Surgical management of 58 patients with placenta praevia percreta

Aysun Camuzcuoglu · Mehmet Vural · Nese Gul Hilali · Adnan Incebiyik · Hasan Husnu Yuce · Ahmet Kucuk · Hakan Camuzcuoglu

Summary

Objective The aim of this study is to present our experience with surgical management of placenta praevia percreta.

Methods This study was conducted from January 2009 through March 2014 at Harran University Hospital and was a chart review of all patients who underwent caesarean hysterectomy with the placenta left in situ for placenta praevia percreta.

Results The study group comprised 58 patients. All of the patients underwent ultrasound mapping of the placental area before surgery. Emergent caesarean hysterectomy was only performed in 9 patients; 49 patients underwent planned caesarean hysterectomy. Bilateral internal iliac artery ligation was performed in all cases. Four patients (6.9 %) had bladder damage, one patient (1.7 %) required cystotomy, and one patient (1.7 %) required re-operation because of postoperative hemorrhage. The mean operative time was 141.6 (range: 95–355) minutes. Only 17 (29.3 %) patients were administered more than four units of red blood cells. There was no ureteral damage or maternal death. Furthermore, there were no complications in 42 (72.4 %) patients.

Conclusions Caesarean hysterectomy for placenta praevia percreta is associated with increased maternal morbidity. However, preoperative diagnosis of placenta praevia percreta, ultrasound mapping of the placenta, and the presence of a multidisciplinary experienced team may decrease maternal morbidity and mortality. Moreover, the urinary system may be protected in the patients with placenta praevia percreta without serious morbidity.

Keywords Placenta percreta · Placenta praevia · Obstetric hemorrhage · Caesarean hysterectomy

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Introduction

Placenta percreta is characterized by invasion of the myometrium and serosa, and rarely of nearby organs, such as the bladder and ureters. Placenta percreta is an uncommon complication of pregnancy that has been associated with increased maternal morbidity and mortality resulting from massive obstetric hemorrhage [1–3]. Since almost all cases had previous uterine surgery history, pathophysiology is believed to be related with invasion of weakened incision site [4]. Placenta praevia is described as the placenta overlying the internal cervical os [5]. Placenta praevia often accompanies the percreta, and it is named placenta praevia percreta.

Treatment options of this entity are performing C-section disregarding anteriorly placed placenta, delivering baby from fundal hysterotomy, and leaving placenta and uterus by clamping the umbilical cord, performing hysterectomy by dissecting the bladder and placenta interface. Preoperative or intraoperative interventions to reduce blood flow such as balloon catheter occlusion,

uterine artery embolization, and internal iliac artery ligation (IIAL) can be combined with this surgery. In this case series we aimed to present our experience with the surgical management of placenta praevia percreta.

Materials and methods

This study was conducted from January 2009 through March 2014 at Harran University Hospital in Sanliurfa, Turkey, which is a tertiary referral center and was a chart review of all patients who underwent hysterectomy for placenta praevia percreta and was approved by the Medical Ethics Committee of Harran University. For this study, the following data were collected: demographic data, units of blood transfusion, details of the surgical procedure, intra- or postoperative complications, length of hospital stay, and the need for intensive care unit (ICU).

