

Effects of creation of bladder flap during cesarean section on long-term residual urine volume and postoperative urinary retention

Sezaryen sırasında mesane flebi oluşumunun uzun süreli rezidüel idrar hacmi ve postoperatif idrar retansiyonu üzerindeki etkileri

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Abstract

Aim: Postpartum urinary retention (PUR) is an important clinical condition that is frequently detected after both vaginal and cesarean delivery. The aim of this study was to evaluate PUR in women who did and did not have bladder flaps created during cesarean section and the effect of Kegel exercises on long-term bladder muscle function in those with high postnatal residual urine volume.

Methods: This prospective randomized study was conducted with 100 primiparous pregnant women who were to undergo elective cesarean section between April and December 2019. Patients were divided into two groups: The experimental group (bladder flap group, n=50) and the control group (non-bladder flap group, n=50). The study data were collected with the Maternal Information Form and UDI-6. Kegel exercise results, post-void residual volume and urinary system symptoms were assessed on the 2nd and 5th postoperative day and 6 weeks after birth.

Results: There were no significant differences between the groups in terms of socio-demographic characteristics, postoperative 5th day and 6th week residual urine volume, postoperative urinary retention volume, urinary system symptoms (UDI-6 scores) and bladder injury. There were significant differences between the groups in terms of residual urine volume, duration of surgery, and pain values assessed on the second day ($P=0.045$, $P<0.001$, $P<0.001$, respectively). Intra group comparisons demonstrated a decrease in residual urine volume in the participants with high residual urine volume after Kegel exercises, and their postoperative 2nd day and 6th week residual urine volumes and UDI-6 scores were significantly different ($P<0.001$, $P<0.001$).

Conclusion: The present study determined that bladder flaps created during cesarean section increases postoperative urinary retention. In patients with high residual urine volume, Kegel exercises reduce residual urine volumes and urinary symptoms in the long term.

Keywords: Bladder flap, Omission of a bladder flap, Urinary retention, Cesarean section

Öz

Amaç: Postpartum idrar retansiyonu hem vajinal hem de sezaryen doğumdan sonra sıklıkla saptanan önemli bir klinik durumdur. Bu çalışma ile sezaryen sırasında mesane flebi olan ve olmayan kadınlarda idrar retansiyonunu ve ayrıca doğum sonrası rezidüel idrar hacmi yüksek olanlarda Kegel egzersizlerinin uzun süreli mesane kas fonksiyonu üzerindeki etkisini değerlendirmek amaçlanmıştır.

Yöntemler: Bu ileriye dönük randomize çalışma, Nisan-Aralık 2019 tarihleri arasında elektif sezaryen operasyonu geçiren 100 primipar gebe kadınla gerçekleştirildi. Deney grubu (mesane flebi grubu, n=50) ve kontrol grup (mesane dışı flep grubu, n=50). Çalışma verileri Anne Bilgi Formu ve UDI-6 ile toplandı. Doğumdan sonraki 2. gün, 5. gün ve 6. haftalarda Kegel egzersiz sonuçları, işeme sonrası rezidüel hacim ve üriner sistem semptomları değerlendirildi.

Bulgular: Gruplar arasında sosyo-demografik özellikler, postoperatif 5. gün ve 6. hafta rezidüel idrar hacmi, postoperatif idrar retansiyon hacmi, üriner sistem semptomları (UDI-6 skorları) ve mesane yaralanması açısından anlamlı farklılık yoktu. İkinci gün değerlendirilen rezidüel idrar hacmi, ameliyat süresi ve ağrı değerleri açısından gruplar arasında anlamlı farklılık vardı (sırasıyla $P=0,045$, $P<0,001$ ve $P<0,001$). Grup içi karşılaştırmalar, Kegel egzersizlerinden sonra rezidüel idrar hacmi yüksek olan katılımcılarda rezidüel idrar hacminde azalma olduğunu gösterdi ve postoperatif 2. gün ve 6. hafta rezidüel idrar hacimleri ve UDI-6 skorları istatistiksel olarak anlamlı farklıydı ($P<0,001$, $P<0,001$).

