



Comparison of conservative and radical surgery in the management of placenta previa percreta

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Abstract

Objective: We aimed to compare the uterine sparing (US) surgery and hysterectomy for placenta previa percreta (PPP) management.

Methods: Data from PPP patients with anterior invasion who underwent US surgery and caesarean hysterectomy were retrospectively analyzed. The clinical and surgical outcomes of patients with PPP were compared according to the type of surgery.

Results: The mean intraoperative blood loss was lower in US surgery group than in caesarean hysterectomy group (1227.78±204.80 ml vs 1442.22±125.68 ml; p=0.017). The hemoglobin drop was also significantly lower in the patients with US surgery (1.87±0.68 g/dl vs 2.88±1.04 g/dl; p=0.026). Moreover, the mean total transfusion rate was also significantly lower in the patients with US surgery (1.33±0.87 U vs 2.33±0.71 U; p=0.016).

Conclusion: Uterine sparing surgery reduces intraoperative blood loss and transfusion rate in PPP patients with anterior placental invasion compared to hysterectomy. The temporary blockage of bilateral uterine and utero-ovarian arteries with Satinsky clamps may potentially contribute to the success of US surgery.

Keywords: Placental invasion anomaly, placenta percreta, placenta previa, Satinsky clamps, uterine sparing surgery.

Özet: Plasenta previa perkreta yönetiminde geleneksel ve radikal cerrahi operasyonun karşılaştırması

Amaç: Plasenta previa perkreta (PPP) yönetimi için uterus koruyucu cerrahi (UKC) ve histerektomi karşılaştırmayı amaçladık.

Yöntem: UKC ve histerektomi olan anterior invazyonlu PPP hastalarının verileri retrospektif olarak analiz edildi. PPP'li hastaların klinik ve cerrahi sonuçları, cerrahi operasyon türüne göre karşılaştırıldı.

Bulgular: UKC grubunda ortalama intraoperatif kan kaybı, sezaryen histerektomi grubuna kıyasla daha düşüktü (1227.78±204.80 ml'ye karşı 1442.22±125.68 ml; p=0.017). Hemoglobin düşüşü, UKC yapılan hastalarda anlamlı şekilde daha düşüktü (1.87±0.68 g/dl'ye karşı 2.88±1.04 g/dl; p=0.026). Ayrıca, ortalama toplam transfüzyon oranı da UKC grubundaki hastalarda anlamlı şekilde daha düşüktü (1.33±0.87 Ü'ye karşı 2.33±0.71 Ü; p=0.016).

Sonuç: Histerektomiye kıyasla UKC, anterior plasental invazyonlu PPP hastalarında intraoperatif kan kaybını ve transfüzyon oranını azaltır. Bilateral uterusun ve utero-ovaryen arterlerin Satinsky klempleriyle geçici blokajı, UKC başarısına katkıda bulunma potansiyeline sahiptir.

Anahtar sözcükler: Plasental invazyon anomalisi, plasenta percreta, plasenta previa, Satinsky klempleri, uterus koruyucu cerrahi.

Introduction

Placenta accreta spectrum is a serious condition that can develop due to abnormal trophoblastic invasion of the placenta towards the myometrium.^[1] It is associated with severe maternal morbidity. The guideline published by

the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) emphasized that such patients should take level 3–4 care.^[2] Furthermore, the incidence of placenta adhesion anomalies increases in correlation with increased

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How to cite this article: Sezgin B, Kasap B, Adeviye Şahin E, Camuzcuoğlu A, Camuzcuoğlu H. Comparison of conservative and radical surgery in the management of placenta previa percreta. Perinatal Journal 2021;29(1):46–53. doi:10.2399/prn.21.0291008

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caesarean section rates today. In a study made in China, which switched from one child to two children policy in 2011, the incidence of increta and percreta has been reported to rise from 0.18% to 0.78%.^[3] In countries where the number of children has been accepted as social force, such as Turkey, the incidence of placenta percreta is estimated to be higher.