When placenta percreta was suspected on ultrasonography (USG) and Doppler USG or magnetic resonance imaging (MRI) [6], caesarean section with a midline vertical incision was performed. The position of the uterine incision was decided preoperatively according to ultrasound mapping of the placental area. Then, to prevent placental disintegration, the uterus was entered with a longitudinal fundal incision and the infant was delivered. Manual removal of the placenta was avoided to reduce the possibility of profuse hemorrhage. Uterus was elevated with ring forceps through catching bleeding sites of the incision borders (Fig. 1). After bilateral IIAL was performed in all patients, the ligamentum ovarii proprium and round ligament were clamped (in three patients these ligaments were ligated in further steps of hysterectomy), and cut and tied to reduce the blood supply of the uterus. IIAL was performed as previously described [7]. Subsequently, dissection of the bladder was achieved using a right angle clamp and bipolar and/or monopolar cautery (Force Triad®, Covidien, USA). Abnormal thick and fragile vessels spreading into the bladder wall from the placental vascular structure were dissected using the right-angle clamp, and then these vessels were clamped, cut, and tied. The bladder was separated until the lower end of the placental adhesion area was reached. During this procedure, perforation of the uterine serosa overlying the placental adhesion area is carefully avoided. In particular, to prevent ureteral injury, ureteral dissection was performed until the ureteric canal was reached in patients with the placenta percreta extending towards the lateral side of the uterus. In cases of laterally extending placenta percreta, the uterus was separated from the pelvic structures, and the paravesical space was opened. Then, the posterior sheet of the broad ligament was cut until the ureter and the uterine artery were reached. After the uterus was dissected from the surrounding tissues, the lower end of the cervical placental adhesion area and the uterine artery was clamped and ligated. Finally, the uterus was removed from this level (Fig. 2). As seen on consort diagram (Fig. 3), all of the preoperative diagnoses were confirmed during surgery and histopathologic examination.
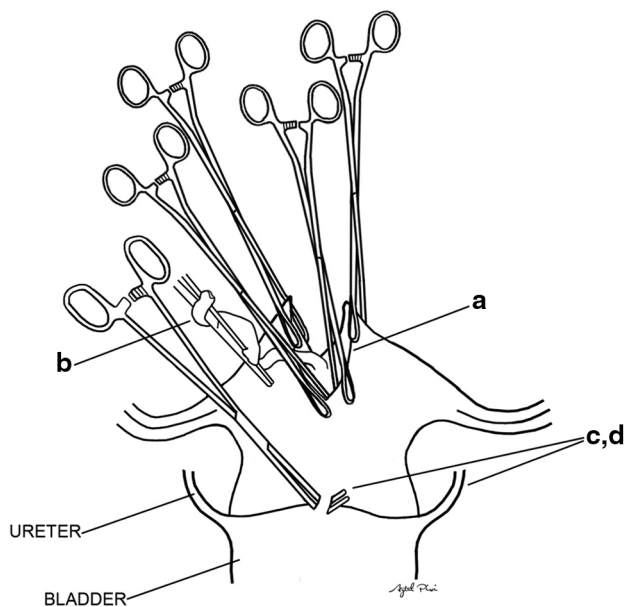
Fig. 1 Schematic presentation of the procedure: (**a**) fundal hysterotomy and delivery of fetus, (**b**) clamping the umbilical cord, (**c**) inspection of the percreta invasion site and examining the ureters, and (**d**) dissection of the bladder by using right-angle clamp starting from top of the bladder adhesion (At this dissection site only parietal peritoneal layer, bladder, and placenta are present)
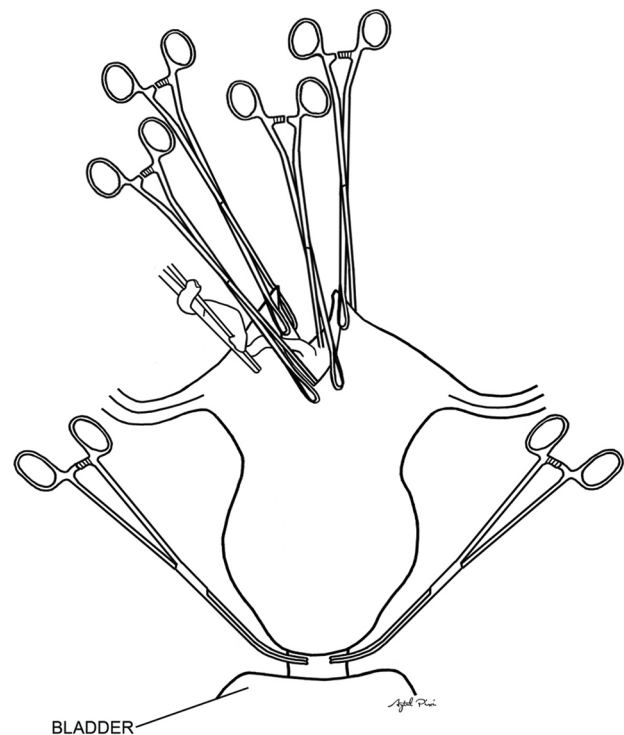
Fig. 2 Bladder is dissected until the level of uterine cervix. After this stage routine hysterectomy procedure is performed. Uterus is removed with in situ placenta
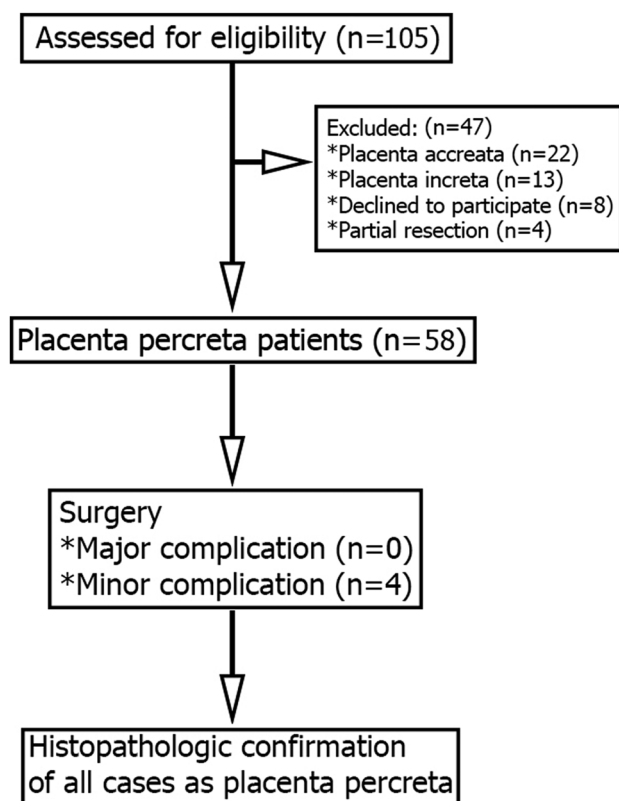
Fig. 3 Consort diagram

