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Risk Factors Associated with Urge Incontinence After Continence Surgery

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Abstract

Purpose—We identified pre-operative factors associated with bothersome UUI after incontinence surgery (Burch or sling).

Materials & Methods—Postoperative UUI was defined as treatment for UUI ≥ 6 weeks after surgery. Variables thought to affect postoperative UUI included: age, race, prior incontinence surgery or treatment, BMI, POP-Q stage, frequency of stress and urge symptoms, incontinence episode frequency, concomitant surgery, and urodynamic findings.

Bivariate logistic regression models were fit, in which each covariate was controlled for separately to ascertain potential importance. After controlling for surgery, the following baseline factors were associated with postoperative UUI ($p<0.10$) and included in multivariable modeling: age, BMI, prior incontinence surgery, prior anticholinergic medication, stress and urge symptom scores, detrusor overactivity (DO), and detrusor pressure-max flow.

Results—665 who had surgical re-treatment for SUI 34 were excluded from the study. Participants had mean±SD age of 51±10. Stress and urge symptom scores were 19.3±4.6 and 6.4±3.9. 89 (14%) had prior incontinence surgery, and 165 (27%) had taken anticholinergic medication.

132 women (21%) required treatment for postoperative UUI (50 Burch, 82 sling). Odds of treatment for UUI after surgery were significantly higher after sling compared to Burch (OR 1.72, 95% CI 1.16, 2.54, p=0.007). A 10-point increase in pre-operative MESA urge score, prior anticholinergics, and DO all independently increased the odds of UUI.

Conclusion—Women are almost twice as likely to need treatment for postoperative UUI after sling than Burch. Women with preoperative urge, DO, or prior use of anticholinergic medications are more likely to have bothersome UUI, postoperatively.

Keywords

Urge incontinence; incontinence surgery; sling; detrusor overactivity; stress incontinence

Introduction

Urge urinary incontinence (UUI) is a major cause of dissatisfaction after surgery for stress urinary incontinence (SUI) and prolapse[1-3]. De novo urge symptoms after continence surgery range from 12-30%[2, 4, 5] and can be so severe as to prompt urethrolysis[6]. Nearly, three quarters of women enrolled in the Stress Incontinence Surgical Treatment Efficacy Trial (SISTEr) reported bothersome UUI at baseline, and 27% of women who had a sling and 20% who had a Burch required treatment for UUI postoperatively[7]. Not surprisingly, concomitant UUI was associated with higher overall failure rates after continence surgery[8]; however, concomitant preoperative UUI was also associated with higher failure rates for SUI specific outcomes. High rates of UUI after surgery and their association with outcomes of SUI surgery underscore the importance of identifying risk factors for UUI after continence surgery. Identification of pre-operative factors associated with bothersome UUI may help surgeons' better counsel and treat patients. In addition, they may provide insight into the pathophysiology underlying their mixed symptoms.

The impact of UUI on outcomes of continence surgery for SUI has several important implications. UUI has dramatic quality of life impact, and some data suggest that women with mixed incontinence have more severe incontinence than those with SUI alone. In one epidemiological study, 38% of women with both SUI and UUI had severe incontinence and almost half were bothered by their incontinence. In contrast, only 17% of women with pure SUI had severe incontinence, and only a third were bothered[9]. In addition, given that more urge symptoms predicted SUI and non-SUI failures in SISTEr, it seems likely that urge symptoms are not merely a reflection of more UUI episodes. Higher failure rates in women with more UUI symptoms may be related to differences in the underlying pathophysiology of the disease.

Identification of factors associated with bothersome UUI in SISTEr participants could yield important insights, which may improve continence surgery outcomes as well as provide information into bladder and urethral function associated with mixed urinary incontinence. In this analysis we determined if rates of bothersome urge incontinence differ by type of treatment (Burch colposuspension or rectal fascial sling) for SUI.

Materials and Methods

Women planning surgery for SUI were invited to participate in SISTEr. Eligibility requirements included at least 3 months of pure or predominant SUI symptoms and a positive standardized stress test. Details of the study methods are published[10]. All study methods were approved by the institutional review boards of the 9 clinical centers and the data coordinating center, and all women provided written informed consent prior to enrollment.

