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Original Article

Maternal outcome after conservative management of abnormally invasive placenta

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ABSTRACT

Objective: The purpose of this study was to describe our preliminary experience of the efficacy and safety of a conservative strategy for abnormally invasive placenta.

Materials and Methods: A retrospective review of eight pregnant women with abnormally invasive placenta (one with placenta previa accrete, three with placenta previa increta, and four with previa percreta) was performed. The diagnosis was made by prenatal ultrasonography, and was confirmed by operative and histopathological findings. Patients who desired future fertility or who had extensive diseases were selected as candidates after panel meeting. Conservative management after obtaining informed consent was defined by a primary cesarean delivery before 35 weeks of gestation with the abnormally adherent placenta left in situ, partially or totally. The primary outcome was successful uterine preservation. The secondary outcome was severe maternal morbidity including sepsis, coagulopathy, immediate or delayed hemorrhage bladder injury, and fistula.

Results: Among the eight patients, the mean age was 34 ± 3 years (range, 30–40 years). All women had risk factors, such as placental previa, previous cesarean delivery and/or dilation & curettage, for abnormally invasive placenta. Seven women underwent planned cesarean delivery at the mean gestation age of 34 weeks (range, 31–37 weeks). One woman received hysterotomy at 18 weeks. In our series, the uterus was preserved in only two cases (25%), one who received hysterotomy at a relatively young gestational age and another who had mild disease. Mean maternal blood loss during primary cesarean delivery was 528 ± 499 ml (range, 100 ml–1,500 ml). Severe maternal morbidity was recorded in seven out of eight patients (87.5%).

Conclusion: In this small series, we observed a low successful uterine preservation rate and a high maternal complication rate. We recommend that primary cesarean hysterectomy should be used as the treatment of choice for mild to severe abnormally invasive placenta. Conservative management should be reserved for women with a strong fertility desire and women with extensive disease that precludes primary hysterectomy due to surgical difficulty.

Introduction

Abnormally invasive placenta, also known as morbidly adherent placenta, is a broad term that describes abnormal adherence of placenta to the underlying myometrium. Depending on the depth of invasion, it is further defined as placenta accreta, placenta increta, and placenta percreta. The term “accreta” is the umbrella term most commonly used to refer to all of these conditions. The term “abnormally invasive placenta” (AIP) was introduced in 2013 and defined as: “A placenta that cannot be removed spontaneously or manually without causing severe bleeding” [1].

The management strategy for AIP is a challenging problem in obstetric practice. Prenatal diagnosis of AIP and a planned cesarean delivery have been proven to improve maternal outcome [2–4]. Scheduled preterm delivery before 35 weeks has been proposed in order to avoid bleeding or labor signs that necessitate emergent

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operation [5,6]. Delivery in a tertiary medical center using a multidisciplinary approach is also mandatory [7,8].

A conservative management with the abnormally adherent placenta left in situ is sometimes indicated because cesarean hysterectomy may be difficult for patients with severe AIP, especially with bladder or parametrium invasion. It is also indicated when fertility preservation is considered. Successful conservative treatment with spontaneous placental resorption has been reported [9–12]. Some women can subsequently achieve pregnancy, with or without recurrent AIP. Maternal complications including adjacent organ injuries, excessive blood loss with transfusion of blood products, immediate or delayed vaginal bleeding, infection, disseminated intravascular coagulation, and even death have been reported.

In Taiwan, the rate of cesarean sections increased from 33.1% in 2004 to 36.6% in 2013 [13]. Outcomes after conservative management for AIP were reported in case reports [14–20] and one case series [21]. The aim of this study was to investigate the safety and efficacy of conservative management in cases with AIP.

Materials and methods

This was a retrospective and descriptive study performed at Taichung Veterans General Hospital, Taiwan, from January 2014 to May 2015. Women with a diagnosis of AIP who received conservative treatment in the hospital were included.

The diagnosis of AIP was made based on findings obtained by color Doppler mapping and 3D ultrasonography, according to previously published protocols [22–24]. All cases of suspected AIP were reviewed in a panel meeting, and individualized management was discussed. We favored a planned preterm cesarean delivery preferably before 35 weeks with concomitant hysterectomy as the first-choice treatment [6,25]. The decision to apply conservative management was made if the patient strongly hoped to preserve her uterus or if primary hysterectomy was deemed to be a difficult and bloody procedure because of extensive invasion.

