ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Evaluation of Postoperative Bladder Functions of Patients Who Underwent Cesarean Hysterectomy Due to Placenta Accreta Spectrum

Plasenta Akreta Spektrumuna Bağlı Olarak Sezaryen Histerektomi Uygulanan Hastaların Postoperatif Mesane Fonksiyonlarının Değerlendirilmesi

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ABSTRACT

Aim: *Placenta accreta spectrum (PAS), which includes placenta accreta, increta, and percreta, defines an abnormal placental invasion. PAS is associated with increased mortality and morbidity and injury of adjacent organs such as the bladder, ureter, and bowel. The bladder is the most common injured organ in the literatüre. Our study aimed to evaluate the bladder functions after postpartum hysterectomy, which was performed for PAS.*

Material and Method: *This single-centered prospective study was performed between January 2016 and January 2018. A total of 81 patients who were planned for an elective cesarean section and underwent peripartum hysterectomy due to PAS were included. Due to the unavailable data, 22 patients were excluded. The patients were divided into two groups: patients with bladder injury (n=20) and those without bladder injury (n=25). Furthermore, the bladder injury group was subdivided into two subgroups as bladder injury ≥2 cm (n=8) and bladder injury <2 cm (n=12).*

Results: *There was no statistically significant difference between the two groups' sociodemographic characteristics. No significant difference was found between the two groups about laboratory parameters. There was no significant difference between the two groups according to the first sense to void, normal desire to void, bladder emptying time, maximum urethral pressure, bladder pressure, maximum urethral closure pressure, and residual volume (p>0.05) while strong desire to void (439.2±70.05 vs. 391±67.34, p=0.024) and maximum bladder capacity (400.8±65.76 vs. 351±57.39, p=0.011) were significantly lower in bladder injury group. Likewise, when subgroups were compared, there were no differences in sociodemographic characteristics in laboratory parameters (p>0.05).*

Conclusion: *Attention should be paid to the postoperative consequences of bladder damage during hysterectomy for PAS.*

Key words: *bladder function; placenta accreta spectrum; postpartum hysterectomy*

ÖZET

Amaç: *Plasenta akreta, inkreta ve perkretayı içeren plasenta akreta spektrumu (PAS), anormal bir plasental invazyonu tanımlar. PAS, mesane, üreter ve bağırsak gibi komşu organların artmış mortalite ve morbidite ve yaralanması ile ilişkilidir. Literatürde mesane en sık yaralanan organ olarak bildirilmektedir. Çalışmamızda PAS için yapılan postpartum histerektomi sonrası mesane fonksiyonlarını ve inkontinans sıklığını değerlendirmeyi amaçladık.*

Materyal ve Metot: *Ocak 2016 – Ocak 2018 tarihleri arasında gerçekleştirilen tek merkezli prospektif bir çalışmadır. Elektif sezaryen operasyonu planlanan ve PAS nedeniyle peripartum histerektomi uygulanan toplam 81 hasta dahil edildi. Ulaşılamayan veriler nedeniyle 22 hasta çalışma dışı bırakıldı. Hastalar mesane yaralanması olan (n=20) ve mesane yaralanması olmayan (n=25) olmak üzere iki gruba ayrıldı. Ayrıca mesane yaralanması olan grup ≥2 cm (n=8) ve <2 cm (n=12) olacak şekilde iki alt gruba ayrıldı.*

Bulgular: *İki grup arasında sosyodemografik özellikler arasında istatistiksel olarak anlamlı bir fark yoktu. Laboratuvar parametreleri açısından iki grup arasında anlamlı fark bulunmadı. İlk işeme hissi, normal işeme isteği, mesane boşaltma süresi, maksimum üretral basınç, mesane basıncı, maksimum üretral kapanma basıncı ve rezidüel hacim (p>0,05), güçlü işeme isteği (p>0,05) açısından iki grup arasında anlamlı fark yoktu 439,2±70,05'e karşı 391±67,34, p=0,024) ve maksimum mesane kapasitesi (400,8±65,76'ya karşı 351±57,39, p=0,011) mesane yaralanması grubunda anlamlı olarak daha düşüktü. Aynı şekilde alt gruplar karşılaştırıldığında da laboratuvar parametreleri açısından sosyodemografik özelliklerde farklılık yoktu (p>0,05).*