In our clinic, cesarean section delivery is performed for percreta patients over the 34th week of gestation if no other emergent situation (bleeding, uterine contraction, membrane rupture) is present.

We recommend laparotomy and cesarean hysterectomy to all patients [1]. Since in this technique we totally dissect the vesicouterine space we prefer to perform total hysterectomy. In the operation room if extension of invasion is limited, then we consider partial resection of invasion site and preserve the uterus. If the extension of the invasion is limited to the anterior part of uterus we perform partial resection of anterior invasion site and repair primarily. IIAL applied for all patients. No complication was recorded until now related with this procedure. There was no complication from the IIAL. All surgical procedures were performed by two experienced surgeons. These cases were done under general anesthesia from the beginning of the operation and both arterial and central venous catheters were placed. All pathology specimens were evaluated by the same pathologist.

In this study, four patients who were treated conservatively for preservation of fertility were excluded. The study group comprised 58 patients. The data were analyzed using SPSS 20.0 (SPSS, Chicago, IL, USA). Descriptive statistics are presented.

Results

The patient characteristics are presented in Table 1. Details of the surgical intervention and maternal morbidity are presented in Table 2. Pregnancy outcomes are presented in Table 3. Figure 4 demonstrates transfused red blood cell count according to week of gestation. While the preoperative mean hemoglobin value was 10.9 ± 1.4, the mean hemoglobin value of patients at discharge was 8.1 ± 0.4. Management strategy was summarized in the consort diagram (Fig. 3). All patients were referred from other hospitals because of the diagnosis of placenta praevia and suspected invasion. Fifty-five patients were

Table 1 Demographic data of the placenta percreta patients

Characteristic	Descriptive statistic ($n = 58$)
Age (years)	31.3 ± 4.1
Gravidity	5 (3–8)[a]
Parity	3 (2–6)[a]
Body mass index	29.2 ± 2.1
Gestational age (weeks)	34 (20–40)[a]
Previous caesarean delivery	3 (1–6)[a]
Smoking	23 (39.7 %)

Data are given as n (%), or mean $\pm$ SD (min-max)
[a]Median (min-max)

Table 2 Maternal morbidity, complications, and pregnancy outcome data of the placenta percreta patients

Characteristic	Descriptive statistic ($n = 58$)
Complications after surgery	
Bladder damage	4 (6.9 %)
Reoperation	1 (1.7 %)
DIC	4 (6.9 %)
Pulmonary embolism	2 (3.4 %)
Wound infection	4 (6.9 %)
Ureteral damage	0
Death	0
No complication	42 (72.4 %)
Cystotomy	1 (1.7 %)
Operation time	141.6 ± 43.5
Transfusion (units)	
<2	9 (15.5 %)
2–3.9	25 (43.1 %)
≥4	17 (29.2 %)
Packed red blood cell (units)	2.7 ± 2
Fresh frozen plasma (units)	2 ± 1.6
Platelets (units)	0.3 ± 1.1
Admission to ICU	27 (65.9 %)
Days in ICU	1.07 ± 1.2
Days in hospital	7.1 ± 4.4

Data are given as n (%), or mean $\pm$ SD
DIC disseminated intravascular coagulation, *ICU* intensive care unit

Table 3 Pregnancy outcomes of the placenta percreta patients

Variable	
Birth weight	2141.4 ± 606.9
1st min. Apgar score	7 (0–9)[a]
5th min. Apgar score	9 (0–10)[a]
Admission into NICU	8/58 (13.8 %)
Perinatal mortality	4/58 (6.9 %)

Data are given as *n* (%), or mean ± SD
NICU neonatal intensive care unit
[a]Median (min-max)

Fig. 4 Stacked bar graphic of the population summarizing transfused red blood cell count

diagnosed by preoperative USG and Doppler USG. Only three patients were diagnosed by MRI.

When we consider the accuracy of the preoperative diagnosis, among all patients, none of the patients was diagnosed to have percreta in the operation theatre that was not suspected preoperatively. On the other hand, two patients were diagnosed to have placenta accrete during the operation and hysterectomy was not performed. These patients were excluded from the group.

Emergent caesarean section was performed as a result of profuse vaginal bleeding in seven patients (30–33rd weeks of gestation), profuse urethral bleeding in one patient (20th week of gestation), and uterine rupture in one patient (33rd week of gestation). Out of seven patients with vaginal bleeding, one had surgery because of life-threatening bleeding in the 20th week of pregnancy. In the patient with uterine rupture, bleeding was observed to arise from placental vascular structures. Additionally, in this patient, dense adhesions were observed between pelvic structures and the uterus. The patient with profuse urethral bleeding was hemodynamically unstable and thus required transfusion of red blood cells. On preoperative cystoscopy, diffuse dilated and bleeding vessels observed on the bladder mucosa. During surgery, the placental tissue was observed to have spread into the posterior wall of the bladder. The anterior lower segment of the uterus was not separated from the bladder wall; rather, the uterus posterior leaf was clamped and cut. The anterior lower segment of the uterus was then cut from above the border of the bladder. Subsequently, placental tissues were removed from the posterior wall of the bladder and then cystotomy was performed. The placental tissue did not reach the bladder mucosa; however, abnormal bleeding vessels were observed on the bladder mucosa. These vessels were ligated and bleeding ceased. Additionally, the bladder wall was not resected in this patient. Postoperative healing was uneventful.

