

INTRODUCTION

The placenta develops from the trophoblast cell layer of the blastocyst embryo at about 6 days from fertilization. With attachment of the blastocyst to the endometrial cavity, the trophoblastic cells differentiate into an inner layer; the cytotrophoblasts and an outer layer; the syncytiotrophoblasts. The syncytiotrophoblasts develop lacunae forming early intervillous spaces.

The placenta forms at the site of the chorion frondosum (the fetal portion of chorion) and the decidua basalis and is first recognized sonographically as a thickened echogenic region by about 9-10 weeks of gestation (**Figure 8.1**). Maternal blood flow is established within the placenta by 12 weeks of gestation (1). The placenta at term is about 20 cm in diameter with a volume of 400 to 600 ml (2). In general, measurement of the placenta is not obtained currently unless in rare pathologic conditions and thus assessment of the biometric dimensions of the placenta are infrequently performed on prenatal sonography today. The normal thickness of the placenta is correlated to gestational age with approximately 1 mm per weeks of gestation (3).

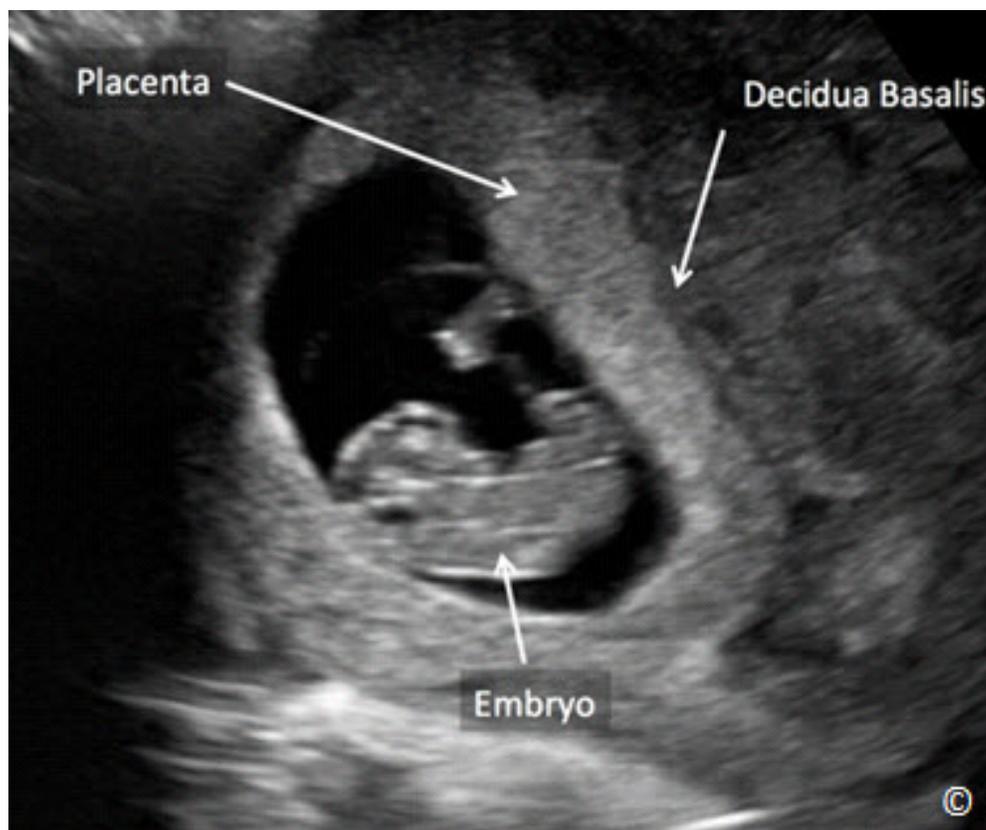


Figure 8.1: Ultrasound of an intrauterine pregnancy at 9 weeks showing the echogenic placenta (labeled). Note the decidua basalis (labeled) as a hypoechoic region behind the placenta. The embryo is also shown (labeled).

Placental localization by ultrasound is one of the six components of the standardized approach to the basic obstetric ultrasound examination and the technical detail of this examination is described in chapter 10. In this chapter, we will focus on the ultrasound diagnosis of placental abnormalities.

PLACENTA PREVIA

The term placenta previa describes a placenta that covers part or all of the internal cervical os. In normal pregnancy, the placenta implants in the upper uterine segment. In the case of placenta previa, the placenta is partially or totally implanted in the lower uterine segment.

Placenta previa is one of the most common causes of bleeding in the second and third trimester of pregnancy. The incidence of placenta previa in the United States at term is estimated at 4.8/1000 deliveries (4). Given that there is a positive association between placenta previa and multiparity, it is expected that the incidence of placenta previa is increased in countries with a high prevalence of multiparity. The classical presentation of placenta previa is painless vaginal bleeding in the late second and third trimester of pregnancy. Painful bleeding may occur in some pregnancies with placenta previa however due to the association with uterine contractions or placental separation (abruption). The first presentation of placenta previa maybe bleeding during labor which highlights the critical importance of prenatal diagnosis and a planned delivery by cesarean section if the placenta previa persists into the third trimester of pregnancy. Placenta previa is also associated with a higher incidence of fetal malpresentation, which by itself maybe a clue to the presence of a placental previa.

Placenta previa is more commonly seen in early gestation (**Figure 8.2**), and in many such cases, with advancing gestation and growth of the uterus, the placenta is lifted into the upper uterine segment. This mechanism of “placental shift/migration” is poorly understood but may be related to a preferential growth of the placental towards a better-vascularized upper endometrium (trophotropism).

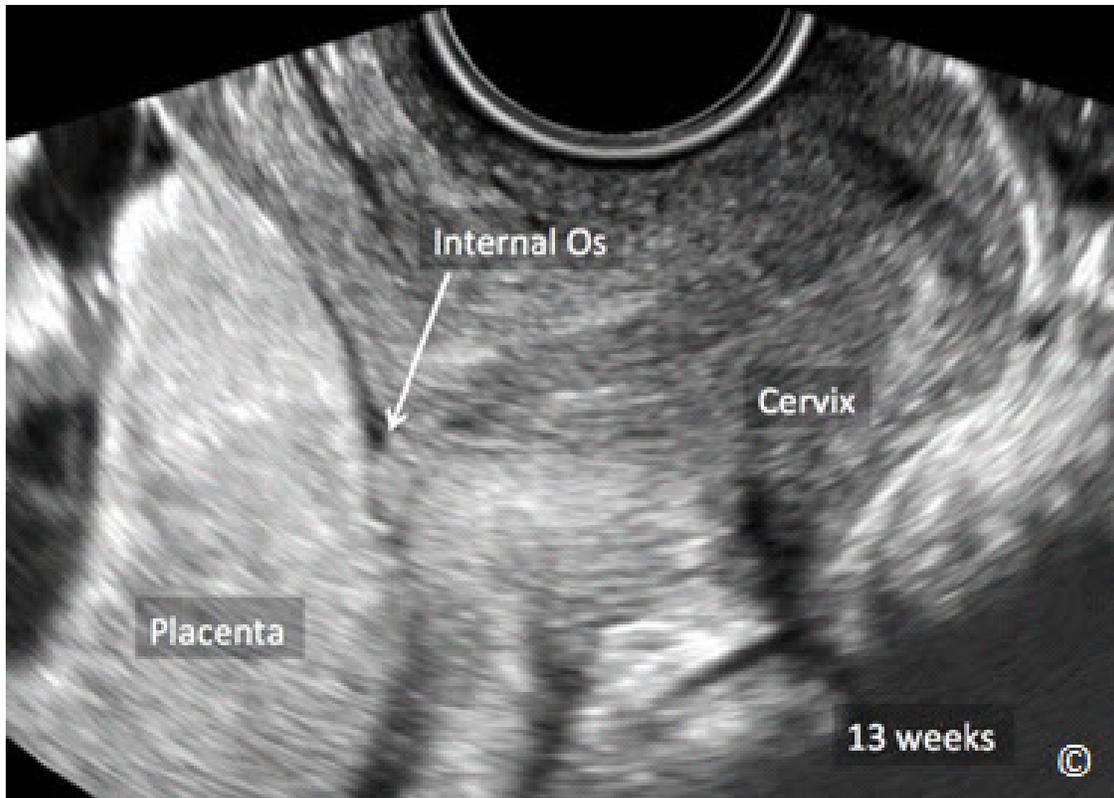


Figure 8.2: Ultrasound of an intrauterine pregnancy at 13 weeks. Note that the placenta (labeled) is covering the internal os of the cervix (labeled), representing a placenta previa.