For patients who were managed conservatively, the operations were performed by collaborating maternal-fetal medicine specialists. Bilateral ureteral stenting was performed by the urologist on the day of operation. A midline longitudinal incision was made in the lower abdomen, and a vertical incision was made on the uterine fundus. After delivery of the newborn, the cord was transected near the placental insertion site and the uterus was closed. The abnormally adherent placenta was left in situ after adequate hemostasis. The patients were transferred to the radiology department after operation. Embolization of uterine arteries and other pelvic collateral vessels was performed by an interventional radiologist using gelfoam cubes. We gave broad-spectrum antibiotics prophylactically. Outpatient visits were arranged weekly or biweekly. We avoided methotraxate injection because it is no longer considered a standard adjuvant therapy [9].

The primary outcome for this study was the rate of successful uterine preservation. The secondary outcome was severe maternal morbidity, including sepsis, coagulopathy, immediate or delayed hemorrhage, bladder injury, and fistula.

Results

A total of eight women (mean age 34 ± 3 years, range 30–40 years) received conservative management of AIP during the study period. All eight cases had been referred from other hospitals or obstetric clinics in the second and third trimesters with a mean gestation of 28 ± 7 weeks (range, 18–37 weeks). All eight cases had documented risk factors for AIP, including previous cesarean delivery and/or dilation & curettage. Antepartum hemorrhage was reported in six cases (75%), but none of the patients received emergent operation due to active bleeding. One case requested termination of the pregnancy at 18th weeks because of bladder invasion. The other seven cases received planned cesarean delivery at a mean gestation of 34 ± 2 weeks (range 31–37 weeks). Maternal demographic characteristics are summarized in Table 1.

Table 1
Demographic characteristic, outcome, and pathology.

Case no	Age (y)	Gravidity/Parity/Abortion	Risk factors	GA at diagnosis (weeks)	GA at delivery (weeks)	Surgery and interventional procedures	Complications	EBL (ml) Primary surgery/secondary procedure	Pathology
1	35	G3P1A1	PL previa CS x1	32	34	CS and UAE/ Delayed SAH	Coagulopathy (63 days after CS) ICU admission	100/4580	Percreta
2	40	G4P2A1	PL previa CS x2	37	37	CS and UAE. Delayed SAH	Coagulopathy (60 days after CS) Bladder perforation	300/2350	Increta
3	30	G3P0A2	PL previa D&C x2	29	34	CS and UAE Delayed D&C	Endometritis (92 days after CS)	1500/250	Increta[a]
4	33	G3P2	PL previa CS x1	18	18	UAE and hysterotomy	Nil	100/minimal	Percreta
5	36	G5P2A2	PL previa CS x2	20	34	CS and UAE Delayed SAH	Coagulopathy (36 days after CS) Bladder perforation	300/1200	Percreta
6	32	G5P2A2	PL previa CS x4	36	36	CS and UAE Delayed TAH	Endometritis (86 days after CS) Bladder perforation	800/800	Increta
7	34	G5P4	PL previa CS x2	23	31	CH + IIAL + cervical suture	IAI immediately ICU admission.	13500/N/A	Percreta
8	33	G4P2A1	PL previa CS x2 D&Cx1	27	34	CS and UAE Delayed SAH	Delayed VAG bleeding (16 days after CS) Multiple organ failure V-V fistula ICU admission	600/about 70000	Increta

CH = cesarean hysterectomy; CS = cesarean section; D&C = dilation and curettage; EBL = estimated blood loss; GA = gestational age; IAI = intra-abdominal infection; ICU = intensive care unit; IIAL = internal iliac artery ligation; N/A = not applicable; PL: placental; SAH = subtotal abdominal hysterectomy; TAH = total abdominal hysterectomy; UAE = uterine artery embolization; USG = ultrasonography; VAG = vaginal; V-V = vesico-vaginal.

[a] This was the sole case in which diagnosis was made by preoperative color doppler ultrasound. Diagnosis in all the other cases was based on pathology findings.

There were no reported complications in only one case (12.5%). The patient received hysterotomy at 18 weeks. A large portion of the placenta was removed during operation, but a small portion of densely adherent placenta measuring 5 × 5 cm that had invaded the bladder was left in situ. Complete placental resorption had not been achieved ten months after operation.

In one patient (case seven), the attempted conservative treatment by cesarean delivery failed because of immediate heavy bleeding originating from the cervix, and therefore emergency hysterectomy was performed, with estimated blood loss of 13,500 ml. Each of the other six cases received uterine artery embolization after cesarean delivery. Mean maternal blood loss during primary cesarean delivery was 528 ± 499 ml (range, 100 ml–1500 ml).

