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PERİPARTUM HİSTEREKTOMİ OLGULARININ DEĞERLENDİRİLMESİ: TÜRKİYE'NİN BATI BÖLGESİNDEKİ ÜÇÜNCÜ BASAMAK BİR SAĞLIK MERKEZİNİN DENEYİMLERİ

EVALUATION OF PERIPARTUM HYSTERECTOMY CASES: EXPERIENCES OF A TERTIARY HEALTH CENTER IN WESTERN REGION OF TURKEY

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ÖZET

AMAÇ: Son üç yıl içinde kliniğimizde uygulanan peripartum histerektomi olgularını retrospektif olarak incelemeyi ve peripartum histerektominin insidansını, risk faktörlerini, endikasyonlarını, uygulanan cerrahi yöntemleri, komplikasyonları ve sonuçlarını değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEM: Çalışmaya Ocak 2017 ve Ocak 2020 tarihleri arasında Pamukkale Üniversitesi Tıp Fakültesinde peripartum histerektomi uygulanan hastalar dahil edildi. Peripartum kanaması olan ancak konservatif yaklaşımlar uygulanarak (defektif plasenta insersiyon alanının sütürasyonu veya segmental rezeksiyonu, uterus kompresyon sütürleri, intrauterin balon uygulamaları, uterin veya internal iliak arter ligasyonu vb.) peripartum histerektomi yapılmayan hastalar çalışmaya dahil edilmedi. Hasta bilgileri, hasta dosyaları ve hastane kayıt sisteminden elde edildi. Hastaların demografik ve klinik verileri analiz edilerek değerlendirildi.

BULGULAR: Üç yıllık süre içinde kliniğimizde toplam 3220 doğum gerçekleşti. Bu hastalardan yirmibir tanesine peripartum histerektomi uygulanmış olup insidansı 6,5/1000 idi. Postpartum kanama grubunda peripartum histerektomi için en sık endikasyon plasenta yerleşim ve invazyon anomalileriydi (% 90,4) ve bu anomaliler arasında da en sık görülen histopatolojik tanı plasenta previa ve plasenta increta (% 33,33) birlikteliğiydi. Masif transfüzyon, mesane hasarı, relaparatomi ve yara yeri enfeksiyonu PH uygulanan hastalarda en sık görülen morbidite nedenleriydi.

SONUÇ: Günümüzde plasenta yerleşim ve invazyon anomalileri peripartum kanamaların en sık nedeni olmaya başlamıştır. Peripartum histerektomi ise abnormal plasentasyon için temel tedavi şekli olmaya devam etmektedir.

ANAHTAR KELİMELER: Postpartum kanama, Anormal plasentasyon, Peripartum histerektomi

ABSTRACT

OBJECTIVE: We aimed to retrospectively examine the cases of peripartum hysterectomy performed in our clinic in the last three years and to evaluate the incidence, risk factors, indications, surgical methods, complications, and results of peripartum hysterectomy.

MATERIAL AND METHODS: Patients who had undergone a peripartum hysterectomy in Pamukkale University Medical Faculty Hospital between January 2017 and January 2020 were included in the study. We excluded all patients with the massive peripartum hemorrhage who were treated with conservative approaches (such as suturing or segmental resection of the defective placenta insertion area, uterine compression sutures, intrauterine balloon applications, and uterine or internal iliac artery ligation) rather than hysterectomy. Data of the patients were obtained from patient files and hospital medical records. The demographic and clinical data of the patients were recorded and analyzed.

RESULTS: During the three years, a total of 3220 births took place in our hospital. Peripartum hysterectomy was performed in twenty-one patients; the incidence was 6.5/1000. The most common indication for peripartum hysterectomy in the postpartum hemorrhage group was placental location and invasion anomalies (90.4%) and among these anomalies, the most common histopathological diagnosis was the association of placenta previa and placenta increta (33.33%). Massive transfusion, bladder damage, relaparotomy, and wound infection were the major causes of morbidity in patients with peripartum hysterectomy.

CONCLUSIONS: Recently, placental location and invasion anomalies have become the most common cause of peripartum hemorrhages. Peripartum hysterectomy is the leading treatment method for patients with abnormal placentation.

KEYWORDS: Postpartum hemorrhage, Abnormal placentation, Peripartum hysterectomy

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INTRODUCTION

According to the World Health Organization (WHO) data, 810 women die each day due to preventable causes related to pregnancy and childbirth (1). Uncontrolled bleeding caused by obstetric reasons, which frequently occurs in the postpartum period, is the most important cause of maternal morbidity and mortality.

