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ARAŞTIRMA MAKALESİ

The Effect Of Urinary Catheter Removal Timing On Urinary Retention In Cesarean Section

Sezaryen Doğumda Üriner Kateter Çıkarma Zamanlamasının Üriner Retansiyona Etkisi

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ÖZ

Amaç: Bu çalışmada sezaryen (CS) ile doğumu gerçekleşen hastalarda 6, 12 ve 24 saat sonra çıkarılan idrar sondalarının postoperatif sonuçlarını ve üriner retansiyon oranlarını karşılaştırmayı amaçladık.

Gereç ve Yöntem: Bu prospektif çalışmaya önceden CS ameliyatı olan ve bu endikasyon nedeniyle spinal anestezi altında elektif CS uygulanan gebeler dahil edildi. Hastalar 1:1:1 oranında üç gruba ayrıldı ve 6,12 ve 24 saat sonra hastaların sondası çekildi. Rezidüel idrar miktarı ultrasonografi ile ölçüldü. Ayrıca ambulasyona kadar geçen süre, rekateterizasyon oranı, idrar yolu enfeksiyonu (İYE) semptomları ve hastanede kalış süreleri kaydedildi.

Bulgular: CS'den 6 saat sonra kateteri çıkarılan grupta üriner retansiyonu oranı (13.9%) anlamlı olarak daha yüksekti. İlk ambulasyona kadar geçen süre kateterin süresinden etkilenmişti ve kateteri 24 saat sonra çıkarılan grupta anlamlı olarak daha yüksekti (p=0.038). Ek olarak, 24 saat sonra kateteri çıkarılan grupta dizüri ve İYE anlamlı olarak daha yüksek izlendi. Ancak hastanede kalış süresi üç grup arasında benzerdi.

Sonuç: Kar-zarar dengesi göz önüne alındığında, çalışmamızın sonuçlarına göre, CS'den 12 saat sonra kateterin çıkarılması önerilebilir. Ancak, yönetim bireyselleştirilmelidir.

Anahtar Kelimeler: Sezaryen; Üriner Kateter; Üriner Retansiyon; İdrar Yolu Enfeksiyonu; Postoperatif Komplikasyonlar.

ABSTRACT

Aim: In this study, we aimed to compare the postoperative outcomes and urinary retention rate of urinary catheters removed after 6, 12, and 24 hours in patients delivered by cesarean section (CS).

Materials and Methods: Pregnant women who had undergone term elective CS for previous CS indication under spinal anesthesia were included in this prospective study. Patients were divided into three groups in a 1:1:1 ratio and the patient's urinary catheter was removed after 6, 12, and 24 hours. The residual urine amount was calculated with ultrasonography. In addition, the time until ambulation, recatheterization rate, urinary tract infection (UTI) symptoms, and the duration of hospitalization were recorded.

Results: The urinary retention rate (13.9%) was significantly higher in the group whose catheter was removed 6 hours after CS. The time to the first ambulation was affected by the duration of the catheter and was significantly higher in the group whose catheter was removed after 24 hours (p=0.038). Additionally, dysuria and UTI were seen significantly higher in the group whose catheter was removed after 24 hours. However, the length of hospital stay was similar between the three groups.

Conclusion: Considering the benefit-harm balance, according to the results of our study, removal of the urinary catheter at 12 hours after CS could be suggested. However, the duration of urinary catheter removal should be individualized.

Keywords: Cesarean Section; Urinary Catheter; Urinary Retention; Urinary Tract Infection; Postoperative Complications

INTRODUCTION

Cesarean section (CS) is the most frequently performed operation in the obstetric field (1, 2). Urinary catheters are inserted in almost all patients before CS operation. In this way, it is thought that the possibility of urinary bladder injury while performing the incision is reduced (3). The urinary catheter also allows the evaluation of urinary output in the follow-up in the postoperative period.

