

# Clinical application of stage operation in patients with placenta accreta after previous caesarean section

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## Abstract

To explore the clinical value of stage operation to patients with placenta accreta after previous caesarean section (CS).

Nineteen women with medium and late pregnancies diagnosed with placenta accreta after previous CS were enrolled in this retrospective study and all underwent stage operation. Postpartum hemorrhage volume, red blood cells (RBC) transfusion, uterus retention rate, postpartum complications, and menstrual recovery were analyzed to evaluate the value of stage operation in patients with placenta accreta.

Four of 19 cases were performed uterus curettage after 63, 38, 56, and 52 days of CS. Total hysterectomy was performed in 2 cases after 44 and 57 days of first-stage CS. Thirteen cases had placenta well discharged after treatment with the traditional Chinese medicine (TCM) Shenghua Decoction. The uterus retention rate was 89.48% (17/19). Mean postpartum hemorrhage volume was  $1594.74 \pm 1134.06$  (400–4500) mL, mean volume of total hemorrhage was  $1878.42 \pm 1276.96$  (400–4500) mL, mean RBC transfusion was  $868.42 \pm 816.53$  (0.00–2400.00) mL. Postpartum bleeding volume showed  $\leq 1000$  mL in 8 patients and  $\leq 500$  mL in 4 patients.

Stage operation reduces postpartum hemorrhage volume and cesarean hysterectomy morbidity in patients with placenta accreta. However, infection and late postpartum hemorrhage should be monitored closely.

**Abbreviations:** CRP = C reactive protein, CS = cesarean section, hCG = human chorionic gonadotropin, MRI = magnetic resonance imaging, RBC = red blood cells, TCM = traditional Chinese medicine.

**Keywords:** conservative treatment, part of placenta in situ, placenta accreta, stage operation

## 1. Introduction

In recent years, the morbidity of placenta accreta is on rise due to the rate of caesarean section (CS). Placenta accreta after previous CS was associated with the severe obstetric hemorrhage, ureteral injury and maternal death.<sup>[1,2]</sup> Currently, obstetricians are involved in solving the most important problems in patients associated with placenta accreta, which includes reduction of intrapartum and postpartum blood loss, decrease visceral injury rate, obstetric hysterectomy rate and related risks of maternal

death. Previously, patients with placenta accreta were treated with cesarean hysterectomy.<sup>[3–5]</sup> However, there is a growing requirement and stronger emphasis of patients for quality of life improvement and willingness to reserve the uterus. So, the treatment management of placenta accreta gradually developed in the direction of conservative one. The objective of this study is to explore the clinical application value of stage operation in patients with placenta accreta. The study retrospectively analyzed clinical data of 19 cases who were admitted to the hospital with placenta accreta and undergoing stage surgery to analyze the volume of postpartum blood loss, blood transfusion, uterine retention rate, postpartum complications and menstrual recovery, and discuss the clinical value of stage surgery. These may in turn help obstetricians for exploring a new method of treatment in patients with placenta accreta and presume as a future reference when treating with such conditions.

## 2. Materials and methods

### 2.1. Clinical data

A prospective study was conducted among 19 pregnant women, with singleton pregnancy of 19 to 38.29 weeks, who were admitted to the Xiangya Hospital Central South University, Changsha, China, for stage operation treatment because of placenta accreta after previous CS between June 1, 2012, and December 30, 2015. The study was approved by the Medical Ethics Committee of Xiangya Hospital Central South University (Approval ID: 201311419), and all the participants provided written informed consent. All cases were performed with color Doppler ultrasound examination, and 8 cases were performed with pelvic magnetic resonance imaging (MRI) examination. All

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*Synopsis:* Stage operation reduces postpartum hemorrhage volume and cesarean hysterectomy morbidity in patients with placenta accreta after previous caesarean section.

