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Risk Factors for Postoperative Urinary Retention in Surgical Population: A Prospective Cohort Study

Cerrahi Popülasyonda Postoperatif Üriner Retansiyon Risk Faktörleri: Prospektif Kohort Çalışması

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What's known on the subject? and What does the study add?

Postoperative urinary retention in surgical population is associated with both infectious and non-infectious complications and increased patient distress. This study helps to investigate the incidence of postoperative urinary retention (POUR) and reveal the perioperative risk factors related with POUR.

Abstract

Objective: Urinary retention is a common postoperative problem. We aimed to investigate the incidence of postoperative urinary retention (POUR) in surgical population and identify the perioperative risk factors for POUR.

Materials and Methods: A total of 332 patients, who underwent elective surgery between May 2012 and July 2012, were included in this prospective observational study. Patients under 18 years of age and those with a history of renal failure or benign prostate obstruction were excluded from the study. Group 1 was consisted of patients who had not developed POUR, whereas patients who experienced POUR were included in group 2. Demographic variables and risk factors related with POUR were compared between the two groups.

Results: Of the 332 patients enrolled in the study, 179 (53.9%) were men and 153 (46.1%) were women. Thirty-three (9.9%) patients developed urinary retention. Comparison of demographic and perioperative variables between the two groups revealed that Diabetes Mellitus (DM) and spinal anesthesia were significantly associated with POUR (p=0.039 and p=0.043, respectively). Multivariate logistic regression analysis found that DM [p=0.017, odds ratio (OR): 3.009; 95% confidence interval (CI), 1.221– 7.414] and spinal anesthesia (p=0.031, OR: 2.266; 95% CI, 1.079-4.760) were significant independent risk factors for developing POUR.

Conclusion: DM and spinal anesthesia were found to be risk factors for POUR. Awareness of risk factor for POUR during preoperative anesthesiology evaluation may help identify patients at risk for POUR, who could benefit from interventions, and prevent POUR and its potential complications.

Keywords: Postoperative urinary retention, Risk factors, Incidence of POUR

Öz

Amaç: Üriner retansiyon sık görülen bir postoperatif problemdir. Bu çalışmada cerrahi popülasyondaki postoperatif üriner retansiyon (POUR) insidansını ve gelişiminde rol oynayan perioperatif risk faktörlerini değerlendirmeyi amaçladık.

Gereç ve Yöntem: Mayıs ve Temmuz 2012 tarihleri arasında elektif cerrahi geçiren 332 hasta bu prospektif kohort çalışmasına dahil edildi. On sekiz yaşından genç hastalar, renal yetmezlik ve benign prostat obstrüksiyonu olan hastalar çalışma dışı bırakıldı. POUR gözlenmeyen hastalar grup 1, POUR gözlenen hastalar ise grup 2 olarak değerlendirildi. Gruplar demografik değişkenler ve POUR gelişimi için risk faktörü kabul edilen değişkenler açısından karşılaştırıldı.

Bulgular: Çalışmaya dahil olan 332 hastanın 179'u (%53,9) erkek; 153'ü (%46,1) ise kadın idi. Otuz üç (%9,9) hastada POUR gelişti. Gruplar demografik değişkenler ve POUR gelişimi için risk faktörleri açısından karşılaştırıldığında Diyabetes Mellitus (DM) ve spinal anestezi POUR gelişimi

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için anlamlı risk faktörleri olarak bulundu (p=0,039, p=0,043, sırasıyla). Çok değişkenli lojistik regresyon analizi sonucunda ise DM [p=0,017, odds ratio (OR): 3,009; 95% confidence interval (CI), 1.221-7.414] ve spinal anestezi (p=0,031, OR: 2,266; 95% CI, 1,079-4.760) POUR gelişimi için anlamlı bağımsız risk faktörleri olarak saptandı.
Sonuç: DM ve spinal anestezi postoperatif üriner retansiyon gelişimi için risk faktörleri olarak tespit edildi. Preoperatif anestezi değerlendirilmesinde POUR risk faktörlerinin farkında olunması POUR riski taşıyan hastaların belirlenmesi ve bunu önleyecek girişimlerde bulunulması üriner retansiyonun olası potansiyel komplikasyonların önlenmesi açısından önem arz eder.
Anahtar Kelimeler: Postoperatif üriner retansiyon, POUR risk faktörleri, POUR insidansı