Table 8.1 lists risk factors for placenta previa. An exponential increase in the incidence of placenta previa exists with increasing number of prior cesarean sections. The presence of four prior cesarean sections increases the incidence of placenta previa about 10 folds (5).

TABLE 8.1	Risk Factors for Placenta Previa
<ul style="list-style-type: none"> - History of prior cesarean delivery - Prior pregnancy termination(s) - Prior uterine surgery - Maternal smoking - Advanced maternal age - Multiparity - Cocaine use in mother - Multiple pregnancy 	

The current terminology used to describe types of placenta previa has been somewhat confusing. Complete placenta previa describes a placenta that completely covers the internal os, a partial placenta previa describes a placenta that partially covers a dilated cervix and a marginal placenta previa describes a placenta where the edge reaches the internal cervical os. If the placental edge is a short distance away from the internal os, within a few cm(s), the term low-lying placenta is suggested, and the distance should be measured. Assessing a dilated cervix by ultrasound for the diagnosis of partial previa is difficult, if not impossible, and the distance used to designate a low-lying placenta has been variable in the literature. Recently, a multi-disciplinary consensus conference in the United States has suggested a simpler terminology of placenta previa that is more pertinent and clinically applicable (6). This new classification uses 3 terms only: placenta previa, low-lying placenta or normally implanted placenta (normal). The terms partial placenta previa and marginal placenta previa are eliminated. Other terms such as incomplete and total placenta previa should also be eliminated.

The new classification is as follows: for pregnancies at less than 16 weeks of gestation, diagnosis of placenta previa is overestimated. For pregnancies greater than 16 weeks, if the placental edge is ≥ 2 cm from the internal os, the placental location should be reported as normal. If the placental edge is < 2 cm from the internal os, but not covering the internal os, the placenta should be labeled as low-lying (**Figure 8.3**) and a follow-up ultrasound is recommended at 32 weeks. If the placental edge covers the internal cervical os, the placenta should be labeled as placenta previa (**Figure 8.4**) and a follow-up ultrasound is recommended at 32 weeks. At the follow-up ultrasound at 32 weeks, if the placental edge is still less than 2 cm from the internal cervical os (low-lying) or covering the cervical os (placenta previa), a follow-up transvaginal ultrasound is recommended at 36 weeks (6). These recommendations are for asymptomatic women and an earlier follow-up ultrasound may be indicated in the presence of bleeding. Because low-lying placenta or placenta previa detected in the mid second trimester that later resolves in pregnancy is associated with vasa previa, transvaginal ultrasound with color/pulsed Doppler in the third trimester (around 32 weeks) is recommended to rule-out vasa previa (**Figure 8.5**) (6). The transvaginal ultrasound should be used as the primary mode of imaging for the diagnosis of placenta previa as a full bladder and / or a uterine contraction of the lower uterine segment can potentially result in a false positive diagnosis of a placenta previa, when a transabdominal approach is used. The transvaginal approach allows for a clear evaluation of the internal cervical os and the exact anatomic relation of the placental edge to the cervix. Furthermore, color Doppler, when available, can assess the vascularity of the placenta, cervix and lower uterine segment and evaluate for the risk of accreta and bleeding at delivery (**Figure 8.6**). The safety of the transvaginal ultrasound approach in the assessment of placenta previa has been well established (7). This is due to the angle of the transvaginal transducer, which places it against the anterior lip of the cervix, unlike a digital examination, which typically introduces a finger

into the cervical canal. **Figure 8.7, 8.8** and **8.9** show normal anterior, fundal and posterior placentas respectively.

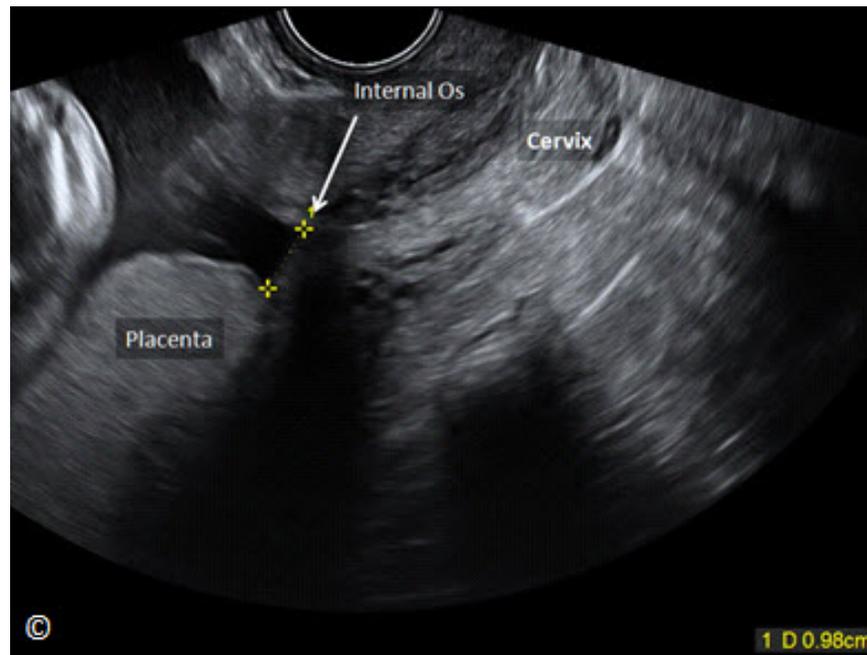


Figure 8.3: Transvaginal ultrasound in the third trimester showing a low-lying posterior placenta (labeled). Note that the lower edge of the placenta is about 0.9 cm from the cervical internal os (labeled). The cervix is also labeled for image orientation.

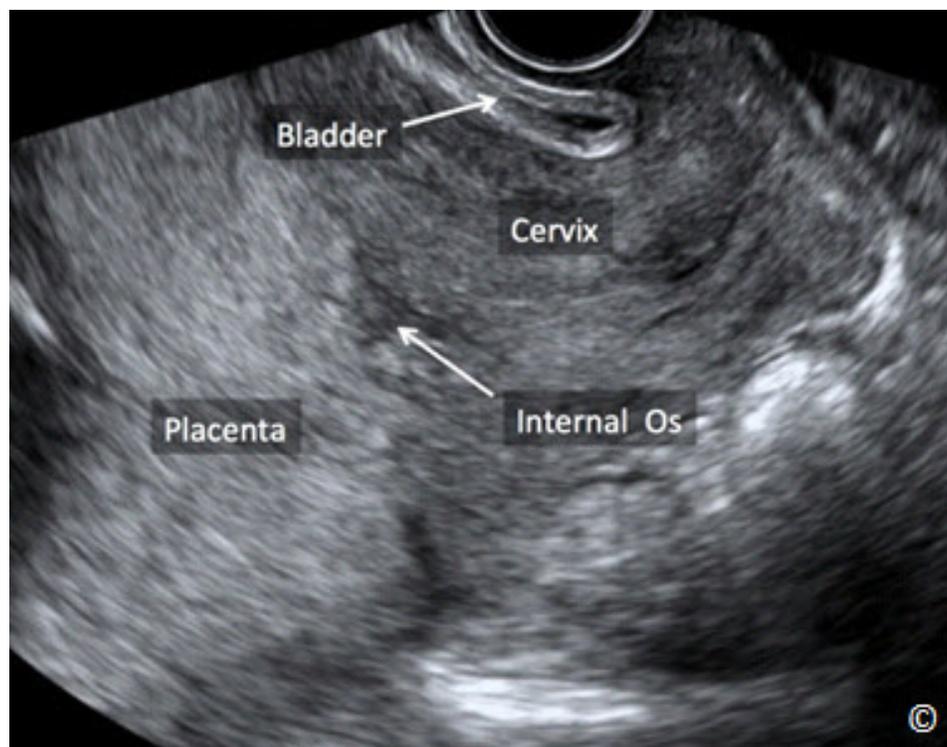


Figure 8.4: Transvaginal ultrasound in the third trimester showing a placenta previa. Note that the placenta (labeled) is covering the cervical internal os (labeled). The bladder is seen anteriorly (labeled). The cervix is also labeled for image orientation.

