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Conservative management for placenta accreta spectrum disorders: experience of a regional hospital from 2013 to 2021

Yiu Fai WONG[1], MBBS, MRCOG
Tsz Kin LO[2], MBBS, MRCOG, FHKAM (O&G)
Viola Ying Tze CHAN[1], MBBS, MRCOG, FHKAM (O&G), FHKCOG
Vivian Kwun Sin NG[1], MBChB, MSc in Medical Genetics, MRCOG, FHKCOG, FHKAM (O&G), Cert HKCOG (Maternal and Fetal Medicine)
Wai Kuen YUNG[1], MBBS, MRCOG, FHKAM (O&G), FHKCOG, Cert HKCOG (Maternal and Fetal Medicine)
Hin Hung TSANG[3], MBBS, MRCP, FHKAM (Medicine)
Chi Hung KOO[4], MBBS, FHKCA, FHKAM (Anaesthesiology), FANZCA
Danny Hing Yan CHO[5], MBBS, FRCR, HKCR, FHKAM (Radiology)
Wai Lam LAU[1], MBBS, FRCOG, FHKAM (O&G), FHKCOG, Cert HKCOG (Maternal and Fetal Medicine)
Wing Cheong LEUNG[1], MBBS, MD, FRCOG, FHKAM (O&G), FHKCOG, Cert RCOG (Maternal and Fetal Medicine), Cert HKCOG (Maternal and Fetal Medicine)
[1] Department of Obstetrics and Gynaecology, Kwong Wah Hospital, Hong Kong
[2] Department of Obstetrics and Gynaecology, Princess Margaret Hospital, Hong Kong
[3] Department of Intensive Care Unit, Kwong Wah Hospital, Hong Kong
[4] Department of Anaesthesiology & OT Services, Kwong Wah Hospital, Hong Kong
[5] Department of Diagnostic and Interventional Radiology, Kwong Wah Hospital, Hong Kong

Introduction: Conservative management by leaving the placenta in situ for placenta accreta spectrum (PAS) disorders can preserve the uterus with reduced surgical complications. This study aims to review the outcomes of planned conservative management for PAS disorders between January 2013 and December 2021.
Methods: The medical records of patients with clinically and/or histopathologically confirmed PAS disorders who underwent conservative management by leaving the placenta in situ between 1 January 2013 and 31 December 2021 at Kwong Wah Hospital, Hong Kong, were retrospectively reviewed. Uterine artery embolisation and various haemostatic methods were used to control bleeding.
Results: A total of 17 patients with PAS disorders were conservatively treated by leaving the placenta in situ. Of these, 15 patients had major placenta praevia; 16 patients had a history of Caesarean delivery; and 10 patients presented with sonographic features of PAS disorders. Intraoperatively, eight patients had partial placenta left in situ, whereas five patients had the entire placenta left in situ. All patients had good maternal outcomes and recovery, except for four patients who had major complications during the immediate postpartum period. Two patients eventually required a hysterectomy.
Conclusion: Planned conservative management for PAS disorders can achieve good clinical outcomes in a regional hospital with a multidisciplinary team.

Keywords: Conservative treatment; Hysterectomy; Placenta; Placenta accreta; Postpartum haemorrhage

Introduction

Placenta accreta spectrum (PAS) disorders, ranging from abnormally adherent to deeply invasive placental tissue, can significantly affect deliveries[1]. The prevalence of PAS disorders is on a rising trend. In Hong Kong, the prevalence of PAS disorders increased from 0.17 per 1000 births in 1999-2003 to 0.79 per 1000 births in 2009-2013[2]. Caesarean hysterectomy is the recommended treatment[3] but is associated with risks of massive intraoperative haemorrhage, injury to other pelvic organs, and loss of fertility. Thus, conservative management is advocated for selected patients[4], including the extirpative technique (manual removal of the placenta), the expectant approach (leaving the placenta in situ), the one-step conservative surgery (removal of the accreta area), and the triple-P procedure (perioperative localisation of the upper placental

Correspondence to: Dr Yiu Fai WONG
Email: matthewwong007@hotmail.com

edge, pelvic devascularisation, placental non-separation with myometrial excision, and uterine repair)[5].

