


Risk Factor of De Novo Urgency and Urge Incontinence After Autologous Fascia Pubovaginal Sling

Pei Shan Yang ^{1,2}
Sophia Delpe²
Casey G Kowalik²
W Stuart Reynolds²
Melissa R Kaufman²
Roger R Dmochowski²

¹Department of Urologic Surgery, Chang Gung Memorial Hospital and Chang Gung University, Taoyuan, Taiwan;

²Department of Urologic Surgery, Vanderbilt University Medical Center, Nashville, TN, USA

Introduction: Pubovaginal sling is an efficient and safe procedure for stress urinary incontinence without the complications of synthetic sling. Urine retention and de novo urgency are bothersome aftermath of this procedure. We aim to identify potential risk factors for de novo urgency after autologous pubovaginal sling.

Methods: From 2013 to 2016, 347 patients underwent autologous pubovaginal sling. Age, BMI, pelvic irradiation, use of anticholinergic medication, previous vaginal related surgical histories, “over-tight” technique, and concomitant surgeries were examined for potential risk factors. De novo urgency/urge incontinence was defined as treatment (medication, botulinum toxin injection, sacral neuromodulation) for urge postoperatively and was not noted before surgery. Chi-square and fisher’s exact tests were used as statistical analysis.

Results: A total of 109 patients underwent autologous rectus fascia pubovaginal sling, after excluding status post urethral diverticulectomy, concomitant diverticulectomy, and concomitant abdominal surgery. Twenty-three (21.1%) patients were treated for de novo urge/urge incontinence, 18 (78.2%) with anticholinergic, 4 (17.3%) with botox injection and 2 (8.69%) with sacral neuromodulation. None but prior pelvic organ prolapse surgery was associated with developing de novo urge/urge incontinence ($p=0.026$).

Discussion: Patients with prior pelvic organ prolapse surgery were more likely to be at risk of de novo urgency after autologous pubovaginal sling. This study provided more information for preoperative consultation for patients undergoing incontinence surgery.

Keywords: autologous fascial sling, de novo urgency, stress urinary incontinence, urge urinary incontinence

Introduction

Stress urinary incontinence (SUI) is reported in 10–40% of women and has a bothersome impact on the quality of life.¹ The surgical treatments consisted of mid-urethral slings (MUS), pubovaginal slings, retropubic slings, transvaginal urethral suspensions and urethral bulking agents. Autologous rectus fascia pubovaginal sling (AF-PVS) was first introduced in the early 20th century, but for the last two decades, synthetic mid-urethral slings have been the main stay of treating SUI. MUS gained its popularity due to shorter operative time, absence of harvest site complications (pain and infection),² faster recovery,³ however urologists and gynecologists have growing concerns for synthetic MUS after several statements made by the Food and Drug Administration since 2008.⁴ Autologous pubovaginal sling has been regaining popularity in the recent years, with reported excellent success rates.⁵ This procedure is

Correspondence: Pei Shan Yang
Department of Urologic Surgery, Chang Gung Memorial Hospital and Chang Gung University, No. 5, Fuxing Street, Guishan District, Taoyuan, 333, Taiwan
Tel +886 328-1200
Email dr.yang.uro@gmail.com



suitable for patients with concomitant urethral diverticulectomy, concomitant urethrovaginal fistula, and post complications failed previous synthetic sling.⁶

Although autologous pubovaginal slings have no concern for mesh-related adverse events, inevitably certain complications have been reported, such as urinary retention, voiding difficulty and de novo urgency incontinence.^{7,8} De novo urgency has been reported to be 2–20%.⁹ Urgency is a bothersome symptom, especially for patients who are already suffering from stress urinary incontinence. Unanticipated de novo urgency/urge incontinence after continent surgery may be discouraging on patients’ satisfaction. Much effort was exerted in finding the risk factors of postoperative urgency/urge incontinence after synthetic mid urethral sling, such as age, preoperative urodynamic finding of detrusor overactivity (DO), and presence of pelvic organ prolapse.^{10,11} However, limited literature to date investigate of the potential risk factors contributing to de novo urgency/urge incontinence after autologous pubovaginal sling.

