

SPECIAL ARTICLE

Placenta accreta: anesthetic management and resuscitation strategies

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ABSTRACT

Placenta accreta (PA) is the term used to describe the clinical condition of abnormal adherence of the entire or a part of the placenta to the uterine wall. Management of PA begins with the identification of high-risk patients with adequate screening. These patients need to be referred to the specialized centre, where a multidisciplinary team is formed and management plan is formulated. This involves patient's counselling with the possibility of hysterectomy, blood transfusion, ICU admission, postoperative ventilation and maternal and foetal risk of mortality. Arrangement of blood products, technique of anesthesia and the use of central venous line depends on the severity of the case. The presence of blood products in the operating room, pre-induction institution of A-line and two large bore cannulas and the use of rapid infusion set are recommended. In cases of massive haemorrhage in patients with PA, it is advisable to limit the use of crystalloids and colloids, and institute the damage control resuscitation by transfusing one unit of RBC along with one unit each of FFP and platelets.

Key words: Placenta accreta; Blood component transfusion; Blood transfusion; Resuscitation policies; Hemorrhage

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INTRODUCTION

Placenta accreta (PA) is the term used to describe the clinical condition of abnormal adherence of the entire or a part of the placenta to the uterine wall. PA is divided into three categories based on the extend of penetration of the abnormal placenta: placenta accreta, when the invasion is limited to the myometrium and the decidual layer is not well-defined; placenta increta when full penetration of the myometrium is achieved; and placenta percreta in which the villi invade pass the uterine serosa and also sometimes into the adjacent organs like bladder.¹

Over the last three decades the incidence of PA has shown a tenfold increase, which seems to parallel the rate of cesarean section (CS). There is a sharp rise from 1 in 4,027 in the 1970s, to 1 in 2,510 in 1980s and to 1 in 533 pregnancies for the period of 1982-2002.²⁻⁴ There are no data available from Pakistan, however, the data from Aga Khan University Hospital (AKUH), Karachi (Pakistan) show a total of 53 cases from 2002 to 2013. The

year wise distribution of cases show a rise of 11.3% from 2002 to 2007, 30.1% from 2008-2010 and a dramatic rise of 58.49% from 2011- 2013.

This special article intends to review the importance of risk factors and diagnostic tools for identification of PA, management plan, anesthetic technique and resuscitation strategies for the safe outcome in patients with PA.

IDENTIFICATION OF PLACENTA ACCRETA

PA is an obstetric emergency and requires timely diagnosis and multidisciplinary approach in a specialized centre. Better outcome has been observed when these patients give birth in specialized centres.⁵

Identification of risk factors for PA helps in screening of these patients for the possible diagnosis of PA, which can facilitate an early referral to a specialized centre having facility to manage these patients. The principle mainstay in the management is to achieve a planned delivery because data suggest greater

blood loss and increase rate of complications in cases performed in an emergency situation.⁶

Early identification can only be possible, if there is awareness among medical healthcare personnel regarding the risk factors for PA and screening of patients for PA:

Risk Factors: Women with myometrial damage caused by previous CS, myomectomy, vigorous curettage, submucous leiomyoma, thermal ablation and uterine artery embolization are at increased risk of PA.^{7,8}

Placenta previa overlying the uterine scar of previous CS is the major risk factor for PA as there is 3%, 11%, 40%, 61% and 67% risk for the first, second, third, fourth, and fifth or greater CS respectively.⁷

Screening to establish the diagnosis: The diagnosis is usually established by ultrasonography and occasionally supplemented by magnetic resonance imaging (MRI). Perinatal ultrasound (US) has a sensitivity of 77–93% and specificity of 71–96% for detecting placenta accrete.⁹ MRI is only indicated when US findings are ambiguous or US may be insufficient, like when there is a suspicion of posterior PA with or without placenta previa.¹⁰

MANAGEMENT

Multi-disciplinary team: The first step in management is the formation of multidisciplinary team. This involves participation from anesthesiologists, obstetricians, interventional radiologists, hematologist and urologists. Blood bank services needs to be taken in the loop.

Planning: Proper planning can reduce the risk of perioperative morbidity and mortality by decreasing the amount of blood loss and need for blood products transfusion.^{11,12} The first step in planning is a discussion among all stakeholders including the patient and his/her family.

