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## Evaluation of clinical profile, risk factors and management challenges in placenta accreta spectrum

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### Abstract

Placenta Accreta Spectrum (PAS), formerly known as Morbidly Adherent Placenta (MAP), refers to the range of pathological adherence of placenta, including placenta increta, placenta percreta and placenta accreta. This condition is associated with severe hemorrhage, devastating complications and considered as a challenge in terms of management options. This study aimed to evaluate the clinical profile, risk factors and complications in women with PAS. This series included four cases of Placenta accreta spectrum managed by different approaches such as radical (cesarean hysterectomy) or uterine sparing surgery according to patient's clinical presentation, hemodynamic condition, extent of invasion and available resources. Risk factors for PAS were previous cesarean deliveries, placenta previa, first cesarean elective and history of uterine curettage. Placenta accreta was associated with various complications mainly obstetric hemorrhage. Pelvic devascularization by inflating radiologically pre-placed occlusion balloons in both internal iliac arteries was associated with less blood loss and reduction in length of inpatient stay.

**Keywords:** Placenta accreta, morbidly adherent placenta, pregnancy, previous cesarean section

### Introduction

Placenta accreta is a generalized term used when an abnormal, firmly adherent placenta implants with some degree of invasion into the uterus [1]. Placenta Accreta Spectrum (PAS), was previously known as morbidly adherent placenta. This condition refers to all 3 grades of abnormal placental attachment according to the depth of invasion known as accreta, increta and percreta. The risk of complications such as massive obstetric hemorrhage (average 3-5 liters), need for emergency hysterectomy, blood transfusion and surgical injury to adjacent organs is increased for women with PAS. Some studies indicate maternal mortality is as high as 7% in cases of PAS [2, 3, 4]. The incidence of PAS has increased in the past 50 years because of rising trends in cesarean section rates. Placenta accreta is a high risk entity, because of its devastating complications and fetal compromise. Decision of selecting an optimal management approach is also challenging. Here we discuss cases of PAS with varied clinical presentation managed by different approaches. The objective of this study was to evaluate the clinical profile, risk factors and complications in women with PAS. We also analyze the applicability of various surgical methods (radical, uterine sparing and conservative) in women presenting with PAS.

### Methods and Materials

This study was conducted from March 2019 to December 2019 for a period of 10 months. During this period there were total 2430 deliveries in study centre out of which 4 cases of PAS were diagnosed and managed. This study included four women who were admitted in the department of Obstetrics and Gynecology at Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, Uttarakhand, India as a diagnosed or suspected case of PAS depending on the presence of symptoms, signs, known risk factors for PAS and placental localization in ultrasonography (USG). After detailed history and examination, the following protocol for management was followed.

- Confirmation of diagnosis and assessment for presence of extrauterine invasion of placenta was done by USG, colour doppler and or magnetic resonance imaging (MRI).
- Involvement of multidisciplinary team was done including consultant obstetrician, anesthetist, interventional radiologist, intensivist, neonatologist, hematologist and urologist to optimize outcome.

- Documentation of plan of management was done taking in consideration extent of placental invasion, need for peripartum hysterectomy, risk of massive hemorrhage, complications and availability of existing infrastructure.
- Preoperative investigations like routine blood investigations, coagulation profile, blood group were done and cross matching and ordering of blood products was done as per the requirements. Although a planned delivery was the goal, but an alternative plan for emergency delivery was also developed if patient presented with vaginal bleeding, rupture of membranes or uterine contractions.
- The timing of elective delivery was individualized depending on patient circumstance and presence of any obstetric complication. Generally delivery was scheduled at 34 to 36 weeks +6 days of gestation. Corticosteroid administration was done for fetal lung maturation. The preoperative and operative specifics which were taken into consideration were internal iliac balloon catheterization, intimation to blood bank for anticipation and management of massive hemorrhage, type of anesthesia, skin and uterine incision. The surgical management of placenta accreta was individualized depending upon the hemodynamic stability of patient, extent of invasion of placenta and availability of resources. The surgical options used were, radical cesarean hysterectomy with or without placenta left in situ and uterine sparing surgery. Various conservative methods available for hemostasis like intrauterine balloon tamponade, compression sutures, uterine artery ligation were also considered and kept in management plan wherever required.