Participants were randomized in the operating room on the day of surgery to receive an autologous fascial sling or Burch colposuspension. Key elements of the surgical procedures were standardized. Baseline assessment included medical history and physical exam including prolapse evaluation using pelvic organ prolapse quantification (POP-Q)[11]; standardized urodynamic testing; and patient self-reported symptoms and bother from urinary incontinence using the validated Medical, Epidemiologic, and Social Aspects of Aging (MESA) questionnaire[12] and urinary distress inventory UDI[13]. Follow-up assessment included interview and physical exam at 6 weeks, then 3, 6, 12, 18, and 24 months postoperatively. In addition, women had repeat urodynamic testing at 24 months.

For this analysis, we included data from all women enrolled in the SISTEr trial regardless of treatment group. We defined postoperative UUI using 2-definitions:

1. For the primary analysis, we defined postoperative UUI as women who required anticholinergic treatment for UUI at least 6 weeks after surgery.
2. Because not all women with bothersome symptoms choose treatment for UUI, in a secondary analysis we chose a symptom-based definition of postoperative UUI. Women were categorized with postoperative UUI if they answered moderately or greatly bothered to UDI question “Do you currently experience urine leakage related to a feeling of urgency” 24 months after surgery.

Potential variables thought to affect or be associated with postoperative UUI included socio-demographic characteristics (age, race); prior incontinence surgery; prior anticholinergic medications; physical exam characteristics (body mass index (BMI), POP-Q stage); baseline stress and urge symptoms (stress and urge subscales scores on MESA); urodynamic parameters (maximum flow during non-instrumented uroflow and pressure-flow studies, detrusor pressure at maximum flow, maximum cystometric capacity, valsalva leak point pressure, and presence of detrusor overactivity); incontinence episode frequency on voiding diary; and concomitant surgery at time of continence procedure.

To investigate which covariates were important to control for in multivariable modeling, a series of bivariate logistic regression models were fit, in which each covariate was controlled for separately to ascertain potential importance. All variables which reached or neared statistically significance ($p<0.10$) were included in multivariate modeling. Model fit was tested using the Hosmer-Lemeshow goodness of fit test.

Results

Of 655 women enrolled in SISTEr 34 underwent re-treatment for SUI and were excluded from this analysis. Table 1 contains preoperative demographic, clinical, and urodynamic characteristics study participants. Participants had a mean MESA urge score of 6.4±3.9. The MESA urge subscale score has a potential range of 0 to 18 with higher scores indicating more urge symptoms. Of the participants 27% had used an anticholinergic medication in the past. We defined preoperative urge incontinence (at baseline) as prior treatment with antimuscarinic and/or detrusor overactivity. A total of 408 women did not meet this priori definition of preoperative urge incontinence. 191 in the Burch group and 217 in the sling group. Of those in the Burch group postoperative urge incontinence developed in 18 (9%) compared to 40 (18%) in the sling group (p=0.009). Among those with a history of urge at baseline 30 of 102 (29%) had postoperative of 101 (41%) in the sling group (p=0.07)

Treatment for UUI 6 weeks after surgery

Of 621 eligible women 132 (21%) underwent treatment for postoperative UUI (50 who had Burch and 82 who had sling) at least 6 weeks after surgery. The majority of participants with

postoperative UUI (70%) started treatment within the first 7 months of surgery. The odds of being treated for UUI after surgery was significantly increased women who had sling procedures compared to Burch colposuspensions (OR 1.72, 95% CI 1.16, 2.54, p=0.007).

Table II demonstrates the demographic, clinical and urodynamic factors that were associated with postoperative treatment for UUI after controlling for surgical treatment group. The following baseline factors were associated with postoperative UUI and included in multivariable modeling: age, BMI, prior incontinence surgery, prior anticholinergic medication, MESA stress and urge scores, detrusor overactivity (DO), and detrusor pressure-max flow. Table III contains the final multivariate model. Odds of treatment for UUI after surgery remained significantly higher after sling compared to Burch (OR 2.09, 95% CI 1.35, 3.24, p=0.001). In addition, a 10-point increase in pre-operative MESA urge score, prior anticholinergics, and DO all independently increased the odds of treatment for postoperative UUI.

