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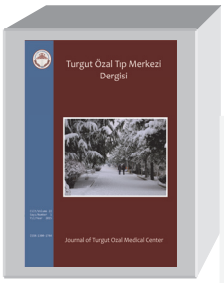

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An Investigation of Potential Risk Factors for Postoperative Urinary Retention Following Cesarean Section

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Abstract

Objectives: To investigate the risk factors for postoperative urinary retention following cesarean section.

Materials and Method: 135 female patients in Ankara Zekai Tahir Burak Woman's Health, Training and Research Hospital who underwent cesarean section were included in the study. Women who had postvoidal residual bladder with a volume of ≥150 ml measured by ultrasonography were the main group of patients. Women with postvoidal residual bladder with a volume of <150 ml were the control group patients. Demographic data such as age, parity, body mass index weight gain during pregnancy as well as obstetrical characteristics including gestational age and indications of cesarean section, number of cesarean section, anesthesia type, estimated blood loss during cesarean section, birth weight of newborn, presence of labor induction with intravenous oxytocin infusion before cesarean section were all among the data we collected throughout our research. At the end, a logistic regression model was performed to analyze the possible risk factors for postoperative urinary retention following cesarean section.

Results: We detected postoperative urenary retention in 21 (%15.6) patients. There were statistically significant relationships between the potential risks of postoperative urinary retention and the gain weight in the logistic regression model (Odds Ratio=20.8; 95; Confidence Interval=1.8-245.9; p=0.016), birth weight (>4000 gr) (Odds Ratio=0.1, 95%; Confidence Interval=0.0-0.5; p=0.002), birth induction before the cesarean section (Odds Ratio=0.2, 95%; Confidence Interval =0.0-0.8; p=0.027), and the presence of pain in the first urination after removing the urinary catheter (Odds Ratio=92.9, 95%; Confidence Interval =6.6-1299.0; p=0.001).

Conclusion: Postcesarean urinary retention risk increases if there is increased weight gain during pregnancy, macrosomic newborn delivery, cesarean section subsequent to labor induction, and high pain perception during the first urination after cesarean section.

Key Words: Urinary Retention; Cesarean Section; Risk Factors.

Sezaryeni Takiben Gelişen Postoperatif İdrar Retansiyonu İçin Potansiyel Risk Faktörlerinin Araştırılması

Özet

Amaç: Sezaryeni takiben gelişen postoperatif idrar retansiyonunun potansiyel risk faktörlerini araştırmak bu çalışmanın amacıdır.

Gereç ve Yöntem: Ankara Dr Zekai Tahir Burak Kadın Sağlığı Eğitim ve Araştırma Hastanesinde Ocak 2014 ve Mayıs 2014 tarihleri arasında sezaryene alınan 135 hasta çalışmaya dahil edildi. Ultrasonografi ile işeme sonrası mesane hacmi ≥150 ml olan kadınlar çalışma grubu olarak olarak tanımlandı. İşeme sonrası mesane hacmi < 150 ml olan kadınlar ise kontrol grubunu oluşturdu. Bütün kadınlar yaş,parite,vücut kütle indeksi gibi demografik bilgileri ile gebelikte kilo alımı,gestasyonel yaş,sezaryen endikasyonu,sezaryen sayısı,anestezi tipi,sezaryen sırasında tahmini kan kaybı,yenidoğanın kilosu,sezaryen öncesi doğum indüksiyonunun varlığı açısından değerlendirildi. Lojistik regresyon modeli sezaryeni takiben gelişen postoperatif idrar retansiyonunun potansiyel risk faktörlerini analiz için yapıldı.

Bulgular: 21 (%15.6) kadında postoperatif idrar retansiyonu tespit edildi. Lojistik regresyon modelinde gebelikte kilo alımı (Odds Ratio =20.8; 95 Confidence Interval=1.8-245.9; p=0.016), doğum ağırlığı >4000 gram olan bebek doğurmak (Odds Ratio =0.1, 95% Confidence Interval=0.0-0.5; p=0.002) sezaryen öncesi doğum indüksiyonu (Odds Ratio =0.2, 95% Confidence Interval =0.0-0.8; p=0.027), idrar kateterinin çekilmesinden sonraki ilk işemede ağrı olması (Odds Ratio =92.9, 95% Confidence Interval =6.6-1299.0; p=0.001) sezaryeni takiben gelişen postoperatif idrar retansiyonunun potansiyel risk arasında istatiksel olarak anlamlı bulundu.