Sonuç: Bu çalışmada sezaryen sırasında yapılan mesane flebin ameliyat sonrası üriner retansiyonu artırdığını belirlemiştir. Yüksek rezidüel idrar hacmine sahip hastalarda yapılan Kegel egzersizinin uzun vadede rezidüel idrar hacmini ve idrar semptomlarını azalttığı bulunmuştur.

Anahtar kelimeler: Mesane flebi, Mesane flebi açılmaması, İdrar retansiyonu, Sezaryen

Introduction

The number of Cesarean sections performed has significantly increased in the last two decades, especially in developed and developing countries [1,2]. A usual technique used in Cesarean section is the creation of a bladder flap following the abdominal incision, then making the uterine incision. Among the aims of formation of bladder flap during Cesarean section are to prevent the spread of infection to the intrauterine cavity, to minimize of the possibility of bladder injury caused by the surgeon and to allow the surgeon to access the lower uterine segment [3,4]. Although several studies have revealed that bladder flap creation is not beneficial during Caesarean section, many obstetricians routinely perform this procedure [4-6].

Postpartum urinary retention (PUR) is observed at a rate of 3.2% to 24.2% after vaginal cesarean delivery [7-9]. Because the effects of surgical techniques and anesthetic agents used in the postpartum period on the bladder are not clear yet, it is difficult to determine the role of Caesarean section in PUR [7]. In the literature, PUR indicates a post-void residual bladder volume (PVRBV) [10] ≥ 150 ml [11]. Ultrasound scanning or intermittent catheterization method is used in the assessment of the residual bladder volume [12]. Most obstetricians and gynecologists prefer to use ultrasound scan in the detection of postoperative urinary retention rather than intermittent catheters, since the former is a non-invasive, fast, painless, comfortable, and safe method compared to the latter [7].

This study was designed to assess PUR in women with and without bladder flaps created during Caesarean section, and the effect of Kegel exercises on long-term bladder muscle function in those with high postpartum residual urine volume.

Materials and methods

Medipol University Clinical Research Ethics Committee approved the study (R.N: 108400098-604.01.01-E.53606). Written consent was obtained from Nisa Hospital administration and the patients prior to the study, which was conducted in accordance with the guides on human participants in research, taking into account the 1964 Helsinki Declaration and ethical rules.

Between April 2019 and December 2019, 120 of the women who had cesarean section under general anaesthesia were primiparas. The presence of urinary retention in women who did and did not have bladder flaps created, and the regression in urinary retention and urinary system symptoms with Kegel exercises were evaluated with UDI-6 score and ultrasonography. With a type 1 error of 0.05, and a power of 0.90 ($\alpha = 0.05$, $1-\beta = 0.90$), the minimum sample size was 92 ($n=46$ for each group). Fifty participants were included in each group (G*Power version 3.1).

In the present study, changes in the urinary symptoms evaluated by UDI-6 scores were considered the primary outcome. According to the mean UDI-6 scores between the groups at the first and sixth weeks, while the effect size of the study was $\alpha = 0.91$ for the intervention group and $\alpha = 1.08$ for the control group, the post hoc power of the study was 1.00

(100%) for both groups. The sample size of the study was considered sufficient.

Before surgery, patients with even protocol numbers were included in the bladder flap intervention group, and those with odd protocol numbers were included in the non-bladder-flap group. Randomization was achieved with a computer-based random number generator (Figure 1).