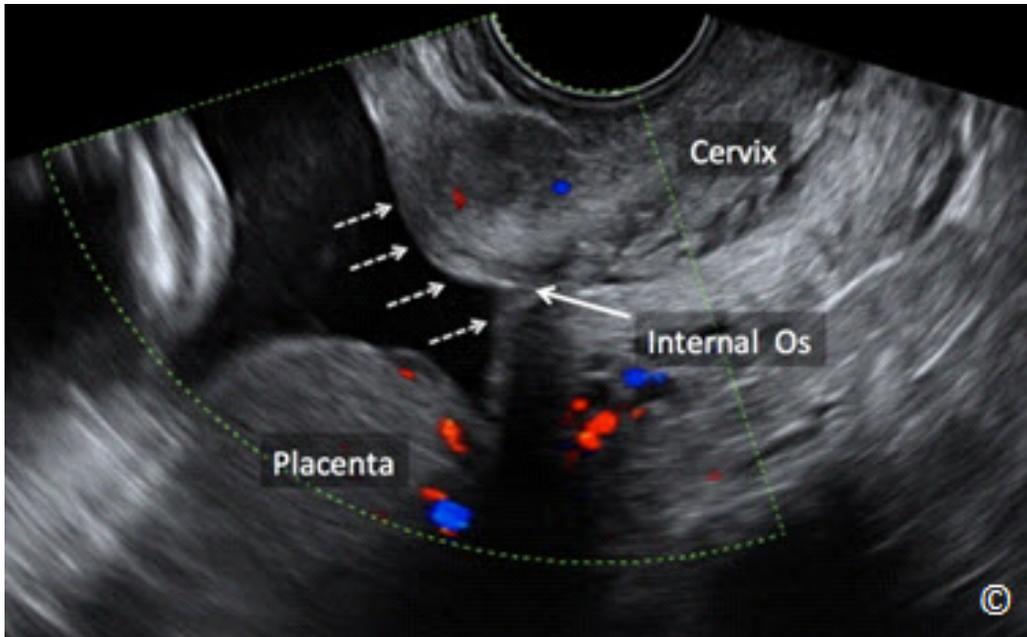


Figure 8.5: Transvaginal ultrasound with color Doppler at 32 weeks showing the absence of a vasa previa (dashed arrows) in a pregnancy that had a placenta previa in the second trimester. Note that the placenta is no longer covering the cervical internal os (labeled). The cervix and internal os are also labeled for image orientation.

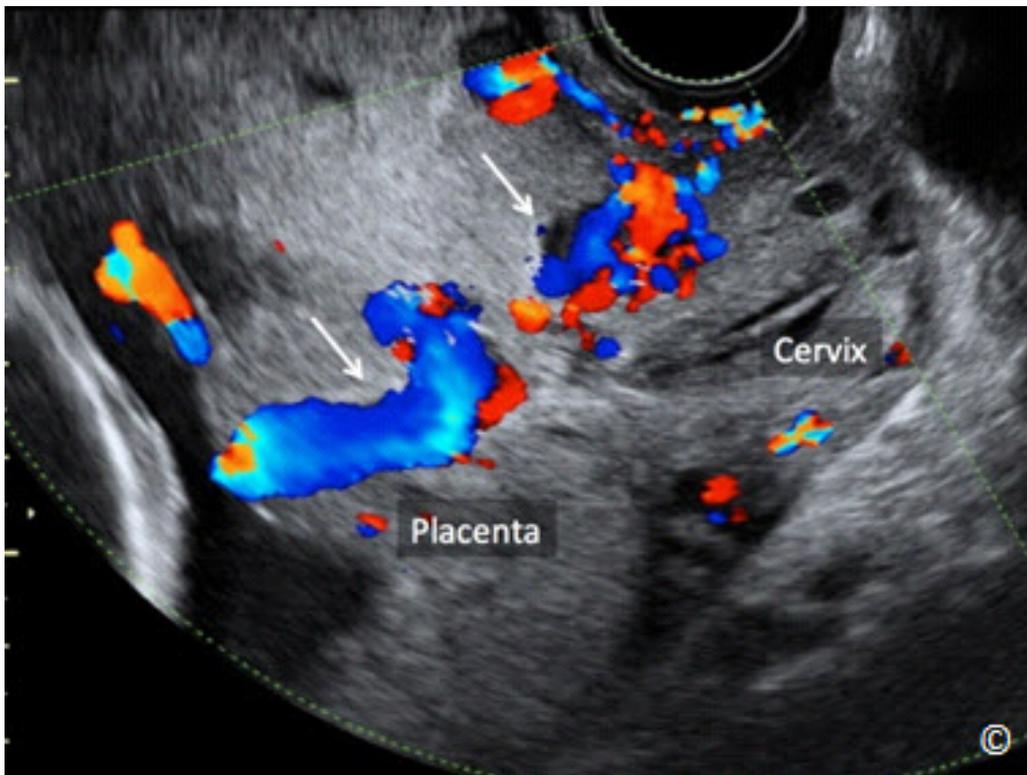


Figure 8.6: Transvaginal ultrasound with color Doppler in the third trimester in a patient with placenta previa and placenta accreta. Note the presence of increased vascularity in the placenta and cervix (labeled – arrows).

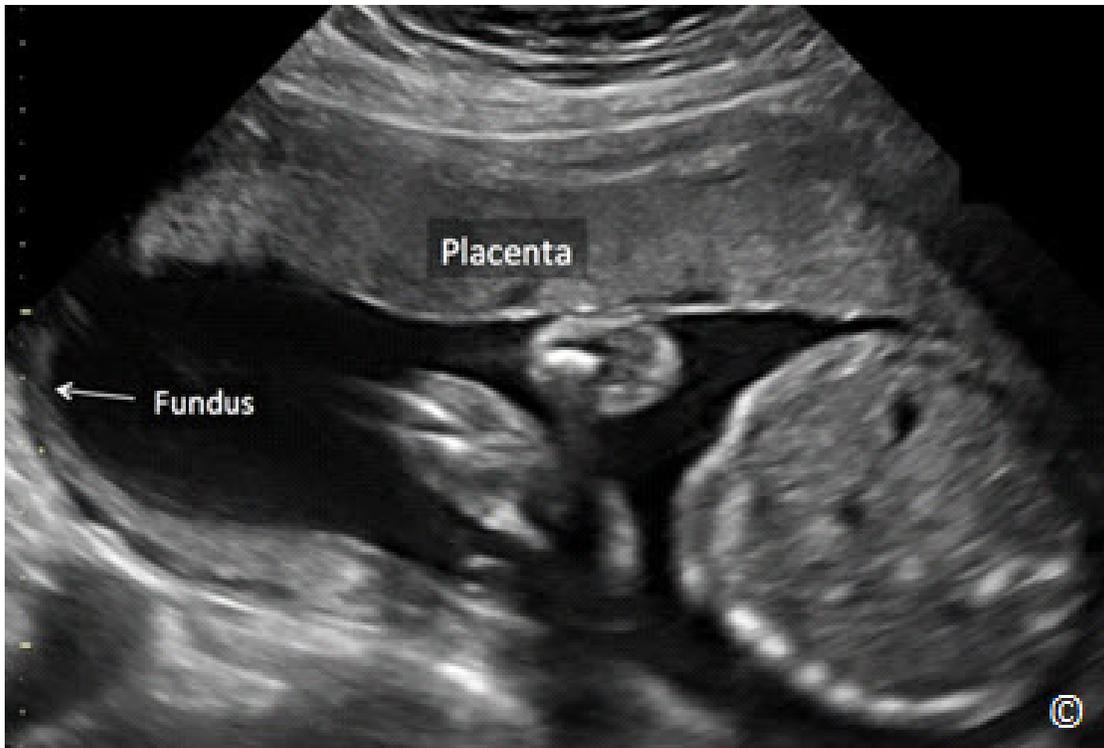


Figure 8.7: Transabdominal ultrasound in the second trimester in a sagittal orientation showing an anterior normal placenta (labeled). The uterine fundus is labeled for image orientation.