The various variables recorded were demographic characters of women, type of risk factors present for PAS, diagnostic modality used, surgical approach, amount of blood loss and requirement of blood products. Intraoperative and postoperative complications were also noted.

### Case 1

A 29 year old woman presented in emergency with 33 weeks pregnancy and chief complaints of heavy bleeding per vaginum and weakness. She was G3P2L2 with history of previous two Lower Segment Cesarean Section (LSCS). On examination pallor, tachycardia was present. On per abdomen examination symphysiofundal height corresponded to 32 weeks and paramedian vertical scars of previous cesarean delivery were present. Vulva and medial aspects of thighs were smeared with fresh blood. Her USG showed single live intra uterine foetus of 29 weeks 3days gestation with anterior low lying placenta. There was loss of hypoechoic zone between placenta and myometrium. Abnormal uterine serosal bladder interface seen with decrease in myometrial thickness. On doppler examination, multiple vascular lacunae seen with turbulent flow suggestive of placenta accreta.

Patient was shifted to operation theatre with high risk consent for emergency cesarean hysterectomy. Under general anesthesia abdomen opened up by midline vertical incision. Intraoperatively a highly vascular bluish area was seen on the lower segment mainly occupying the previous scar on the uterus. Increased vascularity was noted over the urinary bladder wall. A high transverse fundal incision was given over the uterus to avoid incising the placenta. After delivery of baby cesarean hysterectomy with placenta left in situ was done. Surgical injury to urinary bladder was present so repair of bladder wall was done by urologist. Patient had massive hemorrhage and was

transfused 8 units of packed red blood cells (PRBC), 12 units of fresh frozen plasma (FFP) and 2 units of platelets during intra-operative and postoperative period. She required postoperative mechanical ventilation and ICU stay. Patient had slow but progressive recovery and she was discharged in satisfactory condition after 23 days.

### Case 2

A 32 year old G<sub>4</sub>P<sub>3</sub>L<sub>2</sub> with 35 weeks pregnancy came with a USG report of anterior type 3 placenta previa and suspected placenta accreta. She had history of previous 3 LSCS. Her general condition was fair and vitals were stable. As known risk factors (previous 3 cesarean deliveries and placenta previa) for morbid placental adherence were present, her MRI was done which showed abnormal uterine bulging, dark intraplacental beds, heterogeneous signal intensity, interrupting of bladder myometrial interface with strong suspicion of placenta accreta. With complete preoperative work up and pre anesthetic check up, her elective delivery was planned at 35 weeks 6 days. Administration of corticosteroids was done for fetal lung maturity. Preoperative internal iliac balloon catheterization was done by interventional radiologist. The balloons were placed in both internal iliac arteries and kept deflated (Figure1). Under general anesthesia, abdomen was opened by midline vertical incision. Lower uterine segment (LUS) was very vascular with engorged vessels. Extreme thinning of previous scar was present and bulging of placenta was noted suggestive of placenta accreta. Baby delivered by high transverse incision on the fundus of uterus. After delivery of baby the balloon occlusion devices were inflated to minimize blood loss. Uterine incision was closed and total cesarean hysterectomy was done with placenta left in situ. Intra operative blood loss was 800ml and patient received only one packed red blood cell transfusion. The balloon device was removed after 24 hours. Patient had an uneventful post operative period and was discharged in satisfactory condition after 9 days.