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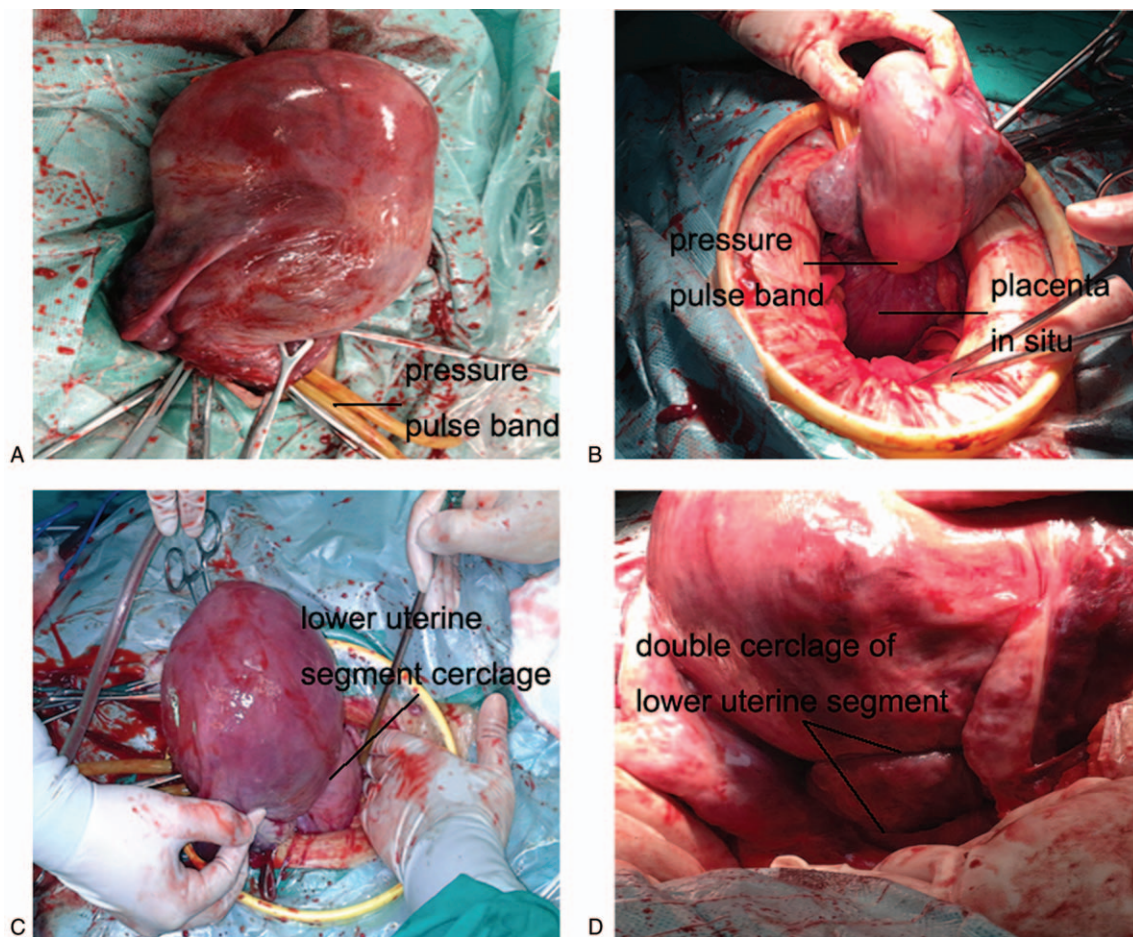
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**Figure 1.** Operation procedures of this study. (A) Uterus was delivered outside from the pelvis and the lower uterine segment was strapped by pressure pulse band as low as possible. (B) Placenta above the pressure pulse band was manually removed, and placenta below the pressure pulse band was retained in situ. (C) Lower uterine segment cerclage by 1-0 absorbable suture. (D) Double cerclage of lower uterine segment.

19 cases were diagnosed with placenta accreta which was confirmed by color Doppler ultrasound or MRI examination. And the diagnoses were confirmed by both intraoperative findings and postoperative pathological examination. Cases with coagulation dysfunction, hematological diseases, and other serious medical diseases were excluded from the study.