In this study, we reviewed patients’ baseline characteristics, related-history and surgical technique who had underwent rectus fascia pubovaginal sling, and analyzed in those who received secondary treatments for de novo urgency/urge incontinence. The aim is to identify the potential risk factors attributed to postoperative de novo urgency/urge incontinence.

Materials and Methods

Between 2011 and 2016, a total of 347 women with SUI underwent pubovaginal sling in a single medical center; this study included only patients using rectus fascia and who followed up postoperative for over a year. The patients with concomitant abdominal surgery, concomitant urethral diverticulectomy and previous diverticulectomy were excluded to eliminate confounding factors in the study population. The cohorts received pubovaginal sling

surgery with full understanding and consent of the procedure and under the indication based on their clinical symptoms, past surgical and urological history. The patients were informed about the purpose of the study.

De novo urgency is defined in patients who did not report urge or urge incontinence, but were treated with anticholinergics or beta3 agonist, intravesical botulinum toxin A (Botox) injection and sacral neuromodulation. We understand urgency/urge incontinence treated in a tiered manner; therefore, we recorded the treatment modality seen at the last follow-up date. Data were extracted from electronic medical records and charts. There was no standardized questionnaire to evaluate the urgency symptoms, but descriptions were noted in the preoperative and postoperative chart. Baseline data including age, BMI, prior irradiation, prior hysterectomy, prior surgeries for SUI were recorded. Perioperative details such as “overtight” method, concomitant pelvic organ prolapse of any compartment (POP) surgery and concomitant urethral surgery were collected. Patients who follow up less than a year, previous or concomitant diverticulectomy, concomitant abdominal surgery were excluded.

Descriptive data were presented as mean. The Chi-square and fisher’s exact tests were used to compare categorical variable. The chi-square analysis was done to find a relationship between urgency/urge incontinence and those parameters. A *p*-value for <0.05 was considered to be statistically significant. All analyses were conducted using the statistical Package for Social Sciences (SPSS) version 24.0.

Result

Total of 109 patients were included in this study after the exclusion of patients following up less than a year, prior and concomitant urethral diverticulectomy as shown in Figure 1. The median age was 65.3 ± 11.9 years at the time of surgery, they were followed up for 40.8 ± 26.3 months after surgery. Among these patients, 67 (61.5%)

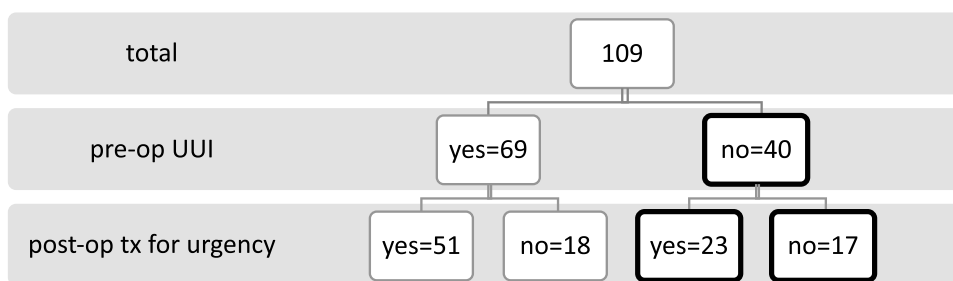


Figure 1 Patient distribution. 109 patients were included in our study, 40 patients did not present with urge urinary incontinence preoperatively. Among these 40 patients (bold black outline boxes), 23 patients received treatment or postoperatively urge urinary incontinence and 17 patients were not treated.

had prior hysterectomy, only 1 (0.9%) had prior irradiation, 86 (78.9%) had prior abdominal surgery, 31 (28.4%) had prior anti-incontinence surgery. The cohort demographic data are as described in Table 1.

In the surgical aspect, 18 (16.5%) patients utilized the “over-tight” technique. Fifty-eight (53.2%) patients had underwent pubovaginal sling alone, while 6(5.5%) had concomitant POP repair, 40 (36.7%) had urethrolysis or mesh excision, only 2 (1.8%) had concomitant sacrocolpopexy.

In the overall population, 11 (10.1%) patients reported similar bothersome SUI postoperatively, 48 (44.0%) patients stated improved symptoms, 42 (38.5%) patients were cured, but 8 (7.3%) patients reported worsen symptoms.