Leaving the placenta in situ is the primary management plan in our hospital. In 2013, we reported on 12 cases of PAS treated with this method, and the results supported its use in hospitals with interventional radiology facilities[6]. This study aimed to review the outcomes of planned conservative management for PAS disorders between January 2013 and December 2021, with use of various haemostatic measures.

Materials and methods

The medical records of patients with clinically and/or histopathologically confirmed PAS disorders who underwent conservative management by leaving the placenta in situ between 1 January 2013 and 31 December 2021 at Kwong Wah Hospital, Hong Kong, were retrospectively identified through the Clinical Data Analysis and Reporting System using diagnosis codes for adherent placenta, placenta accreta, placenta increta, placenta percreta, and morbidly adherent placenta. Patients in whom PAS was not suspected antenatally but was detected incidentally during delivery were excluded. To ensure no cases of PAS were missed, another hospital database, OBSCIS, was cross-checked using the keywords 'primary post-partum haemorrhage due to accreta/percreta' and 'Caesarean section for morbidly adherent placenta'.

Since 2008, our hospital has adopted a protocol for uterine conservation for patients with PAS who wish to retain their uterus. Patients with risk factors for PAS (including major placenta praevia in previous Caesarean deliveries, multiple uterine surgeries such as surgical termination of pregnancies and uterine curettage, and a previous history of PAS) were reviewed by maternal-fetal medicine specialists in the third trimester. Detailed ultrasound scanning was performed to identify features of PAS (such as abnormal placental lacunae, myometrial thinning), as described by FIGO (The International Federation of Gynecology and Obstetrics)[7]. For patients with clinical and/or sonographic features suspicious of PAS, detailed counselling on intrapartum management, potential complications, and follow-up with diagram illustrations were provided, taking into account the patient's wish for uterine conservation.

Caesarean delivery was scheduled at around 37 weeks, with bilateral tubal ligation offered at same setting. A multidisciplinary approach was initiated, involving the blood bank, paediatricians, an anaesthetic team, an intensive care unit team for postoperative support, a radiology team for uterine artery embolisation (UAE), and a urology team on standby in case of bladder injury. Steroid prophylaxis was given if delivery was scheduled before 37 weeks of gestation.

Delivery by Caesarean section was performed under general anaesthesia in a lead-shielded operating room equipped with facilities for interventional radiology. Patient haemodynamics were monitored intra- and post-operatively. Large-bore intravenous cannulae and rapid fluid infusion and warming devices were used for fluid resuscitation and to prevent hypothermia. A 5-Fr femoral arterial sheath was inserted by the interventional radiologist via the groin before Caesarean section. The operation was attended by operating surgeons and one or two consultant obstetricians. A vertical skin incision was made to avoid cutting through the vascular lower segment and placenta. After delivery of the baby, the edge of the uterine wound was clamped using Green-Armytage forceps. Time was allowed for spontaneous separation of the placenta, usually within 30 minutes. Forceful manual removal of the adherent placental part was prohibited, while any spontaneously separated part was trimmed away. The remaining morbidly adherent placenta tissue was left in situ unless there was active bleeding or haemodynamic instability. The proportion of placenta left in situ was estimated visually. After uterine wound closure, UAE was then performed with absorbable gelatin-based microparticles injected under fluoroscopic screening to embolise engorged arteries. An angiogram was performed to confirm sluggish flow of bilateral uterine arteries and beyond. A speculum examination was performed before and after UAE and at the end of the operation to check for excessive bleeding from the cervical os.

