Original Article

Prevalence of Postoperative Urinary Retention and the Optimal Duration of Transurethral Urinary Catheterization after Pelvic Floor Surgery

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Objective: To determine the prevalence of postoperative urinary retention following pelvic floor surgery, identify risks associated with pelvic floor surgery, and determine the optimal duration of transurethral urinary catheterization after pelvic floor surgery.

Materials and Methods: This retrospective cohort study included women aged 35 to 85 years diagnosed with pelvic organ prolapse [POP] and urinary incontinence [UI] who underwent pelvic floor surgical correction between January 2009 and December 2016 at a tertiary referral center.

Results: The authors identified 542 potential participants who underwent pelvic floor surgery. Of these, 161 were excluded due to lack of data, and 381 medical charts were studied. The mean age of selected participants was 66.0±9.1 years. Most patients were menopausal (95%), 13.5% had previously undergone hysterectomy, and 11.4% had previously suffered from incontinence or undergone prolapse surgery. Most patients (82.4%) had stage 3 or 4 POP and 24.9% experienced UI before surgery. Almost 7% (28/418) of patients experienced postoperative urinary retention and required insertion of a Foley catheter. All patients returned to normal after 7 to 10 days. Patients who had previously undergone a hysterectomy were more likely to experience postoperative urinary retention (28.6% versus 12.3%, $p = 0.02$). Operative procedures were not statistically different between urinary retention and non-urinary retention groups. A statistical difference in urinary retention rate was not observed when comparing placement of a Foley catheter for 24 hours versus more than 24 hours (9.1% versus 6.4%, $p = 0.5$, RR 1.5, 95% CI 0.48 to 4.42).

Conclusion: The rate of postoperative urinary retention after pelvic floor surgery was approximately 7%. There was no significant correlation between surgical procedure and postoperative urinary retention outcomes. The optimal duration for placement of a Foley catheter was 24 hours. This protocol will reduce hospital stay duration and associated costs. Therefore, catheter removal 24 hours after pelvic floor surgery is recommended.

Keywords: Urinary retention, Pelvic floor surgery, Urinary catheterization

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Postoperative urinary retention is one of the most common complications following pelvic floor surgery. Urinary retention is a condition that prevents a patient from being able to completely or partially empty their bladder[1]. However, there is no standard definition of urinary retention[2,3]. The percentage of women with this complication following pelvic floor surgery is 2.5% to 27.2%[4-7]. Urinary retention was measured by post-void residual urine [PVR], for which there is no definitive cut-off. A clinical cut-off point of 100 cc of PVR was used to define postoperative urinary retention at the authors institute. The standard treatment for postoperative urinary retention is bladder catheterization with either prolonged catheterization or clean intermittent catheterization [CIC], which results in discomfort, restricted mobility, prolonged hospitalization, and dissatisfaction after surgery. Therefore, urogynecologic surgeons attempt to identify risks associated with pelvic floor surgery and postoperative urinary retention to improve surgical outcomes. Risk factors for postoperative urinary retention include high-grade anterior compartment prolapse, levator plication, Kelly plication, intraoperative blood loss, transvaginal uterosacral ligament suspension, and anterior/posterior

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colporrhaphy[7-11].

The objective of the present study was to determine the prevalence of postoperative urinary retention following pelvic floor surgery and identify risks associated with pelvic floor surgery and the optimal duration of transurethral urinary catheterization after pelvic floor surgery.

Materials and Methods

The Research Administration Section of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University approved the present study (ID 01-60-58). This was a retrospective cohort study of women aged 35 to 85 years diagnosed with pelvic organ prolapse [POP] and urinary incontinence [UI] who underwent pelvic floor surgical correction between January 2009 and December 2016 at the Department of Obstetrics and Gynecology, Ramathibodi Hospital, Mahidol University. Medical records of patients who met the inclusion criteria were identified. Electronic medical records were reviewed retrospectively for demographic data and for possible predisposing factors for postoperative urinary retention, including patient age, parity, body mass index [BMI], menopausal status, medical comorbidities, previous hysterectomy, previous pelvic floor reconstructive surgery, preoperative POP quantification [POP-Q] measurement, operative time, blood loss, concomitant surgical procedures, pre/postoperative postvoid residual urine volume, postoperative Foley catheter removal, and length of hospital stay (from surgery day to discharge day). A previous study[9] showed that the prevalence of 3-days postoperative urinary retention following pelvic floor surgery was 8.7% of 345 patients. The data were analyzed using Chi-squared and Fisher's exact tests for categorical data, and Student's t-tests and Mann-Whitney U tests for continuous data. Logistic regression analyses were performed. Stata version 15.0 software (Stata Corp., College Station, TX, USA) was used for the analyses. The *p*-value less than 0.05 was considered as statistically significant.

The authors defined postoperative urinary retention by the need for intermittent catheterization for at least three days after the procedure[12]. Three patients who failed to void immediately after the procedure but readily regained normal voiding with a urethral catheter, which was removed the next morning, were sorted into a non-retention group.