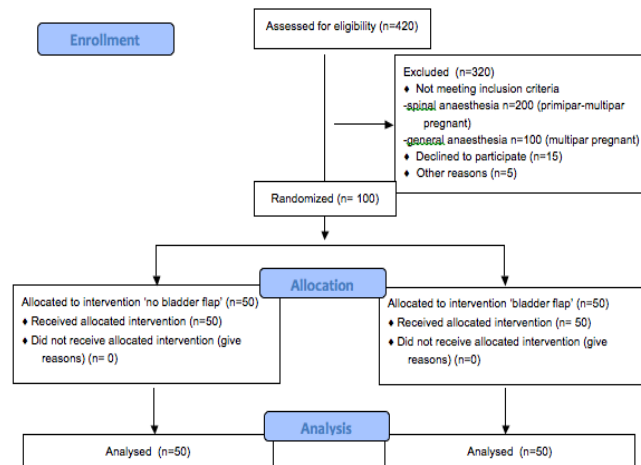


Figure 1: Diagram showing the recruitment and progression the trial of postpartum women

All participants were operated by the same doctor (D.K.G) and a different midwife. Another researcher (A.Ş.K) gave training on Kegel exercises to those who had high residual urine volume during discharge from the hospital, but did not know which group they were in. Both the patients and the doctor did not know which group the patients belonged to.

Being between 20-40 years of age, at the 37th-42nd weeks of gestation, being primipara, and having a cesarean section were the inclusion criteria, while having a chronic disease that requires medication (diabetes, hypertension, etc.), previous urinary tract infection, previous laparotomy, emergency cesarean section (abruptio placenta, fetal distress, etc.) constituted the exclusion criteria.

Maternal Information Form contained 30 items that questioned the socio-demographic characteristics of the participants, ultrasonographic measurements of the remaining urine volume, the presence of urinary infection, hematuria levels, and hemoglobin levels.

Urogenital Distress Inventory (UDI-6) was developed by Vassalo et al [13]. Çam et al. conducted a Turkish adaptation study of the UDI scale [14]. 1st and 2nd items evaluate irritant symptoms, 3rd and 4th items evaluate stress symptoms and 5th and 6th items evaluate the uncomfortable urination symptoms. The higher the score, the higher the urinary retention.

Visual Analogue Scale (VAS)

Developed by Bond and Pilowsky, VAS is a 10 cm long ruler, with 0-10 points, where 0 indicates no pain, and 10 indicates the most severe pain ever felt by the patient [15].

Cesarean section was performed under general anaesthesia. Pfannenstiel skin incision was made in all patients. Subcutaneous tissues, fascia, parietal peritoneum were opened and the abdominal cavity was entered.

1. Flap steps for the study group: A small transverse midline incision was made with a scalpel at the vesicouterine peritoneum and the bladder peritoneum was bluntly separated from the uterus using both index fingers.

2. Steps for the control group: A bladder flap was not created; a transverse incision was made 1 cm above the peritoneal vesicouterine layer.

The uterine cavity was entered bluntly in all patients. The placenta was separated after the fetus was delivered. The uterus was closed with a continuous suture. The parietal peritoneum, the fascia and skin were closed. 20 units of oxytocin was administered in 1000 mL saline to prevent uterine atony after birth.

Four hours after surgery, each participant was administered 20 IU oxytocin in 1000 mL 5% dextrose saline and 40 drops/min. In the postoperative period, nonsteroidal anti-inflammatory 75 mg Diclofenac Sodium was administered intramuscularly (IM) and 500 mg paracetamol were administered orally twice daily to the participants. Bladder catheters were removed 6 hours after surgery in both groups. When the patient urinated, urine samples were collected, and residual urine volumes were assessed with the 3D portable ultrasound device. Among them, those who had ≥ 150 ml of residual urine and high UDI-6 scores were given training on Kegel exercises by the researcher (A.Ş.K.) on the postoperative 2nd day using illustrated brochures.

Kegel Exercise

The patients were instructed to tighten the vagina and anus for 10 seconds, rest for 3 seconds and repeat this exercise 10 times. Kegel exercises were performed for 20 minutes every day. Then, the efficacy of Kegel exercises and urinary symptoms were assessed by the UDI-6 score on the postoperative 5th day and 6th week. In addition, residual urine volume was assessed through ultrasonography.

