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Incidence and Risk Factors of Urinary Retention after Vaginal Hysterectomy for Pelvic Organ Prolapse

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ABSTRACT

Objectives: To determine the incidence and risk factors of urinary retention after vaginal hysterectomy for pelvic organ prolapse.

Materials and Methods: This is a retrospective review of 279 women who underwent vaginal hysterectomy for pelvic organ prolapse between 2005 and 2013 at Siriraj Hospital. Baseline characteristics, types and degrees of prolapse, concomitant surgical procedures, anesthetic method, operative time, intraoperative blood loss, and duration of postoperative indwelling catheter were recorded. Postoperative urinary retention was defined as a post-void residual urine 150 ml or more, measured by intermittent catheterization. The incidence and risk factors were identified.

Results: The incidence of postoperative urinary retention was 10.0%. Compared to those without urinary retention, patients with urinary retention were significantly more likely to have anterior colporrhaphy (78.6% vs 57.4%; odds ratio 2.725; 95% confidence interval 1.022-8.473; p = 0.03). Age, parity, body mass index, type of prolapse, anesthetic method, operative time, intraoperative blood loss, and duration of postoperative indwelling catheter were comparable between the groups.

Conclusion: Incidence of urinary retention after vaginal hysterectomy was 10.0%. Anterior colporrhaphy was the only factor associated with postoperative urinary retention.

Keywords: postoperative urinary retention, vaginal hysterectomy, pelvic organ prolapse.

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อุบัติการณ์และปัจจัยเสี่ยงของการเกิดปัสสาวะค้างหลังการผ่าตัดมดลูกทางช่องคลอดเพื่อแก้ไขภาวะอวัยวะอุ้งเชิงกรานหย่อน

ชุติมน อสัมภินวงศ์, พิชัย ลีระศิริ, พรนภา ล้อมทอง, พัทยา เฮงรัศมี

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาอุบัติการณ์และปัจจัยเสี่ยงของการเกิดปัสสาวะค้างหลังการผ่าตัดมดลูกทางช่องคลอด เพื่อแก้ไขภาวะอวัยวะอุ้งเชิงกรานหย่อน*

วัสดุและวิธีการ: *ทำการศึกษาย้อนหลังในผู้ป่วยที่ได้รับการผ่าตัดมดลูกทางช่องคลอดในโรงพยาบาลศิริราช จำนวน 279 ราย ตั้งแต่ปี พ.ศ. 2548 ถึง พ.ศ. 2556 โดยเก็บข้อมูลพื้นฐาน ชนิด และระดับของการหย่อนของอุ้งเชิงกราน ชนิดของการผ่าตัด การระงับความรู้สึก ระยะเวลาการผ่าตัด ปริมาณการเสียเลือด และระยะเวลาการใส่สายสวนปัสสาวะหลังการผ่าตัด การมีปัสสาวะค้างหลังผ่าตัดวินิจฉัยเมื่อมีปริมาณปัสสาวะคงค้างตั้งแต่ 150 มิลลิลิตร ขึ้นไปจากการสวนปัสสาวะหลังจากนั้นนำข้อมูลมาหาอุบัติการณ์ รวมถึงปัจจัยเสี่ยงของการเกิดปัสสาวะค้างหลังการผ่าตัด*

ผลการศึกษา: *อุบัติการณ์ของการเกิดปัสสาวะค้างหลังการผ่าตัดเท่ากับร้อยละ 10.0 เมื่อเปรียบเทียบระหว่างกลุ่มที่มีปัสสาวะค้างและกลุ่มที่ไม่มีปัสสาวะค้าง พบว่าผู้ป่วยที่มีปัสสาวะค้างหลังการผ่าตัดจะมีสัดส่วนของผู้ป่วยที่ได้รับการผ่าตัดซ่อมแซมกระบังลมด้านหน้าสูงกว่าอย่างมีนัยสำคัญทางสถิติ (ร้อยละ 78.6 และ 57.4, p = 0.03) ไม่พบความแตกต่างของอายุ จำนวนบุตร ดัชนีมวลกาย ชนิดของการหย่อนของอุ้งเชิงกราน การระงับความรู้สึก ระยะเวลาการผ่าตัด ปริมาณการเสียเลือด และระยะเวลาการใส่สายสวนปัสสาวะหลังการผ่าตัดระหว่างสองกลุ่ม*