Bladder injury occurred in four patients as a result of dense adhesions between the posterior wall of the bladder and uterus during dissection. All these injury cases are managed together with expert urologist. The bladder serosa had been invaded by the placenta and/or atypical blood vessels in these patients. However, the bladder mucosa was normal. The injury area was also far from the trigon of the bladder in these patients. Separation of a small part of the posterior wall of the bladder was not attempted to reduce the risk of disruption of atypical blood vessels and the uterine serosa overlying the percreta area. Therefore, dissection was continued around this area. Then, a small part of the bladder wall (approximately 2–3 cm) was cut and left on the uterine serosa. Placental disruption or significant bleeding did not occur during surgery. Eventually, minimal tissue loss in the bladder wall occurred in these patients, and the damage was easily repaired. In the postoperative follow-up period these patients remained to be urinary catheterized for a week. In addition, there were no postoperative complications associated with the bladder.
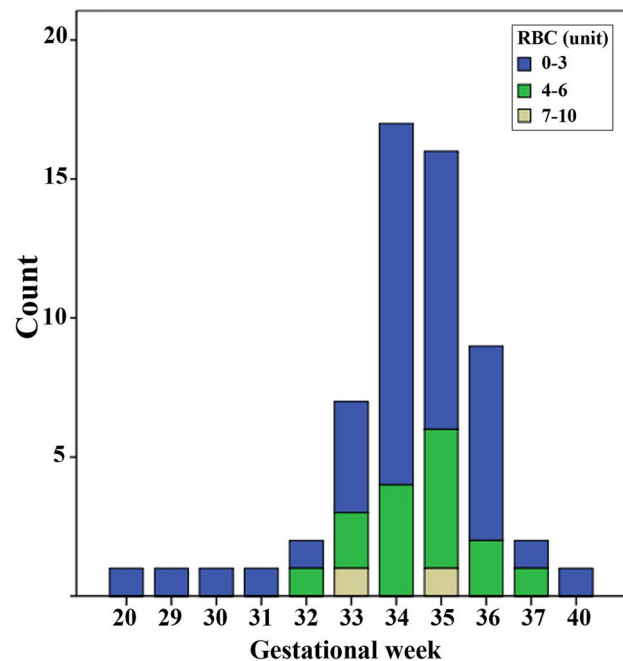
Invasion of the surrounding pelvic structures was observed in three patients during the operation. In these patients, the uterus was separated from the pelvic structures, bladder, and ureters without serious bleeding. In four patients, the ureter was dissected to the entrance of the bladder because the placenta reached inside the broad ligament and parametrium. In particular, the iliac vessels were carefully dissected to reduce the risk of life-threatening bleeding. Finally, the uterus was removed.

A 23-week pregnant patient who developed premature rupture of membranes underwent surgery in the 29th gestational week because of chorioamnionitis. Additionally, all pregnant women under 34 weeks in this study received steroids. In this series, maternal death and morbidity arising from IIAL were not observed. One patient was re-laparotomized after 12 h for postoperative hemorrhage. After drainage of intra-abdominal hemorrhage, no significant arterial bleeding was detected. Four perinatal mortalities were detected (20th, 29th, 30th, and 31st week of gestation).

All hysterectomy specimens were diagnosed as "placenta percreta" after pathologic examination.

Discussion

In this report, excluding the accreta and increta cases, to the best of our knowledge, this is the largest series of praevia-percreta cases in the literature. We especially point out low morbidity rates with the careful dissection technique and discussed possible morbidities. We also aimed to prove total dissection of bladder is possible in almost all percreta cases. This also showed that the problem is not the tissue invasion but vascular invasion of the placenta.

Preoperative diagnosis of placenta praevia percreta may reduce maternal mortality and morbidity. Therefore, in patients with placenta praevia who have risk factors for percreta, obstetricians should preoperatively consider the possibility of placenta percreta [8, 9]. Furthermore, preoperative diagnosis of placenta percreta enables a multidisciplinary approach, which may decrease maternal morbidity and mortality [1, 10].