**Fig 1:** Preoperative use of balloon occlusive devices in internal iliac arteries (case 2).

### Case 3

A 22 year old unbooked G<sub>2</sub>P<sub>1</sub>L<sub>1</sub> with 28 week pregnancy presented in emergency with profuse bleeding per vaginum. She had history of previous one elective LSCS done 9 months back and she conceived soon after in lactation amenorrhea. She gave history of bleeding per vaginum, sudden severe abdominal pain and drowsiness at home, following which patient was rushed to

the hospital. Her USG report was suggestive of placenta Previa. On examination severe pallor was present. Her pulse rate was 112/ minute and BP was 90 systolic. Abdomen was distended, tender, fetal heart sounds were absent and profuse bleeding pervaginum was present. After pre operative work up and high risk consent, patient was taken for emergency laparotomy. Under general anesthesia abdomen was opened by midline vertical incision. Intraoperatively gross hemoperitoneum was present. A rent of about 2 to 3 cm was present at the right corner of previous scar on the LUS which was bleeding profusely. Extreme thinning of the scar was noted in rest of the length and bulging of placenta was present. In our opinion probably, it was a case of cesarean scar pregnancy which grew as placenta accreta and had rupture of scar at home.

After delivery of baby and placental removal, uterotonics were given, uterine massage was done and bilareal uterine artery ligation was done. Heavy bleeding from placental bed continued and patient was haemodynamically unstable so decision for total caesarian hysterectomy was taken. Surgical injury to urinary bladder injury was there which was repaired by urologist. Patient required 8 units of packed red blood cells and 10 units of fresh frozen plasma in intraoperative and postoperative period. Slowly she recovered combating UTI and fever and discharged after 18 days.

#### Case 4

A 26 year old G<sub>2</sub>A<sub>1</sub> with 38 wk pregnancy presented with slight spotting per vaginum. She gave history of uterine curettage for missed abortion of 8 weeks pregnancy 2 years back. Her ultrasound report was consistent with central placenta previa. Her general condition was fair and vitals were stable. She was planned for an elective Cesarean delivery. She underwent LSCS under spinal anesthesia. Intra operatively difficulty in manual removal of placenta was encountered and after piecemeal removal of placenta heavy bleeding started from the implantation site. This finding raised the suspicion of focal placenta accreta. Box sutures were taken for hemostasis and bilateral uterine artery ligation done. Heavy bleeding was controlled but there was continuous oozing from lower segment of uterus at the site of placental attachment. Intrauterine balloon tamponade was done by abdominal route. An assistant pulled the distal end of balloon shaft through the cervix into the opened uterus and the balloon was inflated with 100 ml of sterile saline solution. Hysterotomy incision was closed carefully in order to avoid damaging the balloon. After closure of uterine incision balloon was inflated with extra 200ml of sterile saline. Hemostasis achieved and patient's vitals improved. She was transfused with 2units of PRBC and 4 units of FFP, in intraoperative and postoperative period. Balloon was removed after 15 hours. Patient showed good recovery thereafter and discharged after 10 days.

#### Results

In this period there were 2430 deliveries in study centre out of which 4 women had Placenta Accreta Spectrum complicating pregnancy with a rate of 0.164%. All four women were in age group of 22-32 years. They were multipara with gestational age of 28 weeks to 38weeks. Total blood loss was 3500 ml in case1 and case 3, whereas it was 1500ml in case 4. Minimum blood loss of 800ml was present in case 2 in which internal iliac balloon catheterization was done preoperatively. So balloon devices proved as a novel and effective approach to minimise blood loss in Placenta Accreta Spectrum. Cases of morbidly adherent placenta were associated with significant obstetric

haemorrhage and required multiple blood product transfusions such as PRBC, FFP and platelets except in case 2 which required only one PRBC transfusion (Table 1).

The risk factors for PAS were previous caesarean deliveries, placenta previa, previous elective cesarean section and history of uterine curettage (Table 2)

Cases of PAS were associated with various complications and morbidity. Massive obstetric hemorrhage and surgical injury to urinary bladder was observed in case1 and case 3. Cesarean hysterectomy was done in case 1, case2, and case3. In case 1 need for mechanical ventilation and ICU stay was there and case 3 and case 4 had post operative infection in the form of urinary tract infection and wound infection (Table 3).