Results

The authors identified 542 potential participants who underwent pelvic floor surgery. Of those, 161 were excluded due to a lack of data, while 381 medical charts were studied. The mean age of selected participants was 66.0±9.1 years. Most patients were menopausal (95.0%), 13.5% had previously undergone a hysterectomy, and 11.4% had previous suffered from incontinence or undergone prolapse surgery. Most patients, (82.4%) had stage 3 or 4 POP and 24.9% experienced UI before surgery.

When comparing urinary retention and non-urinary retention groups, no statistically significant differences in age, BMI, parity, previous pelvic floor reconstructive surgery, prolapse compartment, or concomitant surgical procedures were found (Table 1). Patients who had previously undergone hysterectomy had significantly higher rate of postoperative urinary retention compared with patients who had never had hysterectomy (28.6% versus 12.3%, *p*-value 0.02).

According to surgical procedures, there was no

Table 1. Baseline patient characteristics by prevalence of postoperative urinary retention

	Urinary retention (n = 28), n (%)	No urinary retention (n = 353), n (%)	*p*-value*
Age (years), mean ± SD	68.3±9.1	65.8±9.1	0.92
BMI (kg/m^2), mean ± SD	23.8±3.6	43.9±349.8	0.38
Parity, mean ± SD	3.4±1.6	3.0±1.6	0.88
Postmenopause	26 (96.3)	332 (94.9)	0.74
Previous hysterectomy	8 (28.6)	43 (12.3)	0.02
Previous incontinence or prolapse surgery	5 (17.9)	38 (9.7)	0.17
Advanced degree POP (stage 3 to 4)			
Anterior compartment	23 (82.2)	231 (68.6)	0.13
Posterior compartment	9 (34.6)	86 (26.4)	0.36
Apical compartment	17 (63.0)	213 (63.8)	0.93
Urinary incontinence before surgery	12 (42.9)	174 (44.6)	0.86

BMI = body mass index; POP = pelvic organ prolapse

* Chi-square test

significant differences of concomitant procedures, anterior compartment surgery, operative time, blood loss, length of hospital stay, and intraoperative and postoperative complications (Table 2).

Approximately 7% (28/381) of the participants experienced postoperative urinary retention requiring a prolonged Foley catheterized. All of them returned to normal after 7 to 10 days. A univariate analysis revealed that patients who had previously undergone a hysterectomy were approximately three times more likely to have postoperative urinary retention (28.6% versus 12.3%, OR 2.89, 95% CI 1.02 to 7.44).

Table 2. Surgical factors and operative data

	Urinary retention (n = 28), n (%)	No urinary retention (n = 353), n (%)	*p*-value
Concomitant surgical procedures			
Vaginal hysterectomy	14 (66.67)	200 (69.4)	0.79
Colpocleisis	2 (12.5)	20 (7.9)	0.52
Sling	0 (0.0)	3 (1.2)	0.67*
Anterior colporrhaphy	17 (85.0)	245 (81.9)	0.73
Posterior colporrhaphy	9 (52.94)	166 (59.7)	0.58
Operative time, mean ± SD	116.0±48.0	102.3±38.0	0.96†
Blood loss (cc), mean ± SD	116.8±98.9	104.6±112.0	0.71†
Length of hospital stay (days, mean ± SD)	3.1±10.2	3.4±10.6	0.44†
Intraoperative complications			
Blood transfusion	1 (0.3)	1 (3.6)	0.14*
Bladder injury	0 (0.0)	3 (0.9)	NA
Ureter injury	0 (0.0)	1 (0.3)	NA
Bowel injury	0 (0.0)	1 (0.3)	NA

NA = not applicable

* Fisher's exact test, † Student t-test

Table 3. Patient's characteristics between postoperative urinary retention and non-urinary retention groups

Factors	UR (n = 28), n (%)	Non-UR (n = 353), n (%)	OR (95% CI)
Age >65 years	54 (52.7)	16 (57.1)	1.24 (0.52 to 2.98)
BMI			
<25	17 (60.7)	158 (50.2)	Ref.
25 to 29.9	10 (35.7)	131 (41.6)	0.71 (0.31 to 1.61)
30 to 39.9	1 (3.6)	26 (8.3)	0.36 (0.05 to 2.83)
>40	0 (0.0)	0 (0.0)	
Parity ≥2	21 (75.0)	181 (57.3)	2.24 (0.88 to 6.40)
Postmenopause	26 (96.3)	299 (94.9)	1.39 (0.20 to 60.55)
Previous hysterectomy	8 (28.6)	38 (12.1)	2.89 (1.02 to 7.44)
Previous incontinence or prolapse surgery	5 (17.9)	33 (10.5)	1.84 (0.51 to 5.42)
Advanced degree POP (stage 3 to 4)	23 (92.0)	238 (81.0)	2.71 (0.64 to 24.30)
Anterior compartment	23 (82.1)	210 (69.1)	2.10 (0.73 to 7.13)
Posterior compartment	9 (34.6)	79 (26.6)	1.46 (0.55 to 3.63)
Apical compartment	17 (63.0)	195 (63.5)	0.94 (0.39 to 2.39)
Urinary incontinence before surgery	9 (32.1)	139 (33.9)	0.61 (0.23 to 1.47)
Concomitant surgical procedures			
Vaginal hysterectomy	14 (50.0)	194 (61.2)	0.63 (0.27 to 1.49)
Colpocleisis	2 (7.1)	20 (6.3)	1.14 (0.12 to 5.15)
Sling	0 (0.0)	3 (1.2)	NA
Anterior colporrhaphy	17 (60.7)	234 (73.8)	0.55 (0.23 to 1.35)
Posterior colporrhaphy	9 (32.1)	156 (49.2)	0.49 (0.19 to 1.18)
Operative time ≥90 minutes	18 (64.3)	193 (61.5)	1.13 (0.47 to 2.83)
Blood loss ≥100 cc	14 (50.0)	171 (48.7)	1.05 (0.45 to 2.46)
Length of hospital stay ≥3 days	22 (81.5)	245 (70.4)	1.85 (0.66 to 6.42)
Intraoperative complications			
Blood transfusion	1 (0.3)	1 (3.6)	13.1 (0.16 to 1028.9)
Bladder injury	0 (0.0)	3 (0.9)	NA
Ureter injury	0 (0.0)	1 (0.3)	NA
Bowel injury	0 (0.0)	1 (0.3)	NA