Our institution is in the Southeast Anatolian Region of Turkey where the fertility rate (births per woman between the ages of 15 and 49) is 3.47 [11]. There were 56,000 deliveries per year during this time in the Sanliurfa region. This high rate of birth is inevitably herewith high rate of caesarean section. Since our hospital is a reference center, cesarean section rates were relatively high (between 40 and 60 %) and annual birth count was between 800 and 1200 in that period. Since all percreta invasions are encountered on the lower anterior wall of the uterus, we believe that repeat caesarean sections may be the underlying reason. Additionally, since our institution is a tertiary referral center most of these cases are directed to our clinic.

Although balloon catheter occlusion, arterial embolization, and IIAL for reduction or cessation of bleeding have been reported in patients with placenta percreta, the available data regarding efficacy and improvement of surgical outcome are unclear. Moreover, these interventions may be associated with significant complications [12–14]. Since an expert is not available to perform selective arterial embolization in our institution, IIAL is performed for these patients. In our series, bilateral IIAL was performed to minimize bleeding during surgery in all patients, and there were no complications.

Unplanned C-Section through low segment transvers incision or leaving placenta and uterus after delivering baby has crucial risks [15–17]. In the current knowledge it is known that careful dissection of the bladder and performing hysterectomy is the principle treatment option [1].

The surgical management of placenta percreta consists of planned hysterectomy with the placenta left in situ to prevent life-threatening bleeding. It is important to use a midline vertical incision when entering the abdomen because this incision provides sufficient exposure during surgery in patients who require extensive dissection. If abnormal dilated vessels and/or placenta percreta area appear on the uterine serosa, the classic uterine incision towards the fundus may reduce the risk of bleeding originating from the placental rupture [1, 8]. Moreover, preoperative ultrasound mapping of the placental area may be useful for determining the optimal location for the uterine incision [1, 2]. Therefore, it is important to refer a patient to a specialized center if effacement of sonoluscent line under placenta is observed in pregnant women with previous cesarean section history.

Caesarean hysterectomy for placenta praevia percreta, particularly when it is extending towards anterior or lateral side of the uterus, is associated with urinary system injury. Some authors have suggested preoperative ureteral stenting in these patients. However, ureteral stent placement does not completely eliminate intraoperative ureteral injury [1, 2, 9]. We did not utilize preoperative ureteral stent placement in our series; rather, we carefully dissected the ureter to the ureteric canal, but rarely to the bladder, in patients with placenta praevia percreta.

If invasion of the bladder is present, the maternal mortality rate in placenta praevia percreta has been reported to be approximately 20 % [18]. In a recent series of placenta accrete, increta, and percreta cases, 13 % severe morbidity was reported although percreta cases constituted only 31 % (21 cases) of the total 68 cases [17].

Hysterectomy with the placenta left in situ for placenta praevia percreta is associated with both bleeding and urinary system injury. In these patients, attempted separation of the bladder wall from the placental adhesion area may result in life-threatening bleeding [8]; however, separation may be achieved with the loss of a small part of the posterior wall of the bladder without severe bleeding because only a part of the bladder serosa is usually invaded. Finally, the bladder may be preserved with minimal damage in these patients. The risk of maternal morbidity and mortality is also very high at this stage of the operation because of persistent bleeding. Therefore, it is crucial to reduce uterine blood flow before dissection of the bladder [9].

The uterine serosa overlying the placenta during dissection of the bladder should not be perforated because of the risk of intractable hemorrhage. Although rare, if placental invasion inside of the bladder wall is present, hematuria may be observed [19]. In the present series, only one patient complained of hematuria, and in this patient, invasion of the placental tissues into the bladder wall took place but was not observed in the mucosa. Although some authors have suggested that all invaded tissues such as the ureter and bladder should be removed, this procedure is associated with high morbidity because of the requirement for increased transfusion and extensive surgery [18, 20]. In contrast, conservation of the bladder may be possible in patients with bladder invasion or dense adhesions between the posterior wall of the bladder and the uterus [19, 21].