Sonuç: *PAS için histerektomi sırasında mesane hasarının postoperatif sonuçlarına dikkat edilmelidir.*

Anahtar kelimeler: *mesane yaralanması; plasenta akreata spektrumu; postpartum histerektomi*

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Introduction

The placenta accreta spectrum (PAS), which includes placenta accreta, increta, and percreta, defines an abnormal placental invasion. Placenta accreta and increta are used for superficial and deep myometrial invasion, respectively, while placenta percreta is used for full-thickness myometrial invasion and serosa or adjacent visceral organ inolvement[1,2]. However, the incidence of PAS was 0.8/1000 in 1980; it recently reached 3/1000 (Helena c. Bary-tels, placenta accreta spectrum). In this spectrum, the frequency of placenta accreta was reported to be 79%, increta 14%, and percreta 71.2%.

The main risk factors of PAS are advanced maternal age, increased parity, presence of placenta previa, and previous uterine surgery or curettage[3–5]. PAS is associated with increased mortality and morbidity, disseminated intravascular coagulopathy, renal failure, acute respiratory distress syndrome, infection, increased hysterectomy rates, and injury of adjacent organs such as bladder, ureter, and bowel[1].

The most common approach in the treatment of PAS is hysterectomy. Unfortunately, the urinary tract injury rates reach nearly 29% for hysterectomies performed for PAS, whereas it is 4.8% for standard hysterectomy[6,7]. The bladder is the most common injured organ in the literature. In studies evaluating the incidence of bladder injury in patients who underwent a peripartum hysterectomy, Kayayalcin et al. reported the bladder injury rates as 5.4%, and Yucel et al. reported this rate as 8.88%. Hence, early diagnosis, determining the invasion depth preoperatively, and multidisciplinary surgical team approach including urology team is crucial for cases of urinary tract invasion. Urinary incontinence is a common health issue affecting the quality of life of a woman. Clinical symptoms of urinary incontinence are only seen in 25% of patients who have bladder injury during obstetric and gynecologic surgery[4].

To the best of our knowledge, there is no study evaluating the incidence of urinary incontinence after postpartum hysterectomy in the Turkish population. Our study aimed to assess the urodynamics alterations and frequency of urinary incontinence after postpartum hysterectomy performed for PAS.

Material and Methods

This single-centered prospective study was performed at the University of Health Sciences, Bursa Yuksek Ihtisas Research and Training Hospital, Obstetrics and Gynecology Department, between January 2016 and January 2018. The local ethics committee approved it of our university, and it was by the principles of the Declaration of Helsinki (2011-KAEK-25 2018/10–12). Written informed consent was obtained from all participants.

A total of 187 patients, who were planned for an elective cesarean section and underwent peripartum hysterectomy due to PAS, were included. The patients were divided into two groups: patients with bladder injury and patients without bladder injury. Furthermore, the bladder injury group was subdivided into two subgroups: bladder injury ≥2 cm and bladder injury <2 cm. During the surgery, the location of bladder injury was not in the trigon part of the bladder in any patient. Therefore, no description has been made regarding the location of the bladder injury. The study was designed based on the size of the bladder injury. Patients with and without bladder injury were compared in bio demographic, intraoperative, postoperative characteristics, laboratory parameters, voiding diary, and urodynamic parameters.

Study Protocol

Patients with PAS are scheduled for elective cesarean section at 36–37th weeks of gestation in our clinic. In the preoperative period, two erythrocyte suspensions and fresh frozen plasma are reserved for patients with hemoglobin values >10 g/dL. In contrast, four units of erythrocyte suspension and fresh frozen plasma are reserved for patients with hemoglobin <10 g/dL. Patients are operated in a lithotomy position. Considering the clinical and sonography findings obtained in the preoperative period, midline or Phannenstiel incision was preferred for the abdominal entrance route. The baby is delivered by making a fundal incision to the uterus, and without removing the placenta, a hysterectomy is performed. Patients with bladder damage during hysterectomy are consulted with the urology department, and control cystoscopy is performed at the end of the surgery. Some measures have been taken to prevent bladder injury. Foley catheter was inserted in all patients in the preoperative period. During the uterine artery dissection, care was taken not to separate the bladder excessively. While performing vesicouterine cavity dissection, sharp dissection (with scissors) was avoided in order not to increase the possibility of bladder injury. The two-fold

