



Placenta Accreta: Anaesthesia Management (Review Article)

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Abstract

Haemorrhagic emergencies always pose a challenge to anaesthetist. Though multidisciplinary approach to treat such emergencies is a cornerstone of management, knowledge of the disease process and the management plan decides the outcome. One such life threatening emergency is placenta accreta. The incidence is approximately 1 in 1000 deliveries. Uterine scar caused by previous caesarean section for placenta previa puts the patients in high risk zone for placenta accreta. Diagnosis is generally done by grey scale ultrasonography while magnetic resonance imaging may be helpful in ambiguous cases. Antenatal diagnosis seems to be a key factor in optimizing maternal outcome. Elective caesarean hysterectomy with placenta in situ is recommended treatment to avoid the haemorrhagic morbidity. A prenatal screening for cell-free fetal DNA, placental mRNA, and DNA microarray can play crucial role in better understanding of placental invasion.

The current review discusses the epidemiology, predisposing factors, pathogenesis, diagnostic methods, clinical implications and management options of this condition.

Keywords: *Placenta accreta, obstetric hysterectomy, Haemorrhage, Massive blood transfusion.*

Introduction

With the increase in rate of caesarean deliveries, pregnancy related complications are increasing. One of the potentially life threatening complication of pregnancy is placenta accreta being the most common indication for peripartum hysterectomy. The incidence of placenta accreta is approximately 1:1000 deliveries with reported

range from 0.04% rising up to 0.9%. Although the incidence is increasing nearly up to 1:533 deliveries^{1,2}.

The patients with history of previous caesarean section for placenta previa carry highest risk of accreta in the subsequent pregnancy. The incidence of placenta accreta in previous placenta previa is almost 5-10%. It is associated with

massive and potentially life threatening intrapartum and postpartum haemorrhage with almost 60% morbidity and 7% mortality^{3,4}. It occurs when the placenta is abnormally adherent to the uterine myometrium as a result of partial or complete absence of the decidua basalis and Nitabuch's layer.

Histopathological gradings is as follows:

Placenta accreta- the part of placenta or entire placenta gets deeply and firmly attached to the uterus but does not invade it⁵. It is the most common condition accounting for 75% of all cases.

Placenta increta- the placenta is attached even more deeper or the chorionic villi invade the myometrium. Incidence is almost 15%.

Placenta percreta- the invasion occurs through myometrium and serosa along with occasional invasion of urinary bladder or other adjacent intra-abdominal organs. It is less common condition with 5% incidence.

Pathogenesis

The exact pathogenesis of placenta accreta is less understood. Hence various hypothesis have been put forward. The most accepted being the defective decidualization or maldevelopment of decidua, abnormal maternal vascular remodeling with excessive trophoblastic invasion, or combinations thereof, considered to be the result of previous instrumentation which can turn into placenta accreta^{6,7}. In some patients areas of accretions show direct contact of chorionic villi with myometrium and absence of deciduas. Tantbirojn et al, in his study suggested the invasion of larger vessels in the outer myometrium and near the serosa, rather than a pre-existing defect in trophoblastic growth which would produce uncontrolled invasion through the entire depth of the myometrium in cases of accreta. They also proposed that due to dehiscence of a scar, trophoblast columns gets better access to large outer myometrial vessels resulting into increta and percreta.⁸ In another study, increased levels of alpha-fetoprotein (AFP) and human

chorionic gonadotropin have been found in maternal circulation which suggests increased diffusion due to the abnormal placental attachment with myometrial invasion.

Tseng and Chou hypothesized that the abnormal expression of growth, angiogenesis, and invasion-related factors in the trophoblast populations are the main factors responsible for the occurrence of placenta accreta⁹.

Cohen et al. reported that the cytotrophoblast secretes factors that favour invasion, whereas decidua does not play major role in regulating cytotrophoblast invasion in vitro.¹⁰

Torrencial obstetric haemorrhage occurs when placenta does not get completely separated from uterus. Such patients need urgent hysterectomy. The average blood loss is 3-5 Litres.¹¹ Almost 90% of patients require blood transfusion while 40% require massive blood transfusion. The other life-threatening complications are disseminated intravascular coagulopathy, surgical injury to the ureters, bladder, bowel, or neurovascular structures; adult respiratory distress syndrome; acute transfusion reaction; electrolyte imbalance and renal failure.

Risk factor

Patients with previous caesarean delivery having either anterior or posterior placental position overlying the uterine scar carry the highest risk for placenta accreta in view of myometrial damage. However the risk is 1-5% in patients of placenta previa without previous uterine surgery. The other risk factor is Asherman syndrome resulting from vigorous curettage. Endometrial defect is the causative factor in this condition.¹² Patients previously operated for myomectomy are also prone as myometrial tissue damage followed by secondary collagen repair makes the area vulnerable for placental invasion.¹² In addition, patients with thermal ablation, submucous leiomyomas and uterine artery embolization show increased risk for placenta accreta.^{13,14}

Diagnosis

The safest diagnostic method for lower uterine segment examination is antenatal transvaginal ultrasonography. Though transabdominal route is also recommended, Grayscale ultrasonography has sensitivity of 77–87%, specificity of 96–98%, a positive predictive value of 65–93%, and a negative predictive value of 98%.¹⁵

Signs of accretion may be seen as early as in the first trimester. In second and third trimester of pregnancy the sonographic findings reveal

Irregularly shaped placental lacunae (vascular spaces) within the placenta giving “Swiss cheese” appearance adjacent to the placental implantation site and thinning of or loss of hypoechoic retroplacental myometrial zone or clear space to less than 2 mm;

Absence of the hypoechoic myometrium in the lower uterine segment between the placenta and bladder;

Thinning or disruption of the hyperechoic uterine serosa-to-bladder interface or protrusion of the placenta into the bladder.