## 2.2. Operation procedures and stage operation

**Operation procedures:** Transverse/oblique cesarean uterine incision which avoided placenta was selected in all the 19 cases. The uterus was delivered outside from the pelvis immediately after fetal delivery, and the lower uterine segment was strapped by pressure pulse band as low as possible to control bleeding (Fig. 1A). If still bleeding, the ascending branches of bilateral uterine arteries were ligatured. Placenta above the pressure pulse band was manually removed, and placenta below the pressure pulse band was retained in situ (Fig. 1B). Then 1-0 absorbable suture was strapped in the lower uterine segment from the lowest point of avascular zone of the unilateral broad ligament, bypassing the posterior uterine wall to the corresponding parts of the contralateral broad ligament and was tied a knot in the anterior uterine wall (Fig. 1C). Then the pressure pulse band was loosened. If still bleeding, another 1-0 absorbable suture cerclage was placed in the lower uterine segment via the posterior fornix

lower than the previous one (Fig. 1D). After observation of no active bleeding, the uterine cavity should be wiped out and the topical surface of placental separation should be sutured. Then suture the uterine incision and the abdominal incision was closed layer by layer. Pelvic indwelling drainage tube was retained in all the cases.

Intramuscular uterine injection of oxytocin, carboprost tromethamine and pituitrin were regularly administered in all cases immediately after fetal delivery. The internal iliac artery ligation, uterine narrow suture, and topical suture can be complementarily applied during or after the operation according to the bleeding condition. All cases were treated with traditional Chinese medicine (TCM) Shenghua Decoction to promote involution of uterus. Changes of hemogram, C reactive protein (CRP), human chorionic gonadotropin (hCG) and gynecological sonography were regularly monitored. According to the results of gynecological sonography 1 to 2 months after CS, curettage was performed in patients with mass placental residue and stable condition, and most patients with discharged and absorbed placental tissues were continued on Shenghua Decoction. All the cases were regularly monitored for 3 to 6 months after delivery until all the placental residues were discharged.

Shenghua Decoction that was firstly introduced in Jingyue Quanshu in A.D. 1624 is a well-known traditional Chinese herbal prescription for reducing uterine bleeding and promoting

uterus involution after childbirth or abortion.<sup>[6-8]</sup> The prescription consists of Motherwort, Codonopsis Radix, Astragali Radix, peach kernel, Angelica, Chuanxiong Rhizoma, and Licorice.<sup>[6]</sup>

### 2.3. Observation targets

1. Volume of blood loss during CS and blood loss volume during 24 hours after delivery.
2. Blood loss volume during the second operation (curettage or hysterectomy). Total blood loss is the sum of the postpartum blood loss and the blood loss during the second operation.
3. Total transfusion volume is the sum of the red blood cells (RBC) transfusion volume during 24 hours after delivery and the RBC transfusion during 24 hours after the second operation.
4. Changes of hemogram, CRP, hCG and gynecological sonography were regularly monitored with outpatient follow-up.
5. Lochia after delivery and involution of uterus during 42 days after delivery.
6. Postpartum complications and postpartum menstrual recovery.

### 3. Results

**General information:** The average age of the pregnant women (N=19) was 32.11±4.50 (24-40) years, and there were 7 cases whose age was ≥35 years old. The average gestational age of the 19 cases was 31.69±6.88 (19.00-38.29) weeks, and there were 13 cases whose gestational age was ≥28 weeks. The average gravidity and cesarean delivery times of the 19 cases were 5.37±2.95 (2.00-13.00) and 1.37±0.50 (1.00-2.00), respectively. No history of placenta previa was observed in the cases. Table 1 showed the general information of all cases and the volume of blood loss or RBC transfusion intra and post operation. Figures 2 and 3 showed MRI and color Doppler ultrasound images before and after CS or curettage of case 3 who had curettage 63 days

after delivery. Figures 4 and 5 showed the MRI and color Doppler ultrasound images before and after CS of case 1 whose placental residues were discharged after treatment with Shenghua Decoction.

