Research Article

Incidence of Post-Operative Urinary Retention after Pelvic Organ Prolapse Reconstruction

Insidensi Retensio Urin Pascarekonstruksi Prolaps Organ Panggul

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Abstract

Objective: To determine the incidence of post-operative urinary retention after pelvic organ prolapse reconstruction and associated factors.

Method: This was a prospective cohort study conducted in Dr. Cipto Mangunkusumo and another associate hospital. We recruited women planned for pelvic organ prolapse reconstruction from April 2013 to April 2015. Inclusion and exclusion criteria were women with pelvic organ prolapse (2nd, 3rd and 4th degree) without prior urinary retention, drugs affecting bladder function, and history of bladder injury. After surgery, urinary catheter was applied for 24 hours. Six hours apart from urinary catheter released, residual urine was measured. Urinary retention was defined as residual urine more than 100 ml.

Result: Of 200 subjects, 59 of them (29.5%) classified as having urinary retention. No association found between age, body mass index (BMI), degree of prolapse, degree of cystocele and urinary tract infection toward urinary retention. Total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation and reconstruction duration more than 130 minutes were associated with urinary retention (relative risk (RR) 3.66; 95% CI 2.91-4.60; p<0.001 and 1.66; 95% CI 1.07-2.59; p=0.02; respectively).

Conclusion: The incidence of post-operative urinary retention after pelvic organ prolapse reconstruction is quite high. Reconstruction duration and type of reconstruction are associated with urinary retention.

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Keywords: pelvic organ prolapse reconstruction, postoperative urinary retention, risk factor

Abstrak

***Tujuan**: Untuk mengetahui insidensi retensio urin pascarekonstruksi prolaps organ panggul dan faktor-faktor yang berhubungan.*

***Metode**: Penelitian kohort prospektif ini dilaksanakan di RS Dr. Cipto Mangunkusumo dan RS jejaring dengan mengikutsertakan perempuan yang hendak mengalami rekonstruksi prolaps organ panggul dalam rentang waktu April 2013 hingga April 2015. Kriteria inklusi dan eksklusi subjek meliputi perempuan dengan prolaps organ panggul derajat 2, 3 dan 4 tanpa riwayat retensio urin sebelumnya, konsumsi obat-obatan yang dapat menyebabkan retensio urin dan tanpa cedera kandung kemih. Pascarekonstruksi, subjek dilakukan pemasangan kateter urin selama 24 jam. Kemudian, enam jam pascapelepasan kateter, dilakukan pengukuran residu urin pada kandung kemih. Retensio urin didefinisikan dengan didapatkannya residu urin lebih dari 100 ml.*

***Hasil**: Dari 200 subjek, ditemukan 59 subjek (29,5%) mengalami retensio urin. Tidak ada hubungan antara faktor risiko umur, Indeks Massa Tubuh (IMT), derajat prolaps, derajat sistokel, dan kejadian infeksi saluran kemih terhadap retensio urin. Jenis prosedur total vagina hysterectomy + kolporafi anterior + kolpoperineorafi + sacrospinous fixation, dan durasi operasi > 130 menit berhubungan dengan retensio urin dengan RR 3,66; 95% IK 2,91-4,60; p<0,001 dan RR 1,66; 95%IK 1,07-2,59; p=0,02.*

***Kesimpulan**: Insidensi retensio urin pascarekonstruksi prolaps organ panggul cukup tinggi. Durasi operasi dan jenis rekonstruksi berhubungan dengan retensio urin.*

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***Kata kunci**: faktor risiko, prolaps organ panggul, retensio urin pascaoperasi*

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INTRODUCTION

Pelvic organ prolapse (POP) causes morbidity for women as it can decrease the quality of life, both physically and sexually. As a main management procedure, POP reconstruction surgery has been performed 200.000 times annually in USA.[1,2] However, this number was only representative for those who underwent POP reconstruction, not a total population of women suffered from POP as it was estimated 24% of women aged above 20 years old.[3] Until now, the management of POP was based on stadium and symptoms of the patients through both conservative and surgical procedures as available options.[4] One of complications after reconstruction surgery that could prolong the duration of hospitalization and patients quality of life was the post operative urinary retention.[5]

The incidence of post-operative urinary retention was varied among institutions. In a study reporting patients underwent vaginal mesh procedure, post urinary retention after POP reconstruc-

tion was accounted among 34% subjects.[6] Meanwhile, 29% patients underwent colporaphy experienced urinary retention.[7]

