Placenta and Placental Problems

The normal placenta[1, 2]

The placenta provides for exchange of nutrients, oxygen and waste products between the mother and fetus, as well as being an endocrine organ for the synthesis of hormones and neurotransmitters and a barrier to toxins and infection. It is derived from both maternal and fetal tissue, with approximately one fifth derived from fetal tissue at term. It comprises a large number of functional units called villi, which are branched terminals of the fetal circulation, allowing transfer of metabolic products.

At term, the normal placenta:

- Is blue-red in colour and discoid in shape.
- Is about 22 cm in diameter.
- Is 2.5 cm thick in the centre.
- Weighs, on average, 450 g but weight will be affected by when and where the cord was clamped.
- Has a maternal surface that is divided into lobules or cotyledons with irregular grooves or clefts.
- Has a smooth, shiny, translucent fetal surface, the chorionic plate, covered in amniotic membrane.
- Has a basal plate which is the maternal surface and is created at the separation of the placenta from the uterine wall at delivery.

The normal umbilical cord:[3]

- Is 51-60 cm long and 2-2.5 cm in diameter.
- Should have abundant Wharton's jelly with no true knots.
- Contains two umbilical arteries and one umbilical vein.
- Can arise from any point on the fetal surface of the placenta; it usually arises in the centre or just off-centre.
- Has a length not associated with length, weight or gender of the baby.

Abnormalities of shape, size, surfaces and function[2, 4]

Circumvallate[5]

- In approximately 1% of cases, there is a small central chorionic area inside a paler thick ring of membranes on the fetal side of the placenta.
- This is associated with an increased rate of antepartum bleeding, prematurity, abruption, multiparity and perinatal death.

Succenturiate lobe[5]

- These are accessory lobes that develop in the membrane some distance from the periphery of the main placenta.
- Occurs in 1.7% of pregnancies, two thirds of which also have velamentous cord insertion (see under 'Abnormalities of the cord', below).[6]
- Large torn vessels within the fetal membranes but beyond the edge of the delivered placenta are suggestive of an undelivered lobe and the uterus should be further explored for retrieval.
- Succenturiate lobes are associated with retained placenta and increased risk of postpartum infection and haemorrhage. They appear to be associated with increasing maternal age and are more common in women who have received in vitro fertilisation (IVF).
Bipartite placenta
This is uncommon:

- The placenta appears as a bilobed structure joined by main vessels and membranes.
- If retained after birth, it can cause bleeding and septic complications.

Placenta membranacea
- Failure of the chorion laeve to atrophy during the development of the placenta means that placental cotyledons form an envelope around the greater part of the uterine wall.
- This is associated with antepartum and postpartum haemorrhage as well as retained placenta.

Placenta in multiple pregnancy
- Fraternal twins have either two distinct placentas or a fused placenta but there are always two distinct chorions and amnions.
- With identical twins the situation depends upon the timing of the division of the fertilised ovum: they can have two distinct placentas and sets of membranes or many different types of fusion with possible interchange of blood supply.

Pathological lesions
- Lesions of the placenta that are consistent with maternal vascular underperfusion are consistently associated with stillbirth and neonatal mortality. In surviving children there is a significant association with neurological impairment.
- Obstructive vascular lesions (fetal thrombotic vasculopathy) are strongly associated with neonatal morbidity, including necrotising enterocolitis and fetal cardiac abnormalities.
- Ascending uterine infection (amniotic infection syndrome) is also strongly associated with neonatal morbidity.
- It is recommended that paediatricians access the results of the histological examination of the placenta, as this may help explain poor neonatal outcomes and may have implications for treatment.

Abnormalities of attachment

The attachment abnormalities placenta praevia and retained placenta are dealt with in detail in their separate articles Placenta Praevia and Retained Placenta.

Placenta accreta
These are conditions where the placenta is morbidly attached to the uterine wall to an increasing degree:

- Placenta accreta: chorionic villi penetrate the decidua basalis to attach to the myometrium.
- Placenta increta; the villi penetrate deeply into the myometrium.
- Placenta percreta: the villi breech the myometrium into the peritoneum.

For simplicity they are all generally referred to as placenta accreta:

- Incidence is about 1/2,500 deliveries.
- All are associated with retained placenta requiring surgical management and have high risk of massive postpartum haemorrhage.
- May be partial with some parts of the placenta unaffected.
- Is associated with preterm delivery: 40% of women deliver before 38 weeks of gestation; caesarean should be planned for 36-37 weeks.