After surgery, prophylactic broad-spectrum antibiotics with amoxicillin/clavulanic acid were given for at least 1 week. Patients were transferred to the intensive care unit for close monitoring for at least 1 day and then returned to general ward once they had stabilised. After discharge, patients were followed up in a special postnatal clinic. Early signs of sepsis and delayed haemorrhage were sought, with regular monitoring of markers including the haemoglobin level, white blood cell count, C-reactive protein, and genital swabs. Serial ultrasounds were performed to monitor placental resorption. Methotrexate was not given as adjuvant therapy.

Owing to the rare occurrence of PAS disorders, the sample size was expected to be small. Statistical analysis was performed using SPSS (version 26.0; IBM Corp, Armonk

[NY], United States of America). Nominal variables were summarised by frequencies and percentages and tested with the Fisher's exact test. Quantitative variables were summarised by median and range and were tested with the Wilcoxon rank-sum test. Statistical significance was set at $p<0.05$.

Results

A total of 17 patients with PAS disorders were managed conservatively in our unit between 2013 and 2021. With a total delivery number of around 38 700, the rate of PAS disorders was 0.44 per 1000 births, which was similar to the 0.4 per 1000 births reported in our unit between 2008 and 2012[6] (Table 1).

Of the 17 patients, 13 were aged ≥35 years at the time of delivery. Only one patient did not have a history of Caesarean delivery. All diagnoses of placenta praevia were made antenatally by ultrasound. 15 patients had major praevia (type III-IV); 10 patients presented with sonographic features of PAS disorders, and four of them had more than one marker. All patients underwent classical Caesarean section, except for one who had a lower segment transverse uterine incision in view of the well-formed and relatively avascular lower uterine segment. Patient 17 required a Caesarean hysterectomy because of uncontrolled massive bleeding despite multiple medical treatments. After delivery, all patients (except the patient with a lower segment Caesarean section) were transferred to the intensive care unit.

All patients had good maternal outcomes and recovery, except for four patients who had major complications during the immediate postpartum period (Table 2). Patient 3 underwent re-laparotomy for haemorrhagic shock due to bleeding from raw areas, which was controlled with stitches. Patient 7 had sepsis and severe anaemia after passing 5-cm placental tissue on day 10; the complication was controlled with blood transfusion, intravenous antibiotics, and an intrauterine balloon. Patient 15 had a burst abdomen on day 8 after removal of skin stitches, which was re-sutured using tension sutures. Patient 16 had persistent vaginal bleeding with fever despite broad-spectrum intravenous antibiotics; she underwent emergency suction evacuation under ultrasound guidance to remove intrauterine septic foci on day 15. Six (35%) patients required re-admission; all were treated conservatively, except for patient 9 who required a hysterectomy at 2 months after delivery for uncontrolled postpartum haemorrhage despite repeated UAE. The patient had haemoperitoneum 1 day after hysterectomy, requiring re-laparotomy to control bleeding from the peritoneal edge at the left pelvic sidewall.

The 17 patients with PAS disorders in 2013-2021 were compared with the 12 patients with PAS disorders in 2008-2012 (Table 1). All patients had placenta praevia. The proportion of patients with placenta adherent and left behind was lower in the present cohort than in the past cohort (median [range], 30% [0%-100%] vs 90% [20%-100%], p=0.03). The proportion of patients with postpartum haemorrhage requiring treatment was also lower in the present cohort than in the past cohort (29% vs 75%, p=0.025), as was the proportion of patients with paralytic ileus after delivery despite not significantly (24% vs 42%, p=0.422). However, two patients in the present cohort required a hysterectomy, compared with no patient in the past cohort required a hysterectomy.

Discussion

The success rate of uterine conservation using the expectant approach for PAS disorders has been reported to range from 62% to 90%[4,8-10]. In the present study, the success rate of uterine conservation was nearly 90%. Thus, this study supports the use of an expectant approach for managing PAS disorders.

