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Original Research Article

Short-term voiding patterns after vaginal hysterectomy and pelvic floor repair

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ABSTRACT

Background: Post-operative transient voiding dysfunction is a known complication of vaginal hysterectomy (VH) with pelvic floor repair (PFR). This study aims to determine the duration of urinary catheterization prior to resumption of normal voiding and hospital length of stay for patients who have undergone VH, PFR with or without concomitant application of transvaginal mesh (TVM) and/or mid-urethral sling (MUS).
Methods: This is a retrospective cohort study of women who underwent VH with PFR at a single urogynaecology centre in Singapore between 01 October 2016 and 30 September 2017. Patients' files were reviewed for data collection and analysis.
Results: A total of 238 women with VH with PFR were studied, of whom 68 (28.6%) did not have any implant, 60 (25.2%) had only TVM, 50 (21.0%) had only MUS, and 60 (25.2%) had both TVM and MUS. Overall, 1/68 (1.5%) patients without implants, 16/110 (14.5%) patients with one implant and 13/60 (21.7%) patients with two implants failed at least 1 inpatient voiding trial. Patients undergoing VH PFR without implants had shorter duration of catheterization compared to those with concomitant implants (2.2 versus 5.6 days, $p<0.01$). Duration of catheterization was shorter in patients with only MUS compared to patients with only TVM (3.5 versus 4.7 days, $p<0.01$). Patients with single implant had significantly shorter duration of catheterization compared to those with two implants (4.2 versus 5.6 days, $p=0.001$).
Conclusions: One in 68 patients with VH with PFR without implants experienced short term voiding difficulties. This risk increased to 1 in 5 when concomitant implants were inserted.

Keywords: Pelvic organ prolapse, Voiding difficulty, Transvaginal mesh, Mid-urethral sling, Vaginal hysterectomy

INTRODUCTION

Pelvic organ prolapse (POP) is defined as a herniation of pelvic organs to or beyond the vaginal walls.[1] It has a prevalence of 3-6% when defined by symptoms, and up to 50% when based on vaginal examination.[1] The incidence of POP surgery was reported to be 1.5-1.8 per 1000 women years, and peaks in women aged 60-69.[1]

Vaginal hysterectomy (VH) with pelvic floor repair (PFR) is commonly performed to treat POP. Repairs may be primarily reconstructed or augmented with transvaginal mesh (TVM) implants. Concomitant surgery to treat stress urinary incontinence (SUI) may be performed, commonly with the use of mid-urethral slings (MUS). Post-operative transient voiding dysfunction is a frequent consequence of POP and incontinence surgeries. This results in repeated voiding trials, or insertion of indwelling urinary catheter (IDC) causing distress to patients.

This study aims to determine the duration of urinary catheterization prior to resumption of normal voiding and

hospital length of stay (LOS) for patients who have undergone VH, PFR with or without concomitant application of TVM and/or MUS. This will allow better pre-operative counseling of patients and planning for post-operative voiding trials.

METHODS

This is a retrospective cohort study of all women who underwent VH with PFR for POP at a single urogynecology center in Singapore between 01 October 2016 and 30 September 2017. In our center, patients with Baden Walker grade 3 or 4 cystourethroceles are offered TVM and patients with stress urinary incontinence or urodynamic stress incontinence are offered concomitant MUS. All pelvic reconstructive surgery with or without implants was performed by a single senior urogynecologist at our institution. Pelvic floor repair involved both anterior and posterior colporrhaphy. In this cohort, patients selected for TVM received either the Uphold (Boston Scientific) or Restorelle DirectFix Anterior (Coloplast) mesh kits. Patients requiring MUS were treated with either TVT-Exact (Ethicon, Johnson & Johnson), TVT -Abbrevo (Ethicon, Johnson & Johnson), Solyx Single Incision Sling (Boston Scientific) or Altis Single Incision Sling (Coloplast). The postoperative characteristics analysed include the duration of urinary catheterisation prior to resumption of normal voiding, hospital length of stay and the need for tape loosening or mesh revision procedures.

