history, and incontinence types, among the four treatment groups. These results provide a balanced foundation for assessing the outcomes of different surgical approaches for patients with SUI.

Stress urinary incontinence is a common condition affecting many women, caused by loss of support of the urethra and different procedures are considered effective in all types of SUI surgeries in the past decades (10-12). The study of Huang et al. (13), noticed the effectiveness of the repeat sling appeared to depend on adequate post-operative urethral

mobility and urethral closure pressure. Regarding the type of procedure, various studies reported that retropubic suburethral procedures have a better cure rate than transobturator procedures in SUI (14, 15). Recent studies have revealed that the success rate of repeated suburethral sling procedures was better for slings positioned at the proximal urethra (4,16,17). Urodynamic stress incontinence is more likely observed in women with a greater sling-pubis gap, and sling location should be close to the symphysis pubic to reduce the length of the urethral funnelling (18). According to Lo et al. (15), mid urethral slings surgery including TOT and TVT, is safe for the young and aging patients with USI and demonstrated improvement in its outcomes, but objective and subjective cure rates decrease with age.

Our findings revealed no differences among the groups in terms of age, weight, height, BMI, menopausal status, history of difficult birth, cesarean section, abortion, TAH-BSO surgery, infection, or incontinence types. Postoperative anticholinergic medication uses and duration of use, as well as preoperative daily pad usage, were similar across the groups. Furthermore, there were no differences in cystocele grading among the groups, with the majority of patients having a grade 2 cystocele in the TVT, TOT, and BC groups. Although the BC group showed 100% grade 1 rectocele, this difference was not significant compared to the other groups.

Our study has several limitations that should be acknowledged. First, the relatively small sample size of each treatment group might limit the generalizability of the results. Second, we did not account for potential confounding factors such as the surgeon's experience, patient compliance, and postoperative care, which could affect treatment outcomes. Additionally, the follow-up period was not uniform across all participants, which may introduce potential bias in the assessment of

outcomes. Lastly, the lack of a standardized outcome measure to assess treatment success limits the comparison of results with other studies. Despite these limitations, our study has several strengths that merit attention. We included a diverse patient population with various clinical presentations of SUI, which increases the external validity of the findings. We also provided a comprehensive assessment of patient demographics, medical history, and incontinence types, which offers a holistic view of the patient characteristics associated with SUI. Furthermore, we performed rigorous statistical analyses, taking into account potential confounders and differences among the groups, to provide a robust evaluation of the outcomes. Finally, our study directly compared multiple surgical treatment options for primary SUI, which can contribute to the development of personalized treatment strategies for patients with SUI.

Conclusion

Our results indicate that demographic and clinical characteristics, including age, weight, height, BMI, menopause status, history of difficult birth, caesarean section, abortion, TAH-BSO surgery, infection, incontinence type, postoperative anticholinergic use and duration, preoperative daily pad usage, and cystocele and rectocele grades, were similar among patients undergoing TVT, TOT, BC, or APR surgical interventions for urinary incontinence. Therefore, the choice of surgical approach can be tailored to individual patient needs, taking into consideration factors such as expertise, preference, and comorbidity. Further research with larger sample sizes and longer follow-up periods is needed to better assess the long-term outcomes and potential advantages of each surgical approach.

Conflict of Interest

The author declares no conflict for the present research article.

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