repair was performed with 3–0 atraumatic chromic catgut when bladder injury occurred. Patients with bladder injury were routinely followed up with foley catheter for 7–10 days postoperatively[9,10]. Cellulitis or infection appears as a complication in cases where bladder injury is noticed late. Therefore, cystoscopy is routinely recommended if bladder injury is suspected. It is known that the factors causing bladder injury are related to the patients' previous uterine surgery and the increasing invasion of the placenta to the bladder caused by PAS. In the study, the greater the degree of invasion, the greater the bladder injury was seen. In the 6th postoperative month, these patients are called for control, their urination functions are questioned, and urodynamic studies are performed. If bladder and urethral injuries occur, routine intraoperative ureteroscopy is recommended[11,12]. All patients were evaluated for urinary tract infection; appropriate treatment was applied to the patients with infection. In addition, each patient was asked to complete the voiding diary for three days.

Urodynamics; It is a diagnostic method used to reveal or exclude components associated with lower urinary system disorders, to predict the effects of LUT functions and disorders on the upper urinary system, to follow the results of the intervention or treatment performed on the patient, and to investigate the causes of failure of the previous treatments[13]. Independent of urinary incontinence, evaluation of lower urinary system functions of urinary incontinence.

Uroflowmetry is a test in which the amount of urine voided per unit time is measured in ml/sec. Tests in which voiding less than 50% of the total functional bladder capacity is performed are not diagnostic. Since the same patient can void at different volumes during each uroflowmetry measurement, it is impossible to accurately measure the patient's bladder capacity change by uroflowmetric evaluation.

Bladder storage function is evaluated during the urodynamic examination, taking into account the bladder sensation, detrusor activity, bladder compliance, and bladder capacity parameters[14].

Considering the above reasons, the urodynamic study was preferred instead of uroflowmetry to evaluate lower urinary system functions more accurately.

In urodynamic evaluation, the patient is told to empty her bladder before urodynamic, and the remaining volume is measured. Following this, an isotonic NaCl was infused at a rate of 50 ml/min using a disposable double-lumen 8F bladder catheter for filling cystometry in a standard gynecological lithotomy position. The presence of detrusor contractions exceeding 15 cmH2O and can not be inhibited during filling is defined as detrusor instability. The bladder is filled, and the first sense to void (ml), normal desire to void (ml), strong desire to void (ml), and maximum bladder capacity (ml) are recorded. In addition, starting from 100 cc, the patient is coughed for every 100 cc increment to obtain any urine leakage. Valsalva leak point pressure is measured in patients with urine leakage, and pressure greater than 200 cmH20 is accepted as a normal urodynamic study. Maximum urethral pressure is measured when the bladder catheter is withdrawn. Following cystometry, while the bladder is full, the infusion lumen is pumped with liquid, and the catheter is pulled from the catheter to the distal, proximal urethra. This way, maximum urethral closure pressure, and functional urethral length are measured.

Age, gravida, parity, abortion, curettage, height, weight, number of previous cesarean section, presence of prior myomectomy, gestational age at delivery, birth weight, type of incision, method of anesthesia, need for perioperative transfusion, duration of hospitalization, urinary catheterization length, maternal complications and preoperative and postoperative laboratory parameters such as complete blood count, fasting glucose, kidney, and liver function test parameters were recorded. Moreover, patients were questioned for urinary incontinence and first sense to void, normal desire to void, strong desire to void, maximum bladder capacity, bladder emptying time, maximum urethral pressure, bladder pressure, maximum urethral closure pressure, and residual volume parameters were obtained from the urodynamic studies.