There are three types of placenta accreta spectrum. Those are, accreta, increta and percreta, which varies according to the degree of pathological invasion. Placenta percreta is the most serious form of these types. Thus, it causes intractable intrapartum and postpartum bleeding due to the deep invasion of the placenta into the adjacent structures of the myometrium and uterus.^[4] Postpartum hemorrhage in 65.9%, transfusion requirement in 86.2%, peripheral visceral injury in 14.3% and neonatal intensive care need in 54.5% of the patients with placenta percreta are indicated.^[3] Risk of placental insertion anomaly in patients with placenta previa in 3rd caesarean section was 40% and in 4th it reaches 67%.^[5] The combination of placenta percreta and placenta previa is thought to increase the aforementioned risks.

The management of placenta percreta requires a multidisciplinary approach and experience. Today, the most widely recommended approach is planned caesarean hysterectomy before the start of labor.^[6] But for patients who want to maintain fertility, uterine sparing (US) alternative approaches come to the fore. Several US approaches have been proposed to date based on the basis of reducing the amount of bleeding and complications.^[4,7-10] Nevertheless, both the patients and the obstetricians have a tendency to avoid placenta previa percreta (PPP) surgery, although there are several techniques have been developed for such cases. An optimal treatment for placenta accreta spectrum disorders has not yet been determined. In this study, we aimed to compare the effectiveness and the results of radical surgery versus US surgery using Satinsky clamps in the surgical management of PPP.

Methods

This retrospective study was approved by the local ethics committee for clinical research of Muğla Sıtkı Koçman University, Faculty of Medicine, Muğla, Turkey. Between March 2015 and January 2020, data from patients who underwent hysterectomy or US surgery for PPP were retrospectively analyzed. In our clinic practice, standard surgery for previa percreta

patients is planned with hysterectomy. For patients who insisted on preserving her fertility, we performed US surgery after telling the risks of US surgery and taking the strict necessary approval form. The necessary information was obtained from the hospital database and patient files. Only those who had signed the informed consent at the time of medical evaluation were included in the present research.

During this period, 25 patients who preoperatively diagnosed as PPP were analyzed. Among those patients, 18 had anteriorly proved placenta percreta diagnosis intraoperatively and included to the study. Three patients had parametrial or posterior invasion anomaly of percreta, three patients who were not diagnosed as PPP during surgery were excluded. Medical records of one patient could not be found. A total of nine patients with US surgery and nine patients with hysterectomy were included (**Fig. 1**). Patients characteristics such as age, gravida, parity, body mass index

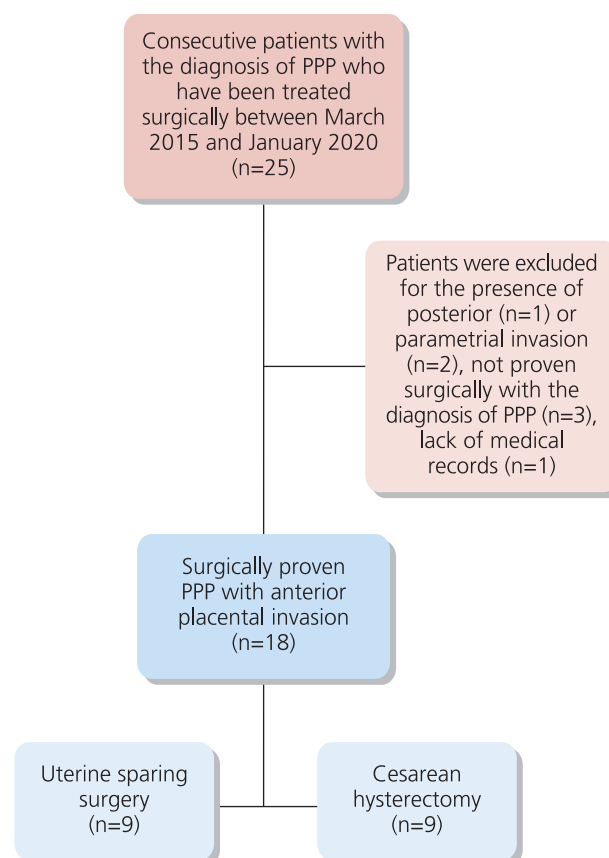


Fig. 1. Flowchart for selection of study population.

(BMI), birth week, the number of previous caesarean sections, intraoperative blood loss, intraoperative complications (bladder, ureter, gastrointestinal system injuries), postoperative complications, preoperative hemoglobin, postoperative hemoglobin, hemoglobin decrease, total transfusion need and intensive care unit need were obtained from the hospital database.

