29 Products of Conception and Placentas

Products of Conception

Products of conception is the term used for intrauterine tissue that is either passed spontaneously or removed surgically in early gestation. These specimens are usually sent for diagnostic or therapeutic purposes. The major goal is to verify that a gestation was present. This requires the identification of either fetal parts, chorionic villi, or trophoblastic cells. The presence of decidua alone is not sufficent for diagnosis. Molar pregnancies and placental neoplasia may also be identified, although these are much less common. Always be familiar with the patient's clinical history, as this will help guide your examination.

Specimens from first trimester gestations are usually composed of irregularly shaped small tissue fragments and blood clots suspended within a fluid-filled container. Strain the entire contents of the container, and give an estimate of the amount of the specimen by volume (in cubic centimeters) or as an aggregate measurement. Spread the specimen across your work bench, and separate the blood clots from the tissue. Carefully inspect the tissue for fetal parts and villous tissue. Villous tissue is soft and spongy, whereas decidua is more likely to be firmer and membranous. Another method of examination is to suspend the tissue fragments in saline. The delicate villous fronds will then become readily apparent. Also, look for evidence of swollen or hydropic villi, which appear as small, grapelike vesicles.

If fetal parts are identified, measure them separately, and submit several pieces along with representative villous tissue in one or two tissue cassettes. If no fetal parts are identified and you are confident of your identification of villi, submit representative sections in two or three tissue cassettes. However, because the confirmation of an intrauterine pregnancy is often needed immediately, it may be wise to use the following guideline: Submit the entire specimen if it is small or as much as can be included in five tissue cassettes. Always specify the percentage of the specimen that was submitted, and include only tissue fragments. We have found that the microscopic evaluation of blood clots from intrauterine pregnancies often does not reveal entrapped villi. If no villi are identified after your initial microscopic evaluation, the entire specimen may need to be submitted.

In the case of a clinically suspected molar pregnancy or the presence of hydropic villi, the submission of at least eight tissue cassettes is recommended to assess the degree of trophoblast proliferation. Any large tissue fragments, that is, fragments greater than 3 to 4 cm, should be sectioned and entirely submitted if they are firm, indurated, or necrotic. Consider sending fresh tissue for flow cytometric ploidy analysis or tissue culture cytogenetic analysis. Partial moles are triploid, whereas complete moles are diploid or tetraploid. Uterine resection specimens for gestational trophoblastic malignancies should be handled as for hysterectomies for endometrial or cervical cancer depending on the site of the tumor.

Second trimester therapeutic or elective abortion specimens may have intact placentas and fetuses. These specimens may be handled in the routine surgical pathology laboratory if the fetus is less than 500 g and/or less than 20 to 21 weeks' gestation. A description of a full neonatal autopsy is beyond the scope of this chapter;

however, most cases can be appropriately handled with a limited approach. Briefly, weigh the fetus, and measure the crown–rump, crown–heel, and foot length. Examine the external appearance for skin slippage and any gross abnormalities of structure such as missing limbs or extra digits. Open the thorax and abdomen with a vertical midline incision. Confirm the appropriate position of the internal organs, and take a piece of liver, lung, and gonads for microscopic evaluation. For the examination of a fetus with either chromosomal or congenital abnormalities, the reader is referred to Wigglesworth and Singer.[14] The placenta can be routinely handled, as described in the next section.

