

# Mixed incontinence and cystocele: postoperative urge symptoms are not predicted by preoperative urodynamics

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## Abstract

**Introduction and hypothesis** Pelvic organ prolapse (POP) frequently presents with urinary incontinence, either urge (UI), stress (SUI), or mixed (MUI). We sought to determine the effect of high-grade prolapse repair on MUI. **Methods** A retrospective review was performed for 111 patients with anterior POP repair and sling over 4 years. **Results** Sixty patients (54%) presented symptomatically with MUI, 25% with SUI, and 9% with UI, 12% asymptomatic. Occult SUI was found in 21% (UI plus asymptomatic). Success was seen for SUI in 92% and for POP in 89%. Urge symptoms were present in 63% pre-op and 30% post-op. MUI patients were significantly more likely to experience post-op urgency ( $p=0.033$ ). Detrusor overactivity (DO) was seen in 22 MUI patients, but was not predictive of post-op urgency ( $p=0.91$ ). **Conclusions** Cystocele patients with MUI are at significant risk for postoperative urge symptoms regardless of DO, and counseling regarding persistent urgency is imperative.

**Keywords** Cystocele · Mixed incontinence · Urgency · Urodynamics

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## Abbreviations

POP	Pelvic organ prolapse
SUI	Stress urinary incontinence
MUI	Mixed urinary incontinence
UI	Urge urinary incontinence
UF	Urinary urgency/frequency
UDS	Urodynamics
DO	Detrusor overactivity
BOO	Bladder outlet obstruction
OAB	Overactive bladder

## Introduction

Pelvic organ prolapse (POP) and incontinence are common disease processes in aging women. By the age of 80, a woman has an 11.1% lifetime risk of having to undergo a surgical procedure, with 29.2% of these patients requiring more than one surgery [1]. Substantial numbers of women are believed to go undiagnosed and untreated. Fittingly for the disease process, a large portion of women with genital prolapse also have stress urinary incontinence (SUI) or mixed urinary incontinence (MUI) as urethral support is lost or is concomitantly compromised. In women with anterior compartment prolapse, this can be masked by the prolapsed vaginal wall, producing occult stress incontinence. Occult SUI can be present in 20–30% of women with high-grade anterior vaginal wall prolapse [2, 3].

Certainly, the fact that incontinence and pelvic organ prolapse are so interrelated has long been appreciated by most practitioners. The natural history and biomechanics of the two entities are nearly identical, including (but not limited to) such predisposing factors as previous childbirth, pelvic surgery, obesity, chronic cough, constipation, and

connective tissue disorders. While bladder support from the anterior wall of the vagina and its surrounding structures, most notably the apical support derived from the cardinal–uterosacral complex, is important for proper detrusor and continence function, the loss of other elements of vaginal support can contribute to overall morbidity. However, continence and urinary symptomatology are often still the main concerns of patients when they present with a defect in pelvic support, both pre- and postoperatively.

Dooley et al. [4] demonstrated that the incidence of incontinence can be as high as 49.6%, and of these women, 34.3% suffer from MUI. More specifically, rates of urinary urgency in women with genital prolapse have been reported to be from 14% to 68%, and urge urinary incontinence (UUI) can be present in 33–50% of women with prolapse. Antimuscarinic medications can be used to help control the urgency symptoms in some of these patients, although with reduced efficacy [5]. Additionally, in women who are symptomatic from their prolapse and require surgery, some series suggest that surgical correction of the prolapse reduces urgency symptoms in 63% of patients [6].

While several studies have described outcomes of incontinence after prolapse surgery from strictly either an UUI or SUI point of view, there is relatively little in the literature describing the outcome of MUI patients themselves as a separate entity. The aim of this study was to evaluate our experience with high-grade anterior compartment prolapse, defined as a Baden–Walker grade 3 or 4 cystocele, in terms of UUI and SUI, but also focus on MUI, and report outcomes of these patients after undergoing anterior compartment repair and pubovaginal sling and the ability of urodynamics (UDS) to predict these outcomes.

## Materials and methods

A Vanderbilt University IRB exemption was obtained for this study. A retrospective chart review was undertaken to assess all patients at our institution who underwent a Baden–Walker grade 3 or 4 cystocele repair from January 2002 until June 2006. We were able to identify records of 141 patients. Exclusion criteria included <6 months of follow-up and those without preoperative UDS studies. Also, only patients who underwent a concomitant sling procedure were included.