We focus on our analysis on the 40 patients who did not mention nor treat for urge/urge incontinence preoperatively, but developed de novo urge/urge incontinence (n=23), as shown in the highlighted box in Figure 1.

Table 1 Demographic of Cohort

	Whole (n=109)
Age	65.3 ± 11.9
Follow up (m)	40.8 ± 26.3
BMI	29.7 ± 5.57
On medication for incontinence	7 (6.42%)
Prior hysterectomy	67 (61.5%)
Prior Irradiation	1 (0.9%)
Prior abdominal surgery	86 (78.9%)
Prior Anti-incontinence Surgery	31 (28.4%)
Other vaginal surgery	22 (20.2%)
Preop UUI	69 (63.3%)
Prior POP repair	28 (25.7%)
Surgery	Whole (n=109)
Over-tight (n, %)	18 (16.5%)
PVS alone	58 (53.2%)
Concomitant POP repair	6 (5.5%)
Concomitant Urethrolysis/mesh excision	40 (36.7%)
Concomitant sacrocolpopexy	2 (1.8%)
Surgical Outcome	Whole (n=109)
Same	11 (10.1%)
Improved	48 (44.0%)
Cured	42 (38.5%)
Worsen	8 (7.3%)
Treatment	Whole (n=109)
Medication	53 (48.6%)
Intravesical Botox injection	13 (11.9%)
Sacral neuromodulation	9 (8.3%)

Among the 23 patients with de novo urgency/urge incontinence, most of the patients (n=20) reported improved or cured symptoms, while 2 patients stated similar bothersome and 1 patient stated worsen symptoms.

In patients with de novo urge/urge incontinence, 16 patients were treated with anti-cholinergic medication, 4 patients were treated with Botox injection and 2 were treated with sacral neuromodulation. One patient with de novo urgency incontinence was treated with both medication and Botox injection.

Chi-square analysis was done in an attempt to identify the potential risk factor of de novo urgency/urge incontinence after autologous pubovaginal sling as shown in Table 2. Patients with previous POP repair were more likely to receive secondary treatment for de novo urgency/urge incontinence (p=0.026). Age, BMI, previous abdominal surgery, previous hysterectomy, previous mid urethral sling, previous bulking agent injection, previous other vaginal surgery, concomitant surgeries were not found to have statistical significance in relation to de novo urgency/urge incontinence.

Discussion

Though synthetic mid-urethral sling has been proven to achieve high success rates, the concern for adverse events has made autologous pubovaginal sling regain popularity for the treatment of stress urinary incontinence. Autologous fascia sling remained the fallback surgical option for patients with sling complications and previously failed slings. The downfalls of pubovaginal slings reported were wound infections, obstructive symptoms and de novo urgency incontinence.¹² The reported incidence for de novo urge and urge incontinence post autologous sling surgeries were 15–20% and 7.2%, respectively;¹³ which is similar to the incidence of this study in urgency and urge incontinence as 21% (23/109). This study had identified previous POP repair and over-tight technique to be related to patients seeking for treatment for de novo urgency incontinence after surgery.

The etiology of de novo urgency after incontinence surgery has not been validated, but causes of de novo urgency after synthetic sling were proposed by Abraham et al, including urinary tract infection, bladder outlet obstruction, perforation of the urinary tract and idiopathic urgency.¹⁴ Similar hypothesis can be implemented in autologous pubovaginal sling, except perforation by foreign body. Other hypotheses included irritation of the vesical neck,¹⁵ it is suggested bladder contraction is triggered by

Table 2 Comparison Between Patients with De Novo Urgency/Urge Incontinence and Those Did Not by Chi-Square