Regardless of the way of birth, postpartum hemorrhage (PPH) is defined as having cumulative blood loss of 1000 ml or more and/or having symptoms of hypovolemia (hypotension, tachycardia, etc.) within the first 24 hours after birth (2). PPH is called primary or early if it occurs within the first 24 hours after birth, secondary or late if it occurs within 24 hours after delivery, or postpartum within 12 weeks. Approximately, 3% to 5% of obstetric patients will experience postpartum hemorrhage (3). The most common causes of postpartum bleeding are uterine atony, placental location and invasion anomalies, uterine rupture, placental retention, coagulation disorders, uterine inversion, lacerations, and vascular injuries. While uterine atony was the most common cause of PPH in the past (2), placental location and invasion anomalies have become the most common cause of postpartum hemorrhage due to older age at pregnancy, use of assisted reproductive techniques, the increase in the number of cesarean delivery, and previous uterine surgery in recent years (4 - 6).

The term Placenta Accreta Spectrum (PAS) disorder is used to describe invasion disorders of the placenta. PAS disorder is defined as the abnormal attachment and invasion of villous tissues to the deeper vascular areas of the myometrium. According to the classification made by FIGO in 2019, PAS is evaluated as three grades: Grade 1: Abnormally adhering placenta (placenta adherenta or creta), Grade 2: Abnormal invasive placenta (increta), Grade 3: Abnormal invasive placenta (percreta) (7).

Various medical and surgical methods are available for the prevention and treatment of postpartum bleeding. Intrauterine balloon applications, uterine compression sutures, uterine or internal iliac artery ligation, segmental resection of the defective placental insertion area, and peripartum hysterectomy (PH) are some examples for surgical treatments. Although PH is quite risky, it is an effective surgical method applied during delivery or unstoppable bleeding within the first 24 hours after delivery (8). Unwanted morbidities such as transfusion requirement, re-exploration, and major surgical complications may develop with PH (9). When PH is applied under suitable conditions and by experienced surgeons, it is lifesaving. If the risk factors are known in advance, PH can be applied under suitable conditions in terms of maternal and neonatal health.

In this study, we aimed to examine retrospectively the cases of peripartum hysterectomies performed in our clinic in the last three years and to evaluate the incidence, risk factors, indications, surgical methods, complications, and results of peripartum hysterectomies.

MATERIALS AND METHODS

Subjects

Patients who underwent a peripartum hysterectomy in the Department of Obstetrics and Gynecology, Pamukkale University Medical Faculty between January 2017 and January 2020, were included in this retrospective study.

Exclusion criteria comprised of patients with the massive peripartum hemorrhage who were treated with conservative approaches (such as suturing or segmental resection of the defective placental insertion area, uterine compression sutures, intrauterine balloon applications, and uterine or internal iliac artery ligation) rather than hysterectomy.

Patients' ages, pregnancy and abortion numbers, delivery patterns (vaginal delivery/cesarean delivery), and bleeding history in the antenatal period were determined from the files. Reports of ultrasonography and magnetic resonance imaging methods for placental placement and invasion were examined. Patients' postoperative hospital stay, preoperative and postoperative hemoglobin levels, blood products given during or after the operation, temporary ureter catheterization before the operation, complications and histopathological

examination results of hysterectomy materials were evaluated. The gestational week at birth, birth weight, neonatal intensive care need, and duration of stay were also determined from the files.

Ethical Committee

This investigation was approved by the Pamukkale University Medical Faculty ethics committee (17.03.2020 / 06). All procedures were per the principles of the Declaration of Helsinki.

Statistical Analysis

In our study, the samples were not normally distributed because of the small number of cases; it was better to use non-parametric statistical tests. Therefore, statistical analysis was made with Wilcoxon Two Related-Samples and Mann-Whitney tests. The data were expressed as means ± SE (Standard Error). Statistical significance was set at $p < 0.05$, and the categorical variables were expressed as percentages. Data were analyzed with the IBM Statistical Package for the Social Science, version 21 (IBM Corp., Armonk, NY, USA).

RESULTS

During the last three years (2017-2019), a total of 3220 deliveries were performed in our clinic. Of the deliveries, 765 (23.76%) were carried out as normal spontaneous vaginal delivery (NSVD) and 2455 (76.24%) were carried out as by cesarean section (C/S). Peripartum hysterectomy (PH) was performed in 21 of 3220 births, and its incidence is 6.5/1000. Five of the peripartum hysterectomy cases were performed in 2017, 10 in 2018, and 6 in 2019 **(Table 1)**.