Placentas

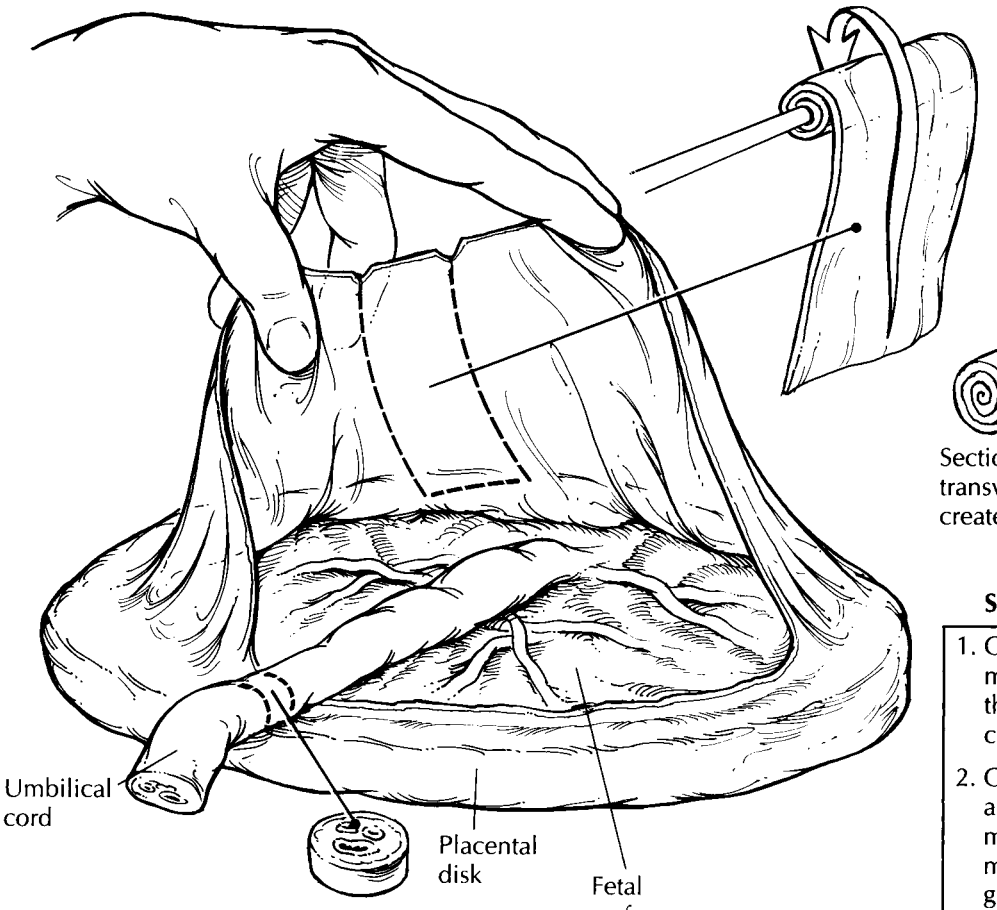
Placentas are submitted for evaluation because of maternal conditions, fetal/neonatal conditions, or gross anomalies of the placenta and in all multiple gestations. Many abnormalities can be recognized with a thorough gross examination. Approach each placenta by systematically evaluating the three main components: the fetal membranes, the umbilical cord, and the placental disk.

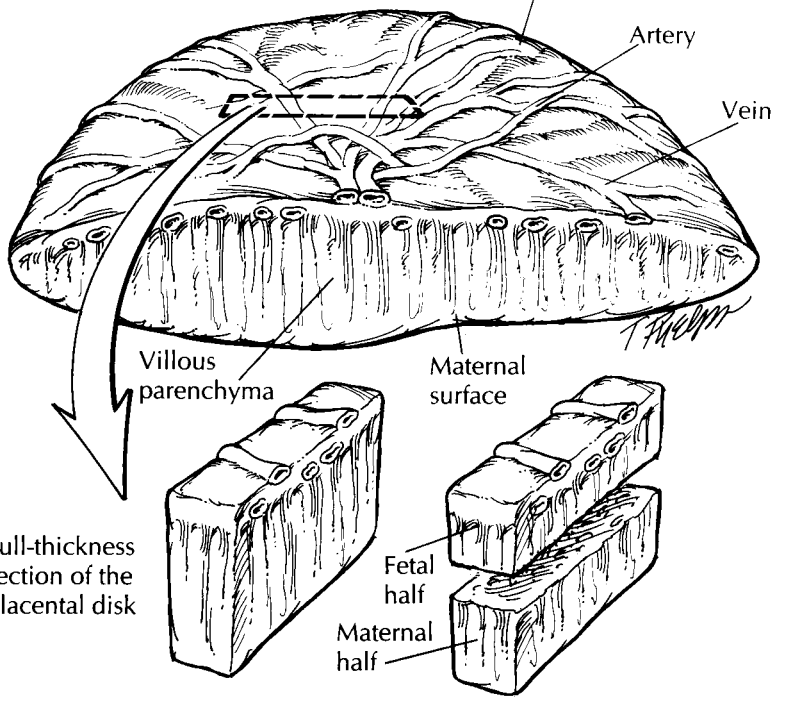
Placentas should initially be examined in the fresh, unfixed state. Choose a work area that allows for the drainage of blood and fluid, which is copiously expressed from the placental bed on sectioning. Always be aware of the clinical history before proceeding, and check the contents of the container in which the placenta was received for any separate blood clots. Orient the placenta by placing the spongy, red maternal surface face down and the shiny, membranous fetal surface with umbilical cord face up. Invert the membranes, if necessary, so that they are draped around the fetal surface.