Introduction

Postoperative urinary retention (POUR) is a common complication following surgery. The incidence of POUR in different studies varies from 5% to 70% (1,2). Differences in patient characteristics, different definitions of POUR, types of surgery and anaesthesia and perioperative fluid therapy are considered potential reasons for this extensive variability in its incidence. POUR which may be prolonged and complicate the postoperative period may lead to bladder overdistention and detrusor dysfunction when not identified and treated in time (3). Recognition of risk factors for POUR, which may pave the way to avoidance of this problem, is particularly important due to potential urethral injury and urinary tract infection following catheterization. In this study, we aimed to evaluate the incidence of postoperative POUR in patients who underwent elective surgery and identify the perioperative risk factors for this common postoperative problem.

Material and Method

This study was designed as a prospective cohort study. After obtaining local ethics committee approval, patients who underwent elective surgery under general or spinal anesthesia or peripheral nerve block between May 2012 and July 2012 were included in the study. Patients under 18 years of age and those having a history of renal failure or benign prostate obstruction were excluded from the study. Written informed consent was obtained from all patients. Type of the anesthesia was determined by the anesthetist responsible for the management of the anesthesia. Demographic variables, comorbidity, such as Diabetes Mellitus (DM), history of abdominopelvic surgery, American Society of Anesthesiologists score, operation type (abdominal, anorectal, eye, ear-nose-throat, thyroid-breast, orthopedic, urinary, vascular surgery), surgery duration, perioperative atropin usage, periopertaive opioid usage, anesthesia duration, perioperative fluid intake (<500 mL, 500-1000mL, >1000 mL), postoperative fluid intake (≤1000mL, >1000 mL), and perioperative blood loss (≤100 mL, >100 mL) were recorded (Table 1). Urinary retention was defined as urethral catheterization requirement due to inability to completely or partially empty the bladder in the postoperative 24 hours. Group 1 consisted of patients who had not developed POUR, whereas patients who experienced POUR were included in group 2. Demographic variables and risk factors related with POUR were compared between the two groups.

Statistical Analysis

All data are expressed as mean ± standard deviation for normally distributed data and median with range for skewed data. The Student's t-test was used to evaluate differences between groups for normally distributed data, or the Mann-Whitney U test for non-normality. The association of each potential risk factor with urinary retention was analysed by univariate and multivariate logistic regression analyses (SPSS Statistics for Windows, version 22, IBM Corp., Armonk, N.Y., USA). A p value of 0.05 or less was considered statistically significant.

Results

Of the 332 patients enrolled in the study, 179 (53.9%) were men and 153 (46.1%) were women. Thirty-three (9.9%) patients developed urinary retention. Comparison of demographic and perioperative variables between the two groups revealed that DM and spinal anesthesia were significantly associated with POUR (p=0.039 and p=0.043, respectively) (Table 1). Multivariate logistic regression analysis showed that the risk of POUR was three times higher in patients with DM compared to non-diabetic patients (p=0.017, odds ratio: 3.009; 95% confidence interval, 1.221-7.414). Furthermore, type of anesthesia was also determined as a risk factor for POUR in multivariate logistic regression analysis. Patients who were operated under spinal anesthesia were 2.3 times more likely to develop POUR when compared to patients operated under general anesthesia or peripheral nerve block.