**Intraoperative situations:** During CS, all the 19 cases were confirmed with placenta accreta. Among them, 4 cases were combined with penetrative placenta and the placenta penetrated into the bladder. Loss of muscle layer just above the internal orifice of uterus and part of the placenta lying under the pressure pulse band were found during the operation in all the cases. Placenta above the pressure pulse band was manually removed and the placenta lying below the pressure pulse band was retained in situ. Among all the 19 cases, CS after bilateral uterine arterial embolization was performed in one case. One case had bilateral iliac artery ligation, and another 3 cases had lower uterine segment transfexion to control bleeding.

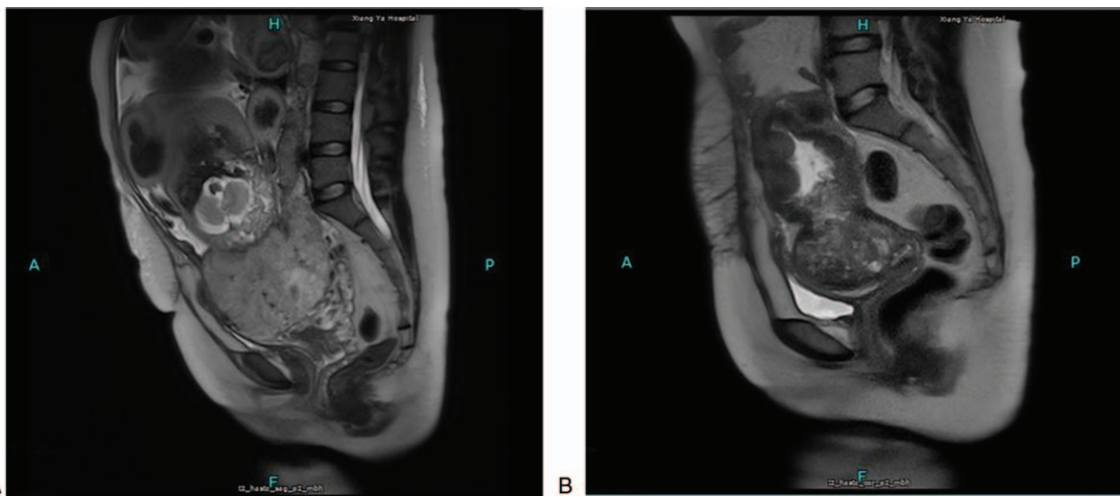
**Postoperative situations:** The mean volume of postpartum blood loss was 1594.74±1134.06 (400-4500) mL, and 4 of 19 cases (cases 3, 4, 5, and 8) had uterus curettage 63, 38, 56, and 52 days after CS, respectively, and the amount of blood loss volume during the second operation were 50, 500, 100, and 40 mL, respectively. Total hysterectomy was performed in 2 cases (cases 10 and 17) 44 and 57 days after the first-stage of CS, and the blood loss volume were 3000 and 1200 mL, respectively. Neither total hysterectomy nor uterus curettage was performed in 13 cases due to the discharge of residual placenta after treatment with Shenghua Decoction and all 13 cases reserved uterus (13/19). The uterus retention rate was 89.48% (17/19). The mean volume of total hemorrhage of all the 19 cases was 1878.42±1276.96 (400-4500) mL, and their total mean RBC transfusion was 868.42±816.53 (0-2400) mL. Among them, postpartum bleeding volume of 8 cases ≤ 1000 mL, 4 cases ≤ 500 mL, and no blood transfusion was received in 5 of the 19 cases. Three cases had mild fever whose hemogram and CRP levels increased during the outpatient follow-up, and were healed when treated with ceftazidime. No severe puerperal infections were found after follow up at 3 to 6 months, and 17 cases whose uterus was reserved had restored menstruation in 3 to 6 months.

