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Prevalence and risk factors for urinary tract infection up to one year following midurethral sling incontinence surgery

Adi Y. Weintraub[a,*], Yonatan Reuven[b], Dorit Paz-Levy[a], Zehava Yohay[a], Inbal Idan[a], Debi Elharar[a], Hannah Glinter[a], Tamar Tzur[c], David Yohay[a]

[a] Department of Obstetrics and Gynecology, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheba, Israel
[b] Siaal Research Center for Family Medicine and Primary Care, Division of Community Health, Faculty of Health Science, Ben-Gurion University of the Negev, Beer Sheva, Israel
[c] Department of Obstetrics and Gynecology, Tel-Aviv Sourasky Medical Center, Tel-Aviv, Israel

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ABSTRACT

Objective: To investigate the prevalence and risk factors of urinary tract infection (UTI) one year following sub-midurethral sling (SMUS) incontinence surgery in a university affiliated medical center in southern Israel.

Methods: A retrospective cohort study was conducted to identify and characterize patients who suffered UTI within a year following SMUS surgery. The study population comprised of all patients who underwent a SMUS surgery between the years 2014 and 2015. Demographic and clinical data were retrieved from the patients' medical records, and a comparison between patients with and without a positive urine culture was performed.

Results: During the study period, there were 178 SMUS surgeries. Urine culture positive UTI was noted in 21% (38 patients) within the first year following surgery. The mean age and BMI of patients complicated with UTI was 64.8 and 29.1, respectively. The most common pathogen found in urine culture was *E. coli* that accounted for 55% of all UTIs. When comparing patients with and without UTI, no significant difference was noted in the pre- and intra-operative characteristics. However, duration of hospitalization and readmissions in the first year following surgery, were significantly associated with the risk of UTI ($p < 0.026$ and $p < 0.003$, respectively).

Conclusions: Approximately one in every five women undergoing a SMUS operation in our population will suffer from UTI within a year from surgery. A significant association was found between the duration of hospitalization and readmissions in the first postoperative year and suffering from UTI.

Introduction

Stress urinary incontinence (SUI) defined as the complaint of involuntary urinary leakage on effort, exertion, sneezing or coughing affects 4%–35% of women. SUI occurs when an increase in intraabdominal pressure exceeds urethral closure pressure [1,2]. Management options for SUI include conservative (vaginal pessaries, pelvic floor muscle exercises) and surgical treatments.

SMUS have become the surgical treatment of choice for SUI and have replaced other procedures (eg, retropubic colposuspension, bladder neck slings) [3]. SMUS placement involves the introduction of a polypropylene tape beneath the middle portion of the urethra. This sling functions as a backboard that offers resistance beneath the urethra during increases in intraabdominal pressure, but is tension-free at rest.

There are two main types of SMUS the transobturator sling and the retropubic sling. Retropubic slings have slightly higher efficacy at the cost of higher complication rates including bladder perforation, bowel injury and postoperative voiding dysfunction. The subjective and objective cure rates and patient satisfaction for the two sling types are high and seem to be comparable, although they have differing risk profiles [4–6].

SMUS placement are minimally invasive procedures and complications are uncommon. The most frequent complications of retropubic slings are bladder perforation, voiding dysfunction, and development of urinary urgency symptoms. Transobturator

* Corresponding author at: Department of Obstetrics and Gynecology, Soroka University Medical Center, Faculty of Health Sciences, Ben-Gurion University of the Negev, POB 151, Beer Sheva, Israel.
E-mail address: adiyehud@bgu.ac.il (A.Y. Weintraub).

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slings were developed to avoid these complications of retropubic slings and have been largely successful in achieving this goal however; they may result in voiding dysfunction too. In addition, women following transobturator sling placement may experience groin pain, a complication that is not found with retropubic placement. Although considered relatively safe, serious or long-term complications have been reported following SMUS procedures [7–9].

One of the most common complications following SMUS placement is urinary tract infection (UTI). The rates of UTI vary widely and have been reported to be as high as 34% within the first three postoperative months and up to 50% after a year [10,11]. Recurrent UTI has been reported in 6.4% of patients after SMUS placement [12]. Different populations, different study designs and different diagnostic criteria may account for the wide range in reported rates of postoperative UTI. The purpose of the current study was to investigate the prevalence and risk factor of UTI one year after SMUS incontinence surgery.