Table 1: Delivery numbers, type of deliveries, peripartum hysterectomy numbers and incidences by years

Year	Delivery numbers (n)	VD (n)	C/S (n)	PH (n)	Incidence of PH (n/1000 delivery)
2017	793	190 (%24,83)	603 (%24,56)	5	6,3
2018	1009	231 (%30,2)	778 (%31,7)	10	9,4
2019	1418	344 (%44,97)	1074 (%43,74)	6	4,2
Total	3220	765 (%100)	2455 (%100)	21	6,5

C/S: Cesarean section, PH: Peripartum hysterectomy, VD: Vaginal delivery

The most common indication for PH was placental location and invasion anomalies (90.4%). Among the placental location and invasion anomalies, the most common histopathological diagnosis was the association of placenta previa and placenta increta (33.33%), **(Figure 1)**.

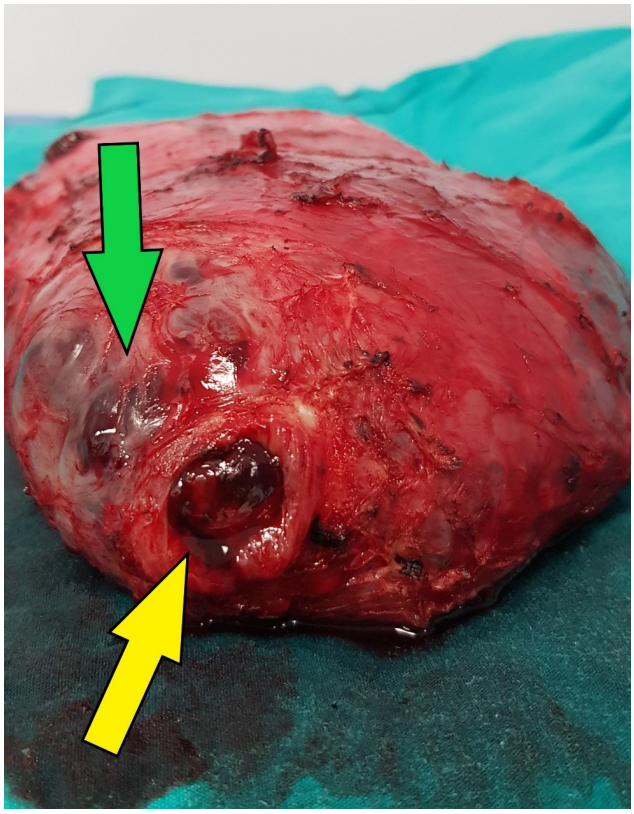

Figure1: Hysterectomy material of a case with placenta previa totalis and placenta increta (Yellow arrow points to placental location in cervix and green arrow points to myometrial invasion areas of placenta). Notice that the plasenta in situ.

61.9% of PH cases were applied under elective conditions and 38.1% of the cases were performed under emergency conditions. Distribution according to the PH indications and application conditions were indicated in **Table 2**.

Table 2: Indications for peripartum hysterectomies

Indications	Elective conditions (n,%)	Emergency conditions (n,%)	Total (n,%)
Pl. accreta+ Pl. previa	3 (%23,07)	2 (%25)	5 (%23,80)
Only Pl. accreta	1 (%7,7)	0	1 (%4,76)
Pl. increta+ Pl.previa	6 (%46,15)	1 (%12,5)	7 (%33,33)
Only Pl. increta	0	1 (%12,5)	1 (%4,76)
Pl. percreta + Pl.previa	1 (%7,7)	0	1 (%4,8)
Only Pl. previa	2 (%15,38)	2 (%25)	4 (%19,04)
Uterine atony	0	1 (%12,5)	1 (%4,8)
Uterine rupture	0	1 (%12,5)	1 (%4,8)
Total (n,%)	13 (%61,9)	8 (%38,1)	21 (%100)

The mean demographic data of hysterectomized patients were as follows: age 33.52±1.17, gravida 4.24±0.39, parity 4.24±0.33, number of abortions 2.48±0.18, a gestational week at birth 34.86±0.63 **(Table 3)**.