**Table 1**

**General materials, intraoperation and postoperation conditions of the 19 cases.**

Patients	Age, years	Gestational age, weeks	Gravidity, time	Cesarean delivery times, time	Postpartum hemorrhage, mL	Hemorrhage volume in second operation, mL	Interval of 2 stage operation, days	Total RBC* transfusion, mL	Uterus preservation
1	35	33.71	8	2	2000	None	None	800	Yes
2	33	36	4	1	2500	None	None	1600	Yes
3	31	36.86	3	1	1200	50	63	300	Yes
4	40	36.14	9	1	1500	500	38	800	Yes
5	39	36.43	3	1	500	100	56	0	Yes
6	33	29.71	2	1	2000	None	None	1100	Yes
7	24	37.14	2	1	500	None	None	0	Yes
8	35	37	4	2	600	40	52	400	Yes
9	32	37.29	6	1	2000	None	None	600	Yes
10	31	19	4	1	500	3000	44	2400	No
11	32	36	5	1	1000	None	None	700	Yes
12	36	22.86	8	2	400	None	None	0	Yes
13	28	24.29	13	1	1000	None	None	600	Yes
14	28	26.00	5	1	4500	None	None	2100	Yes
15	27	23.29	4	2	500	None	None	0	Yes
16	25	37.86	5	2	3000	None	None	1000	Yes
17	35	38.29	4	2	3000	1200	57	1700	No
18	29	19.14	3	2	1000	None	None	0	Yes
19	37	35.14	10	1	2600	None	None	2400	Yes

\* RBC=red blood cell.