The main cause of post-operative urinary retention was the anesthetic and anatomical injury related to POP reconstruction.[8,9] Theoritically, all types of reconstruction have risk to cause post operative urinary retention.[10] Other possible risk factors for post operative urinary retention consisted of age, body mass index (BMI), and urinary tract infection.[11] Management of post-operative urinary retention was through chatheterization. However, the use of catheter itself could lead to urinary tract infection. Current data estimated that urinary tract infection after colporaphy was around 10-46%.[12,13] In the other hand, the use of catheter in a short duration could lead to abnormal spontaneous bladder emptying, which increased the risk of urinary retention.[14] Identification of risk factors associated with POP reconstruction is important for clinicians to be aware of susceptible patients and get prepared for further patients management. Currently, there is still a few prospective studies evaluating potential risk factors for post operative urinary retention among patients undergoing POP reconstruction in Indonesia. Therefore, this study aims to determine the incidence of post-operative urinary retention after pelvic organ prolapse reconstruction and factors associated with it.

METHODS

This was a prospective cohort study which recruited women underwent POP reconstruction in two referral public hospitals, Dr. Cipto Mangunkusumo and another associate hospital. This study was held from April 2013 to April 2015.

The inclusion criteria of the study were women underwent POP reconstruction for 2nd, 3rd, and 4th degree of POP. Subjects with prior history of urinary retention, taking drugs that potentially affect bladder function, and prior bladder injury were excluded. As this study tried to evaluate the potential risk factors in cohort study, we used rule of thumb formula to estimate the sample size. Prior study revealed that the incidence of post urinary retention could be around 29%. Thus, we calculated the sample size as ten times risk factors divided into the incidence rate.

We identified age, body mass index (BMI), degree of prolapse, degree of cystocele, duration of surgery, type of reconstruction, and urinary tract infection as potential risk factors. As a result, 241 women were calculated as the minimum sample size. We recruited the samples consecutively.

All subjects who would like to participate in this study had to sign the informed consent. All subjects got prophylactic antibiotic (1 gram of co-amoxiclav) one hour prior POP reconstruction. Patients were allowed to drink after surgery (around 2,000 cc in 24 hours). Twenty-four hours after POP reconstruction, the catheter was released by trained nurse or doctor in charge in recovery room. Six hours apart, patients were asked to urinate by themselves. Catheter was then applied to measure residual urine in bladder. Urine dipstick test was used to screen for urinary tract infection.

Urinary retention was defined as loss of spontaneous urinary process six hours after catheter being released with residual urine in bladder more than 100 ml. Body mass index was classified according to Asia-Pacific criteria by World Health Organization.[15] Degree of prolapse was classified based on Pelvic Organ Prolapse Quantification System (POP-Q).[16] Urinary tract infection was assessed using one positive result from either nitrit or leucocyte esterase test by dipstick.[17,18]

Data analysis was performed using SPSS statistics for Windows version 22. The numerical data were analyzed for its normality using Kolmogorov-Smirnov test. Dependent variable was urinary retention; while, independent variables were the risk factors. Duration of operation cut-off for categorization was assessed statistically using receiver operating curve (ROC). Chi-square or Fisher exact as its alternative were used for categorical data analysis. Independent t-test was also used for numerical bivariate analysis. We took the p value less than 0.05 as statistically significant. All bivariate analysis with initial $p<0.2$ were entered for multivariate analysis using logistic regression test.

RESULTS

Of 200 subjects recruited, 59 of them (29.5%) were experienced post-operative urinary retention. The median of residual urine among subjects at six hours after urinary catheter being released was 112.2 (7-780 for the minimum-maximum) ml. Most of the subjects aged above 50 years old (170 subjects; 85.0%). The characteristics of patients were presented in Table 1. Meanwhile, the type and du-

ration of POP reconstruction were shown in Table 2. The median duration of POP reconstruction was 130.0 minutes. We determined more than 130 minutes as a cut-off point to classify prolong duration of POP reconstruction. Fifty-one percent subjects experienced more than 130 minutes duration of POP reconstruction. Total vagina hysterectomy + anterior colporaphy + colpoperineoraphy was the most frequent type of reconstruction being used among subjects (128 subjects; 64.0%). Sixty-six subjects (33.0%) were positive for either nitrit or leukocyte esterase.