สรุป: *อุบัติการณ์ของการเกิดปัสสาวะค้างหลังการผ่าตัดมดลูกทางช่องคลอดเ ท่ากับร้อยละ 10.0 พบว่าการผ่าตัดซ่อมแซมกระบังลมด้านหน้าเป็นปัจจัยเสี่ยงเพียงอย่างเดียวที่สัมพันธ์กับการเกิดปัสสาวะค้างหลังการผ่าตัด*

คำสำคัญ: *ปัสสาวะค้างหลังการผ่าตัด, ผ่าตัดมดลูกทางช่องคลอด, อวัยวะอุ้งเชิงกรานหย่อน*

Introduction

Pelvic organ prolapse (POP) is a downward displacement of the pelvic organs such as uterus, vaginal segment, bladder, rectum or bowel which is caused by attenuation of pelvic supportive structures[1,2]. Several pelvic reconstructive procedures such as vaginal hysterectomy, vaginal apical suspension, and colporrhaphy are common and effective alternatives for women with symptomatic POP who have failed or declined the non-surgical treatments[3]. Although transvaginal approach tends to be relatively safe and efficient with shorter recovery and low morbidity, it is frequently associated with postoperative urinary retention with reported incidences varying from 12% to 29% following prolapse surgery[4-8].

Urinary retention is one of the frequent complications after gynecologic surgery, particularly with pelvic organ prolapse surgery. It is a transient complication which can be diagnosed either clinically by symptoms and signs, sonographically by measurement and calculation, or quantitatively by catheterization. There are no standard criteria for diagnosis of postoperative urinary retention. The exact etiology is not clearly understood. However, it is believed that postsurgical changes that lead to edema, inflammation, damage to peripheral nerve endings, and pain can affect bladder sensation and the micturition pathway causing urinary retention[9]. Subsequently, untreated urinary retention can precipitate significant morbidities such as (1) bladder over-distension which can stimulate sympathetic over-activity leading to hemodynamic disturbances, (2) detrusor muscle dysfunction causing long-term voiding difficulty, (3) urinary tract infection, and (4) prolonged hospitalization[8,10].

According to previous studies, several factors have been proven to increase incidence of postoperative urinary retention including increasing age, pre-existing neurologic abnormality, preoperative urinary tract pathology, surgery especially colorectal and urogynecological procedures, intraoperative aggressive fluid administration, massive blood loss, postoperative pain, postoperative opioid use, and short duration of postoperative indwelling catheterization[4, 5, 7, 8,10]. While some risk factors of postoperative urinary retention are unavoidable, there are several factors that are modifiable. Preoperative acknowledgement of risk factors can increase awareness leading to early detection and management of postoperative urinary retention, and can subsequently prevent long-term damage to bladder integrity and function.

With Thailand becoming an aging society, POP has been found to be more prevalent among Thai female population requiring surgical repair. Vaginal hysterectomy, with or without concomitant vaginal repair, is the most common procedure performed in order to correct POP. These urogynecological procedures have been proven to be strongly associated with postoperative urinary retention. Due to limited information and statistics on postoperative urinary retention among Thai women, we were then interested in review our own data on the patients undergoing vaginal hysterectomy and related vaginal repair procedures, aiming to primarily demonstrate the incidence of postoperative urinary retention and to secondarily determine the possible risk factors.