There is no consensus as to the duration of urinary catheter usage after CS in the literature. In fact, there are studies advocating that urinary catheter insertion before CS should not be performed as a routine protocol (4, 5). Although each Delivery Unit has its own surgery protocol, the urinary catheter is usually removed up to 24 hours. Whereas there are studies suggesting removing the catheter just after the CS, there are also studies suggesting keeping the catheter until 24 hours after surgery (6-9). Late removal of the catheter is thought to prevent bladder atony. Usually, the catheter is removed as soon as the patient is mobilized. However, prolonged urinary catheter retention is associated with some complications such as longer hospital stays, increased urinary tract infections (UTI), bacterial colonization, and delayed mobilization of the patients (10).

Urinary retention is a common postpartum morbidity varying between 1.7 to 17.9% (11). It is a condition in which a significant amount of urine remains in the bladder after voiding. There are studies showing that there is higher urinary retention in CS compared to vaginal delivery (12, 13). However, the association between the duration of urinary catheters and urinary retention is not well studied. Therefore, in this current study, we compared the postoperative outcomes and urinary retention of patients who have undergone elective CS and urinary catheters removed after 6, 12, and 24 hours.

MATERIALS AND METHODS

Approval was obtained from the Ankara City Hospital review board (E2-22-1285/19.01.2022). Pregnant women who had undergone term elective lower segment CS for previous CS indication under spinal anesthesia were included in this prospective study.

Patients' sociodemographic characteristics, obstetric and gynecological history and laboratory findings were recorded. Patients with UTIs, iatrogenic bladder injury, and patients who have diseases that may affect urine output (chronic kidney diseases) and have undergone

incontinence surgery were excluded. Pregnant women diagnosed with preeclampsia and/or eclampsia were excluded. Patients whose data were not fully available were also excluded.

In our hospital, all elective CS patients were given a date of surgery between 39 weeks - 39 weeks and 3 days after their last menstrual period was confirmed by the early ultrasonographic findings. Before surgery, 2 grams cefazolin was administered intramuscularly routinely. After spinal anesthesia, a Foley catheter was inserted.

Patients were divided into three groups in a 1:1:1 ratio by using computer-generated random numbers. Patients whose urinary catheter was removed after 6 hours were accepted as 6 hours urinary catheter removal group. Patients whose urinary catheter was removed after 12 hours and 24 hours were accepted as 12 hours and 24 hours urinary catheter removal group respectively. Clamping was not performed before the removal of the urinary catheters.

After the urinary catheter removal, the patients were encouraged to void. Then, with ultrasonography, 3 dimensions of the bladder were measured and the residual urine amount was calculated by the same obstetrician (B.E.) in order to avoid inter-observer variability. The residual urine amount was calculated by lenght x width x height x 0.52 formula (14). A post-void residual urine >100 ml was accepted as urinary retention (15).

In addition, the duration of the operation, the birth weight of the baby, the time until ambulation, recatheterization rate, UTI symptoms (dysuria), and the duration of hospitalization were recorded.

Data were analyzed via SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Kolmogorov- Smirnov analysis was used to evaluate the normal distribution of continuous variables. Continuous variables were compared via one-way ANOVA. When p-value from the analysis was statistically significant, post hoc Tukey test was used to know which group differed from the others. The comparison of categorical variables was tested via $\chi 2$ test. Whereas normally distributed nominal data were shown as mean ± standard deviation, non-normally distributed data were shown as median (min-max) in the tables. Categorical data are shown in numbers (n) and percentages (%). A p-value of < 0.05 was taken to be significant.

RESULTS

A total of 216 pregnant women, 72 in each of the 3 groups, were included in this prospective study. The CS indication was previous CS for all pregnant women.

The characteristic features and the neonatal outcomes of the groups were shown in Table 1. Accordingly, the age, parity, body mass index (BMI), body weight before pregnancy, and gestational age at birth did not differ between the groups. Additionally, the duration of operation did not differ between the groups (p=0.231).