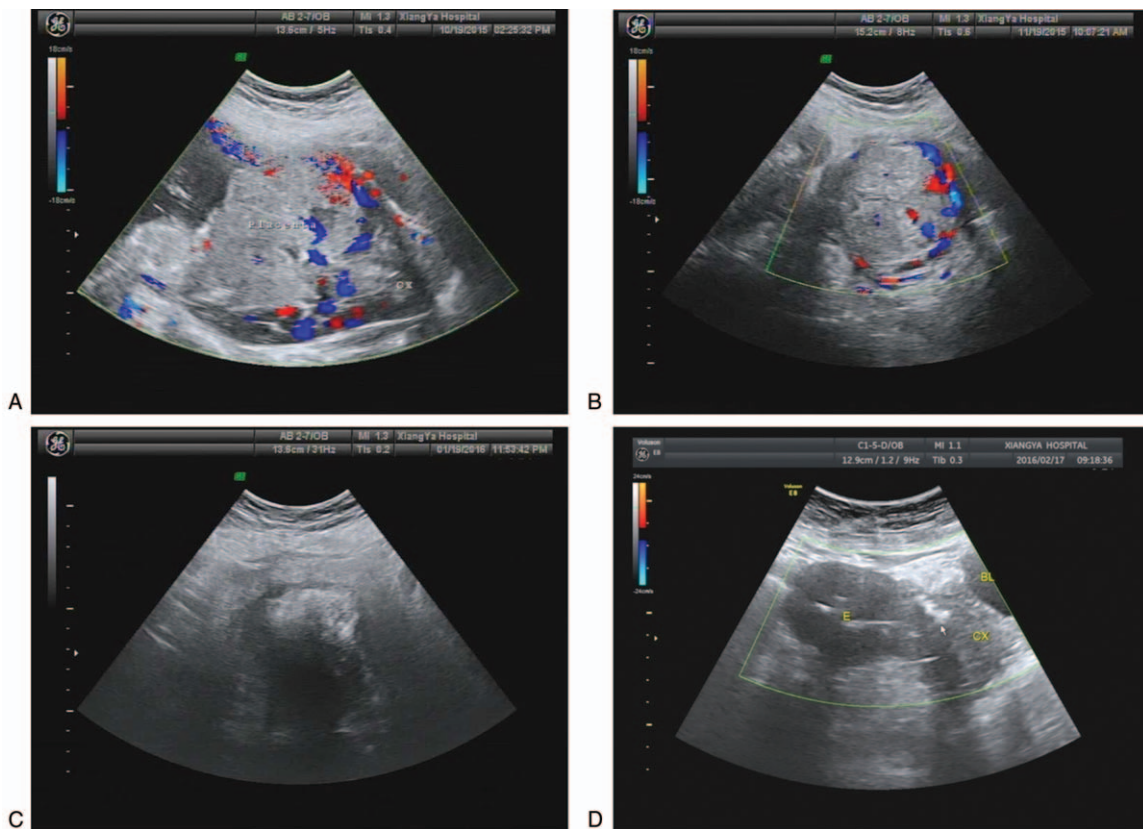


**Figure 2.** Pelvic magnetic resonance imaging (MRI) images before and after cesarean section of case 3. (A) Pelvic MRI images before cesarean section. (B) Pelvic MRI images after cesarean section. MRI=magnetic resonance imaging.

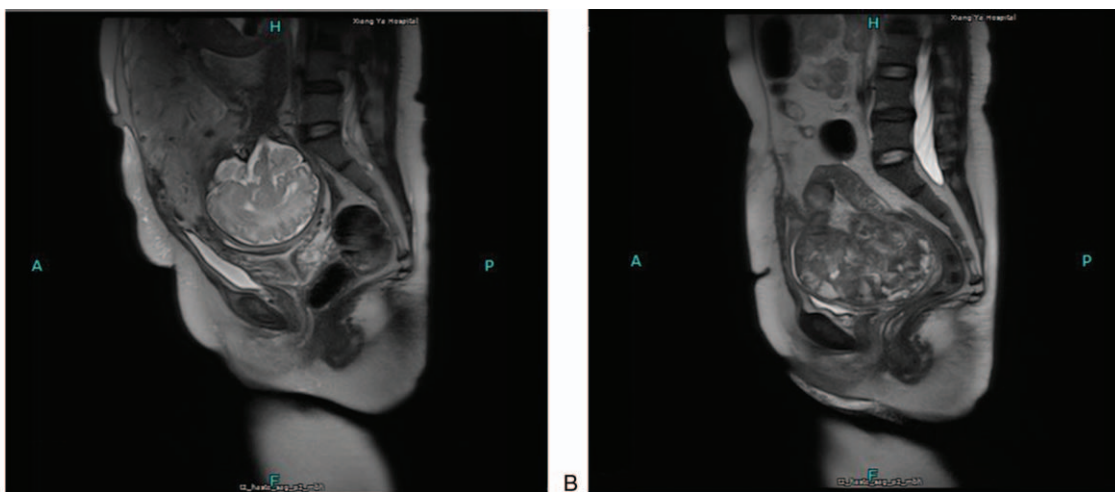
**4. Discussion**

Placenta accreta after previous CS refers to those pregnant women who had a history of CS conceived pregnancy again and their placenta was attached to the original uterine CS incision. The cesarean delivery rate of China was reported to be 5% to 10% in 1970s, 46.2% in 2008 and 54.472% in 2011.<sup>[9]</sup> Nowadays, the rise in the rate of CS<sup>[9]</sup> causes increased morbidity

of placenta accreta. The overwhelming danger of patients with placenta accreta is mainly manifested with severe postpartum hemorrhage, high uterine resection rate and urinary system injury which greatly threatened the maternal life. The mean postpartum hemorrhage volume of patients with placenta accreta was reported to be 3000 to 5000 mL,<sup>[10]</sup> the mean RBC transfusion was 1000 mL and the incidence of obstetric hysterectomy during