Antenatal diagnosis of PAS disorders is crucial. In our unit, both clinical risk factors and sonographic features are assessed to identify patients antenatally. In our patients, sonographic features of PAS disorders, as described by FIGO[7], were absent in >40% of patients; this shows the limitations of ultrasonography for the prenatal diagnosis of PAS disorders. The median gestation at delivery in our patients was 37 weeks, which is recommended by the Royal College of Obstetricians and Gynaecologists[3]. In 2019, FIGO proposed a new classification system for the clinical diagnosis of PAS disorders[11]. We reclassified our patients using this system to better differentiate between accreta, increta, and percreta. Although four of our patients had no placental tissue left in situ after Caesarean delivery, they were classified as PAS (grade 1) under the new classification system, as the adherent placental tissue was manually removed secondary to excessive bleeding from the placental bed and required extra haemostatic procedures to control bleeding. Patients with a higher clinical grade required a more complicated operation for a deeper and larger adherent area and a longer follow-up duration and had more postpartum complications and a lower success rate of uterine conservation.

Table 1. Baseline, antepartum, intrapartum, and postpartum characteristics of patients with placenta accreta spectrum (PAS) disorders in 2013-2021 and 2008-2012

Characteristic	2013-2021 (n=17)*	2008-2012 (n=12)*	p Value
Maternal age, y	37 (31-43)	35 (33-40)	0.211
Advanced maternal age (≥35 y)	13 (76)	8 (67)	0.683
Parity	2 (1-9)	1 (1-2)	0.152
History of Caesarean delivery	16 (94)	12 (100)	1.00
For placenta praevia	2 (12.5)	2 (17)	1.00
History of PAS	0	-	-
History of surgical termination of pregnancy / dilation and curettage	9 (53)	8 (73) of 11	0.435
No. of previous surgical termination of pregnancy / dilation and curettage	2 (1-6)	1 (1-3)	0.236
Placenta praevia			-
Type I	1 (6)	0	
Type II	1 (6)	0	
Type III anterior	6 (35)	2 (17)	
Type III posterior	5 (29)	2 (17)	
Type IV	4 (24)	8 (67)	
History of antepartum haemorrhage	8 (47)	5 (42)	1.00
Sonographic features of PAS disorders	10 (59)	9 (75)	0.449
>1 sonographic marker	4 (24)	6 (50)	-
Steroid given before delivery	10 (59)	-	-
Total operative time, min	176 (68-438)	153 (91-254)	0.419
Gestation at delivery, wk	37 (33-38)	37 (33-38)	0.394
Emergency Caesarean section	4 (24)	4 (33)	0.683
Type of skin incision, midline	17 (100)	12 (100)	-
Classical Caesarean section	16 (94)	11 (92)	1.00
Placenta removal			
Adherent but removed completely	4 (24)	0	-
Left partially in situ	8 (47)	7 (58)	-
Left completely in situ	5 (29)	5 (42)	-
Duration of observation to confirm absence of placental separation, min	20 (0-30) [6 not documented]	17.5 (10-59)	0.913
% of placenta adherent and left in situ	30 (0-100)	90 (20-100)	0.03
Intraoperative blood loss, ml	1100 (300-7600)	1200 (500-3300)	0.845
No. of patients requiring transfusion	9 (53)	6 (50)	1.00
No. of pack cells transfused	2 (0-15)	1 (0-10)	0.879
Additional haemostatic measures			
Tranexamic acid	9 (53)	-	-
Additional uterotonics besides oxytocin	4 (24)	6 (50)	-
Balloon tamponade	6 (35)	-	-
Uterine artery embolisation	16 (94)	12 (100)	-
Ligation of uterine vessels	0	-	-
Compression sutures	5 (29)	4 (33)	-
Hysterectomy	1 (6)	0	-

* Data are presented as median (range) or No. (%) of patients

Table 1. (cont'd)