Discussion

POUR is a common problem among patients undergoing surgery and may be a major source of pain, infection, and increased cost. Pain, restlessness and confusion, especially in elderly patients, which may delay hospital discharge are some potential consequences of postoperative bladder distension and associated urinary retention (4). Nevertheless, permanent

Table 1. Demographic and perioperative variables

		Group 1 (No POUR) (n=299)	Group 2 (POUR) (n=33)	p value
Age (mean ± SD)		46.4±15.65	44.5±14.55	0.502[a]
Gender (n, %)	Female	142 (47.5%)	11 (33.3%)	0.122[c]
	Male	157 (52.5%)	22 (66.7%)	
Surgery duration (min.)		70 (10-245)	80 (30-220)	0.510[b]
Anesthesia duration (min.)		90 (18-285)	90 (40-250)	0.718[b]
ASA score (n, %)	I	172 (57.5%)	18 (54.5%)	0.451[c]
	II	116 (38.8%)	15 (45.5%)	
	III	11 (3.7%)	0 (0%)	
Diabetes Mellitus		31 (10.4%)	8 (24.2%)	<0.039[d]
Previous abdominopelvic surgery (n, %)		47 (15. 7%)	8 (24.2%)	0.211[c]
Perioperative fluid intake (mL)	<500	24 (8%)	4 (12.1%)	0.255[c]
	500-1000	181 (60.5%)	23 (69.7%)	
	>1000	94 (31. 4%)	6 (18.2%)	
Perioperative blood loss (mL)	≤100	253 (84.6%)	25 (75.8%)	0.191[c]
	>100	46 (15.4%)	8 (24.2%)	
Postoperative fluid intake (mL)	≤1000	96 (32.1%)	12 (36.4%)	0.620[c]
	>1000	203 (67.9%)	21 (63.6%)	
Perioperative atropin usage		143 (47.8%)	17 (51.5%)	0.687[c]
Type of the anesthesia	General	178 (59.5%)	15 (45.5%)	0.043[c]
	Spinal	103 (34.4%)	18 (54.5%)	
	Block	18 (6%)	0 (0%)	
Perioperative opioid usage		140 (46.8%)	14 (42.4%)	0.631[c]
Type of the operation	Abdominal	115 (38.5%)	16 (48.5%)	0.432[e]
	Anorectal	20 (6.7%)	4 (12.1%)	
	Ortopedics	66 (22.1%)	7 (21.2%)	
	Cardiovascular	15 (5%)	2 (6.1%)	
	Eye-ear-nose-throat	56 (18.7%)	2 (6.1%)	
	Thyroid-breast	25 (8.4%)	2 (6.1%)	
	Urinary	2 (0.7%)	0 (0%)	

ASA: American Society of Anesthesiologists, POUR: Postoperative urinary retention, min: Minimum,
[a]: Student's t test, [b]: Mann-Whitney U test, [c]: Pearson ci-square test, [d]: Fisher's Exact test, [e]: Fisher-Freeman-Halton Exact test, SD: Standard deviation

changes in bladder contractility leading to urinary dysfunction may arise from overdistension of the bladder (5). Prevention of POUR which may prolong and complicate the postoperative period requires the identification of patients with perioperative risk factors to avoid potential consequences of catheterization such as urethral injury and urinary tract infection.

The incidence of POUR in different studies varies from 5% to 70% (1,2). This wide range of incidence may be attributed to different patient populations, operative conditions and difficulties in estimating bladder volume. One of the three methods has been used to diagnose POUR: physical examination, identifying need for bladder catheterization, and ultrasonographic assessment. In our study, 33 (9.9%) patients developed urinary retention. Relatively low incidence of POUR found in our study is may be due to not using ultrasongraphy for detecting urinary retention.

Age has been shown to increase the risk of POUR by 2.4 times in patients over 50 years of age (6). However, in our study, there was no significant difference in age between the groups (p=0.502)

Previous reports indicated a higher incidence of POUR in men compared to women (6). Nevertheless, gender was not reported as a risk factor for POUR in our study (p=0.122). This finding may be related with the fact that benign prostatic obstruction as major gender-specific pathology increasing POUR risk was excluded in our study.