Table 1. The characteristic features and the neonatal outcomes of the groups

Variables	**6 hours urinary catheter removal group (n:72)**	**12 hours urinary catheter removal group (n:72)**	**24 hours urinary catheter removal group (n:72)**	**p value**
Age (year)	30.5±3.1	29.6±2.5	28.9±1.8	0.266
Gravidity (n)	3 (1-3)	3 (1-4)	3 (1-4)	0.390
Parity (n)	2 (1-3)	2 (1-4)	2 (1-4)	0.728
BMI (kg/m^2)	27.8±3.5	29.3±3.1	29.2±2.3	0.128
Body weight before pregnancy (kg)	69.9±5.2	71.4±4.1	72.1±3.6	0.254
Gestational age at birth (weeks)	39 (39-40)	39 (39-40)	39 (39-40)	0.879
Birth weight (grams)	3298.5±442.7	3362.4±334.1	3343.5±346.8	0.336
BPD of the newborn (cm)	33.4±2.8	34.6±2.4	34.3±2.3	0.567
Duration of operation (minutes)	52.9±13.3	49.7±17.4	48.9±15.2	0.231

Values were given as mean ± standard deviation, median (min-max), and number (%).

BMI: Body mass index, BPD: Biparietal diameter

p<0,05 was considered statistically significant.

The postoperative events and urinary complications of the groups were shown in Table 2. Urinary retention was observed in 13.9% of pregnant women whose urinary catheter was removed after 6 hours, whereas it was observed in 2.8% of pregnant women whose urinary catheter was removed after 12 hours. Moreover, urinary retention was not observed in 24 hours urinary catheter removal group (p=0.001). Only 2 pregnant women whose urinary catheter was removed after 6 hours required recatheterization. However, while dysuria was observed in 14 pregnant women (19.4%) whose urinary catheter was removed after 24 hours,

it was observed in only 2 pregnant women (2.8%) whose urinary catheter was removed after 12 hours (p=0.001). In the current study, urine culture samples were sent to laboratory only from patients with dysuria complaint (n:16), and UTI was confirmed in 5 pregnant women. It was found that the first ambulation time was affected by the duration of the catheter as the time to first ambulation was 9.2 ± 2.4 hours in 24 hours urinary catheter removal group and was significantly higher than the other groups (p=0.038). However, no significant difference was found as to the length of hospital stay between the groups (p=0.059).

Table 2. Postoperative events and urinary complications

Variables	**6 hours urinary catheter removal group (n:72)**	**12 hours urinary catheter removal group (n:72)**	**24 hours urinary catheter removal group (n:72)**	**p value**
Urinary retention	10 (13.9)[b]	2 (2.8)	0 (0.0)	**0.001[a]**
Dysuria	0 (0.0)	2 (2.8)	14 (19.4)[b]	**0.001[a]**
First ambulation (hours)	5.2 ± 1.6	6.1 ± 2.2	9.2 ± 2.4[b]	**0.038[a]**
Length of hospital stay (hours)	44.9±4.1	46.2±3.3	47.1±4.2	0.059

Values were given as mean ± standard deviation, median (min-max), and number (%).
[a]: Statistically significant difference between the three groups.
[b]: Statistically significant difference versus the other two groups.
p<0,05 was considered statistically significant.

DISCUSSION

In this study, the effect of urinary catheter duration time after CS on urinary retention and postoperative outcomes was evaluated. The urinary retention rate was significantly higher in the 6 hours urinary catheter removal group. The time to the first ambulation was found to be significantly lower in the 6 hours urinary catheter removal group. Dysuria and UTI were seen significantly higher in the 24 hours urinary catheter removal group. However, the length of hospital stay was similar between the three groups.

Studies in the literature mostly evaluated the effect of immediate and late removal of urinary catheters with no clear consensus. Whereas some studies suggested that urinary catheter insertion before CS should not be performed as a routine protocol, there are also studies suggesting keeping the catheter until 24 hours after surgery (5-9).