Statistical Analysis

Statistical analysis of the study was carried out with SPSS 21.0 program. Power analysis was used to determine the sample size of the study. Considering the power as 80%, the minimum number of patients was calculated with a 30% difference, and the 0.05 p-value was calculated as 20 for each group. The Shapiro Wilk test was used to determine whether the data was normally distributed or not. Data were expressed as mean ± standard deviation, median, or percentage. Student-t-test was used to compare the normally distributed

data between the two groups, and Mann Whitney-U test was used to compare the non-normally distributed data. Chi-square or Fischer Exact test was used to compare categorical variables. P<0.05 value was considered as statistically significant.

Results

A total of 187 patients who were planned for an elective cesarean section and underwent peripartum hysterectomy due to PAS were included. But 81 of these patients whose pathology result was evaluated as PAS were included in the study. A total of 22 patients were excluded because of unavailable data, four patients with morbid obesity, six patients who have pre-operative urinary incontinence and bladder function disorder, one patient with a history of urinary incontinence surgery, and three patients having a history of urinary incontinence before pregnancy are excluded. Since morbid obesity is a risk factor for urinary incontinence, four morbid obesity patients were excluded from the study. Finally, a total of 45 patients were analyzed in the study. The patients were divided into two groups: patients with bladder injury (n=20) and those without bladder injury (n=25). Furthermore, the bladder injury group was subdivided into two subgroups as bladder injury ≥2 cm (n=8) and bladder injury <2 cm (n=12).

None of the patients had urinary incontinence six months after the hysterectomy due to PAS; the two alterations statistically significant in the urodynamic study were "the maximum bladder capacity and strong desire to void. However, we found no difference in these parameters in comparison to subgroups.

The mean age of the patients was 33.87±4.89 years. Patients were divided into two groups: patients with bladder damage (n=20) and those without bladder damage (n=25). The sociodemographic characteristics of all patients are demonstrated in Table 1. There was no statistically significant difference between the two groups regarding age, gravida, parity, abortion, number of curettages, body mass index, number of previous cesarean sections, and presence of prior myomectomy (p>0.05).

Perioperative features of patients with and without bladder injury are shown in Table 2. There was no statistically significant difference between the two groups according to birth weight, perioperative transfusion unit, anesthesia method, and maternal complication rate. Gestational age at delivery was earlier (34 (30–37) vs 36 (28–37), p=0.008), the incision type was preferred to the midline (75% vs 36%, p=0.009), hospital stay (9.5±4.17 vs 6.76±2.11, p=0.014) and urinary catheterization time (7.1±2.22 vs 1.64±1.44, p<0.001) were longer in bladder injury group.

None of our patients had clinical bladder dysfunction symptoms in the postoperative period, and there was no significant difference in the voiding diary. (p=0.863)

Laboratory parameters of patients with and without bladder injury are presented in Table 3. There was no significant difference between the two groups regarding preoperative hemoglobin, preoperative and postoperative platelet, aspartate aminotransferase, alanine aminotransferase, glucose, urea, and creatinine values. Postoperative hemoglobin levels were statistically lower in the bladder injury group (9.25±1.04 vs. 8.41±1.65, p=0.007).

It was technically not possible to statistically compare the voiding diaries of different patients with each other. Therefore, nocturia, which may be one of the most important indicators of a decrease in bladder capacity, was taken as the primary evaluation criterion in evaluating voiding diaries. When the urination diaries were assessed, it was found that no patient woke up more than once at night, and no significant difference was found between the groups in the statistical evaluation made on this issue (p=0.768).

Although a standard test was not used in the verbal interrogation of the patients, the obstructive and irritative symptoms of the bladder were asked together. In this questioning, all of the patients answered no to whether you have urinary incontinence.

The urodynamic properties of patients with and without bladder injury are shown in Table 4. There was no significant difference between the two groups according to the first sense to void, normal desire to void, bladder emptying time, maximum urethral pressure, bladder pressure, maximum urethral closure pressure, and residual volume (p>0.05) while strong desire to void (439.2±70.05 vs. 391±67.34, p=0.024) and maximum bladder capacity (400.8±65.76 vs. 351±57.39, p=0.011) were significantly lower in bladder injury group.