Materials and Methods

With ethical approval from Siriraj Institute Review Board (SIRB 188/2015), the medical records of the women undergoing vaginal hysterectomy for POP at Urogynecology Unit, Department of Obstetrics and Gynecology, Siriraj Hospital between January 2005 and December 2013 were retrospectively reviewed. The exclusion criteria were the patients with serious perioperative complications such as bladder injury and hypovolemic shock, preoperatively proven cause of urinary retention such as urethral stenosis and neurogenic bladder, and incomplete medical records. Bladder function tests such as bladder capacity and post-void residual urine volume which measured at first office visit were reviewed. Patients were advised to digitally reduce their prolapse during the preoperative post-void residual urine volume measurement. The preoperative urinary retention was considered abnormal if the residual urine was 150 ml. or more, measured by

ultrasonography.

Baseline characteristics including age, parity, body mass index (BMI), menopausal status, presence of diabetes mellitus, stage and location of prolapse according to Pelvic Organ Prolapse Quantification (POP-Q) system, and presence of clinically confirmed stress urinary incontinence were recorded. Perioperative data including surgical procedures, anesthetic method, operative time, intraoperative blood loss, duration of postoperative indwelling catheterization, and post-void residual urine volume (PVR) were collected. PVR was assessed by intermittent catheterization after second spontaneous voiding with regard to trial of void protocol. Postoperative urinary retention was diagnosed if residual urine was 150 ml. or more.

The study population was estimated from the pilot study of the patients' medical records which showed 7% incidence of postoperative urinary retention. At 95% confidence level and 3.5% acceptable error, the calculated number of 246 cases was required. The incidence of postoperative urinary retention was estimated. The relationship between possible associated risk factors and postoperative urinary retention was examined, using student t test, chi-square test, Mann-Whitney U-test, univariate analysis and multivariate analysis as appropriate. A p value of less than 0.05 was considered as an indicator for statistical significance.

Results

A total of 284 patients underwent vaginal hysterectomy for pelvic organ prolapse at the Urogynecology unit at Siriraj hospital during the study period were included in our study. However, 1 patient was later excluded due to a history of preoperative urinary retention and 4 patients were excluded due to the missing data on post-void residual urine. The remaining 279 were finally eligible. Postoperative urinary retention was observed in 28 cases which corresponded to an incidence of 10.0% (95% confidence interval (CI) 7.0%-14.1%). The baseline characteristics were shown in Table 1. The mean age was 66.3 ± 9.6 years old while the median parity was 3 (interquartile range (IQR) 2-4). Advanced stage (stage III-IV) of anterior, posterior and apical vaginal wall prolapse with regard to POP-Q system were identified in 72.4%, 41.6%, and 52.0%, respectively. There was no significant difference in terms of age, parity, BMI, menopausal status, presence of diabetes mellitus, stress urinary incontinence status, and type of prolapse when compared between the patients with and without postoperative urinary retention.

Table 1. Baseline characteristics of the participants (N=230).

	Overall (n=279)	Non-urinary retention (n=251)	Urinary retention (n=28)	p value
Age (years)	66.3 ± 9.6	66.0 ± 9.6	67.5 ± 9.7	0.14
Parity	3 (2-4)	3 (2-4)	4 (2-5)	0.51
Body mass index (kg/m^2)	24.9±3.6	24.7±3.6	23.5±3.3	0.20
Obesity (body mass index > 23 kg/m^2)	122 (43.7)	112 (44.6)	10 (35.7)	0.37
Diabetes mellitus	61 (21.9)	52 (20.7)	9 (32.1)	0.25
Menopause	257 (92.1)	231 (92.0)	26 (92.9)	1.00
Stress urinary incontinence	99 (35.5)	88 (35.1)	11 (39.3)	0.81
Prolapse type				
Anterior vaginal wall defect stage III-IVa	202 (72.4)	180 (71.7)	22 (78.6)	0.44
Posterior vaginal wall defect stage III-IVa	116 (41.6)	104 (41.4)	12 (42.9)	0.89
Apical prolapse stage III-IVa	145 (52.0)	133 (53.0)	12 (42.9)	0.31

Data are presented as mean ± standard deviation or number (%) or median (interquartile range)
a Pelvic Organ Prolapse Quantification (POP-Q) system.