The amount of intraoperative bleeding was calculated by adding the amount of blood detected in the aspirator to the weight difference of the wet and dry states of gauze and compresses. The hemoglobin decrease was calculated in g/dl by subtracting the preoperative hemoglobin value from the postoperative hemoglobin value. Preoperative hemoglobin was calculated in g/dl as the hemoglobin value obtained on the day before the operation. Postoperative hemoglobin was calculated in g/dl as the hemoglobin value obtained 24 hours after the operation (default practice of our clinic). The duration of hospitalization was calculated in days from the first postoperative day until discharge time. The patients were grouped into the US group (n=9) and hysterectomy group (n=9). Patient demographics were described. Preoperative, intraoperative and postoperative surgical parameters were compared and analyzed.

Placental implantation site was evaluated with transabdominal, transvaginal and Doppler ultrasonography. Visualization of lacunae/turbulent lacunae flow and lack of a sonoluscent zone were diagnostic criteria used in imaging methods for the diagnosis of PPP.⁽¹¹⁾ In some cases, a magnetic resonance imaging was taken to clarify the diagnosis of PPP. Detection of abnormally engorged vessels on the lower anterior surface of the uterus and abnormal vascularity exceeding the uterine serosa or reaching to surrounding organs during operation estab-

lished the diagnosis of PPP. If bleeding occurred during follow-up period of the patients with PPP, caesarean section was performed without regard to the week of pregnancy. At 35–36 weeks of gestation, planned caesarean section was performed in women without any complications in obstetric follow-ups. Preoperative placental mapping with transabdominal ultrasonography was performed in all patients diagnosed with PPP. The reason for this was to perform the caesarean section without damaging the placenta during uterine incision. We reserved four units of erythrocyte suspension and four units of fresh frozen plasma preoperatively for all patients, which is the routine practice of our clinic.

Surgical technique

Uterine sparing surgery

The surgical procedure began with an infraumbilical midline incision to open the peritoneal cavity. Then longitudinal incision in the uterine fundus was performed for removal of the fetus. However, uterine fundus incision can be modified as slightly laterally according to the findings of placental mapping. This is very important to avoid any unnecessary injury to placenta. Then, fetus is removed immediately via reverse breech presentation. Umbilical cord is clamped and placenta is left in place. At this step, fundal incision is closed in a continuous manner. Before dissection of vesica from anterior wall of uterus, two Satinsky clamps are positioned on bilateral infundibulopelvic ligaments and another two Satinsky clamps are positioned gently on bilateral uterine arteries at the isthmic level for decreasing vascularization of the uterus (**Fig. 2**). This step is critical for more comfortable continuation of the rest of the surgical procedure. Then dissection of vesica from anterior wall is performed by

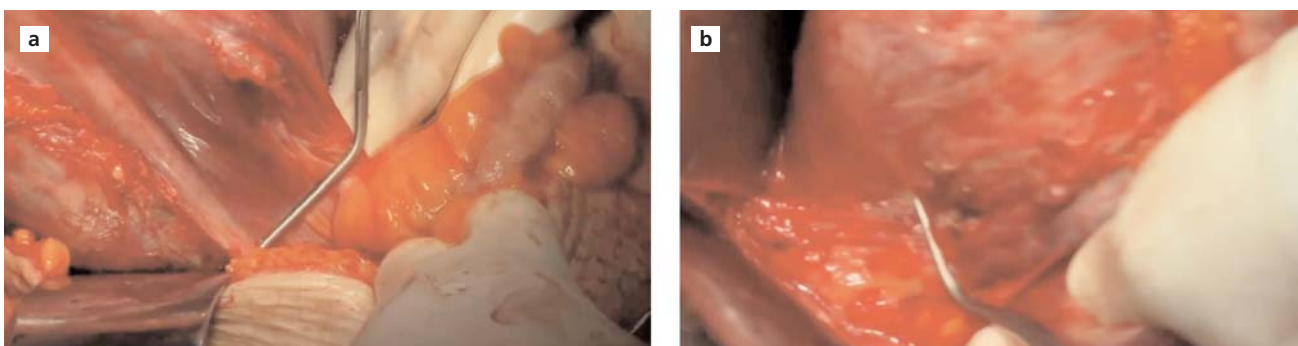


Fig. 2. (a) A Satinsky clamp is positioned on left infundibulopelvic ligament. (b) Another Satinsky clamp is positioned gently on left uterine artery.

