

Postpartum urinary retention after vaginal delivery: Assessment of contributing factors

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Objective: To evaluate the incidence of postpartum urinary retention (PUR) after vaginal delivery and to determine the risk factors for PUR.

Methods: A retrospective case-control study of parturients with PUR after vaginal delivery between June 2007 and July 2008. Four controls, matched for date of delivery, were selected for each case in univariate and multivariate conditional logistic regression analyses.

Results: There were 860 deliveries and 52 cases of PUR (incidence, 6%). All cases of PUR were managed with insertion of a Foley catheter with resolution before hospital discharge. Univariate analysis showed birth weight, increasing duration of the first and second stages of labor, biparietal diameter, perineal trauma, and epidural anesthesia to be significantly associated with PUR. Only perineal trauma remained statistically significant based on multivariate analysis.

Conclusion: Perineal trauma was identified as the single most important associated risk factor for PUR after vaginal delivery. The findings of this study provide information for further exploration on how to reduce perineal trauma during vaginal delivery.

Key words: Postpartum urinary retention; Vaginal delivery; Perineal trauma

Introduction

The incidence of postpartum urinary retention (PUR) varies widely, from 0.05%¹ to 51.7%² of all deliveries.² Thus, PUR after vaginal delivery is a relatively common event. Nonetheless, PUR has been underdiagnosed and considered to be a trivial complication after vaginal delivery. Thus, few data exist with regard to the pathophysiologic mechanism or the appropriate diagnostic modality by which to predict PUR, although known risk factors include primiparity, anesthesia, episiotomy, perineal trauma, and duration of labor. The diagnosis of PUR depends on the postvoid residual

bladder volume (PVRBV). A PVRBV of 150 mL is the volume most widely used in the diagnosis of PUR. Many studies have investigated the risk factors for PUR. However, PUR has not received much attention and there is currently no standardized definition for PUR or diagnostic methods. We therefore report, for the first time in Korea, the incidence and associated risk factors for PUR.

Materials and methods

This was a retrospective case-control study. Cases consisted of parturients who had been diagnosed with overt PUR in the immediate postpartum period (i.e., before discharge from the hospital) between June 2007 and July 2008. Overt PUR was defined as the sudden onset of the inability to void³ in combination with a PVRV of ≥ 150 mL measured by urethral catheterization. Cesarean section deliveries were excluded as insertion of a urethral catheter is routine 24 h after surgery, hampering the diagnosis of PUR. The medical

- Received: 2009. 8. 13.
- Accepted: 2009. 10. 15.

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Table 1. Demographic and obstetric characteristics of cases and controls and univariate analysis

	Cases (n=52)	Controls (n=208)	OR (95% CI)	P-value
Age (years)	29.21±5.37	28.56±6.23	1.02 (0.996-1.04)	0.301
Primiparity	40 (76.9)	56 (26.9)	5.64 (2.18-14.56)	<0.001
BMI (kg/m ²)	22.49±2.93	23.78±11.11	0.99 (0.988-1.010)	0.559
Gestation (weeks)	39.43±1.51	38.30±2.15	0.94 (0.712-1.256)	0.681
Birth weight (g)	3,560±460	3,280±390	1.23 (1.091-1.570)	0.041
Length of labor (min)	530±216	460±231	1.01 (1.01-1.03)	0.036
BPD (cm)	9.5±2.76	9.0±2.40	2.60 (1.09-6.19)	<0.001
Epidural analgesia (n)	31 (29.2%)	15 (15%)	3.29 (1.74-10.06)	<0.001
Perineal trauma (n)	15 (62.3%)	16 (19%)	8.64 (2.18-20.40)	<0.001

Data are the median or number (%)

Table 2. Multivariate analysis of contributing factors

	Odds ratio	95% CI	P-value
Primiparity	2.36	0.52-8.63	0.29
Birth weight (g)	0.98	0.99-1.00	0.62
Length of labor (min)	0.99	0.99-1.01	0.58
BPD	1.42	0.53-4.53	0.30
Epidural analgesia (n)	1.76	0.84-2.99	0.32
Perineal trauma	5.75	2.76-12.0	0.01

records were reviewed and relevant information extracted. Controls consisted of four parturients who had vaginal deliveries of the same duration as each case and who did not develop PUR; in so doing, the effect of differences in obstetric practice that may have occurred over time was minimized. Relevant demographic and obstetric information was extracted from the chart of women who delivered their infants between June 2007 and July 2008 at our institution. Treatment of parturients with PUR consisted of an indwelling urethral catheterization or a Foley catheter. We performed urethral catheterization prior to delivery and catheterization was done for one or more of the following reasons: a) the patient has not voided within 4 hours postpartum, b) the patient had an urge to void but could not void, or c) the patient was catheterized, which yielded ≥ 150 after spontaneous voiding. Intermittent catheterization was continued until resumption of spontaneous voiding, defined as a PVRV < 150 mL. A Foley catheter was inserted after catheterization three times. The Foley catheter was removed on postpartum day 2. Only third and fourth degree perineal lacerations were classified as perineal trauma, whereas first and second degree perineal lacerations were analyzed with the