According to our centre's protocol, patients with uncomplicated surgeries typically had their urinary catheters removed on postoperative day 1 for MUS and day 2 for TVM or native tissue repair without implant. Patients were then instructed to void upon desire or urge. Post void residual urine volume was measured using a bladder scanner and the criteria to pass a voiding trial is defined as post void residual urine volume of less than 150 millilitres. Patients who failed the first voiding trial had their urinary catheters reinserted and a second voiding trial was allowed the next day. Patients who passed the voiding trials were discharged without a catheter. Patients who failed the second trial were either allowed a third voiding trial in hospital 48 hours later or discharged with a urinary catheter and instructed to return for a postoperative visit 7 days later when they were allowed a third voiding trial. Tape loosening or mesh revision procedures were offered to patients with prolonged voiding dysfunction that did not respond to conservative treatment approximately 2 weeks postoperatively.

Patients' files were reviewed for data collection and analysis. Institutional review board approval was obtained and the requirement for informed consent was waived. There are no financial conflicts of interest to disclose.

Data was analyzed using the statistical package for the social sciences (SPSS) software version 19. Categorical data was analyzed using the Chi square test and Fisher's exact test while non- categorical data was analyzed using the Mann Whitney and Kruskal Willis tests. Probability values <0.05 were considered statistically significant.

RESULTS

A total of 238 women were studied. Sixty-eight (28.6%) patients underwent VH with PFR without concomitant implants (group 1), 60 (25.2%) patients underwent VH with PFR with only TVM (group 2), 50 (21.0%) patients underwent VH with PFR with only MUS (group 3), and 60 (25.2%) patients underwent VH with PFR with both TVM and MUS (group 4).

Table 1 compares the demographic variables between the four groups of patients. Majority of patients in all groups were post-menopausal. Only 5 (5.0%) patients with reported SUI declined concurrent treatment with MUS. Seven patients did not have any prolapse, and hysterectomies were performed for abnormal uterine bleeding. The median grade of cystocele, rectocele and uterine prolapse in each group is shown in Table 2.

Table 3 to 5 illustrate the mean duration of catheterization and duration of hospital stay in each group of patients. Thirteen (21.7%) patients with two implants failed inpatient voiding trials and were discharged with a urinary catheter (Table 3). This incidence was greater in this group than in patients with single implants (up to 15%) or patients without any implants (1.5%) (Table 3). Just one patient with TVM only needed a mesh revision and one patient in the group with MUS only needed tape loosening. Two patients with both TVM and MUS required tape loosening (Table 3). Re-operation rates between groups with single or double implants were not significantly different (1.8% versus 3.3%, p=0.61) (Table 4). Overall, 30 (12.6%) patients failed at least 1 voiding trial during their hospital admission, of whom 8 (26.7%) patients had pre-operative voiding difficulties.

Patients undergoing VH with PFR without implants had shorter duration of catheterization compared to those with concomitant implants (2.2 days versus 4.7 days, p<0.01) (Table 5). Patients undergoing VH with PFR with only MUS had shorter duration of catheterization compared to patients with only TVM (3.5 days versus 4.7 days, p<0.01). Patients with a single implant had significantly shorter duration of catheterization compared to those with two implants (4.2 days versus 5.6 days, p=0.001) (Table 4).

All patients had successful voiding trials following tape loosening or mesh revision. Hospital LOS was significantly longer in patients with TVM only (3.1 versus 2.7 days, p=0.009) and those with two implants (3.4 versus 2.7 days, p<0.01) compared to the group with no implants. There is no significant difference between hospital LOS between the group with MUS only and the group with no implant (2.8 versus 2.7 days, p=0.40) (Table 3).

Table 1: Comparison of demographic variables between the four groups of patients.

Variables	VH PFR without concomitant implants (n=68)	VH PFR with only TVM (n=60)	VH PFR with only MUS (n=50)	VH PFR with both TVM and MUS (n=60)
Demographics				
Age				
Mean (SD)	59.8 (9.5)	63.4 (7.1)	62.9 (8.4)	65.0 (8.2)
Median (range)	60.5 (38-78)	63 (47-82)	64 (40-79)	65.5 (46-81)
Postmenopausal, n (%)	53 (77.9)	57 (95)	42 (84)	54 (90)
Body mass index (kg/m^2)				
Mean (SD)	25.3 (3.9)	26.1 (3.5)	26.3 (4.0)	27.8 (4.6)
Median (range)	24.4 (19.3-36.4)	26.0 (19.2-34.4)	25.3 (19.1-35.1)	27.9 (17.1-47.5)
Parity				
Mean (SD)	2.6 (1.2)	2.8 (1.3)	2.6 (1.1)	3.0 (1.7)
Median (range)	2 (0-8)	3 (0-6)	3 (0-6)	3 (0-9)
Vaginal deliveries, n (%)				
Mean (SD)	2.4 (1.4)	2.6 (1.6)	2.3 (1.3)	2.9 (1.8)
Median (range)	2 (0–8)	2 (0–6)	2 (0–6)	3 (0–9)
Operative deliveries	6 (8.8)	8 (13.3)	5 (10)	5 (8.3)
Caesarean sections only	2 (2.9)	0	3 (6)	1 (1.7)
Nulliparity	1 (1.5)	1 (1.7)	1(2)	1 (1.7)
Previous urogynaecological procedures	2 (2.9)	0	2 (4)	3 (5)
Pre-operative urinary symptoms, n (%)				
Stress urinary incontinence	3 (4.4)	2 (3.3)	42 (84)	54 (90)
Urge urinary incontinence	6 (8.8)	14 (23.3)	14 (28)	28 (46.7)
Voiding difficulties	13 (19.1)	16 (26.7)	11 (22)	22 (36.7)