Sonuç: Sezaryeni takiben gelişen postoperatif idrar retansiyonu riski gebelikte fazla kilo alımı, makrozomik bebek doğurma hikayesi, sezaryenden önce doğum indüksiyonu alınması ve idrar kateterinin çekilmesinden sonraki ilk işemede ağrı olması gibi durumlarda artar.

Anahtar Kelimeler: İdrar Retansiyonu; Sezaryen; Risk Faktörleri.

INTRODUCTION

Cesarean section (CS) is one of the most common surgical procedures in obstetrics and its incidence increases globally day by day (1). With the technological and medical improvements, related complication rates have decreased seriously. However, CS may still cause some preventable morbidities that affect patient's quality of life negatively (2). Among these complications, postoperative urinary retention (POUR) is one that occurs rarely but can result in irreversible damage of bladder unless it is managed properly (3).

Although there is no consensus on the definition of POUR following CS today, most clinicians define this condition as the inability to void spontaneously within 6 hours after the removal of an indwelling bladder

catheter that requires catheterization or the postvoid residual bladder with a volume (PVRBV) of >150ml after spontaneous micturition which is identified by ultrasound or catheterization (4, 5).

Baldini et al. investigated the overall incidence and underlying mechanism of POUR associated with surgical procedure, anesthesia and analgesia type, and reported that urinary retantion is common after anesthesia and surgery (6). In the literature, most data about postpartum urinary retention focus on vaginal delivery while the exact role of the CS in this complication is still unknown (7). But the clinical risk factors related to POUR must be identified in order to take necessary cautions against poor outcomes of this condition. So we have designed this study to identify the potential risk factors that can help practitioners to predict the development of POUR following CS.

MATERIAL AND METHODS

One hundred and thirty-five term pregnant women, who underwent CS in the Department of Obstetrics, at Dr Zekai Tahir Burak Woman's Health Education and Research Hospital between January 2014 and May 2014, were included in this prospective observational case-control study. We obtained the approval from the Institutional Review Board and all the participants gave their written consents for the study.

The sample size was determined according to the results of the central limit theorem (8). We collected demographic data such as age, parity, body mass index (BMI), weight gain during pregnancy as well as as obstetrical characteristics including gestational age and indications of current CS, number of CSs, anesthesia type, estimated blood loss during CS, birth weight of newborn, presence of labor induction with intravenous oxytocin infusion before CS for all our patients.

We inserted a size of 16 Fr/Ch indwelling Foley catheter prior to cesarean delivery and removed it 24 hours in accordance with the CS hospital protocol. Patients were encouraged to void 6 hours after the removal of the Foley catheters. Immediately after the first void, the estimated PVRBV was measured by transabdominal ultrasonography. The longitudinal and transverse scan of the bladder that gave the greatest diameter were obtained with the transducer located in the midline above the symphysis pubis. The width (D1) and the anteroposterior diameter (D2) in the transverse plane along with the cephalocaudal diameter (D3) in the sagittal plane were all recorded.

Estimated PVRBV was calculated using the formula D1xD2xD3x0.7 (9). Women who had an estimated PVRBV ≥150ml or were inable to void within 6 hours after the removal of catheter were defined as the cases to be studied. The patients with an estimated PVRBV <150ml were the categorised as the control group. Postoperatively, all women were asked to score the worst pain experienced after CS and during the first void by using a 10 cm-line visual analogue scale (VAS: 0 cm- no pain, 10 cm- excruciating pain). Meanwhile it is important to mention that all women received the same mild postoperative analgesia protocol (tenoxicam 40 mg (IM) twice in 24hours). The postoperative ambulation time of all women were also recorded.

Statistical Program for Social Sciences (SPSS, Version 15.0; Chicago, IL, USA) was used to perform stastistical analysis of the study. The normal distribution of the variables was analyzed by the Kolmogorov–Smirnov test. The continuous variables with normal distribution are presented with mean ± standard deviation. Median (minimum-maximum) value is used where normal distribution is absent. Quantitative variables are given as numbers (percentages). The statistical comparison of the continuous variables with normal distribution was carried out by Independent-Samples t test while Chi-square ($\chi 2$) test was used for the quantitative variables. On the other hand, the statistical differences between the continuous variables with no normal distribution were analyzed by Mann–Whitney U test. Besides a logistic regression model was also performed to analyze the risk factors for POUR following CS. $P<0.05$ was considered statistically significant.