the help of electrocautery, right angle clamp and collet (Fig. 3). Sometimes we choose handle LigaSure sealing device for devascularization of aberrant vessels crossing vesica. After fully dissection of vesica, the lower end of the placental adhesion area was reached anteriorly. Afterwards, local resection of adherent placental part was performed. At this step, as left hand of surgeon controls the borders of adherent part inside the uterus, right hand with scalpel outside the uterus opens the borders of adherent placenta in a circular fashion. After resecting the placenta totally with adherent uterine wall, no:1/0 vicryl is used to suture uterine wall defect in a continuous locked fashion. Then all of the Satinsky clamps are removed. After sustaining normal vascularity of the uterus, we check and suture for extra bleeding parts. When hemostasis control is achieved, the abdominal wall is closed in accordance with its anatomical layers. All patients in US group underwent surgery as described above.

Hysterectomy

The surgical procedure applied in all patients who underwent hysterectomy is the same as described in the study of Camuzcuoğlu et al.^[12] The only difference is that internal iliac artery ligation was not applied in any patient in this study.

Statistical analysis

Statistical analyses were performed using Statistical Package for the Social Sciences software, version 23 (IBM Inc., Armonk, NY, USA). Shapiro-Wilk test was used to determine the distribution type. The data were expressed as the mean \pm standard deviation for normally distributed data, and as median [25th–75th percentiles]

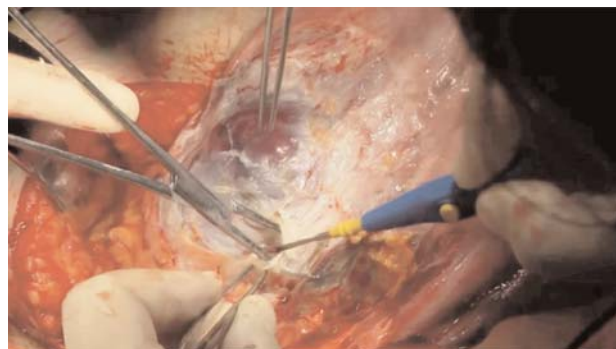


Fig. 3. Dissection of vesica from anterior wall of the uterus is performed by the help of electrocautery, right angle clamp and collet.

for non-normally distributed data. The significance of differences between the groups was determined using Mann-Whitney U (for non-normally distributed data) and independent sample t-test (for normally distributed data). The chi-square analysis was done for categorical data. Post-hoc power analysis was done at the end of study taking transfusion rate as the main outcome variable. A p-value of less than 0.05 was considered statistically significant.

Results

The baseline demographic characteristics of the patients are listed in **Table 1**. The average age of patients in the two groups was similar (US group 34.78 ± 2.11 years vs hysterectomy group 35.67 ± 2.29 years; $p=0.404$). The mean BMI of patients in the two groups was also similar (US group 29.96 ± 2.28 vs hysterectomy group 28.97 ± 2.99 ; $p=0.442$). In US group, median number of caesare-

Table 1. Demographic characteristics of study participants.

Variables	Uterine sparing group (n=9) Mean \pm SD* or Median (25th–75th) [†]	Hysterectomy group (n=9) Mean \pm SD* or Median (25th–75th) [†]	p-value
Age (years)	34.78 \pm 2.11	35.67 \pm 2.29	0.404*
BMI (kg/m ²)	29.96 \pm 2.28	28.97 \pm 2.99	0.442*
Gravidity (n)	3.44 \pm 0.89	3.78 \pm 1.20	0.512*
Parity (n)	2.56 \pm 0.53	3.00 \pm 1.11	0.297*
Birth week (n)	35 (33–36)	36 (35–37)	0.154 [†]
Previous C/S (n)	3 (1.5–49)	3 (2–4)	0.712 [†]

$p < 0.05$ indicates statistical significance. Continuous variables are given as the mean and standard deviation or median [25th–75th]. BMI: body mass index; C/S: cesarean section; SD: standard deviation. *Independent sample t-test; [†]Mann-Whitney U test.

an section was three (range 1.5–4), as well as it was three (range 2–4) in hysterectomy group ($p=0.712$). There was no significant difference in terms of birth weeks of two groups (US group 35 [range 33–36] weeks vs hysterectomy group 36 [range 35–37] weeks; $p=0.154$).