BMI = body mass index; UR = urinary retention; POP = pelvic organ prolapse; NA = not applicable

Operative procedures were not statistically different between urinary retention and non-urinary retention groups (Table 3).

There was no statistically significant difference in urinary retention rates in patients with placement of a Foley catheter for 24 hours versus more than 24 hours (9.1% versus 6.4%, p = 0.5, RR 1.5, 95% CI 0.48 to 4.42).

Discussion

The study of Bødker and Lose revealed that the prevalence of postoperative urinary retention, defined as the inability to fully void a full bladder after general gynecologic surgery, was 9.2%[13]. For pelvic floor reconstructive surgery, which may result in soft tissue edema, alterations of bladder neck or urethral location, or disruption of the pelvic nerve supply during surgical dissection[14], the prevalence of postoperative urinary retention was higher than general gynecologic surgery[7,15]. In the current study of women undergoing transvaginal pelvic floor reconstructive surgery, the prevalence of postoperative urinary retention, defined as the need for intermittent catheterization for at least three days after the procedure, was 7%. The present study demonstrated a lower prevalence of postoperative urinary retention than previous studies[4,6,7], potentially due to the fact that less than 1% of participants underwent a concomitant sling procedure.

In the present study, a history of hysterectomy was the only significant risk factor for postoperative urinary retention. Advanced age, parity, and preoperative PVR were shown to be significant risk factors in previous studies[8,12,16]. However, these factors were not statistically significant in our cohort because most of participants were elderly, multiparity, and had normal PVR preoperatively.

Ninety percent of women with advanced POP and elevated postvoid residual volume prior to surgical correction experienced normalization of the postvoid residual volume after surgical correction[17]. However, advanced anterior compartment prolapse was a predisposing factor for postoperative urinary retention. In addition, severe blood loss, levator plication, and Kelly plication were significant predisposing factors for postoperative urinary retention[9]. The present study showed no significant increase in risk of postoperative urinary retention in anterior compartment prolapse.

Prolonged catheterization after vaginal reconstructive surgery was a common practice and believed to prevent postoperative urinary retention. As a result, longer hospital stay and increased hospital costs were observed. In a randomized control trial comparing removal of the transurethral catheter on the first versus the fifth day postoperatively, prolonged catheterization resulted in a lower rate of postoperative urinary retention than the early removal group (9% versus 40%, OR 0.15, 95% CI 0.05 to 0.47)[15]. In contrast, a recent randomized trial comparing removal of the urinary drainage catheter within four hours of surgery versus on day 1 after major pelvic floor reconstructive surgery, demonstrated no difference in time to spontaneous void[18].

The strength of the present study was the large sample size over an eight-year period and that all procedures were performed by urogynecologists. However, the present study does have several limitations. There was no standard definition of postoperative urinary retention. In addition, the study was retrospective in nature. Therefore, there were possible confounding factors (e.g., age, procedures, anesthesia, drugs, etc.) that required prospective or randomized control studies to evaluate the outcomes. The authors cohort demonstrated that catheter removal on the first postoperative day was preferable.

Conclusion

In summary, the rate of postoperative urinary retention after pelvic floor surgery was 7%. The optimal duration of Foley catheter placement was 24 hours. There was no significant correlation between surgical procedure and postoperative urinary retention outcomes. Catheter removal on day 1 after pelvic floor surgery will likely reduce the duration of hospital stays and associated costs and is therefore recommended.

What is already known on this topic?

The percentage of women with urinary retention following pelvic floor surgery is 2.5 to 27.2%.

What this study adds?

The prevalence of postoperative urinary retention after pelvic floor surgery in this study was 7%. The optimal duration of Foley catheter placement was 24 hours.

Potential conflicts of interest

The authors declare no conflict of interest.

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