Risk factors

- Previous caesarean section:
  - 0.24% risk if no previous caesarean section.
  - 0.31% risk if one previous caesarean section, rising to 6.74% if five previous caesarean sections.

- Placenta praevia.
- Advanced maternal age.

The incidence of placenta accreta is thought to be increasing due to the rise in caesarean section deliveries.

Management

Women who have had a previous caesarean section who also have either placenta praevia or an anterior placenta underlying the old caesarean section scar at 32 weeks of gestation, are at increased risk of placenta accreta and should be managed as if they have placenta accreta: see the separate article on Placenta Praevia for details of the ‘care bundle’.

NB: repeated attempts to remove a placenta accreta manually produce massive haemorrhage requiring emergency hysterectomy in 100% of cases. It is left in place and either conservative management is followed or immediate hysterectomy is undertaken.
The placenta is left in place with or without therapeutic uterine artery embolisation, surgical internal iliac artery ligation or methotrexate therapy.

If followed by elective hysterectomy, this is associated with less blood loss than hysterectomy at the time of caesarean section.

May be applied where the preservation of fertility is paramount.

May be complicated by delayed haemorrhage, sepsis and the ultimate necessity for hysterectomy.

Placental abruption

Abruption is the premature separation of a normally placed placenta before delivery of the fetus, with blood collecting between the placenta and the uterus. It is one of the two most important causes of antepartum haemorrhage (the other being placenta praevia), accounting for 30% of all cases of antepartum haemorrhage.\[7\]

- It is an important cause of perinatal mortality: in a study of 7.5 million singleton births in the USA, perinatal mortality rate was 11.9% with abruption compared with 0.8% among all other births.\[8\]
- It is estimated to occur in 6.5 pregnancies per 1,000 births.
- Its effect on the fetus depends on its severity and the gestational age at which it occurs.
- Its effect on the mother is dependent on its severity.
- The cause of placental abruption is unknown.

There are two main forms:

- Concealed (20% of cases) - where haemorrhage is confined within the uterine cavity and is the more severe form. The amount of blood lost is easily underestimated.
- Revealed (80%) - where blood drains through the cervix, usually with incomplete placental detachment and fewer associated problems.

Marginal haemorrhage occurs with a painless bleed and clot located along the margin of the placenta with no distortion of its shape. It is usually due to the rupture of a marginal sinus. Women should be admitted for observation and fetal monitoring.

Risk factors

There are recognised factors that increase the risk - these include: \[9, 10\]

- Previous abruption carries the highest risk of abruption in current pregnancy.
- Multiple pregnancy: twice as common with a twin pregnancy than with a singleton.
- Trauma:
  - Road traffic accident.
  - Domestic violence.
  - Iatrogenic - eg, external cephalic version.
- Threatened miscarriage earlier in current pregnancy.
- Pre-eclampsia.
- Hypertension.
- Multiparity.
- Previous caesarean section.\[11\]
- Non-vertex presentations.
- Smoking.
- Cocaine or amphetamine use during pregnancy.
- Thrombophilia.
- Intrauterine infections.
- Polyhydramnios.

Abruption is a sudden unexpected obstetric emergency that usually occurs in pregnancies without any risk factors and so cannot be predicted in most cases.

Presentation

May present with vaginal bleeding, abdominal pain (usually continuous), uterine contractions, shock or fetal distress.\[7\]

Diagnosis\[10\]

Abruption is a clinical diagnosis with no available sensitive or reliable diagnostic tests.

- A tense, tender uterus with a 'woody' feel on abdominal examination suggests a significant abruption.
- Ultrasound is not reliable in identifying abruption, as the blood clot is not easily distinguishable from the placenta. However, if ultrasound suggests abruption, the likelihood of an abruption is high.
- Fetal hypoxia due to an abruption will lead to heart rate abnormalities seen on cardiotocograph (CTG).
- Platelet count, if low, may suggest significant abruption. Coagulation screen should be checked, as coagulopathy is common and should be anticipated.
- Depending on the degree of detachment and the amount of blood loss, the mother may be collapsed and the fetus hypoxic or already dead.
- NB: blood pressure may be normal, even with massive haemorrhage, as fit healthy women can tolerate significant loss prior to showing signs of decompensation.\[12\]
Management

See also the separate article on Antepartum Haemorrhage.