Patients with bladder injury were divided into two subgroups as injury ≥2 cm (n=8) and injury <2 cm (n=12), depending on the extent of the damage. The sociodemographic characteristics of patients with

Table 1. *Sociodemographic characteristics of patients*

	Bladder injury (n=20)	No bladder injury (n=25)	p
Age (year)	34±4.65	33.76±5.18	0.872
Gravida (n)	4 (2–9)	4 (2–11)	0.953
Parity (n)	2 (1–7)	2 (1–10)	0.943
Abortion (n)	0 (0–2)	0 (0–3)	0.491
Curettage (n,%)	1 (5%)	1 (4%)	0.872
Body mass index (kg/m²)	25.64±2.17	25.08±2.06	0.384
Number of previous cessarean section (n)	2 (1–7)	2 (1–4)	0.062
Presence of previous myomectomy (n,%)	4 (20%)	2 (8%)	0.872

Table 2. *Perioperative features of patients with and without bladder injury*

	Bladder injury (n=20)	No bladder injury (n=25)	p
Gestational age at delivery (week)	34 (30–37)	36 (28–37)	**0.008**
Birth weight (grams)	2425.5±413.07	2620.8±299.3	0.073
Perioperative transfusion (unit)	4 (0–15)	4 (0–9)	0.870
Incision – Phannenstiel (n,%) – Midline (n,%)	 5 (25%) 15 (75%)	 16 (64%) 9 (36%)	 **0.009**
Anesthesia – General-anesthesia (n,%) – Spinal anesthesia (n,%)	 17 (85%) 3 (15%)	 17 (68%) 8 (32%)	 0.187
Maternal complication (n,%)	4 (20%)	1 (20%)	0.09
Hospital stay (day)	9.5±4.17	6.76±2.11	**0.014**
Urinary catheterization time (days)	7.1±2.22	1.64±1.44	**<0.001**

Table 3. *Laboratory parameters of patients with and without bladder injury*

	Bladder Injury (n=20)	No Bladder Injury (n=25)	p
Preoperative hemoglobin (g/dl)	9.53±1.57	9.59±1.16	0.870
Postoperative hemoglobin (g/dl)	8.41±1.65	9.25±1.04	**0.007**
Preoperative platelet (/mm³)	244200±70137.2	239720±82709.6	0.848
Postoperative platelet (/mm³)	222000±105139	206200±79839.9	0.784
Preoperative AST (IU/L)	23.25±9.82	25.76±12.58	0.493
Postoperative AST (IU/L)	26.15±8.85	29.2±12.08	0.464
Preoperative ALT (IU/L)	17.35±5.87	19.72±9.4	0.507
Postoperative ALT (IU/L)	19.25±5.99	21.4±13.76	0.855
Preoperative glucose (mg/dl)	83.21±11.41	82.24±11.16	0.792
Postoperative glucose (mg/dl)	85.29±7.53	83.65±7.95	0.486
Preoperative urea (mg/dl)	10.97±7.07	9.71±3.59	0.385
Postoperative urea (mg/dl)	11.92±7.77	10.54±4.53	0.689
Preoperative creatinine (mg/dl)	0.74±0.37	0.58±0.11	0.483
Postoperative creatinine (mg/dl)	0.77±0.42	0.63±0.31	0.138

ALT, alanine aminotranferase; AST, aspartate aminotransferase.

Table 4. *Urodynamic properties of patients with and without bladder injury*

	Bladder Injury (n=20)	No Bladder Injury (n=25)	p
First sense to void (ml)	128.25±15.67	135.9±18.18	0.149
Normal desire to void (ml)	248±38.06	257.8±37.22	0.390
Strong desire to void (ml)	391±67.34	439.2±70.05	**0.024**
Maximum bladder capacity (ml)	351±57.39	400.8±65.76	**0.011**
Bladder emptying time (sn)	19.6±1.54	18.92±1.38	0.200
Maximum urethral pressure (cmH_2O)	122.75±6.97	125.2±6.69	0.283
Bladder pressure (cmH_2O)	85.5±3.59	87.4±5.23	0.158
Maximum urethral closure pressure (cmH_2O)	35.05±5.47	37.2±5	0.176
Residual volume (ml)	45±8.43	43.2±7.05	0.409

bladder injury ≥2 cm and <2 cm were presented in Table 5. There was no significant difference between the two groups about age, gravida, parity, abortion, number of curettages, body mass index, number of previous cesarean sections, and presence of prior myomectomy (p>0.05).