RESULTS

135 women who underwent CS volunteered to take part in this study. Of the 135 patients, 21 (15.6%) women were defined as the study group patients while the others (N=114, 84.4%) were the control group patients. In the study group, all women were able to void within 6 hours after the CS. Demographic and related obstetrical data of the groups are shown in Table 1. Mean weight gain during pregnancy was significantly greater in the case group (12.7±1.7 kg) than in control group (9.5±1.2 kg) p(<0.001) as well as the rate of newborn with a birth weight of >4000 g (p<0.01). In case group, labor induction with oxytocin and CS for cephalopelvic disproportion (CPD) is more common compared to the control group (p<0.01 and p=0.04, respectively). The women in the case group had higher postoperative median VAS scores than the control group (p=0.04). In addition, the first void after removal of the urinary catheter in the case group [VAS=9 (9-10)] was significantly more painful compared with the control group [VAS=8 (7-10)] (p<0.001). The other data listed in Table 1 shows no significant differences between the groups.

Analysis by logistic regression model has shown that weight gain during pregnancy (Wald (W)=5.8; Odds Ratio (OR)=20.8; 95% Confidence Interval (CI)=1.8-245.9; p=0.02), newborn birth weight >4000g (W=9.3; OR=0.1, 95% CI=0.0-0.5; p<0.01), labor induction before CS (W=4.9; OR=0.2, 95% CI=0.0-0.8; p=0.03), and the pain experienced during the first void after removal of the urinary catheter (W=11.3; OR=92.9, 95% CI=6.6-1299.0; p<0.01) were all statistically significant factors which effected the presence of POUR following CS.

Table 1. Demographic and obstetrical data of the study and control groups

	Cases (n=21)	Controls (n=114)	p
Age (years)	28.6±3.9	27.0±3.7	0.07*
Parity	2 (1-3)	2 (1-4)	0.54‡
BMI (kg/m²)	31.2±1.3	31.0±1.6	0.56*
Weight gain (kg)	12.7±1.7	9.5±1.2	<0.001*
Gestational age (days)	277.7±6.7	274.9±6.4	0.07*
Birth weight of the newborn (g)	3781.4±372.2	3623.5±347.8	0.06*
No. of those with >4000g (birth weight)	9 (42.9)	17 (14.9)	<0.01#
Anasthesia type			0.78#
General	6 (28.6)	36 (31.6)	
Spinal	15 (71.4)	78 (68.4)	
EBLV (mL)	692.9±92.6	736.5±144.7	0.18*
Duration of CS (minutes)	54.3±17.5	55.5±9.4	0.64*
Labor induction before CS	15 (71.4)	36 (31.6)	<0.01#
CS for previous uterine scar	6 (28.6)	48 (42.1)	0.25#
CS for CPD	6 (28.6)	13 (11.4)	0.04#
CS for arrest of dilation or descent	3 (14.3)	17 (14.9)	0.94#
CS for abnormal fetal heart pattern	3 (14.3)	24 (21.1)	0.48#
Time to first mobilization (hours)	9.6±1.8	9.3±1.7	0.91*
Postoperative VAS score	9 (8-10)	8 (8-10)	0.04‡
Voiding VAS score	9 (9-10)	8 (7-10)	<0.001‡

Values indicate mean ± standard deviation or median (minimum-maximum) values or numbers (percentages)
BMI: Body Mass Index, EBLV: Estimated Blood Loss Volume, CS: Cesarean Section, CPD: Cephalopelvic disproportion, VAS:Visual Analogue Scale
*Independent-Samples t test
‡ Mann-Whitney U test
# Chi Square test
p<0.05 is considered statistically significant

Table 2. Logistic regression model to compare Odds ratio of possible effective factors for postoperative urinary retention development following cesarean section

	Wald	p	OR	95% CI for OR	
				Lower	Upper
Weight gain	5.8	0.02	20.8	1.8	245.9
>4000g birth weight	9.3	<0.01	0.1	0.0	0.5
Anesthesia type	0.5	0.49	0.5	0.1	4.1
Labor induction with oxytocin	4.9	0.03	0.2	0.0	0.8
Presence of CPD	0.7	0.40	0.6	0.1	2.2
Postoperative VAS score	0.4	0.52	0.6	0.2	2.5
Voiding VAS score	11.3	<0.01	92.9	6.6	1299.0

OR: Odss Ratio, CI: Confidence Interval, CPD: Cephalopelvic disproportion, VAS:Visual Analogue Scale
p<0.05 is considered statistically significant.