The clinical and surgical outcomes of the two groups were compared and are documented in **Table 2**. The mean preoperative hemoglobin (Hb) values in the US and hysterectomy groups were similar (11.49 ± 1.32 g/dl vs 11.09 ± 1.75 g/dl, respectively; $p=0.592$). However, postoperative Hb and Hb drop values were lower in the hysterectomy group ($p=0.027$ and $p=0.026$, respectively). The mean intraoperative blood loss volume was significantly lower in the US group (1227.78 ± 204.80 ml vs 1442.22 ± 125.68 ml; $p=0.017$). The mean total transfusion rate was significantly lower in the US group than in the hysterectomy group (1.33 ± 0.87 U vs 2.33 ± 0.71 U; $p=0.016$). No cases of intraoperative complications in terms of ureter and bowel injury were reported in either group. However, one of the nine patients in US group and one in hysterectomy group had bladder injury ($p=0.303$). Moreover, one of the nine patients in US group and two of the patients in hysterectomy group had intensive care unit need ($p=0.134$).

Discussion

In this study, we evaluated and compared the results of US surgery and hysterectomy performed in the PPP cases in our clinic. The main result of the study was that intraoperative bleeding, Hb drop and total transfusion

rate were significantly less in patients undergoing US surgery than in patients undergoing radical surgery. Moreover, there was no difference between the two groups in terms of complications. The results of this study may contribute to the literature in PPP cases with anterior invasion who want to preserve their fertility.

Today, with increased caesarean rates, the risk of encountering with placenta percreta is increasing steadily. Although the classic treatment is hysterectomy, uterine protective approaches has gained popularity in recent years. In particular, in societies where continuing fertility has utmost importance for women's social status, the option of hysterectomy may come across as a problem as it causes cessation of fertility. In 2004, Palacios et al. were able to perform US surgery on 50 out of 68 anterior percreta cases.^[7] In their study published in 2020, the same authors reported that hysterectomy can be prevented by 80% in placenta accreta spectrum disorders.^[13] Local resection and reconstruction methods have been modified by many authors and have been successfully applied in placenta percreta cases until today.^[4,7,10,14–18] We also applied local resection and reconstruction methods in all cases where we have performed US surgery, and the uterus has been preserved in all of the cases. All of these cases were anterior percreta. The placental invasion site is probably one of the most important factors in deciding to perform uterine protective approach. In particular, if there is an invasion of the placenta to the parametrium or posterior of the uterus, the US surgery is not a preferred approach. Because the risk of sudden intractable bleeding and mortality risk is

Table 2. Clinical data of the studied groups.

Variables	Uterine sparing group (n=9) Mean±SD*	Hysterectomy group (n=9) Mean±SD*	p-value
Preop Hb (g/dl)	11.49±1.32	11.09±1.75	0.592*
Postop Hb (g/dl)	9.73±0.96	8.21±1.62	0.027*†
Hb drop	1.87±0.68	2.88±1.04	0.026*†
Intraoperative blood loss (ml)	1227.78±204.80	1442.22±125.68	0.017*†
Total transfusion (unit)	1.33±0.87	2.33±0.71	0.016*†
Bladder injury (n) (%)	1/9 (11.11)	1/9 (11.11)	0.303‡
Ureter injury (n) (%)	-	-	
Bowel injury (n) (%)	-	-	
ICU need (n) (%)	1/9 (11.11)	2/9 (22.22)	0.134‡

Continuous variables are given as the mean and standard deviation. Categorical variables are given as the number (percentages). Hb: hemoglobin; Postop: postoperative; Preop: preoperative; SD: standard deviation. *Independent sample t-test; † $p<0.05$; ‡Chi-square analysis.

high. Here, it can be said that US surgery can be performed on patients insisted keeping their fertility, especially in anterior percreta cases.