In this series, all patients had previously undergone hysterectomy. Additionally, all patients reviewed had SUI. This was identified by either presenting symptoms or discovered on preoperative UDS. In our patients with advanced prolapse, UDS are performed with and without reduction of the prolapse. Slings were not placed prophylactically in this population. Cure of SUI was defined as a negative cough stress test in the second postoperative visit or

no subjective loss of urine on the voiding diary and the last recorded follow-up visit. Urgency and UUI was identified by patient history and preoperative voiding diary. Additional information on the presence or absence of detrusor overactivity was gained from the preoperative urodynamic study. Postoperatively, urgency and UUI was defined as cured based on subjective patient reporting, a negative voiding diary, or discontinuation of anticholinergic medications. Persistent or de novo urgency was defined as being those patients who needed to continue or initiate anticholinergic medications after surgery, as well as those reporting symptoms of urgency/frequency (UF) or UUI in their postoperative voiding diaries. All patients also had at least a grade 3 or greater cystocele defect, as determined by supine pelvic exam at maximum effort Valsalva. Cure of the prolapse defect was defined as an asymptomatic grade 2 defect or better.

Operatively, all patients underwent a sling procedure and had their anterior compartment prolapse addressed. The sling procedures performed were based on surgeon and patient preference and consisted of either autologous fascia pubovaginal sling, porcine dermis pubovaginal sling, or a polypropylene midurethral sling. When addressing the prolapse, repairs were focused on restoring anterior wall integrity, in addition to addressing the vaginal apex in all patients. Posterior defects were repaired as needed. All enterocele defects were repaired as part of the prolapse repair, mainly when addressing the apex of the vagina, either through a sacrospinous ligament or iliococcygeus fixation. Rectoceles were specifically addressed only if the patients were symptomatic or if the defect was very substantial. Anterior prolapse repair consisted of midline cystocele plication alone in some select patients, while most others had a graft-augmented repair. Graft choice was determined by surgeon and patient preferences and consisted of either porcine dermis or polypropylene mesh. The grafts were attached to the arcus tendinosis fascia laterally, proximal to just anterior to the ischial spine, and to the vaginal cuff or cervix in the proximal midline.

Statistical analysis was performed using STATA version 10.0 (College Station, TX, USA). Patients were categorized by presenting symptomatology as having MUI, UUI alone, pure SUI, or as asymptomatic. Main comparisons were made between those patients with MUI vs. those with no urge component (pure SUI and asymptomatic). Continuous variables were analyzed using the Student's *t* test, while categorical variables were analyzed using the chi-square or Fisher exact test. All statistical tests were two-tailed.

## Results

Of the 141 patients identified, 111 met the requirements for inclusion and had sufficient records for analysis. Patient

preoperative symptoms are displayed in Table 1. The average patient age was 59 years (range 28–83). Median follow-up was 31 months (range 6–57). In this cohort, 54% (60/111) patients presented with MUI symptoms. An additional ten patients presented with UUI alone, but were found to have occult SUI on urodynamic testing, bringing the total number of patients with MUI to 63% (70/111). The remaining 41 patients presented with only SUI symptoms in 28 patients (25%) or were asymptomatic in 13 (12%), but found to have occult SUI on urodynamic testing.

From a surgical standpoint, the patients were cured or improved of their SUI in 92% of cases. The rate of cure in the MUI group was 94% (66/70), and the rate of cure for the non-MUI group was 88% (36/41,  $p=0.23$ ). The prolapse was acceptably corrected in 89% of the patients. The rate of cure in the MUI group was 89% (62/70) and in the non-MUI group was 90% (37/41,  $p=0.78$ ).

Overall, our rate of urgency/UUI went from 63% (70/111) preoperatively to 30% (33/111) postoperatively (Table 2). In the group with MUI, the rate of urgency/UUI went from 100% pre-op to 37% (26/70) postoperatively, while the remaining 63% were free of urgency symptoms. This also represented the cure rate of their entire MUI spectrum as no patient with recurrent SUI was without UUI symptoms as well. In the group without urgency symptoms pre-op, there was a 17% (7/41) rate of post-op urgency/frequency, with none of these patients developing overt UUI. This difference of post-op urgency/frequency between the two groups is significant ( $p=0.02$ ). These seven patients also comprise our de novo urgency group. Of these, three were also sling failures as well, leaving four patients with pure UUI post-op (10%).