Statistical analysis

Data analyses were performed with SPSS for Windows, version 22.0. The distribution of variables was examined with skewness and kurtosis coefficients (16) and it was determined that the data was normally distributed according to Skewness (between -.62 and 1.30) and Kurtosis (between -2.00 and -1.96) values. The Pearson chi-square test, Fisher's exact test, the independent samples t-test and Cochran's Q test were used where appropriate. Values of $P < 0.05$ were considered statistically significant.

Results

There were no significant differences between the two groups in terms of education level, perceived income levels, mean age and BMI ($P > 0.05$ for all, Table 1), and given these characteristics, the groups were homogeneous. The mean duration of surgery was higher in the bladder flap group compared to the control group (32.46 (4.79) vs. 26.16 (3.39) minutes) ($P = 0.045$, Table 1). The mean VAS score was higher in the bladder flap group than the control group (4.42 (1.54) vs. 2.82 (1.47)) ($P < 0.001$, Table 1). There was no significant difference in the neonates' birthweight and head circumference between the groups ($P = 0.681$, $P = 0.843$, respectively) (Table 1).

Urinary culture positivity was detected in 8% and 4% of the participants in the bladder flap and control groups, respectively ($P = 0.678$, Table 2). The incidence of hematuria and bladder injury was 30% and 6%, respectively in the bladder flap group and 6% and 0%, respectively in the control group, with no

significant differences between the groups ($P = 0.499$, $P = 0.242$ respectively) (Table 2). The pre- and post-cesarean section mean hemoglobin and hematocrit values were also similar between the groups ($P > 0.05$ for all, Table 3).

Table 1: Descriptive characteristics of the puerpera in the bladder flap and control groups

| | Bladder Flap Group (n=50) | | Non-Bladder Flap Group (n=50) | | Test | |
|-------------------------|---------------------------|--------------------|-------------------------------|--------------------|----------|---------|
| | n | % | n | % | χ^2 | P-value |
| Educational status | | | | | | |
| ≤ Primary school | 10 | 20.0 | 16 | 32.0 | 2.051 | 0.359 |
| High school | 30 | 60.0 | 24 | 48.0 | | |
| University | 10 | 20.0 | 10 | 20.0 | | |
| Income status | | | | | | |
| Lom | 2 | 4.0 | 7 | 14.0 | 3.053 | 0.217 |
| Middle | 39 | 78.0 | 35 | 70.0 | | |
| High | 9 | 18.0 | 8 | 16.0 | | |
| | min.-max | \bar{X} (SD) | min.-max | \bar{X} (SD) | T | P-value |
| Age | 23-41 | 32.32(5.30) | 23-41 | 31.68(5.44) | 0.596 | 0.553 |
| BMI | 23.53-41.02 | 29.48(3.46) | 23.53(41.02) | 29.23(3.63) | 0.357 | 0.722 |
| Operation time (min) | 22-40 | 32.46(4.79) | 20-35 | 26.16(3.39) | 7.587 | <0.001 |
| Post-op Pain (VAS) | 2-7 | 4.42(1.54) | 1-6 | 2.82(1.47) | 5.321 | <0.001 |
| Baby's characteristics | | | | | | |
| Weight (gr) | 2750-4500 | 3403.200 (331.327) | 2750-4500 | 3376.000 (327.682) | 0.413 | 0.681 |
| Size (cm) | 48-53 | 49.56(1.20) | 48-53 | 49.40(1.16) | 0.678 | 0.499 |
| Head circumference (cm) | 34-35 | 34.50(51) | 34-35 | 34.48(50) | 0.198 | 0.843 |