Perioperative features of patients with bladder injury ≥2 cm and <2 cm were demonstrated in Table 6. No statistically significant differences were found between the two groups regarding gestational age at delivery, birth weight, perioperative transfusion unit, incision type, anesthesia method, maternal complication rate, length of hospital stay, and urinary catheterization time (p>0.05).

Laboratory parameters of patients with bladder injury ≥2 cm and <2 cm were presented in Table 7. There was no significant difference between the two groups regarding preoperative and postoperative platelet, aspartate aminotransferase, alanine aminotransferase, glucose, urea, and creatinine values. In contrast, preoperative and postoperative hemoglobin levels differed significantly between the two groups (p=0.013 and p=0.041).

Urodynamic properties of patients with bladder injury ≥2 cm and <2 cm were shown in Table 8. There was no statistically significant difference between the two groups according to the first sense to void, normal desire to void, strong desire to void, maximum bladder capacity, bladder emptying time, maximum urethral pressure, bladder pressure, maximum urethral closure pressure, and residual volume (p>0.05).

Discussion

Since the incidence of PAS has recently increased, both obstetricians and urologists have started to come across PAS complications. Adjacent organ injury is an important concern for peripartum hysterectomies performed for PAS. Bladder adherent to the uterus due to prior surgery and increased blood flow due to the invasion of the bladder by the placenta are the most common reasons for bladder injury and massive hemorrhage. In cases with bladder invasion, it is known that maternal mortality, massive bleeding, infection, and morbidity secondary to adjacent organ injury are increased[15]. In the literatüre, the bladder injury rate during cesarean section was reported as 0.08–0.94%, while it was 14.3% during hysterectomy. This rate was reported by Yasa et al. as 30.5% in PAS cases with bladder invasion. t-testSimilarly, Norris et al. claimed that this rate is 36.1%, while Tam et al. showed it as 22.1% in PAS cases[16,17]. Our study found the bladder injury rate as 44%, which is higher than the literature. This increased rate could be related to the number of prior uterine surgery that can lead to adhesion between the uterus and bladder in our patients. Being a reference hospital in our region and operating complex cases could explain this increasement.

Generally, the midline incision is preferred for optimal exploration in PAS cases. In our study, a midline incision was statistically more common in bladder injury cases which are expected to be more complicated. Moreover, hospital stay and catheterization length were longer in bladder injury cases in our study. In cases of bladder injury, the urinary catheter is routinely followed for 7–10 days without removing the urinary catheter.

Most of the studies in the literature investigated the presence of bladder damage in cases of PAS. Still, no study evaluates how bladder functions are affected among these groups. Our study evaluates whether there is a difference between the groups with and without bladder injury in the urodynamic examination. In addition, we investigated the bladder functions of patients with bladder injury according to the degree of injury in the urodynamic test. In our study, when the urodynamic properties of the group with and without bladder injury were compared, a significant difference was found in terms of maximum bladder capacity and a strong desire to void. However, we found no difference in these parameters in comparison of subgroups. The presence or absence of bladder injury in patients with PAS does not differentiate bladder function between patients in the postoperative period.

When the studies in the literature are examined, it has been stated that bladder injury during PAS operations is a complication. However, there is no study showing the bladder function of the patients with bladder injury during the postoperative period in these studies. The greatest strength was verifying urinary incontinence and urodynamic alterations six months after hysterectomy due to PAS comparing patients that had or not bladder injury.

Our study's limitations are the low number of patients included in the research and the inability to access the data of 22 patients in our study group. However, PAS cases are rare. In addition, our study population is the largest group that underwent hysterectomy and urodynamics for PAS to the best of our knowledge.