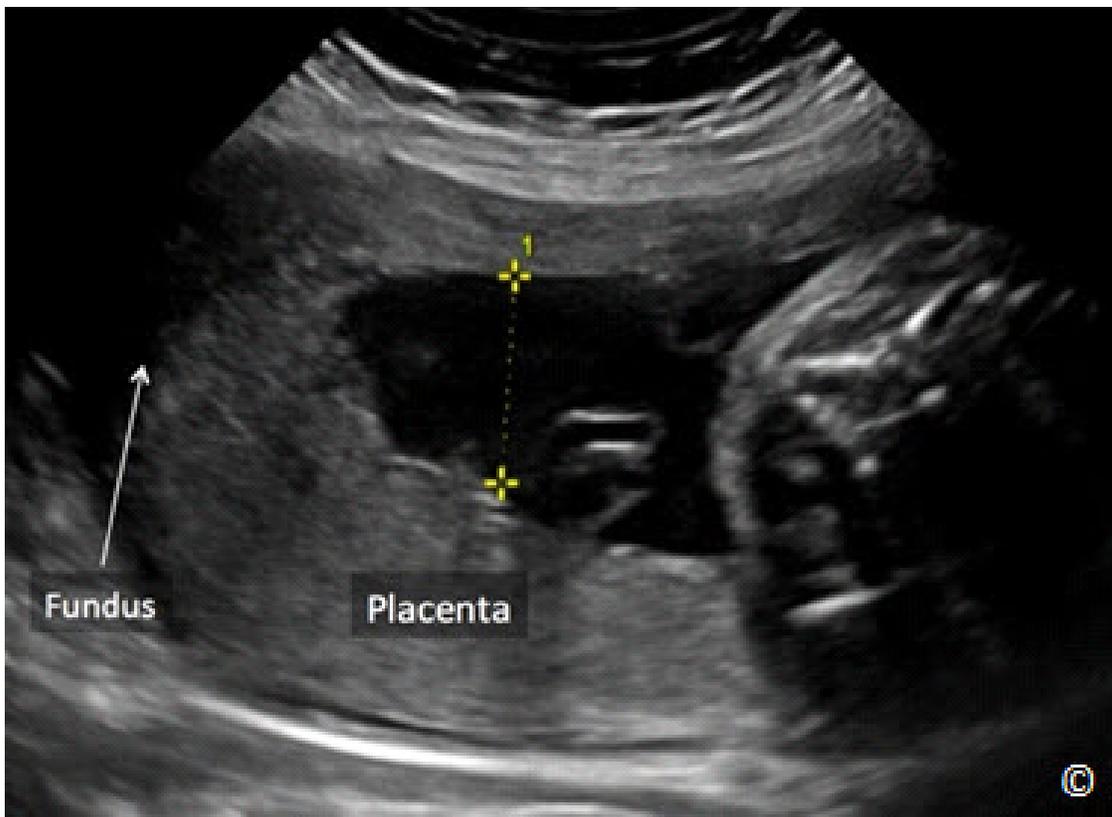


Figure 8.8: Transabdominal ultrasound in the second trimester in a sagittal orientation showing a fundal normal placenta (labeled). The uterine fundus is labeled for image orientation. In this figure, a vertical pocket of amniotic fluid is also measured.

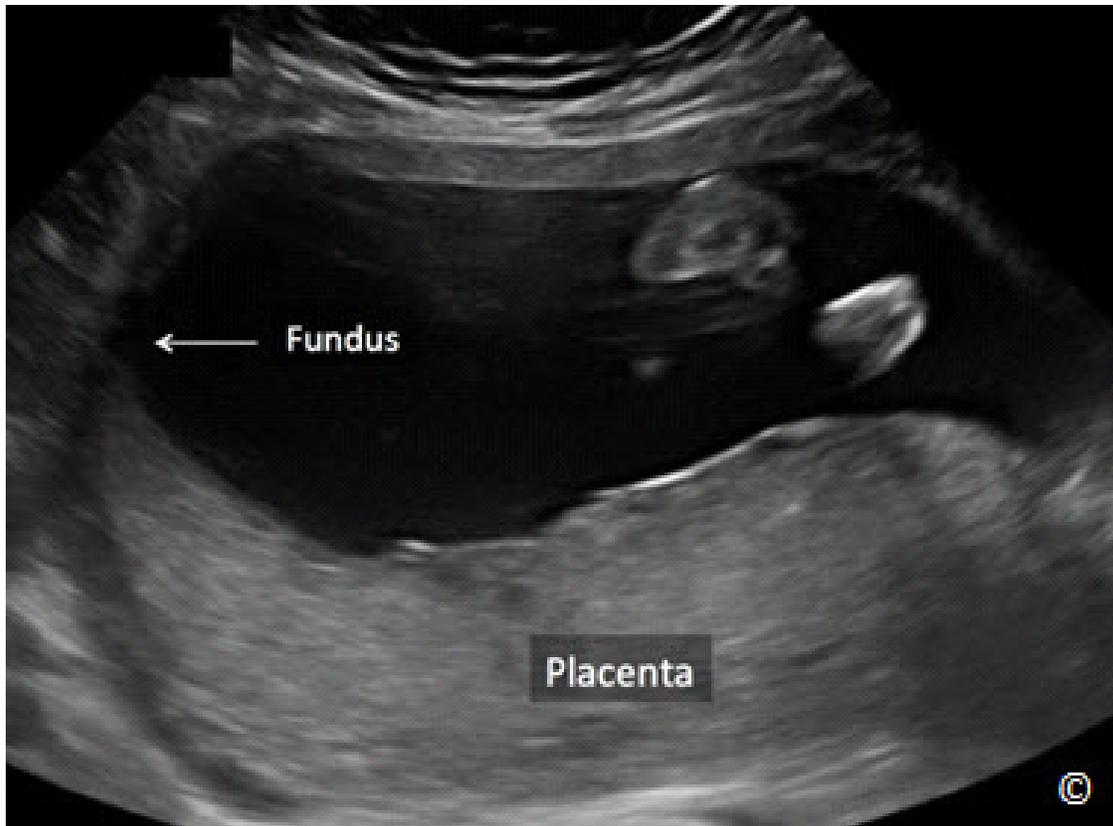


Figure 8.9: Transabdominal ultrasound in the second trimester in a sagittal orientation showing a posterior normal placenta (labeled). The uterine fundus is labeled for image orientation.

Table 8.2 describes the transvaginal ultrasound approach in the evaluation of the placenta when a placenta previa is suspected.

TABLE 8.2	Transvaginal Approach to the Evaluation of the Placenta
<ul style="list-style-type: none"> - Use the transvaginal transducer - Ensure that the woman’s urinary bladder is empty - Insert the transvaginal transducer until you see the cervix, identify the internal cervical os - Maintain sagittal orientation of the transvaginal transducer - Ensure minimal pressure on the cervix - Localize the lower placental edge and assess its relationship to the internal cervical os 	

VASA PREVIA

Vasa previa refers to the presence of fetal blood vessels between the presenting fetal parts and the cervix. The fetal blood vessels can run in the fetal membranes unprotected or the umbilical cord can be tethered to the membranes at the level of the cervical os.

The incidence of vasa previa is approximately 1 in 2500 deliveries (8). The implication of having fetal vessels in front of the fetal presenting part is potentially catastrophic in that should the membranes rupture, the fetal vessels are at risk of rupturing with resulting fetal exsanguination. When undiagnosed, vasa previa has an associated perinatal mortality of 60%, whereas 97 % of fetuses survive when the diagnosis is made prenatally (9).

Prenatal diagnosis relies on the transvaginal ultrasound approach. Vasa previa is diagnosed by ultrasound when color Doppler documents the presence of fetal vessels overlying the cervix (**Figure 8.10 A and B**). It is important to confirm by pulsed Doppler that the vascular flow is fetal in origin (**Figure 8.10 B**). On transvaginal grey-scale ultrasound evaluation of the cervix, the presence of echogenic lines along the amniotic sac and overlying the internal cervical os, should alert the examiner for the presence of a vasa previa (**Figure 8.11 A**). Once these echogenic lines are noted, the addition of color Doppler confirms that the echogenic lines are actually vessels running in fetal membranes (**Figure 8.11 B**). If the umbilical cord or umbilical vessels appear to be tethered to the membranes at the level of the internal os, or in the lower uterine segment along the cervix (**Figure 8.12 A and B**), a vasa previa should also be diagnosed. It is important to rule out a funic presentation by either asking the patient to move around and see if the umbilical cord moves in the process. Repeating the transvaginal ultrasound examination at a later date will also confirm this finding.