Intra- and post-operative data was displayed in Table 2. The median operative time was 60 minutes (IQR 50-90 minutes) and the median blood loss was 80 ml. (IQR 50-150 ml). Anterior and posterior colporrhaphy were the two most common procedures performed in addition to vaginal hysterectomy (59.5% and 78.9%, respectively). Off all concomitant procedures, anterior colporrhaphy was significantly associated with an increased incidence of postoperative urinary retention (78.6% vs. 57.4%, OR 2.725; 95%CI 1.022-8.473; p = 0.03) (Table 3). Multivariate analysis showed that anterior colporrhaphy was an independent risk factor for postoperative urinary retention (Table 4). The majority of the patients received spinal anesthesia (236 out of 279; 84.6%) Among these, half was given spinal morphine. However, no correlation between spinal morphine and postoperative urinary retention was observed (43.0% vs. 39.3%; p = 0.84). Most of the patients had recovered uneventfully during postoperative period and were discharged from the hospital on postoperative day 2. The median duration of postoperative indwelling catheterization was 1.7 days. Patients diagnosed postoperative urinary retention were discharged with an indwelling catheter and were scheduled to return for a repeat trial of void was in the office within one or two weeks.

Table 2. Operative and postoperative characteristics of the patients.

	Overall (n=279)	Non-urinary retention (n=251)	Urinary retention (n=28)	p value
Concomitant operative procedure				
Anterior colporrhaphy	166 (59.5)	144 (57.4)	22 (78.6)	0.03
Anterior mesh augmentation	41 (14.7)	34 (13.5)	7 (25.0)	0.10
Posterior colporrhaphy	220 (78.9)	195 (77.7)	25 (89.3)	0.24
Total colpectomy	41 (14.7)	40 (15.9)	1 (3.6)	0.14
Mid urethral sling	74 (26.5)	68 (27.1)	6 (21.4)	0.68
Vaginal vault suspension	133 (47.7)	119 (47.4)	14 (50.0)	0.95
Anesthetic method				0.62
Spinal anesthesia	236 (84.6)	212 (84.5)	24 (85.7)	
General anesthesia	35 (12.5)	31 (8.8)	4 (14.3)	
Combined spinal and general anesthesia	8 (2.9)	8 (3.0)	0 (0)	
Intraoperative blood loss (ml)				
Operative time (minute)	80 (50-150)	100(50-150)	50 (50-137)	
Duration of indwelling catheter	60 (50-90)	60 (50-90)	62.5 (60-90)	
1 day	138 (49.5)	124 (49.4)	14 (50.0)	
2 days	95 (34.1)	87 (34.7)	8 (28.6)	
> 2 days	46 (16.5)	40 (15.9)	6 (21.4)	
Mean residual urine (ml.)	63.5 ± 77.5	43.1 ± 37.3	246.2 ± 102.1	

Data are presented as mean ± standard deviation or number (%) or median (interquartile range)

Table 3. Univariate analysis for prediction of postoperative urinary retention.

Characteristics	Odds ratio (95% confidence interval)	p value
Anterior colporrhaphy	2.725 (1.022-8.473)	0.03

Table 4. Multivariate logistic regression analysis for prediction of postoperative urinary retention (adjusted for age, advanced anterior vaginal wall defect and duration of indwelling catheter ≤ 1 day).