One case (12.5%) had delayed vaginal bleeding 16 days after operation. In three cases (37.5%), coagulopathy presented as hematuria, diffuse skin bruise, and abnormal coagulation profile, which occurred 36, 60, and 63 days, respectively, after operation. In two cases (25%), sepsis presented as fever, leukocytosis, and pelvic pain which developed 86 and 92 days, respectively, after operation. All six of these patients received a second surgical procedure, including D&C in one patient, in which morbidly adherent placenta was successfully removed with the uterus preserved, and delayed hysterectomies due to maternal complications in the remained five patients. Bladder perforations were encountered in three patients, and were successfully repaired without sequelae. Vesicocervical fistula occurred in one patient (case eight), and was successfully repaired seven months after hysterectomy. There was no maternal mortality.

Discussion

In our small series, the successful uterine preservation rate was 25%, and major maternal morbidity occurred in 87.5% of the patients. The reported uterine preservation rate ranged from 78% to 87%, and the morbidity rate ranged from 6% to 27% [9–12]. The maternal outcome in the present study was worse than that reported in previous studies. This phenomenon may be explained, at least in part, by several factors such as the greater disease severity in our cohort, the greater tendency in our medical practice to remove the uterus when a severe complication occurs, and publication bias, whereby cases with a better outcome may have been more likely to be reported, while poor experiences may have been under-reported.

The first large retrospective study of conservative treatment was reported by Kayem G et al. in 2004. Compared to the extirpative approach, conservative management resulted in fewer hysterectomies (15% vs. 84.6%), less blood product transfusion, and less coagulopathy [10]. In another retrospective study, hysterectomy was avoided in 21 out of 24 women with AIP (80.7%) in the conservative subgroup. Complications were reported as endometritis (15%) and coagulopathy (12%) [11]. Timmermans S et al. reviewed all the reported studies between January 1985 and May 2006. A total of 60 cases were included, and in 80% of these the uteri could be preserved [12]. In a multicentered French study, 131 of 167 women with AIP were successfully treated with a conservative strategy (78.4%). A severe maternal morbidity rate was 6.0% (10/167), including one maternal death. Spontaneous placental resorption was recorded in 75% of these cases on follow-up examination, the median interval was 13.5 weeks (range, 4–60 weeks) [9].

In our study, all (100%) of the patients had placenta previa. Moreover, 37.5% of cases had placenta increta and 50% of cases had placenta percreta. In other published series, placenta previa accounted for 52.1%–76% of the study groups, and the subgroup of placenta percreta accounted for only 10%–15% of cases [9–12]. However, even in a systemic review published in 2013 that included only patients with placental percreta [26], the secondary hysterectomy rate (21/36, 58%) and the complication rate (36%) were still lower than those reported in our patients.

Another possible explanation of our outcome was that we decided to perform hysterectomy when clinical sepsis and

Table 2
Summary of reported cases with abnormally invasive placenta.

Author	Age (y)	Gravidity/Parity	GA at delivery (weeks)	Depth of invasion	Initial management	Additional strategy	Estimated blood loss (ml)	Morbidity	Outcome
Chiang YC [15]	39	G2P1	35	Increta (Inspection)	CS Partial removal of placenta	No	790	Septic shock	Uterus preserved Delayed D&C
Tseng SH [16]	36	G3P1	9	Percreta (Pathology)	UAE	Second UAE	4000	No	Delayed hysterectomy
Yee YH [17]	32	G2P1	34	Percreta (MRI)	CS Placenta left in-situ	UAE, MTX	2000	No	Uterus preserved. Placenta expulsion
Liao CY [18]	30	G8P4	12	Increta (MRI)	UAE	No	Not reported	Delayed massive hemorrhage	Delayed hysterectomy
Cho FN [19]	34	G1P0	22	Increta (MRI)	Vaginal delivery. Placenta left in-situ	UAE, MTX	1200	No	Uterus preserved. Placenta expulsion
Cho FN [20]	29	G1P0	Not reported	Accreta (USG)	Vaginal delivery. Placenta left in-situ	UAE	600	No	Uterus preserved. Delayed placental removal vaginally
Yu PC [21]	34	G2P1	36	Increta (MRI)	CS Placenta left in-situ	UAE	500	No	Uterus preserved. Placenta resorption
Yu PC [21]	35	G1P0	38	Increta (MRI)	CS Partial removal of placenta	UAE	1500	No	Uterus preserved. Placenta resorption
Yu PC [21]	32	G2P1	34	Percreta (MRI)	CS Placenta left in-situ	UAE	1000	No	Uterus preserved. Placenta resorption
Yu PC [21]	34	G5P4	36	Percreta (MRI)	CS Placenta left in-situ	UAE	1000	Endometritis	Uterus preserved. Placenta resorption
Yu PC [21]	32	G3P1	29	Percreta (MRI)	CS Placenta left in-situ	UAE	500	No	Uterus preserved. Placenta resorption
Yu PC [21]	31	G1P0	31	Percreta (MRI)	CS Placenta left in-situ	UAE	800	Peritonitis	Delayed hysterectomy