Begin your examination with the fetal membranes, noting their color, lucency, and insertion. Normal membranes should be shiny and clear and should insert at the edge of the placental disk. Look for any opacities, which may indicate inflammation; small white nodules, which indicate amnion nodosum; and meconium staining, which may indicate intrauterine fetal hypoxia. As illustrated, membrane insertion within the circumference of the fetal surface is called *placenta extrachorialis* and can be subdivided into either circummarginate (a smooth chorionic surface at the insertion) or circumvallate (a grooved or ridged chorionic surface at the insertion). Both may reflect previous bleeding from earlier placental separation. Next, re-create the gestational sac by gently lifting the membranes, and cut a 2- to 3-cm-wide strip of membrane from the ruptured margin to the placental margin. Beginning at the ruptured end, roll the membrane strip with the amnion inward around a small probe. Remove the probe, and cut the newly created ''membrane roll'' transversely for histologic examination. The membranes can now be removed by trimming them along the placental margin.

The umbilical cord is examined next. Record its length and site of insertion. Although the length provided may be artificially shortened if a segment was removed in the delivery room, excessively short (less than 30 cm) or long (more than 70 cm) cords are significant because of their association with abnormal fetal development and activity. Insertions at the edge of the placenta or in the membranes may be associated with exposed vessels, which should be examined carefully for any tears or thrombi. Remove the umbilical cord at its insertion, and examine the entire length of the cord for thinning, thrombi, or knots. True knots can be undone when the umbilical cord ends are freed, whereas false knots cannot. Make several transverse cuts along the cord, and examine the vessels. There should be two small thick-walled arteries and one large thin-walled vein. At the insertion site, many vessels join together and they may not be fused into their terminal vessel until just above this point. Also, twisted regions of the umbilical cord can give the artificial appearance of an increased number of vessels on cross section. Therefore, for an accurate documentation of the number of vessels, it is best to submit a transverse section of the umbilical cord for examination from an area that is not excessively twisted and at least 1 cm above the insertion site.

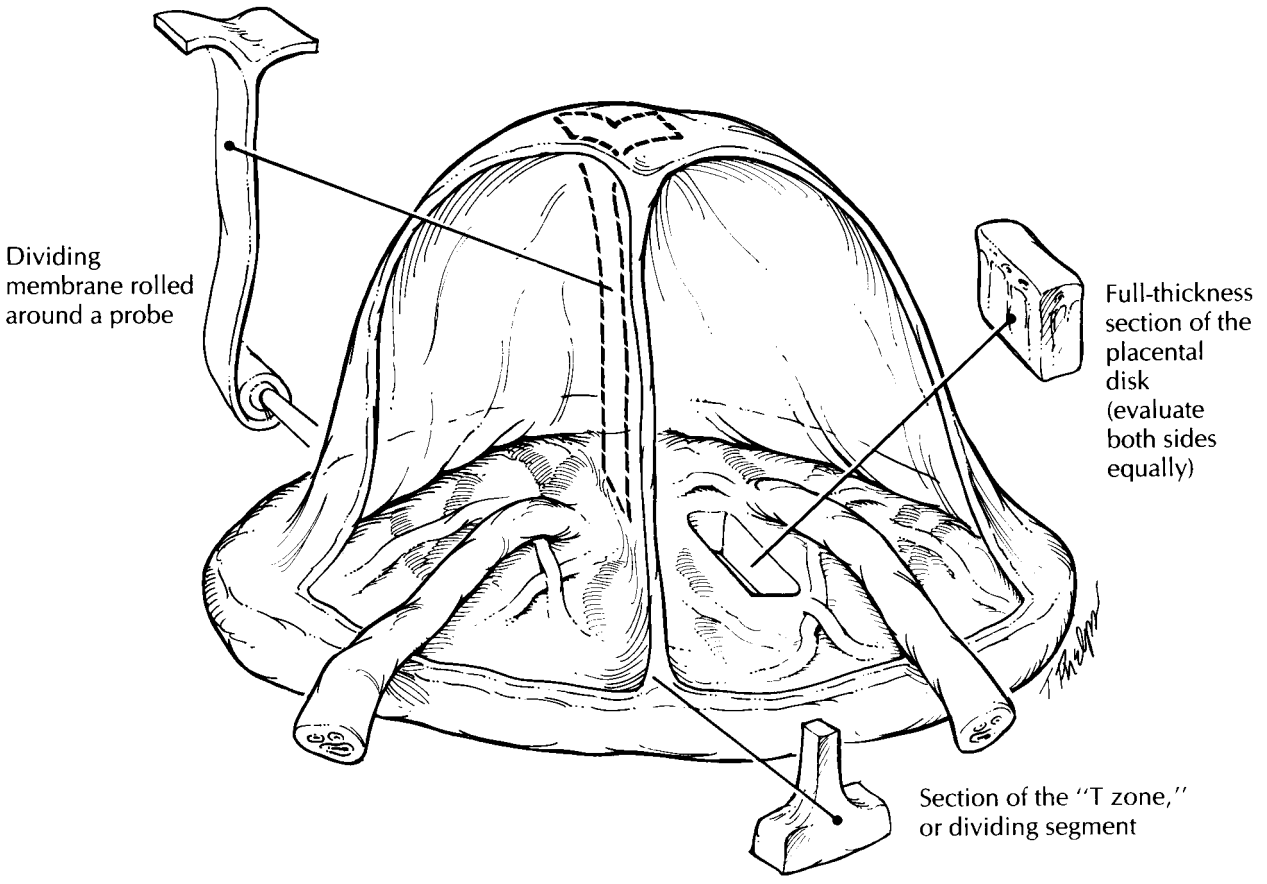
The placenta should now be a solitary disk. Record its weight and three-dimensional measurement. Any unusual shapes or extra lobes should be noted. Examine the membranes on the fetal surface first, and look for nodules within or just below the amnion/chorion layer. Superficial white nodules or fine granularity may represent amnion nodosum, whereas firm, yellowish nodules beneath the membranes may represent subchorionic fibrin deposition. If present, these