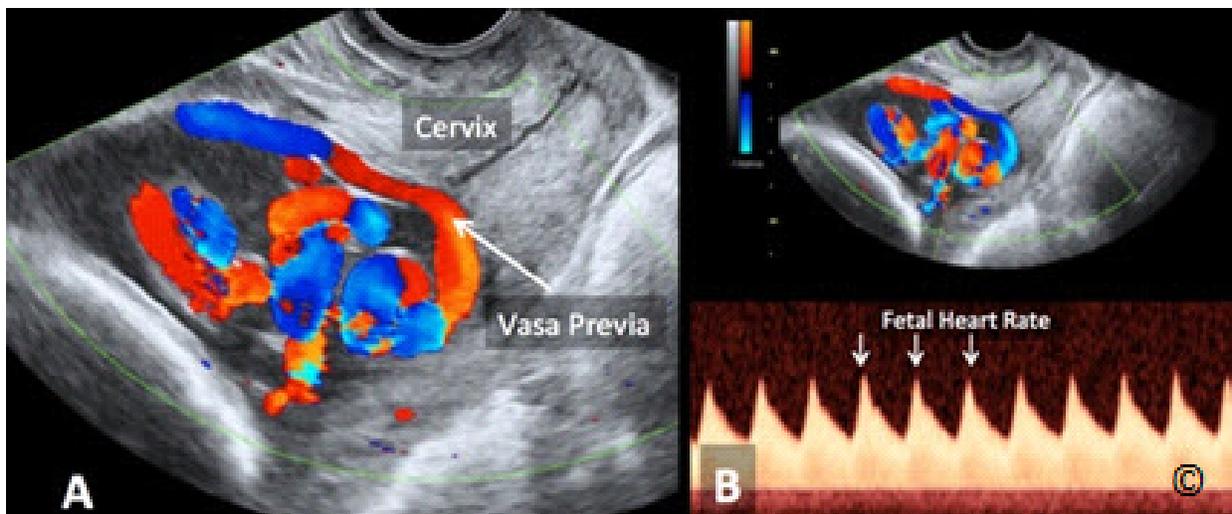


Figure 8.10 A and B: Transvaginal ultrasound in the third trimester in color (A) and Pulsed (B) Doppler in a fetus with vasa previa. Note that color Doppler (A) shows a vessel crossing in front of cervix (labeled as vasa previa) and pulsed Doppler (B) documents fetal heart rate in the vessel. The cervix is labeled in A.

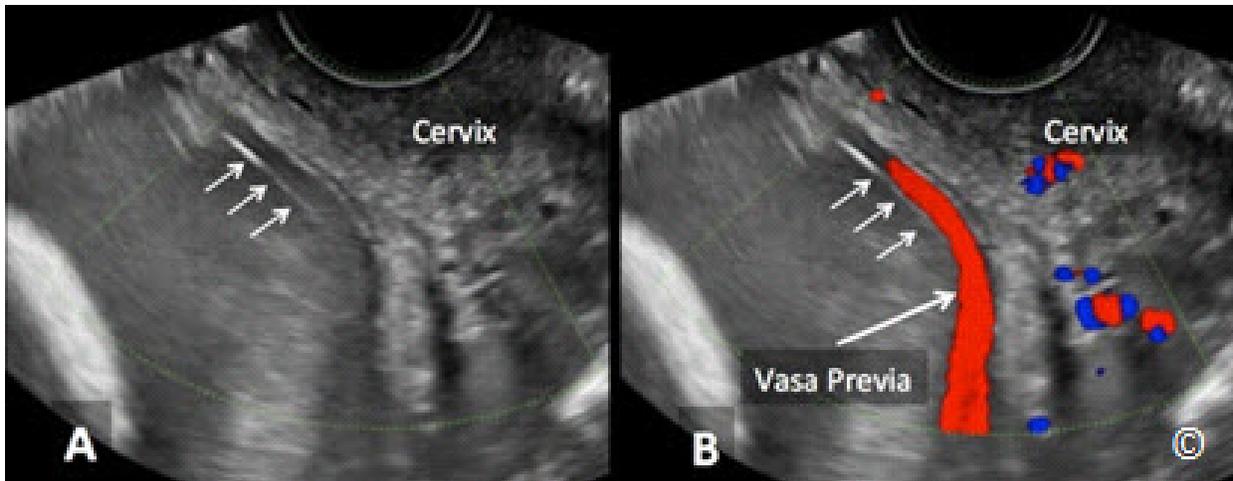


Figure 8.11 A and B: Transvaginal ultrasound in the second trimester in grey scale (A) showing an echogenic line (arrows) in front of the cervix (labeled). Color Doppler (B) confirms the presence of vasa previa. The presence of an echogenic line in front of the cervix may represent a vessel wall and should alert for the presence of vasa previa.

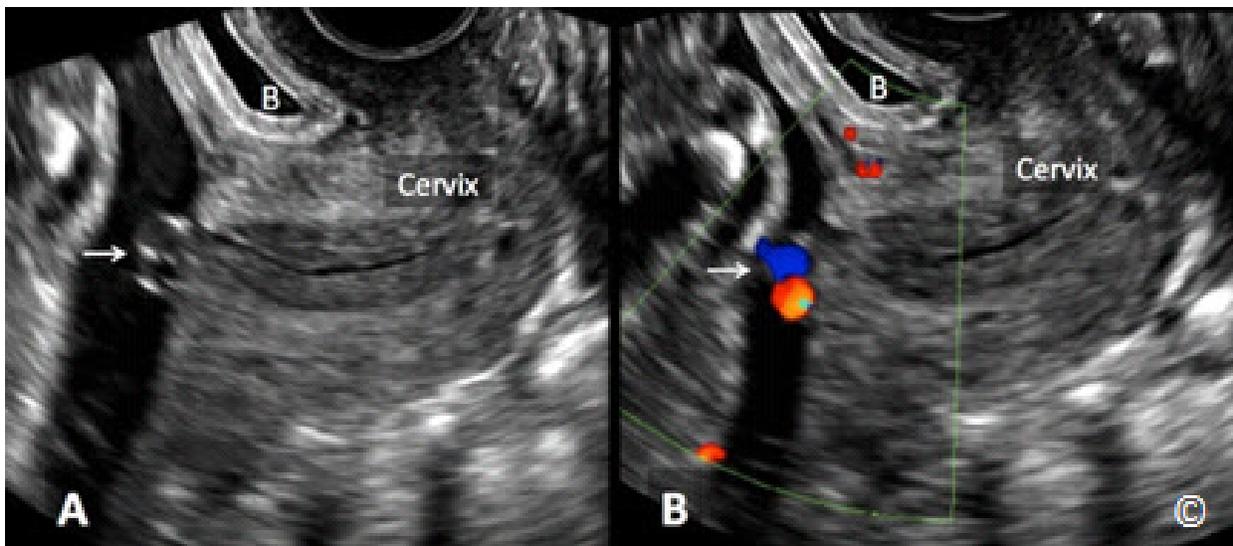


Figure 8.12 A and B: Transvaginal ultrasound in the late second trimester in grey scale (A) and color Doppler (B) showing a vasa previa involving a tethered umbilical cord (arrow) to the cervix (labeled). B = Bladder.

Risk factors for vasa previa are listed in **Table 8.3**. Of those listed, the presence of a second trimester low-lying placenta, or placenta previa is a significant risk factor for vasa previa (9), and thus a follow-up transvaginal ultrasound with color Doppler at 32 weeks is recommended to screen for vasa previa (6).