Table 3: Demographic characteristics and clinical parameters of patients undergoing peripartum hysterectomy

Demographic characteristics	Mean±SE
Age	(33,52 ±1,17)
20-25	1 (%4,76)
26-30	6 (%28,57)
31-35	6 (%28,57)
36-40	7 (%33,33)
≥41	1 (%4,76)
Gravida	(4,24 ±0,39)
0-2	4 (%19,04)
3-4	9 (%42,85)
5-6	7 (%33,33)
≥7	1 (%4,76)
Parity	(4,24 ±0,33)
1	6 (%28,57)
2	7 (%33,33)
3	4 (%19,04)
≥4	4 (%19,04)
C/S	(1,66 ±)
0	1 (%4.76)
1	10 (%47,6)
2	5 (%23,8)
3	5 (%23,8)
D&C	(2,48 ±0,18)
0	10 (%47,61)
1	6 (%28,57)
2	5 (%23,8)
Gestational week	(34,86 ±0,63)
24-32	3 (%14,28)
33-34	4 (%19.04)
35-37	12 (%57.14)
38-42	2 (%9,5)
Preoperative Hgb level (g/dL)	10,6714 ±0,33
Postoperative Hgb level (g/dL)*	10,1286 ±0,44
Transfused ES unit	3,05 ±0,5
Transfused FFP unit	1,19 ±0,29
Postoperative hospitalization period (days)	7,14 ±0,66
Newborn weight (grams)	2421,90 ±129,84
NICU stay (days)	13,67 ±4,8

C/S: Cesarean section, D&C: Dilatation and curettage, ES: Erythrocyte suspension, FFP: Fresh frozen plasma, Hgb: Hemoglobin, NICU: Neonatal intensive care unit
** Hemoglobin level after ES transfusion on the postoperative first day*

While 20 patients (95.2%) had a prior history of at least one cesarean section, only one patient (4.8%) had a vaginal delivery who also had a history of curettage. Mean preoperative and postoperative hemoglobin levels, the number of transfused erythrocyte suspension (ES) and fresh frozen plasma (FFP) suspension, postoperative hospitalization period of patients, birth weight of newborn babies, and duration of stay in neonatal intensive care unit (NICU) are shown in Table 3. When these results were evaluated according to their application whether, in elective or emergency conditions, neonatal intensive care unit (NICU) stay time (p=0.038), total transferred ES (p=0.004) and FFP units were higher (p=0.024) while preoperative Hb level was lower in patients who underwent emergency surgery **(Table 4)**.

Table 4: Comprasion of elective and emergency groups with respect to hematologic parameters, duration of NICU stay of newborn and gestational week at birth

	Emergency conditions (Mean±SE)	Elective conditions (Mean±SE)	p
Preoperative Hgb level	9,67 (±0,7)	11,28 (±0,2)	0,015
Total transfused ES units	4,75 (±0,7)	2 (±0,5)	0,004
Total transfused FFP units	2 (±0,5)	0,79 (±0,3)	0,024
NICU stay (days)	26,1 (±11,3)	6 (±1,7)	0,038
Gestational week at birth	33,7±4,3	35,5(±1,4)	0,500

ES: Erythrocyte suspension, FFP: Fresh frozen plasma, Hgb: Hemoglobin, NICU: Neonatal intensive care unit

Placental placement anomaly was observed in all 21 patients by ultrasonography. In twelve of them, a placental invasion anomaly was detected by magnetic resonance imaging (MRI) **(Figure 2)**.

Figure 2: MRI image of placental location and invasion anomaly (Pl. previa totalis + pl. accreta). Arrow indicates complete myometrial invasion by placenta

Ten of these patients were operated under elective conditions, and two were operated under emergency conditions. Six of nine patients who did not have preoperative MRI were operated under emergency conditions, and three patients were operated under elective conditions. Surgical skin incision types in PH cases that were performed under emergency conditions were Pfannenstiel (PF), infra umbilical median (IUM), and IUM + supra umbilical median (SUM) incisions. Surgical skin incision types applied under elective conditions were IUM. Surgical uterine incision types applied to the uterus were lower segment high transverse (28.57%) and fundal midline vertical (71.43%) incisions **(Figure 3)**.