Sudden bleeding in percreta surgery makes exploration difficult and, increases the mortality and the complications. It is very important to minimize intraoperative bleeding in order to achieve successful outcomes at this surgery. A wide variety of methods have been applied to reduce intraoperative bleeding. These methods include applications requiring interventional radiology such as prophylactic balloon catheter occlusion (uterine artery, internal iliac artery, common iliac artery, aorta), embolization of uterine or internal iliac artery.^[3,11,19-23] Although there is not enough data in the literature on the effectiveness of these methods, there are cases where serious complications have been reported in the literature.^[20,24,25] Our hospital does not have an interventional radiologist experienced in these issues. That's why we have not had an experience on this. Apart from these methods, uterine artery ligation, internal iliac artery ligation, uterine tourniquet, uteroovarian ligament ligation, stapler use in hysterotomy, intracavitary suture methods has been applied by several authors to reduce the amount of intraoperative bleeding.^[9,12,14-18] In percreta patients who underwent hysterectomy, Turan et al., Palacios et al. and Sumigama et al. reported an average amount of bleeding as 1950 ml, 2000 ml and 12,140 ml, respectively.^[9,11,13] Acar et al. and Donna et al. reported the average amount of bleeding in placenta accreta spectrum disorders with US surgery as 1350 cc, 1200 cc, respectively.^[17,22] The majority of these reported cases consist of accreta and increta cases. In our study, although, all cases were placenta percreta, the mean intraoperative bleeding was 1442.22 ± 125.68 ml in the hysterectomy group and 1227.78 ± 204.80 ml in the US group. Here we can say that temporary clamping of bilateral uterine arteries and infundibulopelvic ligaments after removal of the fetus is an effective method to decrease intraoperative bleeding.

In our series, we found that Hb decrease was 1.87 ± 0.68 g/dl in US group and 2.88 ± 1.04 g/dl in hysterectomy group. These values directly affect the transfusion requirement. In their placenta accreta spectrum series where they performed segmental resection, Cırpan et al., Karaman et al. and Karaçor et al. reported an average of 4.18 units, 4.8 units and 4.1 units of erythrocyte suspension replacement, respectively.^[14,16,18] In our study, we detected 1.33 units of erythrocyte suspen-

sion replacement in the US group. According to these findings, we can say that the decrease in the amount of intraoperative bleeding reduces both intraoperative and postoperative complications of transfusion.

In cases of previa percreta, there is a risk of urinary tract injury, especially if there is lateral or parametrial placental invasion of the uterus is present. For this purpose, preoperative ureteral stent application can be made. But applying ureteral stent before surgery does not eliminate the risk of ureteral and bladder damage.^[26] We did not apply ureteral stent to any of our cases. Despite this, we have not encountered any ureteral damage. But we detected bladder damage in one case in US group and in one case in hysterectomy group. In both cases, advanced fibrosis was present between the posterior side of bladder and uterine serosa. At two different percreta hysterectomy series, authors reported 5% and 6.9% bladder injury ratio.^[12,27] In this context, we can say that our rates of bladder injury are in line with the literature. According to our experience, the damage of the serosa overlying the placenta that makes bulging from the anterior surface of the uterus leads to bleeding hard to control and the loss of the bladder dissection plane. This condition may lead to increased bladder complications. We want to emphasize that maintaining the dissection plane of bladder is very important in order to minimize bladder injury.

Satinsky clamps provide temporary vascular occlusion, which are mostly applied in cardiovascular and hepatorenal surgery. We could not find any literature data using Satinsky clamps in percreta surgery. The advantages of these clamps are practical and easy to use, do not damage tissues and can be removed when desired.^[28] In our cases, we have not encountered any complications related to the use of these clamps. In percreta cases with very high risk of bleeding, we can say that the use of these clamps is safe, easy, and may contribute to reduce the amount of intraoperative bleeding according to our experience.

The limitations of our study were retrospective design and low number of patients. Subgroup analyses were not robust due to the low number of cases. The strength of our study is the first to describe a new surgical technique for temporary blockage of bilateral uterine and uteroovarian arteries with Satinsky clamps that potentially contributes to a reduction in intraoperative blood loss and transfusion rates in uterine sparing surgery.

Conclusion

In our study, we found that US surgery reduces intra-operative blood loss and transfusion rate in PPP patients with anterior placental invasion compared to hysterectomy. The temporary blockage of bilateral uterine and uteroovarian arteries with Satinsky clamps may contribute to the literature and future projections in PPP surgery.

Funding: This work did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Compliance with Ethical Standards: The authors stated that the standards regarding research and publication ethics, the Personal Data Protection Law and the copyright regulations applicable to intellectual and artistic works are complied with and there is no conflict of interest.

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