Characteristic	2013-2021 (n=17)*	2008-2012 (n=12)*	p Value
FIGO classification			
Grade 1 (placenta accreta)	11 (all clinical)	-	-
Grade 2 (placenta increta)	6 (5 clinical + 1 histological)	-	-
Grade 3 (placenta percreta)	0	-	-
Hospital stay after delivery, d	8 (5-29)	7.5 (5-13)	0.303
Intensive care unit admission after delivery	16 (94)	11 (92)	1.00
Paralytic ileus	4 (24)	5 (42)	0.422
Major complications	4 (24)	0	0.121
Re-admission	6 (35)	8 (67)	0.139
Total episodes of re-admission	9	13	-
Secondary postpartum haemorrhage	5 (29)	9 (75)	0.025
Transfusion required	3 (18)	1 (8)	-
Managed conservatively	4 (24)	9 (75)	-
Passage of tissue	8 (47)	8 (67)	0.338
Interval from Caesarean delivery, mo	2.3 (0.3-4)	3.3 (1-7)	0.232
Sepsis	2 (12)	0	0.498
Return of menstruation	11 (65); 4 lost to follow-up; 2 had hysterectomy	12 (100)	-
Interval from Caesarean delivery, mo	3 (1-12)	3.6 (1.5-7.5)	0.519
Sonographic resolution of retained placenta, mo	4 (0.3-14)	6.6 (2-13)	0.408
Fertility	1 Caesarean hysterectomy, 1 elective hysterectomy 2 mo later	No hysterectomy	-
Bilateral tubal ligation at Caesarean delivery on maternal request	9 (53)	6 (50)	-
Declined bilateral tubal ligation but no plan for future pregnancy	6 (38); 1 not discussed	6 (50)	-
Pregnancy after delivery	0	-	-

Haemostatic measures during delivery have changed over the years. First, the early prophylactic use of tranexamic acid at skin incision has increased, whereas the prophylactic use of tranexamic acid during Caesarean delivery has mixed results in preventing massive obstetric haemorrhage. The additional use of tranexamic acid is effective in reducing intraoperative blood loss and intraoperative and postoperative transfusion of blood and blood products[12,13]. Second, the use of misoprostol has reduced over the years, because oxytocin is superior to misoprostol in controlling bleeding and misoprostol has a delayed clinical effect on uterine tone[14,15]. Third, there is wider use of mechanical methods to control bleeding such as Hwu's compression sutures for lower uterine segment placental bed bleeding, balloon tamponade for local compression, and temporary tourniquet around the lower segment of the uterus to locally compress the uterine vessels; the choice of method depends on the surgeon's intraoperative judgement. Fourth, there has been limited use of carbetocin, as it can lead to earlier separation of the adherent placental part, causing excessive bleeding. UAE is routinely performed after closing the uterine wound to arrest bleeding in patients with PAS[16].

In our patients, resolution of retained placental tissue took weeks to >1 year. The prevalence of postpartum bleeding and sepsis was low, and most patients with these complications were treated conservatively and made a good recovery. Nevertheless, clinicians should actively monitor patients for signs and symptoms of these complications to enable early intervention. Two of our patients had a hysterectomy. This suggests that conservative management

Table 2. Management of the 17 patients during Caesarean delivery and postpartum re-admission