DISCUSSION

This study has demonstrated that POUR following CS is a relatively common condition with an overall incidence of 15.6%. In the literature, the reported incidence rate for postcesarean urinary retention varies widely, between 5% and 33.3%, which, in fact, reflects its multifactorial etiology (including comorbidities, type of surgery, and type of anesthesia etc.) and that it lacks a uniform definition (7, 10).

The exact role of CS in developing POUR is still unknown. Chai et al, in a prospective study of 207 patients delivered by CS (both scheduled and unscheduled), reports that problems in progress of labor, resulting in an unscheduled CS, can be considered as the single most important risk factor of POUR (7). It is possible that during unsuccesful labor process, pelvic nerve plexuses in the pelvic soft tissue are affected by prolonged pressure of the fetus on the pelvic floor leading to tissue edema or impairment of the detrusor muscle from neuropraxia and, eventually, to urinary retention (11). In our study, labor arrest was not a risk factor for the development of POUR following CS. But we found that the pregnant women who gained much weight during pregnancy, had a cesarean delivery with a birth weight of >4000g, and those for whom labor was

induced by oxytocin infusion are by far more prone to have POUR following CS. Besides, although this is not statistically significant, the data evinced a trend towards POUR development when CS is performed due to CPD and the pain experienced is higher postoperatively. These findings suggest that the increasing abdominal pressure during pregnancy or labor may contribute to damages on pelvic connective tissues and nerves resulting in neurologic impairment of voiding function and, thus, urinary retention.

By using VAS score system, we were able to assess pain perception after CS and during first void after the removal of the urinary catheter interaction with POUR. We found that the women with POUR had statistically greater postoperative VAS scores than the women without POUR, but postoperative VAS score was not an independent risk factor for the development of POUR following CS in our regression model. On the other hand, the higher pain perception during first void after the removal of urinary catheter was presumably related to POUR. Traditionally, urinary catheterization is commonly used during CS to improve exposure of the lower uterine segment at the time of surgery as well as to prevent urinary bladder injury and avoid postoperative urinary retention (12, 13). However, catheterization has been shown as a main cause of urinary tract infections, greater postoperative discomfort, and pain (14, 15). It is possible to assume that the pain perception due to urinary catheterization may result in urinary retention by developing reflex urethral spasms.

It has been previously postulated that epidural anesthesia/analgesia with morphin was significantly associated with postcesarean urinary retention (16, 17) but the mechanism underlying the high incidence of urinary disturbances occurring after postoperative epidural morphine is unknown (10). In a review of postcesarean analgesia, it was stated that a single dose of spinal morphine at the time of CS can provide excellent analgesia of prolonged duration (18). Dahl et al., in a meta analysis on postcesarean analgesia, describe adverse effects of prolonged spinal morphine as pruritus, nausea, vomiting, early or delayed respiratory depression, and urinary retention (19). In our study, no epidural anasthesia was applied while the anesthesia type (spinal or general) was not found to be important in the development of POUR as we used the same type postoperative analgesia protocol in all patients.

Although POUR is not a well-understood clinical condition despite the fact that it results in bladder distention, it may lead to serious short and long term problems such as acute and chronic urinary tract infection, chronic voiding difficulties, and renal failure (20, 21). Thus, it is very important to diagnose POUR in its early stages and manage it properly.

In conclusion, POUR following CS seems as a relatively common complication in obstetric practices, but, since it is rarely reported in the published literature, the underlying mechanism is still not very commonly known. In this study, we suggest that all obstetricians should be aware of the development of POUR when the weight gain during pregnancy is more than normal, the birth weight of newborn is >4000g, the labor induction with oxytocin infusion is present, and the pain perception after removal of urinary catheter is high. The routine use of ultrasound to diagnose this condition during postoperative period may be beneficial whereas further studies with more participants are needed to clarify this topic.

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