Symptoms-only of postoperative UUI

Of 468 women 186 (40%) met our symptom based definition of a response of moderately or greatly bothered to UDI question of leakage associated with urgency. The percentage of women with postoperative UUI nearly doubled when using this symptom based definition. Seventeen percent of participants met criteria for both definitions of postoperative UUI, while 45% met criteria for at least one definition. The odds of bothersome postoperative UUI symptoms in participants not receiving UUI treatment were not increased in the sling group (OR 1.12, 95% CI 0.78, 1.63, p=0.54). In multivariate analysis after adjusting for the other variables, treatment group was still not found to be significantly associated with this symptom-based definition of UUI. (Table 3) For every 10 unit increase in baseline MESA urge score, the odds of UUI increased nearly four-fold. Prior surgical treatment for incontinence and DO at baseline each led to a near two-fold increase in the odds of UUI.

Discussion

Preoperative urge symptoms, DO, and history of using anticholinergic medications are all independently associated with treatment for UUI after fascial sling and Burch colposuspension for SUI. These data suggest that pelvic surgeons should counsel women with mixed symptoms or urodynamic findings that they are at increased risk for anticholingergic treatment and/or bothersome symptoms of UUI after surgery. Other investigators also reported that women with mixed urinary incontinence had lower cure rates after midurethral sling than women with pure USI[4].

Bother from UUI symptoms is common after both sling and Burch procedures; however, not surprisingly, more subjects reported moderate or great bother from UUI than chose to undergo treatment for UUI with anticholinergics. Although likelihood of treatment for UUI was higher after sling than Burch, patient reported bother from UUI symptoms did not differ between groups. In addition, bothersome UUI symptoms were not associated with history of anticholinergic medications, but were associated with prior continence surgery. Our previous work demonstrated that women with preoperative UUI had higher SUI specific failure rates[8]. The relationship between bothersome UUI and SUI may reflect a difference in disease severity, or possibly, a difference in disease process/pathophysiology between these groups. Women with prior failed continence surgery or persistent SUI after continence surgery may represent a more severe or symptomatic group with more overall bother from lower urinary tract symptoms. Future studies should attempt to better understand any potential differences in these groups.

Although we are unable to determine causality from these data, the higher rate of UUI in the sling group was not entirely surprising and may be related to the similarly higher efficacy rates in the sling group. Bladder outlet obstruction frequently presents with symptoms of urgency, frequency and urge incontinence rather than or in addition to urinary retentionor voiding dysfunction. In a case series that reviewed symptoms of 51 patients undergoing urethrolysis, irritative symptoms were the most commonly reported preoperative symptoms (75%) followed by obstructive symptoms (61%) and urinary retention (24%).[6] Thus, there may be an association between more successful continence surgery and a component of urethral obstruction that predisposes to UUI and other irritative storage symptoms.

We did not find an association between any other preoperative symptoms, urodynamic parameters, or patient characteristics and postoperative treatment or bother from UUI. Alperin et al reported that 27% of 92 women with pure SUI developed de novo UUI after midurethral sling[14]. They excluded women with preoperative UUI symptoms or urodynamic DO, and defined UUI as a positive response to a single non-validated question. The only factors associated with de novo UUI were self-reported urinary frequency and detrusor pressures of greater than or equal to 15 cm H_2O during cystometry. Subjective symptoms of UUI were higher in our study population; however, we did not exclude women with preoperative UUI symptoms or urodynamic DO. In addition, we did not find an association between postoperative UUI and increased incontinence episode frequency on voiding diary. Previous studies reported that patients with UUI symptoms tend to overestimate the number of incontinence episodes recorded on diary[15]. It is also possible that patient self-reported urinary frequency is increased compared to diary records, which may account for differences between studies.

Strengths of this analysis include a large, cohort of well-characterized incontinent women who completed validated questionnaires, underwent standardized evaluation, and had surgery by diverse group of surgeons. However, this analysis was not a primary outcome of the study, and thus may not have enough power to detect other important factors associated with postoperative UUI.

Women with stress incontinence with preoperative symptoms or urodynamic evidence of DO are at increased risk bothersome UUI, which may warrant treatment with anticholinergic medications after continence surgery. Surgeons should discuss and counsel such women accordingly to help align their postoperative expectations.

Conclusions

Women with preoperative urge symptoms or urodynamic findings of detrusor overactivity are more likely to have bothersome UUI after surgery for stress incontinence. Surgeons should counsel patients with mixed incontinence symptoms that they are at increased risk for bothersome UUI after surgery.