	De Novo Urgency/ Urge Incontinence (n=23)	No De Novo Urgency/ Urge Incontinence (n=17)	p-value
Age	67.09±11.5	61.65±12.6	0.484
Follow up (m)	38.4±22.4	41.47±27.2	Nil
BMI	29.5±5.42	27.8±6.47	0.334
Prior hysterectomy	14 (%)	13	0.333
Prior Irradiation	0 (%)	1	0.425
Prior abdominal surgery	15 (%)	13	0.505
Prior anti-incontinence Surgery	4	4	0.702
Other vaginal surgery	4 (%)	3	1.00
Prior POP repair	9 (%)	1	0.026
Surgery			
Over-tight (n, %)	4 (%)	2	1.00
PVS alone	11 (%)	11	0.348
Concomitant POP repair	1 (%)	2	0.565
Con- Urethrolisis/excision	9 (%)	5	0.739
Concomitant sacrocolpopexy	1 (%)	0	1.00
SUI Surgical Outcome			
Same	2 (%)	1	
Improved	10 (%)	3	
Cured	10 (%)	12	
Worsen	1 (%)	1	
Treatment			
Medication	16 (%)		
Intravesical Botox injection	4 (%)		
Sacral neuromodulation	2 (%)		

urine entering proximal urethra,¹⁶ and urethral afferent activity can evoke involuntary detrusor activity.¹⁷ Autologous pubovaginal sling is a bladder neck sling, with increasing pressure on the bladder neck, may result in involuntary detrusor activity and subsequently urgency/urge incontinence as a subjective symptom. This hypothesis makes the finding that pubovaginal sling had more de novo urgency reported than midurethral sling.¹⁸ More recent literature recommended the autologous graft to be positioned in the mid-urethral region without tension to decrease de novo urgency, due to the low possibility of urethral obstruction from the low fibrosis rate of autologous graft.¹⁹

We defined de novo urgency as subjects seeking medical treatments such as anticholinergic medication, intravesical Botox injections and sacral neuromodulation, without urgency symptoms in preoperative charting. Previous studies had used a more objective questionnaire and/or included patients on anticholinergic

medication.^{20,21} We included patients who were much affected in order to identify possible risk factors attributed to de novo urgency incontinence.

Age, BMI, previous SUI surgeries were not related to de novo urgency incontinence. “Over-tight” technique and concomitant surgeries were also not attributed to de novo urgency incontinence. Previous POP repair surgery dissections are speculated to be more extensive, therefore resulting in de novo urgency incontinence. Since extensive dissections may disrupt the autonomic innervation of the bladder, this is another possible pathogenesis of de novo urgency.²²

Despite much input in attempt to investigating potential risk factors for de novo urgency, there is limited evidence to support a convincing risk factor. A similar study was done, also trying to look for prognostic factors of autologous fascia rectus sling, and none of the preoperative parameters proved to be associated with the final outcome.²³ Kenton et al were also unable to find an association between any other preoperative symptoms,

urodynamic parameters or patient characteristics and post-operative treatment or bother form UUI,²⁰ after they looked into patients status post Burch colposuspension and pubovaginal sling.

The urodynamic parameters related urgency post-sling procedure have been studied. Alperin et al noticed an elevation of detrusor pressure >15cm H₂O during the filling phase of cystometry put patients at risk of developing de novo urgency incontinence.²¹ However, urge/urge incontinence was self-reported, unlike in this study, the patients were included only if they were treated. Mitsui et al investigated the clinical and urodynamic outcome of autologous pubovaginal, found out patients who had PVR (post void residual) more than 100mL or Qmax 20mL/s or less were more likely to have voiding problems. No urodynamic parameters were reported to associate with urgency/urge incontinence but noted postoperative urgency and de novo urgency rate as 38% and 8%, respectively.²²

Heterogeneous findings in identifying risk factors for de novo urge/urge incontinence were present in our literature review. Not all literatures found urodynamic parameters to be risk factors.^{20,23} The presence of detrusor overactivity, history of prior anti-incontinence surgery were reported to be risk factors of de novo urgency/urge incontinence, while poorer anterior and apical vaginal support were “protective” factors after mid urethral sling.¹⁰ Another study found preoperative urge, detrusor overactivity and prior use of anticholinergic medication were more likely to develop de novo urgency/urge incontinence after autologous sling and/or Burch procedure.²⁰ However, prior medication did not show significance in our result.