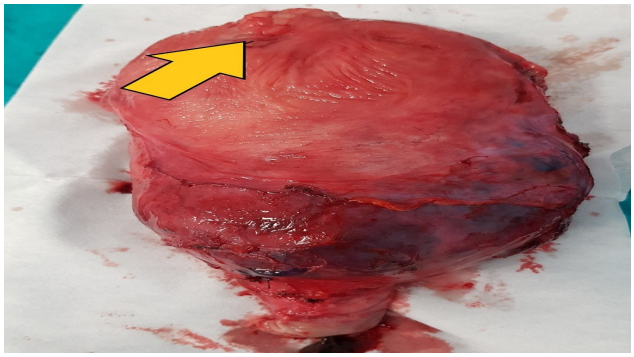

Figure 3: Hysterectomy with plasenta left in situ. Arrow shows the closure of the uterus after fundal midline vertical incision

Two of the six transverse incisions applied were performed in elective conditions, and four of them were performed in emergency operations. A vertical incision was performed in 11 electives and 4 emergency operations. One of these patients had uterine atony, one had a complete uterine rupture, and the others had placental adhesion anomaly. Besides, total hysterectomy was performed in all cases. The causes of morbidity in patients undergoing PH included massive transfusion, bladder injury, relaparotomy, and wound infection. Only one patient received a massive transfusion, and another one developed a post-operative wound infection. One patient underwent relaparotomy due to postoperative hemorrhage. Bladder damage was observed in three patients who had deep placental invasion anomaly and rigid adhesions between the bladder and uterus due to previous C/S. Bladder defects that occurred were repaired by Urologists, and no sequelae occurred in these patients. A temporary ureter catheter was applied to 13 patients to prevent ureter injuries. A preoperative catheter was applied to 11 patients who were operated on under elective conditions, and one patient who was operated under emergency conditions. A prophylactic temporary ureter catheter was applied to one patient to prevent ureteral kink formation after the operation. Eight patients were not catheterized (two in elective and six in urgent conditions). A preoperative temporary ureter catheter was applied to all patients with bladder injury, and these patients were operated under elective conditions. No maternal mortality was observed in patients undergoing PH in our clinic, although in a case of PH under emergency conditions due to uterine rupture, the fetus was delivered dead.

DISCUSSION

Despite the improvements in antenatal imaging methods, medical treatment options, and transfusion capacity in recent years, PH is still a valuable and pertinent method in preventing maternal mortality and morbidity. The frequency and indications of PH application worldwide vary according to the level of development of societies, geographical, ethnic, and cultural structures. For example, indications for hysterectomy and incidence rates according to a study in Pakistan are uterine atony and 4,01/1000, while in Australia these findings are abnormal placentation and 1,1/1000, respectively (10, 11). Two examples whose incidences are similar in Europe are England and Nordic countries (Denmark, Finland, Sweden, Norway, and Iceland) in which the most common indications are uterine atony and placental invasion disorder, respectively (12, 13). Aside from different continents or countries, differences are observed even in separate regions within the same country. For instance, the incidence and most common indication of PH were 3.36/1000 and uterine atony respectively in Eastern Turkey, but they were 0.5/1000 and placental adhesion anomaly respectively in Western Turkey (14, 15).

In our study, the most common indication and incidence of PH are placental adhesion disorder and 6.4/1000, respectively. Our data in terms of the indications of PH was consistent with data from Western Turkey, but the incidence was high-er. The explanation for this high incidence may be that our clinic is a tertiary referral hospital where the number of patients with older age pregnancies, previous cesarean section, or uterine surgery histories was high among the patients who were admitted or referred. The high percentage of C/S deliveries in our clinic also reflects this condition.

In the current study, the rate of PH due to uterine atony was lower compared to the literature. Uterine atony cases are encountered more frequently in secondary healthcare institutions and treatment is performed there. Additionally, these cases are referred less frequently to tertiary health institutions such as our clinic. In uterine atony cases with massive hemorrhage, a successful response has been obtained with conservative medical and surgical treatment methods in our clinic. The only patient who underwent PH due to uterine atony in our study was admitted under emergency conditions with hypovolemic shock and direct hysterectomy was preferred to prevent time loss with conservative treatment methods. For patients who were not supposed to get the benefit of a conservative approach in preoperative evaluation, direct PH was preferred and performed

under elective conditions. Age, obstetric and surgical history of the patients, findings on imaging techniques, and general condition of the patients were primary factors affecting this decision. Therefore, we did not have any patients who have performed PH upon an unsuccessful trial of conservative treatment methods. This condition highlights the importance of preoperative evaluation in determining the timing and choice of treatment. If the PH is to be performed due to postpartum hemorrhage, this can be done in two ways; total or subtotal hysterectomy. In the current study, most of the patients (n=17, 80.95%) who underwent PH had lower uterine segment involvement. Therefore, the total hysterectomy was applied to these patients.

All four patients (%19,05) in the group without lower uterine segment involvement were over 35 years of age. We preferred the total hysterectomy instead of subtotal hysterectomy as a surgical method in these patients to avoid the potential risk of malignancy developing in the cervical stump and the need for regular cytology examinations and other associated problems such as bleeding or discharge associated with the residual cervical stump.