intact perineum group as those lacerations are relatively minor, spare the anal sphincter and rectum, and are not associated with the same degree of morbidity as third and fourth degree lacerations. Logistic regression was used to examine independent associations between predictors and PUR after controlling for confounding among the variables. The odds ratios (OR) and 95% confidence intervals (CI) were estimated for each potential explanatory variable separately, using conditional logistic regression to allow for a 4:1 matching.⁴ Odds ratios and 95% confidence intervals were calculated for the associations of various obstetric factors with PUR. All statistical analyses were performed with SPSS version 12.0. A *P* value < 0.05 was considered statistically significant.

Results

There were 52 cases of overt PUR for the years 2007 to 2008. The total number of vaginal deliveries between June 2007 and July 2008 was 860, giving a frequency of overt PUR of 6%. Second trimester termination, twin deliveries, and intrauterine fetal deaths were excluded. There were 208 time-matched controls. The median volume of urine initially drained was 590 mL (range, 135-3,000 mL).

In 48 cases (92%), intermittent catheterization was used until PUR had resolved. Four cases (7%) were managed with the use of an indwelling Foley catheter and PUR resolved within 3 days in all cases. The demographic and obstetric details of the cases and controls are shown in Table 1. Univariate analysis showed the following factors to be significantly associated with PUR: primiparity, birth weight, increasing duration of the first and second stages of labor,

biparietal diameter (BPD), perineal trauma, and epidural anesthesia. Table 2 shows the results of the multivariate conditional logistic regression model, which included all those variables that were statistically significant based on univariate analysis (Table 1). Only perineal trauma was significantly associated with an increase in the relative risk of retention (OR, 5.75; CI, 2.76-12.0), having adjusted for potential confounding factors.

Discussion

PUR is a clinical condition that is neither well-recognized nor defined by standardized means, but generally has a good prognosis. The frequency of PUR in our hospital was 6% and is in keeping with published incidences for overt PUR. In our study, parity, birth weight, length of labor, BPD, perineal trauma, and epidural anesthesia significantly increase the risk of PUR on univariate analysis. After multiple regression analysis, only perineal trauma remained a significant risk factor for PUR. In previous reports, the obstetric risk factors associated with voiding dysfunction were nulliparity, instrumental deliveries, perineal trauma, protracted delivery, and epidural anesthesia during labor or delivery.⁵⁻⁹ Presently, the etiology of PUR has not yet been clarified, and among these risk factors, many authors have reported a significant relationship between the effect of epidural anesthesia on the bladder and urine retention.¹⁰ Halpern et al.¹¹ has been reported that epidural anesthesia was associated with prolongation of the first and second stages of labor. Yip et al.¹² reported that the lengths of the first and second stages of labor were directly related to PRUV. From these studies, we can infer that the increased residual volume is more likely to be due to prolonged labor than epidural anesthesia. Epidural anesthesia itself was not significant in our study and yet epidural anesthesia in labor may not necessarily be associated with urinary retention as a result of the use of lower dose epidural regimes, better care during labor (including the active management of labor), and surveillance for full bladders.

The finding that perineal trauma was a risk factor for PUR in our study was somewhat different from previously reported studies. Various known risk factors for severe perineal lacerations during parturition have been identified. Among these risk factors, maternal-fetal size disproportion is thought to predispose to perineal trauma.¹³ The larger the fetus that is traversing the birth canal, the greater the stretch and tension that is applied to the vaginal walls and

perineum. According to Scwhartz et al.,¹³ this may be due to narrow pelvimetry (maternal-fetal size disproportion) of Asians compared to Caucasians.

Andolf et al.⁷ found that instrumental delivery is linked with PUR. However, in our institution it was not considered a risk factor because we do not perform instrumental deliveries. In agreement with our findings, based on univariate analysis, others have found that parity was a risk factor for PUR, with more nulliparas manifesting PUR more frequently than multiparas. Another reason for PUR that could be considered is the use of uterine fundal pressure to facilitate vaginal delivery; there are previously no data published regarding the prevalence of the uterine fundal pressure maneuver. Matsuo et al.¹⁴ have been reported that uterine fundal pressure is an independent increase risk factor for perineal trauma. The reason that uterine fundal pressure causes perineal lacerations is not known, but it may possible that the transmission of non-physiologic force to the pelvic floor damages the perineal sphincter.¹⁴

In summary, perineal trauma was identified as the single most important risk factor for PUR after vaginal delivery. The findings of this study provide the basis for further studies on how to reduce perineal trauma during vaginal delivery. An investigation on the prevalence of PUR should be pursued in a larger population-based randomized study.

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