Characteristics	Odds ratio (95% confidence interval)	p value
Anterior colporrhaphy	2.662 (1.015-6.986)	0.047

Discussion

Although postoperative urinary retention is a common complication following POP surgery, the incidence among the patients undergoing vaginal hysterectomy and additional repair procedures at our institute was only 10.0% which was noticeably lower that the incidence of 12-29% reported by previous studies[4-8]. This 10.0% incidence may seem comparable when looking only at the final outcome. However, when focusing on the definition used to define postoperative urinary retention, our study had preferred much less cut-off residual volume of 150 ml. when compared to other literatures. Additionally, when compared to the result of Chong' study[7] whose criteria for diagnosing postoperative urinary retention was 150 ml. or more, their reported incidence of 27.1% which was considerably higher than our result. In Chong's study, urinary retention was diagnosed by ascertaining the residual urine volume after the first spontaneous void. However, in our study, the post-voiding residual urine after the second spontaneous void was measured and used for the diagnosis of urinary retention. This could explain the difference in the incidence of postoperative urinary retention, as we believe that the results obtained after the second spontaneous void are more accurate because it eliminates patients' anxiety during their first spontaneous void, which may lead to an overdiagnosis of urinary retention. Since vaginal hysterectomy, with or without concomitant vaginal procedures, was the most common procedure performed for pelvic organ prolapse, we were then interested in choosing this procedure to be our inclusion criteria to help recruit patients for our study.

Advanced degree and type of prolapse were found by many previous studies to be independently associated with postoperative urinary retention following POP surgery[4,5]. The hypothesis behind the prolapse compartment associated with the outcome was that severe anterior compartment prolapse would be extensive dissection and manipulation of the bladder, and therefore, a resultant increase in postoperative urinary retention. However, our study failed to demonstrate any correlation. The variations in the results between studies might be due to the difference in criteria for the diagnosis of urinary retention, and difference in the surgical technique used, such as Kelly plication. For intraoperative risk factors, anterior colporrhaphy was the only procedure contributing to the development of postoperative urinary retention after prolapse repair among our patients. It can be postulated that extensive dissection and manipulation of the bladder and the bladder neck during anterior colporrhaphy may interfere with the bladder sensation and function, resulting in postsurgical urinary retention. Although levatoplasty, Kelly plication, and massive intraoperative blood loss were reported by previous literatures[5] to be significant risk factors of postoperative urinary retention, our study could not identify any association since these two procedures were no longer performed in our urogynecology unit and no massive hemorrhage was encountered during the study period.

Chong et al[7] found that the incidence of postoperative urinary retention was associated with early postoperative day of urinary catheter removal (day 1). The result was inconsistent with our study outcome in which no significant correlation was found between the incidence of postoperative urinary retention and the duration of postoperative indwelling catheterization. This is possibly due to the difference in the types of surgical procedures and surgical technique. In addition, our study found that age was not an independent risk

factor for urinary retention, which was in discordance with previous study[7]. This may be due to insufficient power in our study.

The major limitation of our study was the nature of retrospective data and lack of standardized institutional protocol on the duration of postoperative indwelling catheterization. The decision to remove urinary catheter was made by an individual attending physician. This could possibly lead to under- or over-estimated prevalence of postoperative urinary retention and inaccurate determination of associated risk factors. In addition, the sample size might be too small having inadequate power to define the risk factors. Moreover, other potential risk factors of postoperative urinary retention were not evaluated such as the surgeon's experience, postoperative pain score, and perioperative urinary tract infection. Larger prospective studies are further needed to thoroughly evaluate the incidence and possible associated risk factors of postoperative urinary retention.

Preoperative acknowledgement of the risk factors of postoperative urinary retention in women undergoing POP repair procedures can help identify the patient at risk leading to better counseling, early detection, and proper management.

Conclusion

In conclusion, the incidence of postoperative urinary retention in patients undergoing vaginal hysterectomy and concomitant prolapse repair procedures was 10.0%. Anterior colporrhaphy was the only factor associated with postoperative urinary retention.

Potential conflicts of interest

The authors declare no conflict of interest.

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