χ^2 : Pearson Chi-square analysis, SD: 2, t: Independent samples t-test, SD: 98

Table 2: Comparison of the incidence of urinary tract infection, hematuria and bladder injury in the participants in the intervention and control groups

| | Bladder Flap (n=50) | | Omission of a Bladder Flap (n=50) | | Test | P-value |
|----------------|---------------------|------|-----------------------------------|-------|-----------------|--------------------|
| | n | % | n | % | | |
| Urine culture | | | | | | |
| Positive | 4 | 8.0 | 2 | 4.0 | | 0.678 ^F |
| Negative | 46 | 92.0 | 48 | 96.0 | | |
| Hematuria | | | | | | |
| Yes | 15 | 30.0 | 12 | 24.0 | $\chi^2: 0.457$ | 0.499 |
| No | 35 | 70.0 | 38 | 76.0 | | |
| Bladder injury | | | | | | |
| Yes | 3 | 6.0 | - | - | | 0.242 ^F |
| No | 47 | 94.0 | 50 | 100.0 | | |

χ^2 : Pearson Chi-square analysis, SD: 2 t: Independent samples t-test, SD: 98

Table 3: Comparison of the mean hemogram values of the participants by group and time

| Hemogram Values | Bladder Flap (n=50) | Omission of a Bladder Flap (n=50) | Difference between groups | |
|-----------------------------------|--------------------------|-----------------------------------|---------------------------|---------|
| | \bar{X} (SD) (min-max) | \bar{X} (SD) (Min-max) | t* | P-value |
| Preoperative hemogram (g/dl) | 11.82(1.14) (9.2-14) | 11.83(1.11) (9.2-13.8) | 0.044 | 0.965 |
| Postoperative hemogram (g/dl) | 11.09(1.10) (8.8-13.3) | 11.16(1.04) (8.8-13.4) | 0.318 | 0.751 |
| Intra-group differences test: t** | 5.984 | 9.948 | | |
| P-value | <0.001 | <0.001 | | |
| Preoperative hematocrit (%) | 34.99(2.84) (29-41) | 35.20(2.85) (29-41.6) | 0.365 | 0.716 |
| Postoperative hematocrit (%) | 32.97(2.76) (27.3-38.3) | 33.02(2.86) (27-37.8) | 0.093 | 0.926 |
| Intra-group differences test: t** | 6.001 | 9.852 | | |
| P-value | <0.001 | <0.001 | | |

t*: independent samples t-test, SD: 98 t **: dependent samples t-test, SD: 49

The residual urine volume on the 2nd postoperative day was significantly different between the two groups ($P = 0.045$, Table 4), while it was similar on the 5th postoperative day and 6th postoperative week ($P = 1.000$, Table 4). However, the incidence of residual volume determined during the three measurements significantly differed between the groups ($P < 0.001$, Table 4). According to the results of further analysis, the incidence of residual urine detection on the 2nd postoperative day was significantly higher than that which was detected on the 5th

postoperative day and 6th postoperative week, both in the bladder flap and the control groups ($P<0.001$, $P<0.001$, respectively, Table 4), while postoperative 5th day and 6th week measurements were similar ($P>0.05$ for all, Table 4). When the participants in the groups presented to have their controls at the 6th week, there was no significant difference between the groups in terms residual urine volumes ($P=1.000$, Table 4).

Mean post-cesarean section UDI-6 scores determined on the postoperative second day and the eighth week were similar ($P=1.000$, Table 5). However, when the intragroup differences in terms of the post-cesarean section mean UDI-6 scores were analyzed, it was determined that the scores obtained at the postoperative sixth week both in the bladder flap and control groups (11.67 (7.21) and 11.11 (6.92), respectively) were lower than were those obtained on the second postoperative day (29.33 (21.91) and 29.33 (19.28), respectively) ($P=0.695$, Table 5).