It is known that there is an association between the type of surgery and incidence of POUR. Particularly, the incidence of POUR in patients undergoing anorectal surgery has been reported to vary between 1% and 52% (7). Injury to the pelvic nerves and anal pain associated with internal anal sphincter hypertonia are the acknowledged factors for this high incidence.

On the other hand, there was no significant association between the risk of POUR and type of surgery in our study (p=0.432). The incidence of POUR was higher in patients who underwent anorectal surgery, however, this finding did not reach statistical significance (p=0.432).

POUR might be expected in case of intravenous infusion of excessive amount of fluid by mechanism of overdistention of the bladder. Nevertheless, there was no difference in peri- and post-operative fluid intake which was evaluated in interquartile ranges such as <500 mL, 500-1000mL, >1000 mL and ≤1000 mL, respectively between the two groups in our study (p=0.255 and p=0.620, respectively).

In the literature, there are conflicting reports regarding the relationship between duration of surgery and POUR risk. Mulroy et al. (8) stated that prolonged operative time can cause POUR. Contrary, Petersen et al. (9) did not find any causal relationship between duration of surgery and risk of POUR. In our study, neither duration of operation nor duration of anesthesia had an effect on POUR risk (p=0.510 and p=0.718, respectively).

Although anticholinergic drugs, such as atropine, are known to block detrusor contractions which may lead to bladder hypotonia and urinary retention, we did not find any link between atropin usage and POUR (p=0.687) (6). Moreover, there was no significant difference in the effects of opioids, which potentially decrease the urge sensation and detrusor contraction, between the two groups (p=0.631) (10).

Since DM is associated with loss of bladder sensation, increased bladder capacity and decreased contractility, patients with DM are prone to develop POUR (11). Toyonaga et al. (7) found that DM was an independent risk factor for developing POUR. They reported that the prevalence of POUR (defined as need for catheterisation within 24 hours postoperatively) was 16.7% in this population.

In line with this research, we found that DM was significantly associated with POUR (p=0.039); moreover, the risk of developing POUR was increased almost three-fold if the patient had co-existing DM. Therefore, particular attention should be paid to patients with DM, and their risk of developing POUR.

The literature has conflicting reports regarding the relationship between the type of anesthesia and POUR. Nevertheless, spinal anesthesia generally considered a risk factor for POUR due to the blockage of transmission of action potentials in the sacral nerves innervating the bladder (12). Particularly, use of bupivacaine as a long-acting local anesthetics may aggravate the effect of spinal anesthesia on development of urinary retention (13). In our study, spinal anesthesia was significantly associated with POUR (p=0.043). Moreover, type of anesthesia was also determined as a risk factor for POUR in multivariate logistic regression analysis. Patients who were operated under spinal anesthesia were 2.3 times more likely to develop POUR when compared to patients operated under general anesthesia or peripheral nerve block. This finding may be the result of preference of bupivacaine as a local anesthetic agent during spinal anesthesia procedure in our study population.

However, this study has a limitation that need to be considered in interpreting the findings. Ultrasonography, which is an objective method for identifying urinary retention, was not used in our study due to technical capability of the hospital. Instead, clinical assessment was the major indicator of urinary retention which was defined as requirement of urethral catheterization due to inability to completely or partially empty the bladder in postoperative 24 hours.

Conclusion

DM and spinal anesthesia were found to be risk factors for POUR. Awareness of risk factors for POUR during preoperative anesthesiology evaluation may help identify patients at risk of POUR, who could benefit from interventions, and prevent postoperative retention and its potential complications.

Ethics

Ethics Committee Approval: Obtaining local ethics committee approval, patients who underwent elective surgery under general or spinal anesthesia or peripheral nerve block between May 2012 and July 2012 were included in the study

Informed Consent: This study was designed as a prospective cohort study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: M.Ç., Design: M.Ç., Data Collection or Processing: M.Y., M.Ç., Analysis or Interpretation: M.Ç., Y.K., Literature Search: M.Ç., İ.A., Ö.Ç., Writing: M.Ç., Ö.Ç.

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