VH: Vaginal hysterectomy; PFR: pelvic floor repair; TVM: transvaginal mesh; MUS: mid-urethral sling

Table 2: Comparison of pre-operative prolapse grade between 4 groups of patients.

Variables	VH PFR without concomitant implants (n=68)	VH PFR with only TVM (n=60)	VH PFR with only MUS (n=50)	VH PFR with both TVM and MUS (n=60)
Cystourethrocele				
Mean (SD)	1.6 (0.8)	3.2 (0.4)	1.7 (0.6)	3.2 (0.4)
Median (range)	2 (0–3)	3 (3–4)	2 (0–3)	3 (3– 4)
Uterine prolapse				
Mean (SD)	2.9 (1.3)	3.6 (0.8)	3.0 (1.0)	3.7 (0.6)
Median (range)	3 (0–4)	4 (2–4)	3 (0–4)	4 (2–4)
Rectocele,				
Mean (SD)	1.6 (0.9)	2.0 (0.6)	1.8 (0.6)	2.3 (1.0)
Median (range)	2 (0–4)	2 (0–4)	2 (0–3)	2 (0–4)

VH: Vaginal hysterectomy; PFR: pelvic floor repair; TVM: transvaginal mesh; MUS: mid-urethral sling

Table 3: Table comparing postoperative outcomes between group with VH PFR without implant with groups of VH PFR with only TVM, VH PFR with only MUS. and VH PFR TVM and MUS respectively.

Group	VH PFR without concomitant implants (n=68)	VH PFR with only TVM (n=60)		VH PFR with only MUS (n=50)		VH PFR with both TVM and MUS (n=60)	
			P value		P value		P value
Duration of catheterization (day) (mean±SD; range)	2.2±1.5 (1–12)	4.7±6.5 (2–32)	p<0.01	3.5±5.3 (1–29)	p=0.475	5.6±6.4 (1–33)	p<0.01

Continued.

Group	VH PFR without concomitant implants (n=68)	VH PFR with only TVM (n=60)		VH PFR with only MUS (n=50)		VH PFR with both TVM and MUS (n=60)	
			P value		P value		P value
Duration of hospital length of stay (day) (mean±SD; range)	2.7±1.1 (2–6)	3.1±1.3 (2–9)	p=0.009	2.8±1.1 (2–7)	p=0.399	3.4±1.2 (2–7)	p<0.01
Discharged with IDC (n; %)	1 (1.5)	9 (15.0)	p=0.006	7 (14.0)	p=0.010	13 (21.7)	p<0.01
Mesh revision/tape loosening (n; %)	0	1 (1.7)	p=0.469	1 (2.0)	p=0.424	2 (3.3)	p=0.218

VH: Vaginal hysterectomy; PFR: pelvic floor repair; TVM: transvaginal mesh; MUS: mid-urethral sling

Table 4: Table comparing postoperative outcomes between VH PFR with one implant (either TVM or MUS only) and VH PFR with dual implants (both TVM and MUS).

Group	VH PFR with one implant (n=110)	VH PFR with both TVM and MUS (n=60)	P value
Duration of catheterization (day) (mean±SD; range)	4.2±6.0 (1–32)	5.6±6.4 (1–33)	p=0.001
Duration of hospital length of stay (day) (mean±SD; range)	3.0±0.7 (2–9)	3.4±1.2 (2–7)	p=0.011
Discharged with IDC (n; %)	16 (14.5)	13 (21.7)	p=0.238
Mesh revision/tape loosening (n; %)	2 (1.8)	2 (3.3)	p=0.614

VH: Vaginal hysterectomy; PFR: pelvic floor repair; TVM: transvaginal mesh; MUS: mid-urethral sling

Table 5: Table comparing postoperative outcomes between VH PFR without implants and VH PFR with one or two implants (only TVM, only MUS or both TVM and MUS).