The mother’s life should take priority. She should be resuscitated and stabilised before any decision is made regarding delivery of the baby, regardless of the gestation. Surprisingly, a Cochrane review has found no trials to inform management.\(^7\)

Guidance from the Royal College of Obstetricians and Gynaecologists for moderate or severe placental abruption is to follow ABCD of resuscitation:

- **Assess Airway and Breathing:** high-flow oxygen.
- **Evaluate Circulation:**
  - Intravenous access, FBC, coagulation screen, U&E, Kleihauer test, crossmatch four units.
  - Position in the left lateral position tilted and keep the woman warm.
  - Until blood is available, infuse up to 2 litres of warmed crystalloid Hartmann’s solution and/or 1-2 litres of colloid as rapidly as required.
  - With continuing massive haemorrhage and whilst awaiting coagulation studies and haematology advice, up to 4 units of fresh frozen plasma (FFP) and 10 units of cryoprecipitate may be given empirically.
  - Ideally, measure central venous pressure (CVP) and adjust transfusion accordingly.
- **Assess fetus and Decide on Delivery:**
  - If the fetus is alive, perform either caesarean section or artificial rupture of the amniotic membranes. Monitor the fetus and switch to caesarean if fetal distress develops.
  - Vaginal delivery is the treatment of choice in the presence of a dead fetus, although if the abruption is massive, caesarean may occasionally be indicated to control haemorrhage.\(^{12}\)
  - If bleeding has settled and delivery is not imminent, maternal steroids may be indicated in order to promote fetal lung development and reduce the risk of respiratory distress syndrome and intraventricular haemorrhage.\(^{13}\)

Two deaths due to placental abruption were reported to the UK and Ireland Confidential Enquiry into Maternal Deaths between 2009-2012.\(^{14}\) Both died of catastrophic haemorrhage associated with postpartum disseminated intravascular coagulopathy (DIC).

NB: women who have had a placental abruption are also at increased risk of postpartum haemorrhage.

Abnormalities of the cord\(^2\)

Marginal insertion of cord (battledore)

This occurs where the cord has a marginal rather than central insertion to the placenta. It is not of clinical significance.

Velamentous cord insertion and vasa praevia\(^6\)

Velamentous cord insertion is the term for where the placenta has developed away from the attachment of the cord and the vessels divide in the membrane. If the vessels cross the lower pole of the chorion, this is known as vasa praevia and there is high risk of fetal haemorrhage and death at rupture of membranes. If suspected, vasa praevia can be accurately diagnosed with transvaginal colour Doppler ultrasound. Risk of vasa praevia is increased in:

- IVF pregnancies.
- Multiple pregnancy.
- Bilobate or succenturiate placenta.
- Second-trimester placenta praevia.

In the presence of bleeding vasa praevia, delivery should be achieved by emergency caesarean section. Elective caesarean section prior to the rupture of membranes should be performed when vasa praevia is diagnosed before labour.

Abnormal length of cord

- A long cord (>100 cm) is associated with increased risk of fetal entanglement, knots and prolapse of the cord, which in turn are associated with poor fetal outcome and an increased risk of intrauterine death.\(^{15}\)
- A short cord (<40 cm) may be associated with a poorly active fetus, Down’s syndrome, cord rupture, breech position, prolonged second stage, uterine inversion and abruption. However, a short cord does not seem to impede vaginal delivery except where excessively short (<13 cm) in association with a fundal placenta.\(^{16}\)
- A normal-length cord may become relatively short because of multiple looping around the baby’s neck.

Abnormal number of vessels

A single uterine artery is associated with increased risk of fetal anomalies, particularly trisomies and cord compression.\(^{17}\)

Further reading & references

6. Placenta Praevia, Placenta Praevia Accreta and Vasa Praevia: Diagnosis and Management; Royal College of Obstetricians and Gynaecologists (January 2011)
10. Antepartum Haemorrhage; Royal College of Obstetricians and Gynaecologists (December 2011)
12. Maternal Collapse in Pregnancy and the Puerperium; Royal College of Obstetricians and Gynaecologists (February 2011)
13. Antenatal Corticosteroids to Reduce Neonatal Morbidity and Mortality; Royal College of Obstetricians and Gynaecologists (October 2010)

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