When assessing for urodynamic predictors for recurrent urgency symptoms, detrusor overactivity (DO) on preoperative UDS was chosen as the most likely predictive marker. However, DO was not able to discern those patients with persistent postoperative urge symptoms (Table 3). Overall, there were 35 patients with DO preoperatively (+DO), and 76 (–DO) without. The rate of urgency/frequency in the

+DO group post-op was 28.6% (10/35) and in the –DO group was 30.3% (23/76,  $p=0.86$ ). In the MUI group, 25 patients were +DO and 45 were –DO. Again, this did not help predict urgency/frequency postoperatively as this rate was 40% and 35%, respectively ( $p=0.71$ ). Interestingly, in the non-MUI group, all ten patients with DO resolved postoperatively, and while the seven patients with urgency/frequency post-op were in the –DO group, this did not achieve statistical significance ( $p=0.10$ ).

## Discussion

In this retrospective study, we demonstrate a high prevalence of MUI in patients with anterior POP. Surgical correction of the prolapse, along with placement of a pubovaginal sling, regardless of the technique of either procedure, often results in the overall resolution of the patients' urinary symptoms. Anatomic correction appears to be more successful than the resolution of both symptoms, which constitute the majority of the pathology in the postoperative period.

The strengths of this study are the relatively homogenous patient population (all post-hysterectomy, all with SUI) and the large number of patients included. The length of follow-up was also longer than many reported series. Despite the fact that this is a referral practice at a large institution, most patients chose to follow up regularly with their primary surgeon, thus allowing for this lengthy average follow-up. Weaknesses of this analysis include its retrospective nature and the fact that not all patients received the same operation. Though this is could be a potential problem, in the preliminary analysis, the rates of SUI, prolapse, and UF/UUI resolution were not different between all surgical corrections utilized; thus, they were not included in our endpoint analyses. Further prospective studies with larger cohort sizes will be needed to determine if a difference in technique is significant. Additionally, our postopera-

**Table 1** Preoperative characteristics

Patient characteristics			
	Average	Range	
Age (years)	59	29–83	
Follow-up (months)	29	6–57	
Group	Presenting urinary symptoms	No. of patients	% Patients
MUI ( $n=70$ )	Mixed incontinence	60	54
	Urge incontinence	10	9
Non-MUI ( $n=41$ )	Pure stress incontinence	28	25
	Asymptomatic	13	12
	Found occult SUI	23	21

**Table 2** Change in UUI/urgency/frequency symptoms

Group	N	UUI/urgency/frequency		
		Pre-op (%)	Post-op (%)	p value
All patients	111	70 (63)	33 (30)	
MUI	70	70 (100)	26 (37)	
Non-MUI	41	0 (0)	7 (17)	0.02

tive analysis did not look specifically at UUI, but rather included all bother symptoms as failed or de novo. This could be an overly inclusive group, thus actually diminishing our outcomes. The goal was to be all inclusive, however, to more accurately reflect any and all disease burden. In further prospective analyses, validated instruments should be employed to further stratify this group.

Looking at MUI as a separate entity is a difficult undertaking, specifically because its separate components are usually assessed separately in the literature and MUI is seldom, if at all ever, looked at as a separate entity. Still, individually, the results here reaffirm what has been previously demonstrated in the literature. Our resolution of UF/UUI in the MUI cohort was 63% (34/70 patients). Nguyen and Bhatia [6] demonstrated an identical rate of symptom resolution in their patients, with UUI resolving in 24 of their 38 patients (63%). In a large prospective study of cadaveric graft prolapse repair and sling, Frederick and Leach [7] also found a similar rate of resolution, with UUI seen in 11% of patients and MUI found in 12% of the patients postoperatively for a combined presence of urgency-related urinary loss of 23% postoperatively in their entire patient population. However, in their 98 patients with UUI preoperatively, 45% had persistent UUI after surgery, similar to our findings here.