Group	VH PFR without concomitant implants (n=68)	VH PFR with one or two implants (n=170)	P value
Duration of catheterization (day) (mean±SD; range)	2.2±1.5 (1–12)	4.7±6.2 (1–33)	p<0.01
Duration of hospital length of stay (day) (mean±SD; range)	2.7±1.1 (2–6)	3.1 ± 1.2 (2–9)	p=0.002
Discharged with IDC (n; %)	1 (1.5)	29 (17.1)	p=0.001

VH: Vaginal hysterectomy; PFR: pelvic floor repair; TVM: transvaginal mesh; MUS: mid-urethral sling

DISCUSSION

Postoperative transient voiding dysfunction is a known short-term complication of pelvic reconstructive surgeries for POP and urinary incontinence. In our study, we found that 1 in 68 patients undergoing VH with PFR without implant experienced short-term voiding difficulties requiring prolonged urinary catheterization, defined in this study as more than 7 days. This risk was increased to 1 in 5 when concomitant implants were inserted. Repeated urinary catheterization not only causes psychological and emotional distress to patients but can also result in catheter-associated urinary tract infections, urethral trauma and pain.[2-4]

In 2006, Fatton et al found the overall rate of immediate postoperative urinary retention following TVM to be 11.8%.[5] This is comparable to our study which showed a rate of 15%. Similarly, the rate of postoperative voiding dysfunction after MUS was quoted to be 17.2% by Yip et al, comparable to our rate of 14% in this study.[6] In the literature, however, we find rates of postoperative voiding dysfunction differ greatly between studies, ranging from 0.2% to 34% for TVM and 2.8% to 43% for MUS.[7-10] The disparity between various studies may be due to the difference in protocols for voiding trials postoperatively and definitions of postoperative voiding dysfunction.

Comparing single and double implants, we found that patients with dual implants had a significantly higher rate of postoperative voiding dysfunction compared to those with single implants. This is in contrast to a study performed by Steinberg et al in 2010, which found no significant difference between both groups.[8] We postulate that this may be due to a higher rate of voiding dysfunction of 34% in their study, as compared to our rate of only 12.6%; and also due to differences in types of transvaginal mesh and surgical techniques. In one of the techniques

described by Steinberg et al, surgeons secured the arms of the mesh to the sacrospinous ligaments after dissecting the rectovaginal fascia towards the levator ani.[8] In our institution however, the Restorelle and uphold meshes were secured to the sacrospinous ligaments through dissection of the anterior vaginal wall. In addition, Steinberg's study used only retropubic and transobturator suburethral slings while our study also included single incision slings, which are shorter, with shorter trajectory of insertion, and avoid passage through the inner thigh muscles. Single incision slings are associated with lower rates of voiding dysfunction in the immediate postoperative period as shown in several studies.[11,12]

In addition, our study also found that patients with a single implant MUS had a shorter duration of catheterization as compared to those with single implant TVM. This is likely due to the difference in our voiding trial protocol whereby patients with MUS had their catheters removed on the first post-operative day compared to patients with TVM who had their catheters removed on the second post-operative day.

Concomitant surgical procedures have the benefit of saving repeated anesthesia, surgery, time and money for patients. Furthermore, patients with SUI may experience worsening of symptoms after PFR.[13] While our study showed that rate of postoperative voiding dysfunction is statistically higher in patients with dual implants, this effect was short-term, with only 3.3% of patients with dual implants eventually requiring tape loosening or mesh revision procedures. None of the patients in this study required long-term catheterization following tape loosening or mesh revision. Nonetheless, clinicians should be mindful of the potential risks of prolonged voiding dysfunction in these patients and stratify the risks according to various risk factors, which include age, advanced pelvic organ prolapse, baseline bladder dysfunction or previous incontinence surgery.[14] Patients with these risk factors should be adequately investigated, counselled and offered the option of performing surgeries on separate occasions.