The limitations of this study were a retrospective and single center study. Our study number would have more statistical power if we have a larger cohort; however, de novo urgency is not a common sequela but a very bothersome symptom after pubovaginal surgery. This study was a snapshot in time, treatment modality was recorded as their last clinic visit. There was no follow up on the change of treatment over the course of time, given that urge/urge incontinence treatment is tiered. Therefore, a follow-up outcome of those treated is a future aspect of research. Transobturator approach autologous PVS had been described with favorable results,^{24,25} based on previous study suggesting higher de novo urge incontinence rate in retropubic than transobturator MUS,²⁶ it is reasonable to hypothesize transobturator approach may

decrease such rate. However, our cohort only underwent retropubic approach, more comparison study is needed in the future to validate if this phenomenon is true in autologous PVS.

There was no literature available on studying the possible risk factors to de novo urgency/urge incontinence after autologous pubovaginal sling. This study had a relatively long follow-up period of time.

Conclusion

De novo urgency/urge incontinence is a bothersome symptom and not an uncommon sequelae after AF-PVS. Our study found prior pelvic organ prolapse surgeries as possible risk factor related to postoperative de novo urgency, hoping to give more information in consultation for autologous pubovaginal sling.

Abbreviations

ASC, abdominal sacrocolpopexy; AF-PVS, autologous rectus fascia pubovaginal sling; DO, detrusor overactivity; LSC, laparoscopic sacrocolpopexy; MUS, mid-urethral sling; POP, pelvic organ prolapse; PSC, pubovaginal cystocele sling; SUI, stress urinary incontinence.

Disclosure

The authors declare that they have no conflicts of interest for this work.

References

- Hunskar S, Burgio K, Diokno A, Herzog AR, Hjalmas K, Lapitan MC. Epidemiology and natural history of urinary incontinence in women. *Urology*. 2003;62(4 Suppl 1):16–23. doi:10.1016/S0090-4295(03)00755-6
- Cox A, Herschorn S, Lee L. Surgical management of female SUI: is there a gold standard? *Nat Rev Urol*. 2013;10(2):78–89. doi:10.1038/nrurol.2012.243
- Kaplan SA, Santarosa RP, Te AE. Comparison of fascial and vaginal wall slings in the management of intrinsic sphincter deficiency. *Urology*. 1996;47(6):885–889. doi:10.1016/S0090-4295(96)00062-3
- Bailly GG, Carlson KV. The pubovaginal sling: reintroducing an old friend. *Can Urol Assoc J*. 2017;11(6):S147–S151. doi:10.5489/cuaj.4611
- Milose JC, Sharp KM, He C, Stoffel J, Clemens JQ, Cameron AP. Success of autologous pubovaginal sling after failed synthetic mid urethral sling. *J Urol*. 2015;193(3):916–920. doi:10.1016/j.juro.2014.09.038
- Ghoniem G, Hammett J. Female pelvic medicine and reconstructive surgery practice patterns: IUGA member survey. *Int Urogynecol J*. 2015;26(10):1489–1494. doi:10.1007/s00192-015-2734-5
- Chaikin DC, Rosenthal J, Blaivas JG. Pubovaginal fascial sling for all types of stress urinary incontinence: long-term analysis. *J Urol*. 1998;160(4):1312–1316. doi:10.1016/S0022-5347(01)62524-2