Foster et al. [8] looked prospectively at patients undergoing prolapse repair, with or without sling, and examined each bother component at regular intervals with a validated instrument. They found resolution of urgency, frequency, and UUI in 76%, 55%, and 75% of patients, respectively. Similar to the present findings as well, the presence of DO in this cohort did not predict which patients would have symptom resolution postoperatively. Indeed,

other reviews have supported these findings as well. In a study by Gilleran et al. [9] looking at urodynamic findings before and after prolapse reduction, the presence of DO with or without the prolapse reduced did not change in this acute setting. It is recognized that at the time of testing, a substantial portion of patients with bother/OAB symptoms [10] will not have any evidence of DO on urodynamics, while other patients with no OAB complaints will demonstrate DO [11]. This was also the case in our own cohort where only 35% of our MUI patients had DO on UDS while 24% of our patients without bother complaints had DO (Table 3).

This raises controversy regarding the utility of urodynamic evaluation in these patients. From our data, DO did not predict a change in outcome. Patient symptomatology was more predictive of outcomes as those with MUI were more symptomatic post-op than pure SUI or asymptomatic patients. In a review by Roovers and Oelke [12], the evidence presented also suggests that UDS has not been proven useful when prolapse is concerned despite the fact that it is widely practiced. The benefit of knowing who has DO preoperatively ultimately fails to stratify who will be symptomatic from UUI and U/F postoperatively and will unlikely dissuade anyone from repairing a symptomatic prolapse, especially given the significant reduction in bother symptoms that has been demonstrated here and in other studies [6, 12].

One strong argument for UDS testing could be to detect occult SUI. Several authors advocate addressing the bladder outlet in all patients undergoing repair of a high-grade prolapse regardless of UDS findings [3, 13]. In our approach, we choose to evaluate our anterior compartment prolapse patients with a reduced and unreduced UDS test in the manner similar to Gilleran et al. [9]. This testing has been shown to rarely cause BOO, so the risk of missing occult SUI should be minimal. Therefore, we, along with others, believe we will not be placing a sling in anyone who does not absolutely require one [14]. If in the rare event that occult SUI is missed, the minimally invasive nature of midurethral slings makes a second procedure much less morbid than a traditional sling or a colposuspension approach has in the past. This and the attendant complications of sling placement such as de novo OAB, BOO, and retention can be maximally avoided.

**Table 3** Relationship between pre-op DO and post-op UUI/urgency/frequency

Group	Pre-op		Post-op UUI/urgency/frequency		p value
	+DO (%)	-DO (%)	+DO (%)	-DO (%)	
All	35 (31)	76 (69)	10/35 (28.6)	23/76 (30.3%)	0.86
MUI	25 (35)	45 (65)	10/25 (40)	16/45 (35.5)	0.71
Non-MUI	10 (24)	31 (76)	0/10 (0)	7/31 (22.6)	0.10

The real challenge of this study was determining the relationship between overall treatment success and the individual determinants. These results intimate that in POP, an anatomically successful surgical outcome, regardless of the technique as shown here, is much more possible than in a patient who is free of symptoms after surgery. From a symptom point of view, MUI patients are much more bothered after prolapse repair and sling than those with prolapse and pure SUI. The reasons for this go much deeper than this review can illuminate. Likely, the long-standing obstruction that some of these patients have from their extensive prolapse is the cause, though this may not always be so, as the degrees of prolapse in our two groups were the same. Even patients with idiopathic DO were found to have a higher than expected percentage of BOO [15]. Thus, in the patient with a definite source of obstruction, the development of DO is understandable, but, again, does not explain every case. In the small de novo population, a further confounder could be whether or not it was the sling or the prolapse repair that resulted in postoperative symptoms. A large, prospectively designed study is required to carefully stratify and identify which patients are at highest risk for postoperative voiding dysfunction.

## Conclusions

In high-grade cystocele patients (grades 3 and 4) presenting with complaints of MUI, there is a significantly higher likelihood of persistent urge symptoms postoperatively compared to asymptomatic of pure SUI patients. Though the UDS parameters evaluated were not able to predict which patients would be symptomatic post-op, we still advocate the use of UDS in all patients undergoing surgery for prolapse and incontinence to correctly classify their preoperative voiding function and identify occult incontinence. While surgical treatments for SUI and prolapse are very successful in these patients, it is critical to provide comprehensive counseling regarding their risk of persistent urgency symptoms.

**Conflicts of interest** None.

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