Methods

This retrospective cohort study was conducted at the Soroka University Medical Center, the sole tertiary hospital in the southern region of Israel. The study population comprised of all patients who underwent a midurethral sling incontinence surgery between the years 2014 and 2015. In our medical center, midurethral slings are not performed in a daycare setting and patients with SUI are hospitalized for the procedure. The study protocol was reviewed and approved by the Institutional Ethics Committee of the Soroka University Medical Center (0454-15-SOR). Since this was a retrospective cohort study no consent for participation was required by the IRB.

Patients' medical records were evaluated to identify and characterize patients who were diagnosed with SUI and underwent SMUS surgery and data was retrieved. Data included demographic details, gynecological history, clinical details concerning the admission diagnosis including underlying medical conditions, history of previous UTI and associated morbidity, history of previous SMUS or pelvic organ prolapse (POP) surgery, laboratory and urine culture results (including bacterial growth and corresponding antimicrobial susceptibility), and medical treatment. The primary outcome was culture-proven UTI within the first year following surgery. Cultures that were taken in both the community setting and in the hospital emergency room were included. Secondary outcomes included readmission to the hospital and recurrent UTI (defined as two positive urine cultures within six months or three positive urine cultures within a year).

All patients received routine perioperative intravenous antibiotic prophylaxis with cefazolin dosed by body weight (or an appropriate alternative if allergic) administered within 1 h before surgery. At the beginning of surgery, an indwelling Foley catheter was routinely placed using a sterile technique after administration of perioperative antibiotics. After surgery, patients were hospitalized overnight with a transurethral Foley catheter. In the first post-op day transurethral Foley catheter was removed and residual volume was sonographically evaluated. If residual volume was more than 100 ml a transurethral Foley catheter was re-introduced.

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, software version 22.0). For continuous variables, mean values, standard deviations, the Student's *t*-test were used. For categorical variables the chi-square test was used, and Fisher Exact test was used when appropriate. The Wilcoxon signed-ranks test was used to evaluate quantitative parameters. P values for all hypothesis testing were two-sided, and $P < 0.05$ was interpreted as statistically significant.

Results

The study population included 180 stress incontinence surgeries, 178 (98%) were SMUS. All procedures were transobturator slings (either GYNECARE TVT ABBREVO® Continence System or GYNECARE TVT™ OBTURATOR System). Urine culture positive UTI was noted in 21% (38 patients) within the first year following surgery. Patients were divided according to urine culture status during the first year following surgery and Table 1 presents baseline demographic and clinical characteristics of the study population. No statistically significant differences were found between groups (Table 1). The mean age and BMI of patients complicated with UTI was 64.8 and 29.1, respectively. Six patients had undergone a previous hysterectomy and one had a previous prolapse surgery. No significant difference was found between groups in the rate of UTI, pyelonephritis and hospitalization due to UTI in the year prior to surgery.

Table 2 presents the intraoperative characteristics of the study population. Three Patients (8%) with UTI were complicated with a perineal hematoma. No bladder injury was noted in both groups. Patients with UTI had longer hospitalization duration. No significant differences were noted between the groups in the rates of concomitant POP surgery or other concomitant procedures.

At 12 months, post-operative improvements of stress incontinence symptoms were noted in 84% of patients diagnosed with UTI.

Table 1
Preoperative clinical characteristics of patients who underwent midurethral sling placement according to urine culture status in the first year following surgery (n = 178).

Characteristics	With UTI N = 38	Without UTI N = 140	P value
Age	64.8 ± 11.5	61.1 ± 12.3	0.09
Body Mass Index	29.1 ± 5.1	28.57 ± 4.5	0.60
Gravidity	5 (1–15)	5 (1–14)	0.54
Parity	3 (1–13)	3 (1–11)	0.42
Menopause (%)	84.2	78.9	0.46
Menopause (years)	13.7 ± 10.4	11.6 ± 10.4	0.28
Previous hysterectomy (%)	15.5	7.7	0.13
Previous POP/SUI surgery (%)	2.6	4.9	1
Previous SUI surgery (%)	2.6	8.5	0.31
Urge urinary incontinence (%)	10.5	7.1	0.50
Mixed urinary incontinence (%)	26.3	32.9	0.44
Major health problems	76.3	71.1	0.53
UTI in the year prior to surgery	5.3	4.9	0.98
Pyelonephritis in the year prior to surgery	2.6	0.7	0.4
Hospitalization due to UTI in the year prior to surgery	2.6	2.1	0.99

UTI – urinary tract infection; POP – pelvic organ prolapse; SUI – stress urinary incontinence.