TABLE 8.3**Risk Factors for Vasa Previa**

- Resolving second trimester low-lying placenta
- Resolving second trimester placenta previa
- Presence of accessory placental lobes (succensuriate lobe)
- Velamentous or marginal cord insertion
- Multiple pregnancies
- Echogenic line(s) seen along the amniotic sac overlying the internal os

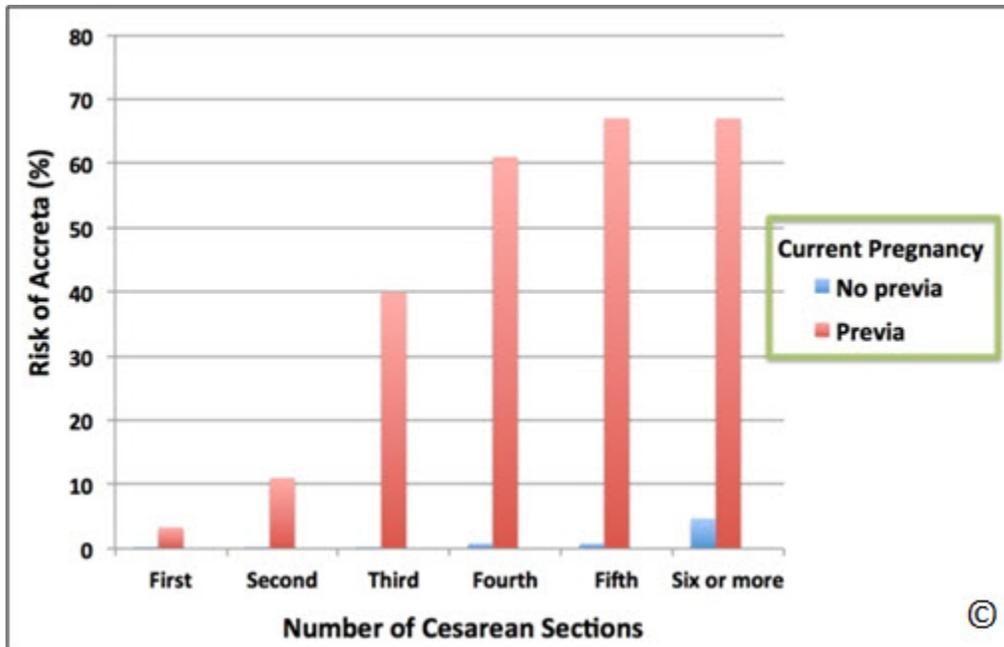
Management of vasa previa relies on the prenatal diagnosis and a planned elective delivery by cesarean section before the beginning of labor. This is typically accomplished around 36-38 weeks. The balance of neonatal resuscitation capabilities with the risk of labor and rupture of membranes should be taken into account when vasa previa is diagnosed in low-resource settings. The status of the cervix and prior obstetric history may help in making such decision.

MORBIDLY ADHERENT PLACENTA

The term morbidly adherent placenta implies an abnormal implantation of the placenta into the uterine wall and this term has been used to describe placenta accreta, increta, and percreta. Placenta accreta is a placenta where the placental villi adhere directly to the myometrium, placenta increta is a placenta where the placental villi invade into the myometrium, and placenta percreta is a placenta where the placental villi invade through the myometrium and into the serosa. About 75% of morbidly adherent placentas are placenta accretas, 18% are placenta incretas, and 7% are placenta percretas (10). Placenta accretas can be subdivided into total placenta accreta, partial placenta accreta, or focal placenta accreta based upon the amount of placental tissue involved in their attachment to the myometrium. Pathogenesis of placenta accreta is not currently clear. It is theorized to result from abnormal vascularization resulting from the scarring process after surgery with secondary localized hypoxia, leading to both defective decidualization and excessive trophoblastic invasion (11, 12, 13). The presence of any type of placenta accreta can be catastrophic to the patient especially in a low-resource setting given the potential need for massive blood transfusion and possibly emergency hysterectomy. Prenatal diagnosis and a planned delivery are therefore essential for optimizing the maternal and neonatal outcome.

The overall incidence of placenta accreta is around 3 per 1000 deliveries and there has been a significant increase in the incidence of placenta accreta over the past several decades (14, 15). The main reason for this increase is the significant rise in cesarean section rates, as cesarean section and placenta previa are both known risk factors for placenta accreta (16) (**Graph 8.1**).

For instance, a patient with three prior cesarean sections, the presence of a placenta previa is associated with a 40% risk for placenta accreta (16) (**Graph 8.1**). It is of note that this association is directly related to the presence of a placenta previa. In this same patient, the risk for the presence of a placenta accreta decreases to less than 1% if there is no placenta previa in the at risk pregnancy (16) (**Graph 8.1**). Assessing for the presence of placenta previa is therefore critical in pregnant women with prior cesarean sections. As the number of previous cesarean sections increase, the risk for placenta accreta increase substantially in the presence of a placenta previa. Other risk factors for placenta accreta are listed in **Table 8.5**.



Graph 8.1: Risk for placenta accreta in pregnancies with and without a placenta previa and prior cesarean deliveries. Note that the risk of placenta accreta increases significantly as the number of prior cesarean deliveries increases in the presence of a placenta previa on ultrasound. When a placenta previa is not noted on ultrasound, the risk for placenta accreta remains small (< 1%), irrespective of the number of prior cesarean deliveries.

TABLE 8.5	Risk Factors for Placenta Accreta
<ul style="list-style-type: none"> - Placenta previa and prior cesarean section - Advanced maternal age - Multiparity - Prior uterine surgery - Prior uterine irradiation - Endometrial ablation - Asherman’s syndrome - Leiomyomas - Uterine anomalies - Hypertensive disorders in pregnancy - Smoking 	

SONOGRAPHIC FINDINGS OF PLACENTA ACCRETA

First Trimester

A gestational sac that is implanted in the lower uterine segment increases the risk for placenta accreta in pregnancy (**Figure 8.13**) (17). Other sonographic findings correlating first trimester ultrasound with placenta accreta include multiple irregular vascular spaces within the placental bed (18) (**Figure 8.14**). Cesarean section scar implantation of the gestational sac is a different entity than a low gestational sac implantation and is used to describe implantation of a gestational sac within a cesarean section scar. Ultrasound findings of cesarean section scar implantation include a gestational sac imbedded into the cesarean section scar at the level of the internal cervical os, at the base of the bladder (**Figure 8.15**). If untreated, cesarean section scar implantation may lead to significant placental abnormalities such as placenta accreta, percreta and increta. A preferred treatment option for cesarean scar implantation includes injection of the gestational sac with methotrexate under direct ultrasound guidance (**Figure 8.16**).



Figure 8.13: Transvaginal ultrasound in the first trimester showing a gestational sac (labeled) implantation in the lower uterine segment. This pregnancy progressed to a placenta percreta. Modified with permission from the American Institute of Ultrasound in Medicine (18).

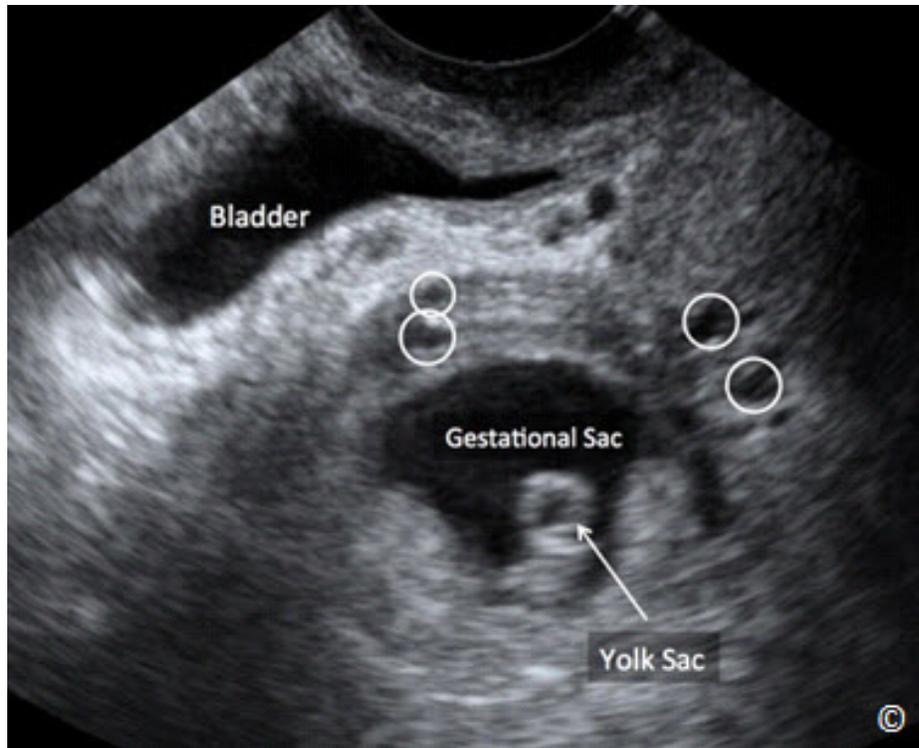


Figure 8.14: Transvaginal ultrasound in the first trimester in the same pregnancy as in figure 8.13. Note the presence of multiple irregular vascular spaces in and around the placenta (white circles). This pregnancy progressed to a placenta percreta. Modified with permission from the American Institute of Ultrasound in Medicine (18).