The planning includes:

- **Counselling:** Patient and family need to understand the risk of death involved, for both mother and foetus, which has been quoted as 7% and 9% respectively.¹³ Possibilities of blood transfusion and hysterectomy needs to be discussed and consent should to be taken before the surgery.
- **Puerperal hysterectomy:** Recommended approach in patients with PA is to perform elective cesarean hysterectomy with hysterectomy rate quoted as 98% in one of the retrospective cohort studies.¹¹ Patient should be given an option of

elective hysterectomy. In our experience of 53 patients 58% (31/53) underwent hysterectomy, and in the rest 41% (22/53) of them the uterus was salvaged.

- **Endovascular Interventions:** In centres where facility is available for endovascular procedures, prophylactic pelvic artery catheterization and embolization is performed in women with PA and studies done in these centres have shown a decrease in the perioperative blood loss with potential avoidance of hysterectomy.¹⁴ However, there is still a paucity of data in the form of large randomized controlled trials on the efficacy and safety of these endovascular procedures, therefore controversy still exists regarding the use of endovascular interventions.¹⁴ If the option and expertise for these procedures is available, it can be discussed in the planning phase and decision can be achieved considering the pros and cons of the procedure.
- **Date of the delivery:** Thirty four weeks of gestation is commonly regarded as a favourable gestational age, therefore an elective cesarean delivery can be planned around this date to avoid an unanticipated and emergent delivery.¹⁵
- **Blood transfusion:** Blood product arrangement should be in accordance with the anticipated severity of bleeding, which in turn depends on the type of PA, patient's co-morbidity like presence of pre-existing anemia or thrombocytopenia. Presence of rare blood group or difficulty in cross matching due to presence of antibodies, are factors to be taken into consideration when arranging blood products for these patients. Blood products should be available in the operating room before the start of the procedure. Routinely, at AKUH approximately 10 units of cross-matched RBCs, FFP, platelets, and sometimes 10 units of cryoprecipitate are arranged. In emergency cases, when the diagnosis of PA is made intraoperatively, the anesthesiologist calls blood bank to initiate massive transfusion protocol. It is recommended that a massive transfusion protocol be present at any institution that provides obstetric care.

ANESTHETIC TECHNIQUE & INTRAOPERATIVE MONITORING

Even though regional anesthesia is the preferred option for CS, with a reported significant decrease in the rate of complications as compared to general anesthesia,¹⁶ there are some reservations for its use in patients with PA. General anesthesia is generally

regarded as the technique of choice for patients with PA.¹⁷ Reasons being chances of profound hypotension, loss of airway and coagulopathy associated with significant risk of massive bleeding in patients with PA, in addition to a high likelihood of hysterectomy, which makes regional anesthesia the less favourable technique for patients with PA.¹⁷ However, regional anesthesia is recommended by some authors for otherwise healthy patients with a minimal degree of invasion of PA.¹⁸ Conversion of regional to general anesthesia is likely in high-risk situations, even when it was not initially planned. Chestnut et al¹⁸ reported that, during cesarean hysterectomy, 28% of epidural anesthetics needed to be converted to general anesthesia because of inadequate operating conditions and/or patient discomfort. At AKUH 53 cases were done from 2002 to 2013, where general anesthesia was used in all except for two patients where regional anesthesia was opted.

All patients who are being operated for PA should have two large-bore intravenous cannula and an arterial line placed before the surgery.¹⁹

The use of central line catheters is debatable, as some authors have reported higher risk of overall complications in pregnant patients as compared with non-pregnant medical or surgical patients (15–20 vs. 25% respectively), especially as regards infectious complications.²⁰ In addition a higher risk for carotid puncture (19 vs. 10% for landmark and 6 vs. 3% for palpatory technique respectively) has been reported in pregnant patients.²¹

Practices at AKUH also vary among different anesthesiologists. In the period mentioned earlier, central line was inserted in 54% (29/53, CVP 23 and swan sheath 6) of the patient. In established placenta percreta, a swan sheath is put preoperatively under ultrasound guidance. This helps in monitoring the central pressure and rapid infusion of fluid during the period of extreme hemorrhage and also for running the infusions of vasoactive drugs in cases of hemodynamic instability.

It is advisable to have a rapid infuser available in the operating room and at least one member of the anesthesia team is dedicated to manage the transfusion.