Blood vessels spreading into the posterior wall of the bladder from the placenta require particular attention.

These vessels may carry a large blood volume because of the lack of development of the media tunica. The inferior uterine segment and posterior wall of the bladder may be invaded by newly formed blood vessels, which may mimic invasion of the bladder by the placenta even though placental invasion of the bladder is not actually present [13]. In these patients, dissection of the bladder is difficult but not impossible. Despite serious preoperative ultrasound mapping and serious preparations, bladder injury may be experienced in nearly half of the patients [22]. Carefully dissection of this invasion gives us a chance to preserve bladder integrity like in our series in which we achieved very low percentage of bladder damage. All blood vessels between the bladder and inferior uterine segment may be carefully dissected without serious maternal morbidity. In placenta praevia percreta involving the pelvic structures surrounding the uterus, it is crucial to separate both urinary system and other pelvic tissues [20, 23]. Furthermore, the possibility of pelvic vascular injury should be considered in these patients. Although this condition is uncommon, removal of the uterus can be dangerous because of its spreading towards the major pelvic vascular structures. In these cases, careful dissection should be performed to prevent life-threatening hemorrhage. It should be remembered that hemorrhage arising from the placenta, uterus, or surrounding pelvic structures during dissection is dangerous. After the uterus is separated from the surrounding tissues and completely devascularized, it may be removed from the lower end of the cervical placental adhesion area.

It is known that severe hemorrhage is the primary cause of morbidity in patients with placenta praevia percreta. The risk of continued bleeding or re-laparotomy is also very high because of dilutional coagulopathy [8, 9, 24]. Reducing intraoperative bleeding may minimize morbidity. Although the intraoperative bleeding and transfusion amount were excessive in our initial cases, they decreased as our team's experience increased. In our series, 42 (72.4 %) patients did not experience any complications. Although maternal death did not occur in the present series, the risk of maternal death is still very high. Although we have reached low morbidity rates in our series, cohort studies may add further knowledge to this life-threatening entity.

American Congress of Obstetricians and Gynecologists (ACOG) recommends planned cesarean hysterectomy in the 34th week of gestation [1]. Since all perinatal mortalities are recorded below the 32nd week of gestation and transfused red blood cell count is tolerable in the advanced pregnancy week (Fig. 4), optimal cesarean hysterectomy week may be planned in late third trimester weeks. All four perinatal infant mortalities were after emergent cesarean cases, and hemodynamical instability of the mother is the most probable underlying reason.

In conclusion, surgical management of patients with placenta praevia percreta is associated with increased risk of maternal morbidity and mortality. Unplanned C-section through low segment transvers incision or leaving placenta and uterus after delivering baby has crucial risks. In the current knowledge it is known that careful dissection of the bladder and performance of hysterectomy is the principle treatment option. Preoperative diagnosis of placenta praevia percreta and ultrasound mapping of the placenta may reduce maternal morbidity. Additionally, planned caesarean hysterectomy with the placenta left in situ and careful dissection to prevent life-threatening hemorrhage may reduce maternal morbidity. Moreover, preservation of the urinary system may be achieved with minimal damage in patients with placenta praevia percreta. The presence of a multidisciplinary team may also improve patient outcomes.

In the future, due to cumulative increase in the rate of repeat cesarean sections, most probably incidence of the percreta will increase gradually and complicated surgery techniques and risks will be experienced by many more obstetricians.

Compliance with ethical standards

Conflict of interest
A. Camuzcuoglu, M. Vural, N. G. Hilali, A. Incebiyik, H. H. Yuce, A. Kucuk, and H. Camuzcuoglu declare that there are no actual or potential conflicts of interest in relation to this article. The authors alone are responsible for the content and writing of the paper.

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