Table 1. Patients' Characteristics (n=200)

Characteristics	**n**	**%**
Age (median, min-max)	60.5 (34.0-87.0) years old	
≤ 50 years old	30	15.0
> 50 years old	170	85.0
BMI (median, min-max)	24.0 (15.6-35.2) kg/m^2	
Underweight	8	4.0
Normoweight	68	34.0
Overweight	58	29.0
Obesity I	56	28.0
Obesity II	10	5.0
Degree of prolapse		
Second degree	59	29.5
Third and fourth degree	141	70.5
Degree of cystocele		
Second degree	39	19.5
Third and fourth degree	161	80.5
Hospital		
Dr. Cipto Mangunkusumo	140	70.0
Another associate hospital	60	30.0

Table 2. Duration and Type of POP Reconstruction

Reconstruction Procedure	**n**	**%**
Duration in minutes (median, min-max)	130.0 (45.0-360.0)	
≤ 130 minutes	103	51.5
> 130 minutes	97	48.5
Type of reconstruction		
Colpocleisis	28	14.0
Colpoperineoraphy	4	2.0
Total vagina hysterectomy +anterior colporaphy + colpoperineoraphy	128	64.0
Anterior et posterior colporaphy	26	13.0
Total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation	6	3.0
Anterior colporaphy + colpoperineoraphy + sacrospinous fixation	8	4.0

Bivariate analysis between various risk factors for post operative urinary retention was shown in Table 3. Duration of POP reconstruction more than 130 minutes and TVH + anterior colporaphy + colpoperineoraphy + sacrospinous fixation were two identified factors which had association with post operative urinary retention with relative risk (RR) 1.66 (1.07-2.59 95% CI; p=0.02) and 3.66 (2.91-4.60 95% CI; p<0.001); respectively. Age, BMI, degree of prolapse, and degree of cystocele did not have association with urinary retention. The correlation analysis using Spearman test between duration of reconstruction and residual urine had a coefficient of 0.18 (p=0.012). However, TVH + anterior colporaphy + colpoperineoraphy + sacrospinous fixation could not include into multivariate analysis as this factor had a cell with 0 (zero) value; thus, the odds ratio (OR) could not be calculated statistically. From multivariate analysis, only duration of POP reconstruction more than 130 minutes showed a significant association with urinary retention (RR = 1.8) (shown in Table 4).

Table 3. Bivariate Analysis between Postoperative Urinary Retention and its Risk Factors

Risk factors	Post-operative urinary retention		Relative Risk (95% IK)	p
	Yes (n=59)	No (n=141)		
Age (years old)	60.0	61.0		0.59[a]
(median, min-max)	(37.0-74.0)	(34.0-87.0)		
≤ 50 years (%)	7 (23.3)	23 (76.7)	1	0.42[b]
> 50 years (%)	52 (30.6)	118 (69.4)	1.31 (0.66-2.60)	
BMI	24.2	23.8		0.60[a]
(median, min-max)	(16.2-35.2)	(15.6-34.1)		
Not obese (%)	38 (29.5)	91 (70.5)	1	0,98[b]
Obese (%)	21 (29.6)	50 (70.4)	1.00 (0.64-1.57)	
Degree of prolapse (%)				
mild	17 (28.8)	42 (71.2)	1	0.89[b]
Advanced (3&4)	42 (29.8)	99 (70.2)	1.03 (0.64-1.66)	
Degree of cystocele (%)				
mild	9 (23.1)	30 (76.9)	1	0.33[b]
advanced (3&4)	50 (31.1)	111 (68.9)	1.07 (0.94-1.24)	
Duration of reconstruction in minutes	150	120		0.05[a]
(median, min-max)	(60-360)	(45-285)		
≤ 130 minutes (%)	23 (22.3)	80 (77.7)	1	0.02[b]
>130 minutes (%)	36 (37.1)	61 (62.9)	1.66 (1.07-2.59)	
Type of POP reconstruction (%)				
Colpocleisis	6 (21.4)	22 (78.6)	0.69 (0.33-1.46)	0.31[b]
Colpoperineoraphy	0	4 (100.0)	0.33 (0.02-4.63)	0.19[b]
Total vagina hysterectomy + anterior colporaphy + colpoperineoraphy	41 (32.0)	87 (68.0)	1.28 (0.80-2.05)	0.29[b]
Anterior et posterior colporaphy	3 (11.5)	23 (88.5)	0.36 (0.12-1.06)	0.03[b]
Total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation	6 (100)	0	3.66 (2.91-4.60)	<0.001[c]
Anterior colporaphy + colpoperineoraphy + sacrospinous fixation	3 (37.5)	5 (62.5)	1.28 (0.51-3.23)	0.61[c]
Urinary tract infection				
Nitrit or leukocyte esterase positive	21 (31.8)	45 (68.2)	1.12 (0.72-1.75)	0.61[b]
Negative	38 (28.4)	96 (71.6)	1	

[a]*Mann-Whitney test,* [b]*Chi-Square test,* [c]*Fisher-exact test*

Table 4. Regression Analysis of Duration of POP Reconstruction

Duration	Urinary retention (%)	No urinary retention (%)	OR (95% CI)	Probability	RR
> 130 minutes	36 (61.0)	61 (43.3)	2.05 (1.10-3.82)	0.409	1.80
≤ 130 minutes	23 (39.0)	80 (56.7)		0.227	refference