Why blood loss is catastrophic in PA patients:

There is an increase in the uterine artery blood flow from 100 to 350 ml/min in normal pregnancy,²² which is further increased in patients with PA, as in these patients uterine blood vessels are not only larger in diameter with increased blood flow

compared to normal pregnancy, but have less muscular tissue and thin elastic layer.²³ As a result they become a source of uncontrolled haemorrhage, when torn during delivery due to their inability to undergo vasospasm.²³

PA and its variant is an obstetric emergency and needs to have planned resuscitation strategies. The medical caregivers should be ready to deal with uncontrolled hemorrhage with associated hemorrhagic shock, massive transfusion and its associated complications like coagulopathy and disseminated intravascular complications. Studies have shown an average blood loss of 3 litres with mean transfusion volume of 10 units RBCs (range of 3–29 units).²⁴ The rate of complication like hemorrhagic shock is found to be 50% and 25% for complications like coagulopathy or disseminated intravascular coagulation (DIC).²⁵

RESUSCITATION STRATEGIES

PA and its variant is an obstetric emergency and needs to have planned resuscitation strategies. There are physiological changes in hemostasis during pregnancy that needs to be taken into account during the resuscitation phase. The following strategies are recommended during massive bleeding in PA patients:

Minimum use of crystalloids and colloids is recommended to prevent dilutional coagulopathy. In addition colloids may also impair platelet function, inhibit fibrin polymerization, and increase fibrinolytic activity.²⁶

Damage control resuscitation: This includes limiting the use of crystalloids and colloids and transfusing RBC, FFP and platelets transfusion in a ration of 1:1:1.^{27,28} Previous studies have shown decreased mortality from multi-organ failure when the strategy of damage control resuscitation was used.²⁹ The data are from trauma patients but can be applied in other cases of massive hemorrhage including obstetric hemorrhage, as the pathophysiologic mechanisms of dilutional and consumption coagulopathy, metabolic acidosis and hypothermia remain the same for both obstetric and non-obstetric populations.³⁰⁻³⁴

Appropriate use of cryoprecipitate and antifibrinolytic agents: Evidence obtained from the setting of postpartum hemorrhage recommends a fibrinogen level of 2–3 g/L as opposed to the previous recommendation of 1 g/L, to maintain adequate haemostasis,³⁵ therefore early administration of cryoprecipitate to parturient is

recommended even if damage control resuscitation has been instituted.¹⁷ Transfusion of 3 ml/kg of cryoprecipitate has been found to raise the fibrinogen level by 1 g/L.³⁵

Early administration of tranexamic acid: The WOMAN trial is being conducted to study the utility of an antifibrinolytic agent like tranexamic acid for the treatment of bleeding obstetric patients.³⁶

Consider factor VII: Use of recombinant factor VIIa for the management of massive obstetric hemorrhage has been proposed in several case reports and case series with a successful reduction in hemorrhage in 76–85% of women, when used in a dose of 81.5–92 mcg/kg.^{37,38} Presence of hypothermia, acidosis, or low fibrinogen levels can lead to failure to respond to recombinant factor VIIa.³⁹

Monitoring after initiation of massive transfusion:

Plasma electrolytes should be checked at baseline and every hour after the initiation of massive transfusion, specifically assessing for hyperkalemia, hypomagnesemia, hypocalcemia and hyperchloremia.⁴⁰⁻⁴⁴

In addition, tests for coagulation needs to be done as base line and then every hour check after the initiation of massive transfusion, including PTT, prothrombin time (PT), platelet count and fibrinogen levels. Unfortunately, none of these tests adequately assesses platelet function, factor XIII levels, clot stability, or fibrinolytic activity, all of which are abnormalities specific to obstetric patients. Use of thromboelastography and thromboelastometry may improve assessment of overall hemostasis and provide valuable information to direct hemostatic therapy.⁴⁵

POSTOPERATIVE MANAGEMENT

These patients have the potential for ICU admission and postoperative ventilation in cases of excessive bleeding leading to hemorrhagic shock or massive transfusion. In one review, admission to the ICU was required for 51.6% of women with PA; of these, 29% had intraoperative and 40% had postoperative complications.²⁴ At AKUH, in this case series of 53 patients from 2002-2013, ICU admission was required in 49% (26/53) with 26.4% (14/53) requiring postoperative ventilation.

CONCLUSION

PA is one of the most dreaded obstetric emergencies, and unfortunately with a rise in the rate of CS, there is a rise in PA as well. This requires a better understanding of the disease process for early diagnosis, better planning and adequate management of these patients to decrease both maternal and fetal mortality. Every centre, primary, secondary or tertiary, dealing with obstetric cases should have high index of suspicion for PA in patients with known risk factors. These patients should be referred to a tertiary care centre, where proper facilities of managing these cases are available. A multidisciplinary team should be formed to initiate counselling and management of the patients.

The hemorrhage in these patients is very difficult to control, therefore, the anesthesiologist should realize that the whole blood volume can be lost within minutes, so all preparations to deal with it should be undertaken before starting the case. The technique of anesthesia, monitoring and blood products arrangement will vary from patient to patient but the basic guidelines of management must be available and followed to avoid catastrophic situations.

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