CS = cesarean section; D&C = dilation and curettage; GA = gestational age; MRI: magnetic resonance image; MTX = methotrexate; UAE = uterine artery embolization; USG = ultrasonography.

coagulopathy occurred. In previously published studies, most patients received antibiotic and blood transfusion instead. According to the treatment policy adopted at our institution, an identified infection source or cause of coagulopathy should be removed to prevent worsening of the clinical condition unless surgical intervention is deemed too difficult. Indeed, we encountered a challenging case (case eight) in which the placenta was not successfully removed in the second surgery and excessive blood loss occurred; however, all of the other patients recovered from complications well shortly after undergoing hysterectomy.

All patients who underwent conservative management received uterine artery embolization before or after hysterectomy/hysterotomy. Arterial embolization is a well established method that is employed to provide adjuvant control of intraoperative blood loss. It can be applied therapeutically to stop immediate postpartum hemorrhage or prophylactically to prevent delayed postpartum hemorrhage. In a case series reported in Taiwan, six patients with placenta increta or percreta received uterine artery embolization after cesarean delivery [17]. Two postoperative infections were reported, and one hysterectomy was performed. In a multicentered retrospective French study, 167 women were treated conservatively, and 62 of them received pelvic arterial embolization. Two cases of uterine necrosis developed among these patients [9]. Concerns have been raised that any form of arterial embolization produces a transient ischemic insult and potentially leads to sepsis, uterine necrosis, and fistula formation (an idea discussed in a personal communication with Dr. Sally Collins). Further research may be needed to determine whether uterine artery embolization is the cause of these complications.

We performed a review of the literature on the conservative management of AIP in Taiwan. A total of six case reports and one case series were included [15–21]. The data are summarized in Table 2. Among these 12 patients, 33% (4/12) had significant morbidity, including one delayed hemorrhage with hypovolemic shock and three cases of sepsis. Successful uterine preservation was achieved in eight cases (67%).

Surgical management strategies for AIP generally include the extirpative approach (attempt to remove placenta), cesarean hysterectomy, and conservative management (with or without partial resection of placenta). Nevertheless, the best policy remains a matter of debate. The treatment strategy should be individualized, and planned cesarean delivery before the 35th gestational week is vital. The current consensus among experts is that a planned preterm cesarean hysterectomy is the recommended approach in such cases [25,27]. Furthermore, numerous case reports and case series have discussed the conservative approach. With the placenta left in situ, conservative management may result in deleterious effects, such as hemorrhage, sepsis, and coagulopathy, with unpredictable risks. However, in some situations, uterine preservation may be attempted if future childbearing is desired. If the invasion of the placenta is too extensive to allow one-step surgery, it may be advantageous to deliver the fetus first and wait for the spontaneous atrophy and resorption of the placenta. With or without a secondary surgery, this strategy helps to minimize maternal blood loss. Therefore, the final decision should always be made in the operative room, according to an actual estimation of the AIP invasion, vascular control probabilities, and the surgeon's ability to perform hysterectomy with adequate tissue hemostasis.

Finally, it is crucial to make the diagnosis of AIP as early as possible. Diagnosis of AIP by sonographic markers in the first trimester has been proposed for high-risk women [28,29]. Serum biomarkers, such as pregnancy-associated plasma protein A (PAPP-A) and free βhCG, may also facilitate the early detection of AIP [30,31]. More research on these and other methods are necessary to reduce delayed diagnosis of severe AIP.

Conclusion

We recommend that primary cesarean hysterectomy is the treatment of choice for mild to severe AIP. Conservative management should be reserved for women with a strong fertility desire and women with extensive disease that precludes primary hysterectomy due to surgical difficulty.

Conflict of interest

All the authors confirm that there are no conflicts of interest.

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