Patient	Year admitted	Extent of placenta retained, %	Additional haemostatic measures besides oxytocin and uterine artery embolisation	Blood loss, ml	Postpartum major complications	Re-admission interval from delivery, mo	Reason for re-admission	Treatment
1	2013	10	Tourniquet around lower segment with tube or gauze, Hwu's sutures, B-Lynch compression sutures	2200	-	-	-	-
2	2013	100	-	1800	-	1, 2, 3	Postpartum haemorrhage, urethral pain, urethral pain	Repeated uterine artery embolisation, transfusion, conservative treatment
3	2013	0	Balloon tamponade	2000	Re-laparotomy for haemorrhagic shock, with 3000 ml haemoperitoneum due to bleeding from raw areas, controlled with stitches	-	-	-
4	2013	100	-	300	-	3	Abdominal pain	Manual removal at bedside with no anaesthesia (of dislodging placental tissue through cervix)
5	2015	0	Tourniquet around lower segment with tube or gauze, balloon tamponade, Hemabate, B-Lynch compression sutures, Transamin	3500	-	-	-	-
6	2016	30	Tourniquet around lower segment with tube or gauze, B-Lynch compression sutures, repeated uterine artery embolisation, balloon tamponade, Hemabate	2700	-	1	Postpartum haemorrhage, *Escherichia coli* bacteraemia	Conservative treatment
7	2016	50	-	1600	Passed 5-cm placental tissue on postdelivery day 10, complicated with sepsis and severe anaemia, controlled with blood transfusion, intravenous antibiotics, and intrauterine balloon	-	-	-
8	2017	0	Hwu's sutures, B-Lynch compression sutures	1000	-	-	-	-
9	2017	100	Transamin	400	-	2, 2.5	Endometritis, massive postpartum haemorrhage	Conservative treatment, repeated uterine artery embolisation, then total abdominal hysterectomy owing to persistent significant per-vaginal bleeding
10	2018	25	Transamin, carbetocin	1100	-	-	-	-
11	2019	0	Transamin, balloon tamponade	1800	-	-	-	-
12	2019	100	Transamin	1000	-	-	-	-
13	2019	100	-	1000	-	-	-	-

Table 2. (cont'd)

Patient	Year admitted	Extent of placenta retained, %	Additional haemostatic measures besides oxytocin and uterine artery embolisation	Blood loss, ml	Postpartum major complications	Re-admission interval from delivery, mo	Reason for re-admission	Treatment
14	2019	30	Transamin	500	-	2.5	Endometritis	Manual removal at bedside with no anaesthesia (of dislodging placental tissue through cervix)
15	2019	5	Transamin	500	Burst abdomen on postdelivery day 8 after removal of skin stitches, re-sutured using tension sutures	-	-	-
16	2019	10	Transamin, balloon tamponade	500	Persistent vaginal bleeding with fever despite broad-spectrum intravenous antibiotics; emergency suction evacuation under ultrasound guidance to remove intrauterine septic foci on postdelivery day 15	3	Urinary tract infection due to *Candida glabrata* cystitis	Antifungal, cystoscopy
17	2021	30	Transamin, balloon tamponade, Hemabate, B-Lynch compression sutures, NovoSeven, total abdominal hysterectomy	7600 (Caesarean hysterectomy for uncontrolled bleeding)	-	-	-	-

for PAS disorders can result in significant morbidities and is not necessarily successful. Both patients had a good recovery after hysterectomy; early resort to hysterectomy is important to avoid delays in controlling the life-threatening bleeding. Good clinical outcomes after conservative management are also possible in PAS disorders of higher clinical grades (increta).

There are several limitations to the present study. First, morbidly adherent placental tissue was not coded as PAS in the system and such patients were not included. Second, the sample size was small, owing to the rare incidence of PAS disorders worldwide. Third, outcomes of subsequent pregnancies were not assessed, as no patient had another pregnancy after the index delivery. Fourth, three patients were lost to long-term follow-up, and there were a few missing data in the documentation. Fifth, all 17 patients opted for uterine preservation; therefore, no patient underwent primary Caesarean hysterectomy for comparison.

Conclusion

Uterine preservation for PAS disorders by leaving the placenta in situ followed by UAE and various haemostatic measures has good clinical outcomes. Nonetheless, early resort to hysterectomy is important in case of uncontrolled life-threatening bleeding to avoid maternal mortality and morbidity.

Contributors

Concept or design: YF Wong, TK Lo, WC Leung
Acquisition of data: YF Wong, TK Lo
Analysis or interpretation of data: All authors
Drafting of the article: YF Wong, WC Leung
Critical revision for important intellectual content: All authors
All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

As editors of the journal, TKL and WLL were not involved in the peer review process of this article. All other authors have disclosed no conflicts of interest.

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Ethics approval

The study was approved by the Kowloon Central / Kowloon East Cluster Research Ethics Committee (reference: KC/KE-22-0088/ER-1).

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