Hospital LOS was statistically longer in patients treated with TVM or two implants in this cohort. However, this may not be clinically significant as the differences were 0.4 (3.1 versus 2.7) days, in the TVM group and 0.7 (3.4 versus 2.7) days in the two-implant group. As such, concerns about hospital LOS should not deter clinicians and patients from considering concomitant treatment of SUI during POP surgery.

Our study is limited by its retrospective nature, which could have introduced selection bias in our sample. For example, the wide range of the subjects' ages and comorbidities were potential confounders that could have affected post-operative recovery. Another limitation of this study is the heterogeneity in types of TVM and MUS used for each group. Nonetheless, despite only studying patients treated within a single 12-month period, we were able to find significant differences in short-term postoperative outcomes between the groups with patients who underwent VH PFR without implants serving as controls. This study provides a foundation for further prospective studies in this area.

CONCLUSION

In conclusion, while concomitant surgeries with surgical implants provide greater cure rates and convenience to patients, clinicians should be mindful of the potential risks of postoperative urinary retention requiring repeated urinary catheterization and its associated complications including psychological distress. Careful selection of surgical candidates should be made and patients must be adequately counseled of the expected postoperative course.

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REFERENCES

1. Barber MD, Maher C. Epidemiology and outcome assessment of pelvic organ prolapse. Int Urogynecol J. 2013;24(11):1783-90.
2. Nguyen-Van-Tam SE, Nguyen-Van-Tam JS, Myint S, Pearson JC. Risk factors for hospital-acquired urinary tract infection in a large English teaching hospital: a case-control study. Infection. 1999;27(3):192-7.
3. Shaw C, Logan K, Webber I, Broome L, Samuel S. Effect of clean intermittent self-catheterization on quality of life: a qualitative study. J Advanced Nursing. 2008;61(6):641-50.
4. Ramm D, Kane R. A qualitative study exploring the emotional responses of female patients learning to perform clean intermittent self-catheterisation. J Clin Nursing. 2011;20(21-22):3152-62.
5. Fatton B, Amblard J, Debodinance P, Cosson M, Jacquetin B. Transvaginal repair of genital prolapse: preliminary results of a new tension-free vaginal mesh (Prolift™ technique)—a case series multicentric study. Int Urogynecol J. 2007;18(7):743.
6. Pang MW, Chan LW, Yip SK. One-year urodynamic outcome and quality of life in patients with concomitant tension-free vaginal tape during pelvic floor reconstruction surgery for genitourinary prolapse and urodynamic stress incontinence. Int Urogynecol J. 2003;14(4):256-60.
7. Kato K, Suzuki S, Yamamoto S, Furuhashi K, Suzuki K, Murase T, Gotoh M. Clinical pathway for tension-

free vaginal mesh procedure: Evaluation in 300 patients with pelvic organ prolapse. Int J Urol. 2009;16(3):314-7.
8. Steinberg BJ, Finamore PS, Sastry DN, Holzberg AS, Caraballo R, Echols KT. Postoperative urinary retention following vaginal mesh procedures for the treatment of pelvic organ prolapse. Int Urogynecol J. 2010;21(12):1491-8.
9. Klutke C, Siegel S, Carlin B, Paszkiewicz E, Kirkemo A, Klutke J. Urinary retention after tension-free vaginal tape procedure: incidence and treatment. Urology. 2001;58(5):697-701.
10. Partoll LM. Efficacy of tension-free vaginal tape with other pelvic reconstructive surgery. Am J Obstet Gynecol. 2002;186(6):1292-8.
11. Naumann G, Steetskamp J, Meyer M, Laterza R, Skala C, Albrich S, Koelbl H. Sexual function and quality of life following retropubic TVT and single-incision sling in women with stress urinary incontinence: results of a prospective study. Arch Gynecol Obstet. 2013;287(5):959-66.
12. Wu LY, Yang TH, Kung FT, Chuang FC, Huang KH. Comparison of the clinical outcomes of transobturator and single-incision slings for stress urinary incontinence. Kaohsiung J Med Sci. 2016;32(7):367-72.
13. Brubaker L, Cundiff GW, Fine P, Nygaard I, Richter HE, Visco AG, Zyczynski H, Brown MB, Weber AM. Abdominal sacrocolpopexy with Burch colposuspension to reduce urinary stress incontinence. N Engl J Med. 2006;354(15):1557-66.
14. Geller EJ. Prevention and management of postoperative urinary retention after urogynecologic surgery. Int J Women's Health. 2014;6:829.

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