**Probability =1/(1+exp (-y)) with y as the regression equation; y = constant+β\ixi*

DISCUSSION

In this study, we found that the incidence of post-urinary retention was 59 subjects (29.5%). Previously, there was similar study using case control method which found that the post-urinary retention after POP reconstruction in Dr. Cipto Mangunkusumo Hospital. Priyatini, et al. found the incidence of post-urinary retention after POP reconstruction was 29%.[19] Our study improved the quality of previous study by using prospective cohort method compared to retrospective study conducted before. The criteria of urinary retention in this study was also similar with Priyatini, et al. study which meant residual urine more than 100 ml at six hours after urinary catheteter being released. Another study described that the incidence of post urinary retention after surgery was around 5-70%.[20] Especially for patients undergoing urogynecology surgery, the incidence of urinary retention after surgery was reported to range from 2.5 to 43%.[21]

This study found there was no association between obesity based on BMI also age and urinary retention after POP reconstruction. Previously, it has been known that these two factors were preoperative risk factors for post-operative urinary retention.[21] Pelvic organ prolapse reconstruction is the highest risk for urinary retention in the field of gynecology. Prolapse repair surgery can cause the alteration in vesico-urethral junction which interfering the urination. In addition, the procedure involves the retropubic space and vagina. This can cause misdisruption of nerve branches which contributes to neuropathy and finally, the neuropathy impacts to the urinate sensation. In addition to age and BMI, advanced degree of prolapse (3rd and 4th degree) and urinary tract infection (UTI) were also known to increase the risk of urinary retention.[21] Urinary retention and UTIs are two related processes. The presence of residual urine more than 30 mL after reconstruction was related to the risk factor for urinary retention.[22] In this study, advanced degree of prolapse was not associated with the urinary retention. A study by Hakvoort, et al. showed that urinary retention was associated with the degree of cystocele. Advanced degree of cystocele (3rd and 4th degree) increased the risk of post-operative urinary retention after POP reconstruction.[10] Unfortunately, we did not assess this risk due to advanced degree of cystocele in the study.

In this study, it was found that the total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation was associated with urinary retention after POP reconstruction with the relative risk 3.66; 95% CI 2.91 to 4.60 (p <0.001). Moreover, the duration of surgery more than 130 minutes was associated with the urinary retention. It was noteworthy that 100% of subjects with total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation had duration more than 130 minutes. A study by Priyatini, et al. held in Dr. Cipto Mangunkusumo hospital patients concluded that there were no risk factors for the type of procedure which was related to urinary retention after POP reconstruction.[19] Geller, et al. declared intraoperative factors such as blood loss more than 100 ml, administration of fluids more than 750 ml and more doses of anesthesia due to longer duration of surgery were associated with urinary retention.[21] This result was similar to study by Lamonerie, et al. which explained that the duration of surgery more than 120 minutes increased the risk of urinary retention with OR 3.03, 95% CI 1.39-6.61.[23]

The use of bupivacaine spinal anesthesia in all subjects of this study was not the reason for high number of patients experienced urinary retention. From the literature, it was known that spinal anesthesia was a risk factor for urinary retention as it interrupted the afferent and afferent nerve fibers disrupting the micturition reflex. Blockade of afferent nerve fibers would cause bladder analgesia while blockade of the afferent nerve fibers interfered with detrusor muscle motor activity.[24] However, as the measurement of post void residual (PVR) at 24 hours post-procedure, the anesthetic

effect had disappeared. It was known that the time to return to normal voiding function in patients with bupivacaine was up to 362 minutes (7-8 hours).[21]

The limitation of this study included insufficient sample size targets. In this study, 241 subjects were expected to be fulfilled. However, due to the limited time of the study, only 200 subjects collected for analysis.The results of this study showed statistically significant ($p<0.05$) for certain risk factors; therefore, it was not mandatory to calculate the power of this study. Besides, UTI identification based solely on urine dipstick test. Although we did not use gold standard of urine culture, positive results of nitrites or leukocyte esterase test had been reported to have a sensitivity and specificity more than 80% and 77%; respectively.[18]

CONCLUSION

There is no relationship between age, BMI, degree of prolapse, degree of cystocele, or post-reconstruction ISK and the post operative urinary retention. Prolong duration of reconstruction and total vagina hysterectomy + anterior colporaphy + colpoperineoraphy + sacrospinous fixation are associated with post-operative urinary retention after POP reconstruction.

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