Figure 8.15: Transvaginal ultrasound of a cesarean section scar implantation of a gestational sac. Note that the gestational sac (GS) is imbedded into the cesarean section scar at the level of the internal cervical os (cervix). The yolk sac is labeled.

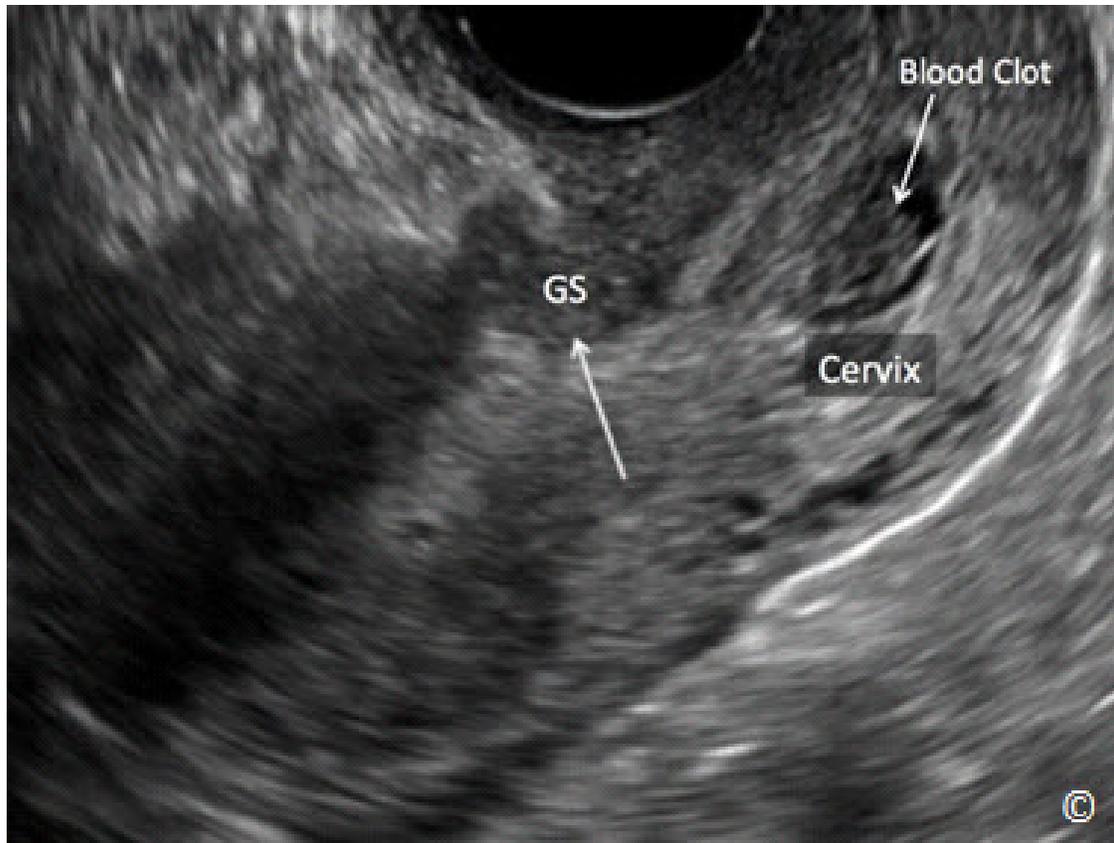


Figure 8.16: Transvaginal ultrasound of a cesarean section scar implantation of a gestational sac, 2 weeks following treatment with direct methotrexate injection under ultrasound guidance (same pregnancy as in figure 8.15). Note that the gestational sac (GS) has collapsed and a small blood clot (labeled) is noted in the cervical canal (cervix).

Second and Third Trimester

Multiple vascular lacunae within the placenta in the second trimester have been correlated with a high sensitivity (80-90%) and a low false positive rate for placenta accreta (19) (**Figure 8.17**). Placental lacunae in the second trimester appear to have the highest sensitivity and positive predictive value of other markers for placenta accreta (19). There are multiple sonographic markers that have been described in the late second and third trimester for placenta accreta. Loss of the normal hypoechoic retroplacental zone, also referred to as loss of the clear space between the placenta and the uterus, is one of those markers (20, 21) (**Figure 8.18 A and B**). This sonographic finding (loss of normal hypoechoic retroplacental zone) tends to have high false positive rate and should not be used alone as it is angle dependent and can be absent in normal anterior placentas (20 - 23).

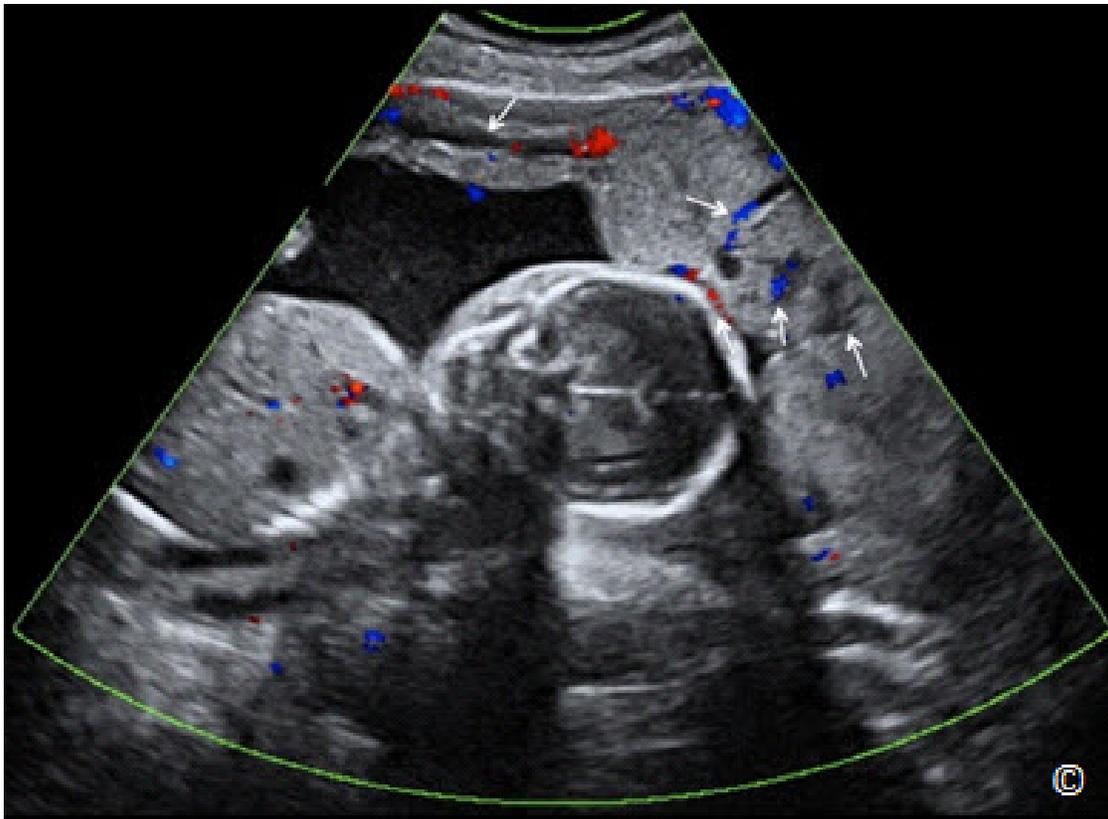


Figure 8.17: Transabdominal ultrasound at 18 weeks with color Doppler showing a placenta accreta. Note the presence of multiple vascular lacunae within the placenta (white arrows). Color Doppler shows blood flow within the lacunae.