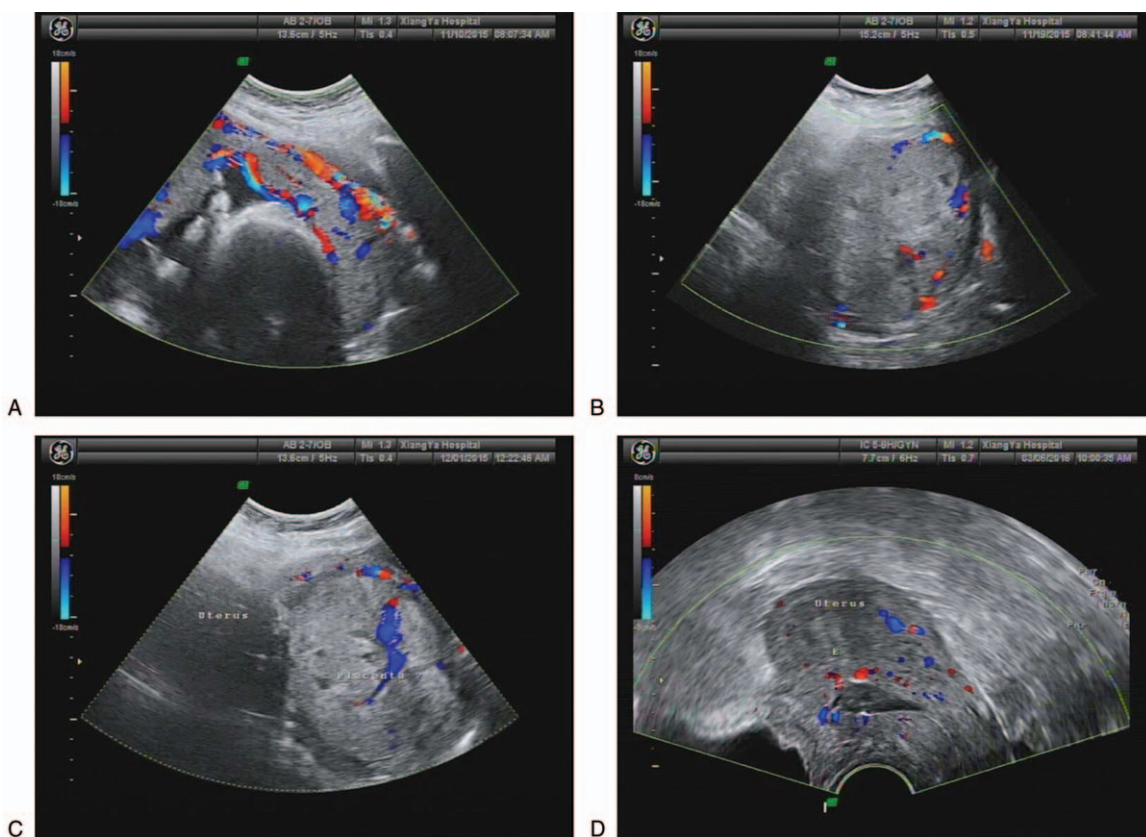
**Figure 3.** Color Doppler ultrasound images before and after cesarean section or curettage of case 3. (A) Color Doppler ultrasound images before cesarean section. (B) Color Doppler ultrasound images 5 days after cesarean section, (C) Color Doppler ultrasound images 4 days after curettage. (D) Color Doppler ultrasound images 33 days after curettage.



**Figure 4.** Pelvic MRI images before and after cesarean section of case 1. (A) Pelvic MRI images before cesarean section, (B) Pelvic MRI images after cesarean section. MRI=magnetic resonance imaging.

the perinatal period was up to 66%.<sup>[5]</sup> Also 10% to 15% of patients were combined with urinary system injury,<sup>[11,12]</sup> which greatly threatened the safety of pregnant women. This study demonstrated a conservative treatment method of placenta reservation in situ and proposed the idea of stage surgery to decrease the perinatal hemorrhage, rate of hysterectomy and

ureteral injury in patients with placenta accreta. The conservative treatment of stage operation refers to manually removing the placenta above the pressure pulse band and retaining the placenta below the pressure pulse band in situ during the CS. After which the patients were treated with Shenghua Decoction to promote involution of uterus, regularly monitoring the changes of



**Figure 5.** Color Doppler ultrasound images before and after cesarean section of case 1. (A) Color Doppler ultrasound images before cesarean section. (B) Color Doppler ultrasound images 5 days after cesarean section. (C) Color Doppler ultrasound images 17 days after cesarean section. (D) Color Doppler ultrasound images 111 days after cesarean section.

hemogram, CRP, hCG, and gynecological sonography. According to the results of gynecological sonography 1 to 2 months after cesarean surgery, uterus curettage was performed in patients who still had mass placenta residue and patients with most of the placental tissues discharged and absorbed were continued to be treated with Shenghua Decoction.