In a study conducted in 2019, the effect of urinary catheter removal at 0 (early), 6, and 24 hours on urinary complications was evaluated. It was shown that early catheter removal was associated with increased urinary retention and recatheterization rate (7) Prolonged catheterization time was also shown to be associated with prolonged time until ambulation, increased frequency of UTI, and prolonged hospital stay. In this study, patient groups with different CS indications such as cephalopelvic disproportion and malpresentation were included, which was shown to increase the risk of urinary retention (12). In order to have homogeneous groups, only the pregnant women who had undergone elective CS for previous CS indication was included in our study. Consistent with these studies, immediate removal of urinary catheter after surgery was shown to increase urinary retention rate also in patients who have undergone hysterectomy (16). However, Basbug et al. found no significant difference in urinary retention rate between pregnant women whose urinary catheter was removed at 2 hours and 12 hours after CS (6). El-Mazny et. al found no significant difference in urinary retention rate between pregnant women whose urinary catheter was removed immediately and at 12 hours after CS (9). In addition, Enhanced Recovery After Surgery (ERAS) protocol was developed in order to maintain normal physiology both in the preoperative and the postoperative period. ERAS society recommended immediate urinary catheter removal after surgery if placed during cesarean delivery (17). In contrast to these studies, we found a higher urinary retention rate in the 6 hours urinary catheter removal group when compared to 12 hours and 24 hours urinary catheter removal group. We suggest that the patients may have pain with the decrease in the effect of spinal anesthesia in the early postoperative period, and in case of early catheter removal, pain-related voiding difficulties may occur and urinary retention increases.

We found no significant difference as to the length of hospital stay between the groups, in contrast to studies that found longer hospital stay in patients with late removal of urinary catheter (7, 9, 18). These studies have associated prolonged hospital stay with UTIs due to increased duration of urinary catheters. In our study, whereas dysuria and UTI were seen significantly higher in the 24 hours urinary catheter removal group, the length of hospital stay was similar between the three groups. In the current study, pregnant women who had UTI before CS, iatrogenic bladder injury, and diseases affecting urinary output were excluded from the study. In addition, only 16 women had dysuria complaints in total and urine culture samples were reached to laboratory. Of the 16 pregnant women 5 were confirmed to have UTI. However, this rate may not be able to show the true rate as we did not send urine culture

samples from the whole study group. Besides this, the discharge process from the hospital was not affected by the duration of catheterization. The mean discharge durations were found to be 44.9±4.1, 46.2±3.3, 47.1±4.2 hours for the 6, 12, and 24 hours urinary catheter removal groups, respectively. This may be explained by our daily clinical practice that patients whose urine culture samples were sent, were called for examination to show the test results on the 3rd day after the urine culture was sent to avoid unnecessary antibiotic use and long hospitalization.

One of the strengths of the current study was the measurement of the residual volume by a single obstetrician (B.E.) to avoid inter-observer variability. The ultrasound bladder volume measurement was shown to be preferred to urethral catheterization to measure the residual volume (19). Therefore, the residual volume was measured by ultrasound in our study. Another strength of this study was that we included a homogeneous group of patients with strict criteria having undergone term lower segment elective CS under spinal anesthesia. Therefore, our number of patients was actually low. It would be much better if we could have included and compared patients followed without catheterization after CS. However, in our hospital, CS is applied without inserting a urinary catheter, only in very emergent situations. So, we do not have any patients followed without urinary catheters in this study. And since the pregnant women were mostly referred from other hospitals with the diagnosis of previous CS, the postoperative follow-up of the most patients were not held in our hospital. Therefore, we could not evaluate long term complications.

In conclusion, the urinary retention rate was significantly higher and the time to the first ambulation was significantly lower in the 6 hours urinary catheter removal group. However, dysuria and UTI were seen significantly higher in the 24 hours urinary catheter removal group and the duration of hospitalization did not differ between the groups. Considering the benefit-harm balance, removal of the urinary catheter at around 12 hours after CS could be suggested. However, the duration of urinary catheter removal should be individualized.

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Declaration of interest: None.

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