Focal exophytic masses or extension of the placenta beyond the myometrial boundaries;

Lacunar flow within the placenta with prominent venous lakes¹⁶—include irregularly shaped placental lacunae (vascular spaces) within the placenta,

The increased vascularity within the myometrium and venous lakes can be better identified by Doppler velocimetry.¹⁷ MRI is helpful in ambiguous cases. Placental heterogeneity and the extent of placenta beyond the uterine contour is guided by MRI. The delineation of myometrium and outer placental surface is better diagnosed with gadolinium contrast. The initial uptake of gadolinium shows obliteration of myometrial zone and beading nodularity within placenta¹⁸.

As per American College of Radiology guidance document for safe MRI practices, it is recommended that gadolinium should be avoided during pregnancy and should be used only if absolutely essential¹⁹. The three-dimensional power Doppler can detect multiple coherent

vessels which can be considered as the single criterion for diagnosis of placenta accreta. It carries 97% sensitivity and 92% specificity²⁰.

Management

Comprehensive planning by multidisciplinary team is a cornerstone of the management of placenta accreta. The team should include Gynecologist, Anaesthesiologist, Surgeon and an Intensivist with sufficient experience and skill in the respective field. Elective cesarean section at 34-35 weeks is a treatment of choice in patients requiring peripartum hysterectomy so as to reduce the complications associated with it.²¹ Least neonatal mortality is expected at this gestational age as the lung maturity is well achieved. The role of interventional radiologist can reduce the morbidity by about 50-80% if pelvic artery catheterization or internal iliac embolisation is done in suspected cases of placenta accreta²².

The anaesthesia management prerequisites should include—

- Two large bore venous accesses for rapid crystalloid and blood product infusion,
- High flow rate and suction device availability,
- Haemodynamic monitoring by central venous and arterial access,
- Warming blankets to combat hypothermia caused by multiple infusions,
- Compression stockings to avoid thromboembolism.

The pneumatic compression stockings can be put preoperatively and maintained until patient becomes fully ambulatory. Preoperative antibiotics play major role to avoid infection. Antiemetic prophylaxis should not be neglected. Blood bank should be well informed and blood replacement in the form of 1:1 ratio of packed red blood cells and fresh frozen plasma should be kept at hand before starting the procedure.

General anaesthesia should be administered to such patients in view of profuse bleeding complicated by profound hypotension and coagulopathy and post operative intensive care. Chestnut et al. has suggested epidural anaesthesia as an appropriate choice for some of these patients²³. However sympathectomy induced

hypotension and an inability to quickly titrate down the level of anesthesia after establishment of neuraxial block make spinal and epidural anesthesia a less favorable choice. The American Society of Anesthesiologists task force on obstetric anesthesia has suggested general anesthesia as the most appropriate choice²⁴. Halogenated inhalational agents should be avoided in view of uterine relaxation resulting into increased haemorrhage. Apart from the routine monitoring for haemodynamic stability, coagulation profile should be monitored hourly after initiation of transfusion. APTT, prothrombin time (PT), platelet count and fibrinogen levels should be checked. PT is more sensitive than APTT (88 vs. 50%). Use of point-of-care devices such as thromboelastography and thromboelastometry may improve the assessment of overall hemostasis and provide valuable information to direct hemostatic therapy²⁵. Hysterectomy with placenta in situ is a safe surgical approach to reduce the bleeding. Endovascular intervention with prophylactic insertion of intravascular balloon catheters or pelvic artery embolisation can definitely reduce the blood loss during cesarean hysterectomy. However there is still paucity of data for its efficiency and safety. Damage control resuscitation strategy advocates the use of RBC, FFP and platelets transfusion in a ratio of 1:1:1. 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.

The use of recombinant factor VIIa in the dose of 81.5-92mcg/kg significantly reduces hemorrhage in 76-85% patients without increase in incidence of thromboembolic events. However hypothermia, acidosis or low fibrinogen levels are the limiting factors.

The highest rate of maternal mortality of 7% is seen in placenta percreta. The common extrauterine organ to get invaded by placental tissue is urinary bladder²⁶. It can further result into

complications like urinary fistula, ureteral transection, and bladder laceration requiring partial or total cystectomy. Preoperative cystoscopy with placement of ureteral stents may help prevent inadvertent urinary tract injury.

In some cases folate antagonist methotrexate can be used to treat placenta accreta as an adjunct. However the approach is debatable as after delivery, the trophoblasts are no longer dividing, thereby rendering methotrexate ineffective.

Conservative management of placenta accrete carries the risk of complications like severe postpartum hemorrhage, postoperative disseminated intravascular coagulopathy, and infection resistant to antimicrobial therapy²⁷.

Conclusion

Increased rate of cesarean section has resulted into increased chances of placenta accreta. Prenatal diagnosis, hysterectomy with placenta in situ, sufficient stock of blood components and proper counselling of patient and relatives can lower the morbidity and mortality. Preoperative ultrasonography with MRI has 100% sensitivity. General anaesthesia should be the technique of choice. Postoperative management in intensive care can definitely add to safety of patient. Conservative management should be considered for the patients willing to preserve the fertility provided no active uterine bleeding is present.

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