It is difficult to predict other causes of peripartum bleeding apart from placental location and invasion anomalies during the antenatal period. The Doppler ultrasonographic evaluation is useful even though its ability to determine the degree of extrauterine penetration of the placenta is insufficient. Indeed, detection of at least one of the findings such as lacunae in the placenta, hypoechoic area in the retro placental area, irregularity, or hypervascularization between the bladder and uterus serosa and less than 1 cm thickness of the myometrium below the placenta suggests PAS disorder. However, magnetic resonance imaging (MRI) is the most preferred method for determining placental location and depth of invasion in peripheral organs (16). In our study, MRI was performed in 12 of 21 patients who underwent PH to confirm the preliminary diagnosis of placental location anomaly with ultrasonography. Histopathological definitive diagnoses were compatible with preliminary diagnoses made by imaging methods. In literature, placenta previa and accreta are the most common causes of PH due to placental adhesion disorder (17 - 20), but in our results, placenta previa and increta co-occurrence was noticed as the primary finding which differentiates our study from the others.

Preparation for PH and delivery can be performed under elective conditions, if placenta adhesion disorder is detected in the antenatal period, moreover, to reduce the need for neonatal intensive care, antenatal steroid applications can be performed for fetal lung maturation before delivery. In elective PH, pre-operative hemoglobin values, peripartum blood loss, and transfusion need are significantly lower than emergency PH (21). Knowing the diagnosis of placental adhesion disorder earlier provides advantages such as explaining possible morbidity to the patient and obtaining a consent form (22). In our study, all patients undergoing PH were compared according to whether the operations were performed in elective or emergency conditions. There were significant differences between the groups in terms of preoperative hemoglobin level (p=0.015), transfused ES units (p=0.004), transfused FFP units (p=0.024), and NICU stays (p=0.038). Accordingly, in patients undergoing PH performed under emergency conditions, the basal hemoglobin levels were lower; the number of transfused ES and FFP units was higher, and also the length of hospitalization of their babies in the neonatal intensive care unit was longer compared to the elective cases.

The type of skin incision determines the ease of surgical application and exploration. In our study, performing PH whether under emergency or elective conditions has been the determinant factor in the skin and uterine incision types. Median vertical skin incisions (IUM, IUM + SUM) were performed in 92.3% of patients operated under elective conditions. This rate was 37.5% in patients operated under emergency conditions. Also, in 84.6% of patients operated under elective conditions, uterine midline vertical incision was applied for fetal delivery. But this rate was 50% for those operated under emergency conditions. Uterus incision pattern varies according to etiology and placental

location; a fundal vertical incision is the most preferred method in PAS disorders (23). The most common morbidities detected in PH applications are massive transfusion requirement, disseminated intravascular coagulation (DIC), re-exploration due to persistent bleeding, febrile morbidity, skin and/or intra-abdominal infection, hematoma, adjacent organ injuries (24). The most common cause of morbidity in our study was bladder injury in three patients who had deep placental invasion and rigid adhesions between the bladder and uterus due to previous C/S. Of these three cases, the bladder was dissected intentionally in a controlled manner by the surgeon to prevent further damage in two patients. Urologists have restored bladder damage without the need for partial cystectomy. Massive transfusion, wound infection, and postoperative bleeding relaparotomy in three patients were other morbidities.

During PH, the most common adjacent organ injuries are those seen in the bladder and ureter (25), because the surgeon has to hurry usually, and anatomical changes related to pregnancy are added to this risk. To reduce the risk of complications, it may be necessary to inflate the bladder with saline, dissect the ureters, and insert a ureter catheter (26 - 29). It is routine in our clinic to attach transient ureter catheters to patients to prevent ureteral injuries before elective PH. It is not certain that catheter application prevents ureteral injuries, but no catheter injuries occurred in patients undergoing catheterization in our study. The limited number of catheter-treated patients was an important drawback of this study. However, a prospective study on this subject has still ongoing in our clinic so that we will obtain more illuminating data in the future. In conclusion, placental invasion anomalies for which peripartum hysterectomy is the main treatment, have become the most common cause of peripartum hemorrhage recently. New definitions, various medical and surgical treatment approaches are being developed to reduce the risks of mortality and morbidity in these patients. After an early diagnosis, the surgical approach performed by an experienced team in elective conditions seems to be a better and safer treatment approach if PH is applied due to invasion anomaly.

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