Table 5. *Sociodemographic characteristics of patients with bladder injury ≥2 and <2 centimeters.*

	Bladder Injury ≥2 cm (n=8)	Bladder Injury <2 cm (n=12)	P
Age (year)	33.5±5.35	34.33±4.33	0.816
Gravida (n)	2 (2–7)	2 (2–9)	0.969
Parity (n)	2 (1–6)	2 (1–7)	0.937
Abortion (n)	2 (25%)	2 (16.6%)	0.450
Curettage (n,%)	1 (12.5%)	1 (8.3%)	0.402
Body mass index (kg/m²)	25.73±2.73	25.58±1.83	0.969
Number of previous cessarean section (n)	2 (1–5)	2 (1–7)	0.322
Presence of previous myomectomy (n,%)	1 (12.5%)	3 (25%)	0.494

Table 6. *Perioperative features of patients with bladder injury ≥2 and <2 centimeters*

	Bladder Injury ≥2 cm (n=8)	Bladder Injury <2 cm (n=12)	P
Gestational age at delivery (week)	34 (31–37)	34 (30–37)	0.839
Birth weight (grams)	2430±538.97	2422.5±331.42	0.969
Perioperative transfusion (unit)	4 (0–7)	4 (0–15)	0.111
Incision			
– Phannenstiel (n,%)	1 (12.5%)	4 (33.3%)	0.292
– Midline (n,%)	7 (87.5%)	8 (66.7%)	
Anesthesia			
– General-anesthesia (n,%)	8 (100%)	4 (33.3%)	0.135
– Spinal anesthesia (n,%)	0 (0%)	8 (66.7%)	
Maternal complication (n,%)	1 (12.5%)	3 (25%)	0.505
Hospital stay (day)	9.63±3.89	9.42±4.52	0.938
Urinary catheterization time (days)	7.63±2.13	6.75±2.3	0.395

Table 7. *Laboratory parameters of patients with bladder injury ≥2 and <2 centimeters*

	Bladder Injury ≥2 cm (n=8)	Bladder Injury <2 cm (n=12)	P
Preoperative hemoglobin (g/dl)	10.61±1.52	8.8±1.16	**0.013**
Postoperative hemoglobin (g/dl)	9.44±2	7.73±0.93	**0.041**
Preoperative platelet (/mm³)	221250±44187.1	259500±81338.24	0.396
Postoperative platelet (/mm³)	186875±64687	245416.6±122210.3	0.396
Preoperative AST (IU/L)	25.63±11.16	21.67±8.98	0.395
Postoperative AST (IU/L)	24.13±6.77	27.5±10.06	0.587
Preoperative ALT (IU/L)	15.88±2.03	18.33±7.36	0.786
Postoperative ALT (IU/L)	18.63±6.55	19.67±5.85	0.536
Preoperative glucose (mg/dl)	79.75±5.99	85.51±13.70	0.436
Postoperative glucose (mg/dl)	81.88±5.54	87.57±8.02	0.069
Preoperative urea (mg/dl)	12.52±5.81	9.93±7.86	0.153
Postoperative urea (mg/dl)	12.96±7.02	11.22±8.45	0.487
Preoperative creatinine (mg/dl)	0.71±0.42	0.76±0.35	0.666
Postoperative creatinine (mg/dl)	0.75±0.55	0.78±0.33	0.063

ALT, alanine aminotranferase; AST, aspartate aminotransferase.

Table 8. *Urodynamic properties of patients with bladder injury ≥2 and <2 centimeters*

	Bladder Injury ≥2 cm (n=8)	Bladder Injury <2 cm (n=12)	p
First sense to void (ml)	126.25±22.48	129.58±9.8	0.172
Normal desire to void (ml)	245±45.36	250±34.38	0.727
Strong desire to void (ml)	370±50.71	405±75.26	0.246
Maximum bladder capacity (ml)	346.25±59.27	354.17±58.54	0.615
Bladder emptying time (sn)	19.75±1.58	19.5±1.57	0.692
Maximum urethral pressure (cmH_2O)	124.38±7.76	121.67±6.51	0.363
Bladder pressure (cmH_2O)	83.75±2.31	86.67±3.89	0.069
Maximum urethral closure pressure (cmH_2O)	37.38±5.10	33.33±5.52	0.088
Residual volume (ml)	45.63±9.43	44.58±8.11	0.875

Conclusion

Attention should be paid to the postoperative consequences of bladder damage during hysterectomy for PAS.

Conflict of Interest

The authors report no declarations of interest.

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