Diagnostic modalities used for diagnosis of PAS were USG, colour doppler and MRI. Elective surgery was planned in those cases who were hemodynamically stable but patients who came in emergency with bleeding per vaginum and other obstetric complications they underwent emergency laparotomy. In case1 and case 3 emergency cesarean hysterectomy was done. In case 2 preoperative internal iliac balloon catheterization followed by elective peripartum hysterectomy done with placenta left in situ (Figure2). In case 4 of focal placenta accreta haemorrhage was controlled by applying compression sutures, uterine artery ligation and placement of intrauterine balloon tamponade (Table 4).



**Fig 2:** Midline vertical abdominal incision, hysterotomy through transverse incision above placental edge, delivery of baby and quick closure of hysterotomy incision followed by total hysterectomy with placenta in situ (case 2).

**Table 1:** Characteristics of patients with PAS

Case	Age (years)	Parity	Gestational age (weeks)	Blood loss (ml)	Blood products transfusion
1	29	G3P2L2	33	3500	8PRBC, 12FFP, 2Platelets
2	32	G4P3L2	35	800	1PRBC
3	22	G2P1L1	28	3500	8PRBC, 10FFP
4	26	G2A1	38	1500	2PRBC, 4FFP

**Table 2:** Risk factors for PAS

Case	Risk factors
1	Previous two cesarean section, placenta previa
2	Previous three cesarean section, placenta previa
3	First cesarean section elective, placenta previa
4	History of uterine curettage, central placenta previa

**Table 3:** Complications and morbidity observed in patients with PAS

Case	Complications and morbidity
1	Massive obstetric haemorrhage, surgical injury to urinary bladder, need for mechanical ventilation and ICU stay, cesarean hysterectomy
2	Peripartum hysterectomy
3	Massive obstetric haemorrhage, surgical injury to urinary bladder, emergency cesarean hysterectomy, postoperative infection (UTI)
4	Atonic PPH, postoperative infection(UTI), wound infection

**Table 4:** Modality used for diagnosis and surgical management approach

Case	Diagnostic modality	Surgical management approach
1	Ultrasound with colour doppler	Emergency cesarean hysterectomy with placenta left insitu
2	Ultrasound with colour doppler, MRI	Internal iliac balloon catheterization followed by elective peripartum hysterectomy with placenta left insitu
3	Ultrasound	Emergency caesarean hysterectomy
4	Ultrasound	Elective LSCS followed by compression sutures, bilateral uterine artery ligation and intrauterine balloon tamponade

## Discussion

Placenta accreta is defined as abnormal trophoblastic invasion of part or all of the placenta into the myometrium of the uterine wall [5]. Rates of PAS are increasing. Various studies from the 1970s and 1980s estimated the prevalence of placenta accreta as between 1 in 2510 and 1 in 4017 whereas from 1982 to 2002 the rate has increased to 1 in 533 [6]. The known risk factors for morbid placental adherence include previous cesarean delivery, placenta previa, advanced maternal age, multiparity, prior uterine surgeries and curettage, prior pelvic irradiation, IVF pregnancy and uterine anomalies [7]. In a study by Silver R.M. *et al*, in the presence of placenta previa, the risk of placenta accreta was 3%, 11%, 40%, 61% and 67% for the first, second, third, fourth, and fifth or greater repeated cesarean deliveries respectively and placenta previa without previous uterine surgery was associated with a 1% to 5% risk of placenta accreta [8]. Similarly in present study the risk factors for PAS were placenta previa, previous cesarean delivery and history of uterine curettage.