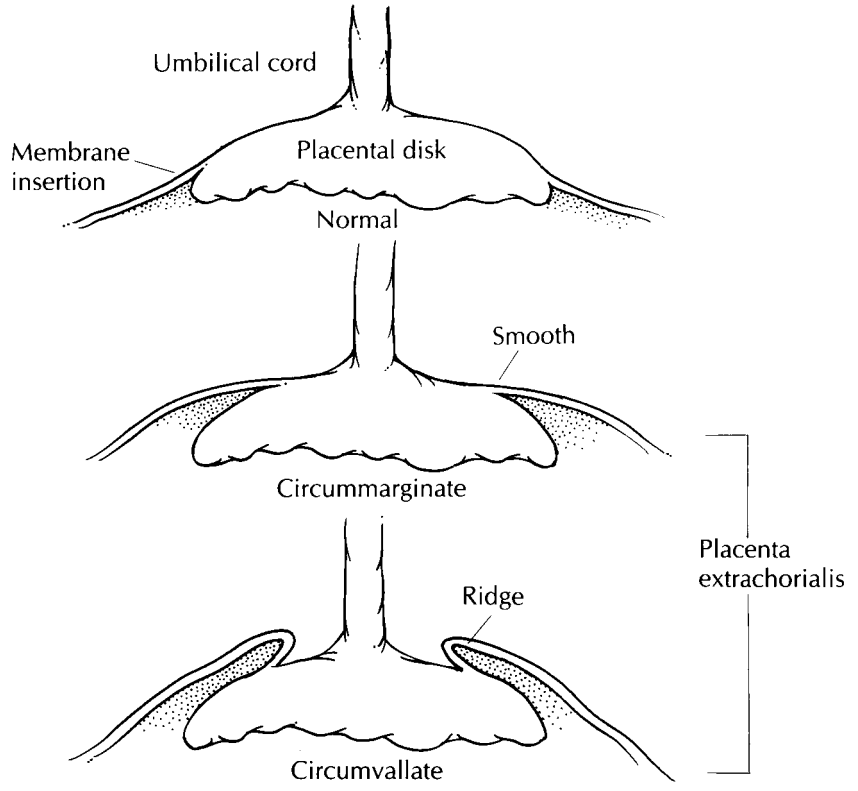




Single and Twin Placentas

1. Orient the placenta with the maternal surface down and the membranes up, encircling the fetal surface.
2. Open the gestational sac, and cut a 2- to 3-cm strip of membrane from the ruptured margin to the placental margin. Roll this strip along a probe with the amnion inward, and section it transversely.
3. Note the insertion of the membranes and trim the membranes from the placental disk.
4. Measure the umbilical cord, remove it at its insertion, and make several transverse sections along its length. Note the number of vessels.
5. Weigh and measure the placental disk.
6. Section the parenchyma at 1- to 2-cm intervals with the maternal surface upward.
7. Submit two to three full-thickness sections of the placental disk. These may be divided into fetal and maternal halves. Also, submit membrane roll and umbilical cord cross sections. For multiple gestations, include the dividing membrane and T zone.





