The placenta is a highly vascular, discoid organ that provides for the nutrition of the fetus. It is usually 2 - 4 cm thick and weighs about 600 grams. Technically defined as the apposition or fusion of fetal organs to maternal tissue for the purpose of physiologic exchange. Functionally and anatomically, the placenta is divided into two portions:

**MATERNAL PORTION**
Constitutes less than 1/5 of placental weight. Composed of compressed sheets of *decidua basalis*. Irregular grooves divide it into *cotyledons*.

**FETAL PORTION**
Composed of multiple functional units called *villi* which provide for the transfer of metabolic products. The villi project into pools of maternal blood known as the *intervillous spaces*. The surface is covered by the amniotic membrane.
**Placental grading**

Structural changes occur within the placenta as it ages. A method of "grading" a placenta based on those changes was devised in an effort to help assess gestational age. Statistical correlation between placental grade and gestational age is poor. The identification of a Grade III placenta in the second or early third trimesters may indicate impending placental insufficiency, especially in the presence of underlying maternal medical complications.

![Placental grading images](image)

**Placental variants**

**Extrachorial types**

Placentas in which the membranous chorion does not extend to the edge. As many as 20% of delivered placentas show partial extrachorial regions. Two types exist:

- **Circumvallate**
  
  a small central chorionic ring surrounded by thickened amnion and chorion. May predispose to early separation from the uterine wall, antepartum bleeding and threatened AB.

- **Circummarginate**
  
  central attachment of membranes without a central ring

![Placental variants images](image)
ACCESSORY TYPES
Due to alterations in the mechanisms of early placentation, three variants can occur:

- **Succenturiate**
  an accessory cotyledon with vascular connections to the main placenta caused by focal areas of involution in the chorion levae.

- **Bipartite**
  a placenta divided into two lobes but united by primary vessels and membranes

- **Annular**
  a ring shaped placenta

INTRAPLACENTAL LESIONS
FIBRIN DEPOSITION

**SONOGRAPHIC FINDINGS:**
- Appear sonographically as focal hypoechoic areas within the placenta.
  They may be:
  - Subchorionic: beneath the chorionic plate
  - Perivillous: around individual villi

INTERVILLOUS THROMBOSIS
Caused by fetal bleeding into intervillous space. There is an increased incidence with Rh incompatibility.

PLACENTAL INFARCTS
Ischemic necrosis of placental villi resulting from the interference with maternal blood flow to the intervillous space. If uteroplacental circulation is otherwise normal, there are rarely any fetal complications. Occurs more commonly in eclampsia/preeclampsia and focal lesions are most prevalent. Intervillous thrombosis is also common. When this condition is severe, *placental insufficiency* may occur.

**SONOGRAPHIC FINDINGS:**
- Anechoic or hypoechoic areas seen in placenta
- May be small or quite large
- Absence of blood flow using color or spectral Doppler
MATERNAL LAKES
The presence of large pools of maternal blood within the placenta. May be caused by an early intervillous thrombosis or perivillous thrombosis.

SUBCHORIONIC HEMATOMAS (SUBMEMBRANOUS)
An accumulation of blood beneath the chorionic plate.

SONOGRAPHIC FINDINGS:
- Sonographic appearance varies based on age of hematoma
- Decrease in size on follow up exam
- May be seen as early as 9 weeks

CHORIOANGIOMA
An angiomatous (blood vessel) tumor of the chorion. Occurs 1:5,000 deliveries. When tumors are large (>5 cm) complications may occur, i.e. polyhydramnios, fetal circulatory disorders.

SONOGRAPHIC FINDINGS:
- Hypoechoic, well circumscribed mass beneath the chorion

**Placental Abnormalities**

**Placenta previa**
Implantation or extension of the placenta into the lower uterine segment which presents an obstruction to descent of the presenting part. The etiology may be related to a scarred or poorly vascularized endometrium.

**RISK FACTORS:**
- Previous C-section (triples risk)
- Advanced maternal age
- Cigarette smoking

**CLASSIFICATION:**
- **Complete:** covering the entire internal cervical os
- **Partial:** incomplete covering of the internal cervical os
- **Marginal** encroaching on the edge of the os
- **Low Lying** lower edge of placenta extends into lower uterine segment but does not encroach upon the os
- **Lateral** either marginally or partially covering the internal os from the side
- **Vasa previa** clinically serious complication of delivery in which velamentously inserted cord vessels precede the presenting fetal part (see Cord abnormalities)
CLINICAL SIGNS:
- Spotting during first and second trimesters
- Sudden, painless profuse bleeding in third trimester (caused by placental separation or placentitis)
- Occasional mild cramping

SONOGRAPHIC FINDINGS:
- Placental tissue seen covering or encroaching upon the internal cervical os
- May be complete, partial or low lying

PITFALLS:
- Over-distended urinary bladder may compress lower uterine anatomy
- Segmental myometrial contractions

**Abruptio Placentae**
Premature separation of the placenta from the uterine wall. Bleeding occurs in all cases but two types of abruption exist:
- **Concealed:** occurs in about 20% of cases and the hemorrhage is confined to the uterine cavity. The detachment of the placenta may be complete and the consequences are severe. May be diagnosed sonographically.
- **External:** blood drains through the cervical os. Detachment is usually not as severe. If no blood remains concealed in the retroplacental space, sonographic diagnosis is not possible.
CLINICAL SIGNS:
- Abdominal (uterine) pain
- Spastic uterus
- Hemorrhage may be visible or concealed
- Evidence of fetal distress
- Hypovolemic shock
- DIC

ETIOLOGIES:
- Arterial rupture with hematoma formation which shears off more placenta. Predisposing conditions include: hypertension, preeclampsia, diabetes, chronic renal disease
- Increased venous pressure with passive congestion of venous bed. Predisposing conditions include: increased uterine venous pressure, IVC compression, vasodilation secondary to shock.
- Trauma

SONOGRAPHIC FINDINGS:
- Elevation of the placenta from the uterine wall
- Retroplacental sonolucent or complex mass
- Placenta may appear normal
- Placenta may appear thickened

CHRONIC RETROPLACENTAL SUBMEMBRANOUS HEMATOMA
- Usually no association with clinical problems or poor outcome
- Usually resolve spontaneously
- May result in disseminated intravascular coagulopathy DIC
**Abnormalities of Adherence**

Deficiency of decidua during implantation may cause placental villi to adhere to the myometrium. Predisposing factors include:
- Previous cesarean section
- Previous placenta previa
- Previous D & C
- Grand multiparity

**Placenta Accreta:** placental villi attached to myometrium but do not invade

**Placenta Increta:** deep invasion of the myometrium

**Placenta Percreta:** perforation of the myometrium by invading placental tissue

**Clinical Signs:**
- There may be none apparent prenatally
- Associated with increased morbidity and mortality
- Associated with maternal hemorrhage
- Total hysterectomy may be necessary

**Sonographic Findings:**
- Depends on type of pathology
- Absence of normal appearing retroplacental sonolucent area
- Focal basal plate thinning - ACCRETA
- Increased myometrial thickness and echogenicity - INCRETA
- Sonographic diagnosis is difficult

Placenta previa percreta. Villous invasion of the lower uterine segment with perforation into the dome of the bladder.