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Table I
Preoperative Demographic, Clinical, & Urodynamic Characteristics

	N (%)	Mean±Standard Deviation
Age	621	51±10
Ethnicity		
Hispanic	70 (11%)	
Non-Hispanic White	452 (73%)	
Non-Hispanic Black	44 (7%)	
Non-Hispanic Other	55 (9%)	
MESA		
Stress Score	621	19.3±4.6
Urge Score	621	6.4±3.9
Prior Incontinence Surgery	89 (14%)	
Prior Anticholinergic Medication	165 (27%)	
BMI	616	30±6.2
POP-Q Stage		
0-I	155 (25%)	
II	376 (61%)	
III/IV	90 (14%)	
Number of Incontinence Episodes (7-day diary)	621	9.7±9
Concomitant Surgery	358 (58%)	
Post-void Residual Urine Volume	560	25±38
Non-instrumented Uroflow		
Maximum Flow	560	25±11
Cystometry		
Valsalva Leak Point Pressure	411	117±38
Maximum Cystometric Capacity	611	393±137
Detrusor Overactivity	58 (9%)	
Pressure Flow Study		
Maximum Flow	587	21±9.9
Detrusor Pressure- Maximum Flow	369	19±12.5

Table II

Preoperative Demographic, Clinical, & Urodynamic Characteristics Associated with Treatment for Post-operative UUI

	Odd Ratio (95% CI)	P Value
Age (per 10 years)	1.31 (1.08, 1.59)	0.006
Ethnicity		0.96
Hispanic	1.17 (0.49, 2.77)	
Non-Hispanic White	0.99 (0.49, 2.00)	
Non-Hispanic Black	1.04 (0.39, 2.76)	
Non-Hispanic Other	1 Reference	
MESA		
Stress Score (per 10 units)	1.48 (0.96, 2.29)	0.07
Urge Score (per 10 units)	2.70 (1.64, 4.45)	<0.001
Prior Incontinence Surgery	1.83 (1.10, 3.02)	0.019
Prior Anticholinergic Medication	3.10 (2.06, 4.67)	<0.001
BMI (per 10 units)	1.37 (1.01, 1.86)	0.04
POP-Q Stage		0.80
0-I	1 Reference	
II	0.94 (0.59, 1.50)	
III/IV	1.13 (0.61, 2.10)	
Number of Incontinence Episodes (7-day diary)	1.00 (0.98, 1.02)	0.90
Concomitant Surgery	1.40 (0.94, 2.09)	0.10
Post-void Residual Urine Volume	1.00 (1.00, 1.01)	0.15
Non-instrumented Uroflow		
Maximum Flow	1.01 (0.99, 1.03)	0.27
Cystometry		
Valsalva Leak Point Pressure	1.01 (1.00, 1.01)	0.11
Maximum Cystometric Capacity	1.00 (1.00, 1.00)	0.14
Detrusor Overactivity	2.53 (1.41, 4.55)	0.002
Pressure Flow Study		
Maximum Flow	0.99 (0.97, 1.01)	0.32
Detrusor Pressure- Maximum Flow	1.02 (1.00, 1.04)	0.04

Table III

Preoperative Predictors of Treatment for Postoperative UUI in Multivariate Modeling

	Odds Ratio (95% CI)	p-value
Treatment Group		0.001
Sling Burch	2.09 (1.35, 3.24)	
MESA urge score (per 10 units)	1.97 (1.13, 3.41)	0.016
Prior anticholinergic medication	2.41 (1.51, 3.85)	<0.001
Detrusor overactivity	2.41 (1.25, 4.63)	0.008

*The Hosmer-Lemeshow goodness of fit test, p = 0.91.

Table IV

Preoperative Predictors of Postoperative UUI Symptoms in Multivariate Modeling

	Odds Ratio (95% CI)	p-value
Treatment group		0.21
Sling Burch	1.30 (0.87, 1.95)	
MESA urge score (per 10 units)	4.14 (2.40, 7.15)	<0.001
Prior incontinence surgery	1.82 (1.04, 3.16)	0.035
Detrusor overactivity	2.20 (1.08, 4.49)	0.030

*The Hosmer-Lemeshow goodness of fit test, p = 0.25.