Table 4: Comparison of the residual urine volumes of the participants by group and time

| | Bladder Flap (n=50) | | Omission of a Bladder Flap (n=50) | | Difference between groups Test | P-value |
|---|---|-------|---|-------|-----------------------------------|---------|
| | n | % | n | % | | |
| 2 nd day residual urine volume >150ml | | | | | χ^2 : 4.000 | 0.045 |
| Yes | 14 | 28.0 | 6 | 12.0 | | |
| No | 36 | 72.0 | 44 | 88.0 | | |
| 5 th day residual urine volume >150ml | | | | | 1.000 ^F | |
| Yes | 3 | 6.0 | 3 | 6.0 | | |
| No | 47 | 94.0 | 47 | 94.0 | | |
| 6 th week residual urine volume >150ml | | | | | AY | |
| Yes | - | - | - | - | | |
| No | 50 | 100.0 | 50 | 100.0 | | |
| Intra-group differences test | 23.286 / 0.000 | | 19.500 / 0.000 | | | |
| C-Q / P | | | | | | |
| Difference | 2 nd day > 5 th day | | 2 nd day > 5 th day | | | |
| | and 6 th week | | and 6 th week | | | |

χ^2 : Pearson chi-square test, SD: 1, F: Fisher's Exact test) AY: Analysis could not be performed because there was not enough sample size. C-Q: Cochran's Q test, SD: 2, Post hoc analysis: McNemar test with a Bonferroni correction

Table 5: Comparison of the mean UDI-6 scores obtained by the participants by group and time

| Measurement time | Bladder Flap (n=50) | | Omission of a Bladder Flap (n=50) | | Difference between groups t ^t | P-value |
|--|---------------------------------|----------------------------------|-----------------------------------|-----------------------------|---|---------|
| | \bar{X} (SD) (Min-max) | \bar{X} (SD) (Min-max) | \bar{X} (SD) (Min-max) | \bar{X} (SD) (Min-max) | | |
| 2 nd day UDI-6 total score | 29.33(21.91) (11.11 - 72.22) | 29.33(19.289) (11.11 - 72.22) | | | <0.001 | 1.000 |
| 6 th week UDI-6 total score | 11.67(7.21) (0 - 33.33) | 11.11(6.92) (0 - 33.33) | | | 0.393 | 0.695 |
| Intra-group differences test t ^{**} | 5.382 | 8.328 | | | | |
| P-value | <0.001 | <0.001 | | | | |
| d / post hoc power | 0.91 / 1.00 | 1.08 / 1.00 | | | | |

t^{*}: independent samples t-test, SD: 98 t^{**}: dependent samples t-test, SD: 49

Discussion

In most of the Cesarean sections, the bladder flap technique is widely used depending on the preference of the obstetrician. Since antibiotic use was not widespread in the past years, surgeons performed bladder flaps to prevent the spread of infection to the peritoneal cavity and to reach the lowest uterine segment with minimal damage to the bladder. Nowadays, although the bladder flap application has become standard in Cesarean sections, there is not enough evidence indicating its effectiveness [3,17]. Therefore, many factors such as bladder flap application and the effects of analgesic agents increase the incidence of PUR after cesarean section [7].

The homogeneity of the groups in this study terms of age, BMI, income status, and the neonates' birthweights and head circumference measurements is important. The present study results are consistent with those of other studies conducted on the issue [7,18].