A variety of hemostatic methods used intraoperatively to stop bleeding, close observation and regular follow-ups after surgery are the pivotal emphases of staging operation in our study to reduce the patients' complications. The usage of contraction agents, lower uterine segment strapped by pressure pulse band, ascending branches of bilateral uterine arteries ligatured, double cerclage of lower uterine segment, and/or vascular occlusion techniques were multiple hemostatic methods used in our study during CS. The mean volume of total hemorrhage in our study was  $1878.42 \pm 1276.96$  (400.00–4500.00) mL and the mean volume of total RBC transfusion was  $868.42 \pm 816.53$  (0.00–2400.00) mL, which were all less when compared to the previous studies.<sup>[10]</sup> Also, no fatal hemorrhage was found in this study. Among the 19 cases, total hemorrhage volume of half of the cases had  $\leq 1000$  mL. Regular outpatient follow-up of the patients with placenta reserved in situ was another critical process of stage operation. Because even small amount of residual placenta would cause massive life-threatening late postpartum hemorrhage during the period of uterus involution even after more than 42 days of cesarean delivery. It is reported that, during the treatment of placenta retention in situ method, the incidence of patients combined with one kind of postpartum complications was at least 61%.<sup>[13]</sup> Women who were treated with placenta reserved in situ would have a probability of 58% to resect uterus even after nine months of CS, and the mortality was almost 4 times higher than the one who resects uterus directly.<sup>[13]</sup> All the cases in this study were followed up regularly in the outpatient department. Three cases were found to have hemogram and CRP levels elevated and slight fever with highest temperature  $< 39^{\circ}\text{C}$ . The abnormalities were recovered after treatment with sensitive antibiotics. No severe puerperal infection was observed in cases which indicate that intensive care and regular follow-up are very significant to detect and prevent puerperal infection timely. However, severe vaginal bleeding was found in 2 cases after 44 and 57 days of CS, respectively, and they were performed emergency hysterectomy, and with a total postpartum hemorrhage volume of which was 3500 and 4200 mL, respectively. It indicates that the residual placenta in uterine cavity should be eliminated by curettage as soon as patients were in stable condition to avoid life-threatening hemorrhage and puerperal infection. In addition, we should also notice its indications when applying the conservative treatment method in patients with placenta accreta. The stage operation could be adapted to patients with placenta accreta who had stable vital signs, normal blood coagulation, controlled bleeding and desired to reserve fertility.

In conclusion, stage operation after part of the placenta in situ reduced the volume of postpartum bleeding and associated morbidity of cesarean hysterectomy in patients placenta accreta. However, because of the potential risk of puerperal infections

and severe vaginal bleeding, patients with part of placenta in situ should be monitored closely. Also, the residual placenta in uterine cavity should be eliminated by curettage as soon as patients were in stable condition. These in turn may help obstetricians for exploring new methods of treatment and also can be a future reference.

### Author contributions

QP carried out the studies, participated in collecting data, and drafted the manuscript. WZ performed the statistical analysis and participated in its design. YL helped to draft the manuscript. All authors read and approved the final manuscript.

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**Funding acquisition:** Qiaozhen Peng.

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**Resources:** Qiaozhen Peng.

**Supervision:** Wei-She Zhang.

**Validation:** Wei-She Zhang.

**Writing – original draft:** Qiaozhen Peng.

**Writing – review & editing:** Wei-She Zhang.

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