Fetal Membrane Insertion

1. Before removing the fetal membranes, examine their insertion at the edge of the placental disk.
2. Normally, the membranes insert at the margins of the fetal surface.
3. In placenta extrachorialis, the membranes insert within the circumference of the placental disk.
4. Circummarginate insertions have a smooth chorionic surface at their insertion site, whereas circumvallate insertions are grooved or ridged in this region.

should be sampled for histology. Next, examine the vessels that radiate toward the umbilical cord, and look for tears or thrombi. Turn the placenta over, and examine the maternal surface. The cotyledons should be relatively uniform and intact. Look for any evidence of disruption or indentation of the parenchyma. Adherent clots without underlying compression do not necessarily signify a placental abruption. Serially section the placenta at 1- to 2-cm intervals with the maternal surface upward, and examine the parenchyma. The greatest thickness of the placenta from the fetal to the maternal surface should be measured. Look for infarcts, intervillous thrombi, or tumors. Both infarcts and intervillous thrombi can appear yellow or white. Intervillous thrombi are usually smooth and displace the villous parenchyma, whereas infarcts involve the villous tissue and appear more granular. If an infarct is identified, be sure to specify the percentage of parenchyma that is involved. Tumors are rare in the placenta, but hemangiomas, choriocarcinomas, and metastatic cancers can be found.

Sections should include the full thickness of the placenta from the central regions, rather than from the margins. If the section is too thick to fit into one tissue cassette, it may be divided into maternal and fetal halves. Standard sections include two central sections from different cotyledons and any focal lesions.

Fused placentas from multiple gestations can be evaluated in a similar manner to single gestations. Additional handling includes an examination of the dividing membranes and the identification of any vascular anastomoses. Dividing membranes are composed of two outer amnions and either one or two intervening chorions. All monochorionic placentas come from monozygotic (identical) twins, whereas dichorionic placentas may belong to either monozygotic or dizygotic (fraternal) twins. The dividing membrane can be easily peeled apart in monochorionic placentas. Dichorionic placentas are moreopaque and difficult to separate. Although you can perform this separation yourself, histologic verification is necessary, and a membrane roll should be submitted from a region that has not been separated. A section from the ''T zone,'' where the membranes attach to the fetal surface, may also be submitted. Look for any vascular anastomoses between the two sides. Note whether these are artery-to-artery (AA), vein-to-vein (VV), or artery-to-vein (AV). Arteries can be readily recognized by the fact that they lie on top of the veins. Abnormal anastomoses may be reflected by one side being severely congested and large, with the other being pale and small.

Additional Studies

You may be requested to send cultures or cytogenetic studies on obstetric specimens. For aerobic and anaerobic cultures of the placenta, it is best to sear a small region of the membranes over the placental disk with a heated scalpel and then sample the underlying subchorionic zone. This technique reduces surface contamination. For cytogenetic studies, small fragments of villous tissue, skin, or pericardium from a fetus can be submitted in sterile media containers provided by the cytogenetics laboratory. It is best to remove this tissue with clean, but not necessarily sterile, instruments. Avoid areas with obvious bacterial contamination.

Important Issues to Address in Your Surgical Pathology Report on Placentas

- What procedure was performed (was the placenta removed via spontaneous delivery or manually), and what structures/organs are present?
- What is the trimester maturation of the villi (second or third trimester)?
- Are any abnormalities of the placental shape, membrane insertion, or cord insertion present?
- Are any anomalous vessels or vessels with thrombi present?
- Is a normal three-vessel cord present?
- Is there inflammation of the membranes, umbilical cord, or chorionic villi?
- Are the maternal cotyledons disrupted, or is there compression by hematomas?
- Does the parenchyma show any infarction? If so, what percentage is involved?
- Are any villous thrombi or neoplasms identified in the parenchyma?
- In twin gestations, is a dividing membrane present? If so, is it diamniotic–monochorionic or diamniotic–dichorionic?