Comparison of the groups in terms of surgery time and postpartum VAS scores revealed a significant difference between the two groups. Both the duration of the surgery and postoperative pain values were significantly higher in the bladder flap group compared to the control group. In Hohlagschwandtner et al.'s study [19], the duration of the surgery was longer and need for analgesics were higher in the group who had bladder flaps created than in the group who did not. Similarly, according to meta-analysis of O'Neill et al. [20], the duration of the surgery was longer in groups undergoing bladder flap procedure. In Aklaghi et al.'s study [21] conducted with 201 primiparous women having undergone cesarean section, the duration of the surgery was longer and the need for analgesia was higher in the bladder flap group than in the non-bladder flap group. However, in other studies to investigate urinary symptoms after Cesarean section, the duration of the surgery was insignificantly shorter in the group with bladder flaps than in those without [1]. On the other hand, in a study conducted by Çetin et al. [18], there was no significant difference between the groups in terms of surgery time. In a randomized controlled study conducted by Tuuli et al. [5], the comparison of the VAS scores of the groups determined on the first postoperative day demonstrated that there was no significant difference between the groups. The duration of the surgery in the present study was different from that in other studies, which was probably due to the fact that conditions in the operating rooms were different and that the surgeon performing the operation did not use the flap technique routinely. In addition, every different application performed during cesarean surgery may have increased the level of pain felt by the person in the postoperative period, and VAS scores may have been significantly different due to the clinical and cultural differences regarding analgesic drugs administered postoperatively.

There was a statistically significant difference between the bladder flap and non-bladder flap groups in terms of the residual urine volume on the postoperative second day, which were similar on the 5th postoperative day and the 6th postoperative week. Hemoglobin and hematocrit values and the incidence of hematuria, urinary system infection, and injury of bladder were similar between the two groups. The results of the study conducted by Tuuli et al. [5] on 258 women indicated that there were no significant differences between the groups in terms of hemoglobin and hematocrit values, and the incidence of bladder injury, urinary tract infection and hematuria. Similarly, according to O'Neill et al.'s [20] meta-analysis conducted to investigate whether the omission of bladder flap would decrease postpartum morbidity during post-Cesarean section, there were no differences between bladder flap and non-bladder flap applications in terms of developing postoperative complications. The results of another study revealed that while there were no significant differences between the groups in terms of hemoglobin and hematocrit values, the residual urine volume was significantly higher in the flap group than in the non-flap

group [18]. The results of the present study were consistent with those of the other study results.

Postpartum PUR is a significant risk factor for maternal morbidity [22,23]. In this study conducted to determine the effect of bladder flap and omission of the bladder flap application during cesarean section performed under general anesthesia on the long-term urinary retention, there was no significant difference between the groups when urinary symptoms were evaluated with the UDI-6 scale at postpartum 2nd day and 6th week, which was similar to the results of the study of Boyle et al., which investigated the same parameters among patients in which bladder flaps were and were not created [1].

The results of this study demonstrated a decrease in residual urine volume in the participants with high residual urine volume after Kegel exercises, and their postoperative 2nd day and 6th week residual urine volumes and UDI-6 scores were significantly different. In their studies evaluating the effectiveness of Kegel exercises in preventing urine retention and edema formation in perineal sutures, Sumiasih et al. [24] found that Kegel exercise not only prevented postpartum urinary retention and edema in the perineal suture, but also helped mothers to return to their pre-pregnancy states.

The strengths of our study include the training of patients with high residual urine volume and urinary symptoms on Kegel exercises during discharge. The ultrasonographic evaluations performed on the 5th postoperative day and 6th week indicated that Kegel exercises decreased residual urine volume in both groups. In addition, in both groups, urinary symptom-related UDI-6 scores measured on the postoperative 6th week were statistically significantly lower than were those measured on the postoperative 2nd day.

Limitations

The present study has some limitations. First, it is a single-center study with a small sample size and second, the results obtained from this study are applicable only to the primiparous pregnant women who participated in the study, and thus cannot be generalized to other women. Similar future studies with multi-center design may promote the reliability of results for the general pregnant population.

Conclusion

In the current study, residual urine volume on the 2nd postoperative day was higher, the duration of the surgery was longer, and the postoperative pain was higher in the bladder flap group compared to the non-bladder flap group. There were no differences between the groups in terms of residual urine volume, UDI-6 scores and bladder injury on the postoperative 5th day and 6th week. In addition, Kegel exercises taught to the participants during discharge by healthcare workers played a significant role in reducing the residual urine volume and urinary symptom complaints.

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