8. Cross CA, Cespedes RD, McGuire EJ. Our experience with pubovaginal slings in patients with stress urinary incontinence. *J Urol.* 1998;159(4):1195–1198. doi:10.1016/S0022-5347(01)63553-5
9. Niknejad K, Plzak LS, Staskin DR, Loughlin KR. Autologous and synthetic urethral slings for female incontinence. *Urol Clin North Am.* 2002;29(3):597–611. doi:10.1016/S0094-0143(02)00074-5
10. Lee JK, Dwyer PL, Rosamilia A, Lim YN, Polyakov A, Stav K. Which women develop urgency or urgency urinary incontinence following midurethral slings? *Int Urogynecol J.* 2013;24(1):47–54. doi:10.1007/s00192-012-1844-6
11. Lee JK, Dwyer PL, Rosamilia A, Lim YN, Polyakov A, Stav K. Persistence of urgency and urge urinary incontinence in women with mixed urinary symptoms after midurethral slings: a multivariate analysis. *BJOG.* 2011;118(7):798–805. doi:10.1111/j.1471-0528.2011.02915.x
12. Sharifaghdas F, Nasiri M, Mirzaei M, Narouie B. Mini sling (ophira) versus pubovaginal sling for treatment of stress urinary incontinence: a medium-term follow-up. *Prague Med Rep.* 2015;116(3):210–218. doi:10.14712/23362936.2015.60
13. Mahdy A, Ghoniem GM. Autologous rectus fascia sling for treatment of stress urinary incontinence in women: a review of the literature. *Neurourol Urodyn.* 2019;38(Suppl 4):S51–S58. doi:10.1002/nau.23878
14. Abraham N, Vasavada S. Urgency after a sling: review of the management. *Curr Urol Rep.* 2014;15(4):400. doi:10.1007/s11934-014-0400-y
15. Summitt RL, Bent AE, Ostergard DR, Harris TA. Stress incontinence and low urethral closure pressure. Correlation of preoperative urethral hypermobility with successful suburethral sling procedures. *J Reprod Med.* 1990;35(9):877–880.
16. Fulford SC, Flynn R, Barrington J, Appanna T, Stephenson TP. An assessment of the surgical outcome and urodynamic effects of the pubovaginal sling for stress incontinence and the associated urge syndrome. *J Urol.* 1999;162(1):135–137. doi:10.1097/00005392-199907000-00033
17. Jung SY, Fraser MO, Ozawa H, et al. Urethral afferent nerve activity affects the micturition reflex; implication for the relationship between stress incontinence and detrusor instability. *J Urol.* 1999;162(1):204–212. doi:10.1097/00005392-199907000-00069
18. Ogah J, Cody JD, Rogerson L. Minimally invasive synthetic suburethral sling operations for stress urinary incontinence in women. *Cochrane Database Syst Rev.* 2009;4:CD006375.
19. Cubuk A, Yanaral F, Savun M, et al. Modified autologous transobturator tape surgery - evaluation of short term results. *Ginekol Pol.* 2020;91(2):51–56. doi:10.5603/GP.2020.0016
20. Kenton K, Richter H, Litman H, et al. Risk factors associated with urge incontinence after continence surgery. *J Urol.* 2009;182(6):2805–2809. doi:10.1016/j.juro.2009.08.032
21. Alperin M, Abrahams-Gessel S, Wakamatsu MM. Development of de novo urge incontinence in women post sling: the role of preoperative urodynamics in assessing the risk. *Neurourol Urodyn.* 2008;27(5):407–411. doi:10.1002/nau.20526
22. Mitsui T, Tanaka H, Moriya K, Kakizaki H, Nonomura K. Clinical and urodynamic outcomes of pubovaginal sling procedure with autologous rectus fascia for stress urinary incontinence. *Int J Urol.* 2007;14(12):1076–1079. doi:10.1111/j.1442-2042.2007.01909.x
23. Athanasopoulos A, Gyftopoulos K, McGuire EJ. Efficacy and preoperative prognostic factors of autologous fascia rectus sling for treatment of female stress urinary incontinence. *Urology.* 2011;78(5):1034–1038. doi:10.1016/j.urology.2011.05.069
24. Cubuk A, Erbin A, Savun M, et al. Autologous transobturator midurethral sling. *Turk J Urol.* 2019;45(3):230–232. doi:10.5152/tud.2018.83797
25. Cubuk A, Yanaral F, Sahan A, et al. Modified autologous transobturator tape surgery - a prospective comparison with transobturator tape surgery. *Urology.* 2020;146:72–78. doi:10.1016/j.urology.2020.09.018
26. Botros SM, Miller JJ, Goldberg RP, et al. Detrusor overactivity and urge urinary incontinence following trans obturator versus midurethral slings. *Neurourol Urodyn.* 2007;26(1):42–45. doi:10.1002/nau.20377

Research and Reports in Urology

Dovepress

Publish your work in this journal

Research and Reports in Urology is an international, peer-reviewed, open access journal publishing original research, reports, editorials, reviews and commentaries on all aspects of adult and pediatric urology in the clinic and laboratory including the following topics: Pathology, pathophysiology of urological disease; Investigation and

treatment of urological disease; Pharmacology of drugs used for the treatment of urological disease. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/research-and-reports-in-urology-journal>