Antenatal diagnosis of PAS is essential because outcome is always better when delivery occurs in a tertiary care centre before the onset of labor or bleeding and with avoidance of placental disruption [9]. Ultrasonography (USG) is recommended technique for PAS diagnosis. USG findings of MAP are multiple vascular lacunae within placenta, decreased retro placental myometrial thickness and abnormalities of the uterine serosa-bladder interface and extension of placenta into myometrium, serosa or urinary bladder [10]. The use of colour flow Doppler imaging also helps in reaching the diagnosis.

Turbulent lacunar blood flow, increased sub placental vascularity, gaps in myometrial blood flow and vessels bridging the placenta to the uterine margins are Doppler findings of PAS [11]. Imaging with MRI was also carried out in some studies for prediction of PAS. In a systematic review by D' Antonio F *et al*. [12] the overall sensitivity of MRI was 94% and specificity was 84% which is comparable to USG and it was unclear whether MRI improves diagnosis of placenta accreta spectrum beyond that achieved with USG. MRI has comparable diagnostic accuracy to USG, but it is costlier than USG, less widely available and requires both experience and expertise in the evaluation of abnormal placental invasion. Einerson BD *et al*. [13] suggested in their study that MRI is not the preferred recommended modality for the initial evaluation of PAS. MRI should be reserved for cases where USG is inconclusive, posterior placenta accreta and to outline the anatomy of invasion in terms of parametrial and ureteral involvement [14]. In present case series USG with color flow Doppler imaging and MRI was used for diagnosis of PAS.

Management of PAS to be done by a multidisciplinary care team including senior obstetrician, neonatologist, interventional radiologist and intensive care specialist who are accustomed to manage such cases. Generally the most accepted approach to PAS is cesarean hysterectomy with placenta left in situ after delivery of fetus, as attempt at placental removal are associated with significant risk of hemorrhage [15]. Various studies and literature has mentioned the conservative and expectant management of PAS which includes uterine preservation.

Conservative management is removal of placenta or uteroplacental tissue without removing the uterus. In a review study by Fox KA *et al*. [16] for patients with focal placental adherence, removal of the placenta by either manual extraction or surgical excision followed by repair of the resulting defect has been associated with uterine preservation in some cases.

In expectant management, the cord is ligated near the placenta and the entire placenta is left in situ, or only the placenta that spontaneously separates is removed before uterine closure. The accepted approach to treat PAS is peripartum hysterectomy. Conservative or expectant management can be considered only for carefully selected cases of PAS after detailed counseling about the risks, uncertain benefits and efficacy and should be considered investigational [17]. In addition to above management options investigators have used adjunctive measures to diminish blood loss, hasten placental reabsorption, or both. Techniques have included intrauterine balloon tamponade, intrauterine packing, compression sutures, uterine devascularization, internal iliac balloon placement, ligation or embolization and post-delivery methotrexate administration [18, 19]. In this study in case 2 pre-operative internal iliac balloon catheterization was done and blood loss was diminished considerably. Patient did not require massive blood transfusion and her post-operative period was uneventful. In case 4 patient's family was not completed so conservative management was opted by taking compression sutures, bilateral uterine artery ligation and intrauterine balloon tamponade done.

Rates of PAS are increasing. Women at greatest risk of PAS are those who have myometrial damage following uterine surgery leading to defective decidualisation and excessive trophoblast invasion. Placenta Accreta Spectrum is becoming increasingly common and is associated with significant morbidity and mortality. Knowledge of risk factors and antenatal imaging expertise can help guide the diagnosis. The general resources needed to be able to attain improved health outcomes in the setting of a known or suspected placenta accreta include planning for delivery with appropriate subspecialists and having access to a blood bank with protocols in place for massive transfusion.

## Conclusion

PAS is a life threatening condition, currently the leading cause for obstetric hysterectomy. Presence of risk factors should raise suspicion for the presence of placenta accreta and hence screening should be initiated. Antenatal diagnosis is valuable and desirable because it allows for multi disciplinary planning in an attempt to minimize potential maternal or neonatal morbidity and mortality.

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