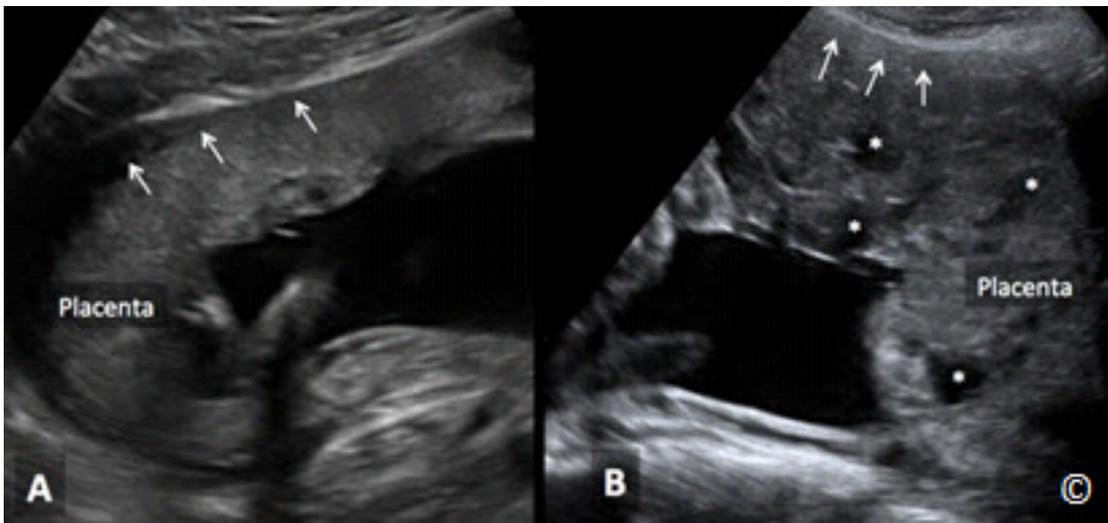


Figure 8.18 A and B: Transabdominal ultrasound showing a normal placenta in A with a normal hypoechoic retroplacental zone (arrows). Note the presence of a placenta accreta in B with loss of the normal hypoechoic retroplacental zone (arrows). The placenta in B also has multiple lacunae (small asterisks).

The presence of multiple vascular lacunae within the placenta, or “swiss-cheese appearance”, is one of the most important sonographic findings of placenta accreta in the third trimester (**Figure 8.19** and **8.20 A and B**). The pathogenesis of this finding is probably related to placental tissue alterations resulting from long-term exposure to pulsatile blood flow (24, 25). The presence of multiple lacunae, especially four or more has been correlated with a detection rate of 100% for placenta accreta. This marker also has low false positive rates, but it should be noted that placenta accretas have been reported with absent multiple vascular lacunae.

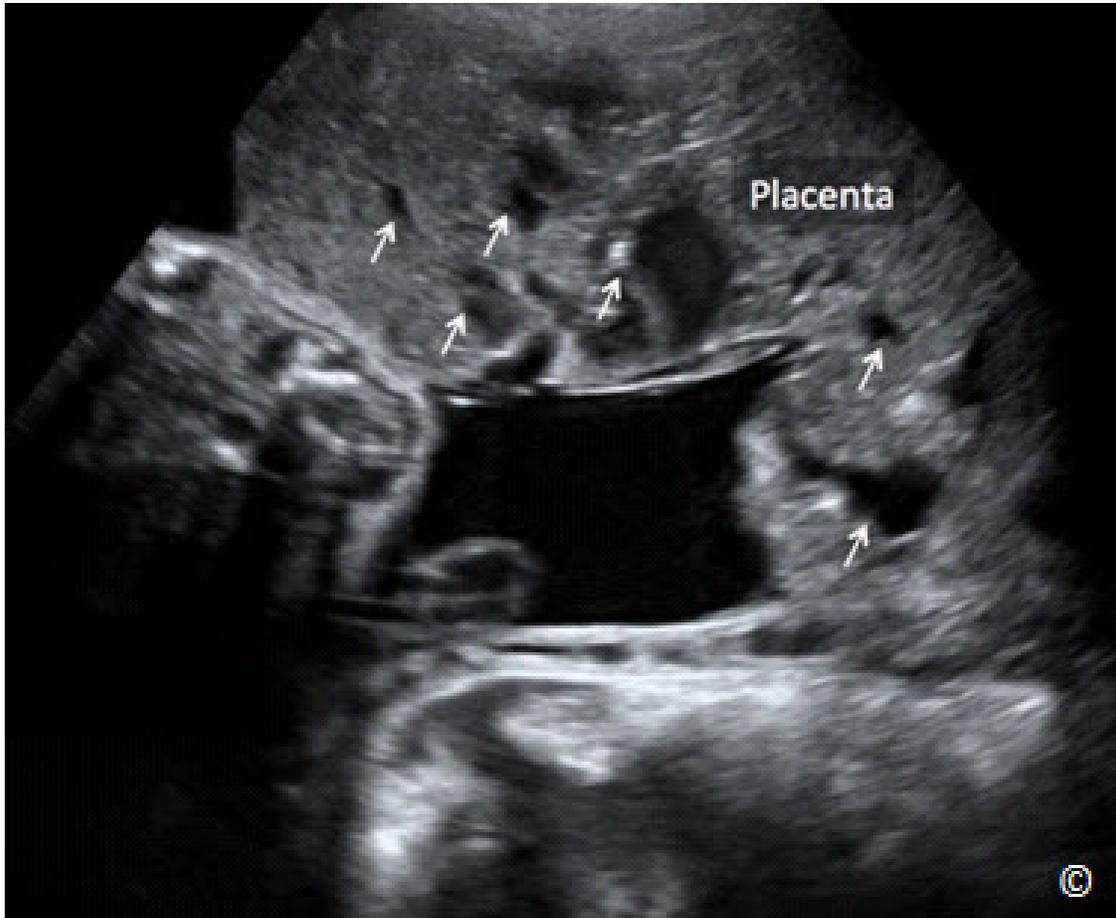


Figure 8.19: Transabdominal ultrasound in the third trimester showing a placenta accreta (labeled as placenta). Note the presence of multiple placental lacunae (arrows).

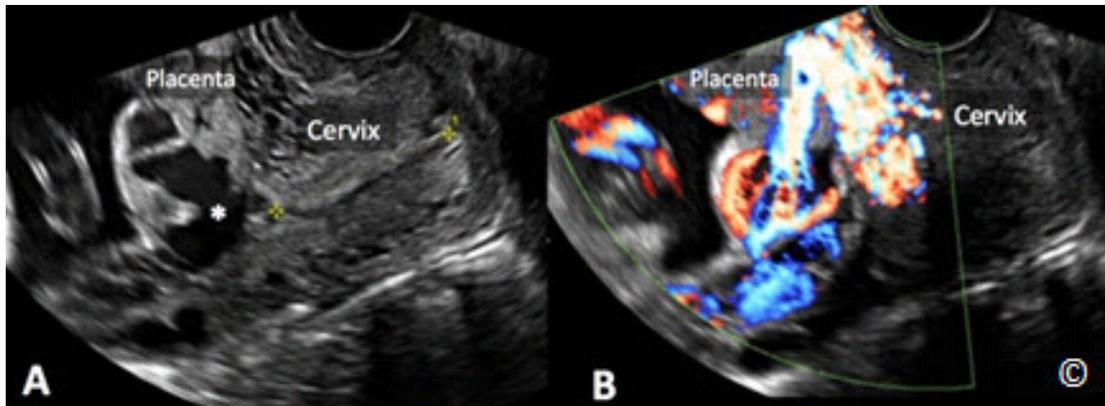


Figure 8.20 A and B: Transvaginal ultrasound in grey scale (A) and color Doppler (B) in a patient with placenta accreta. Note the presence of large placental lacunae (asterisk in A) and color Doppler showing extensive vascularity in B. Cervix and placenta are labeled.

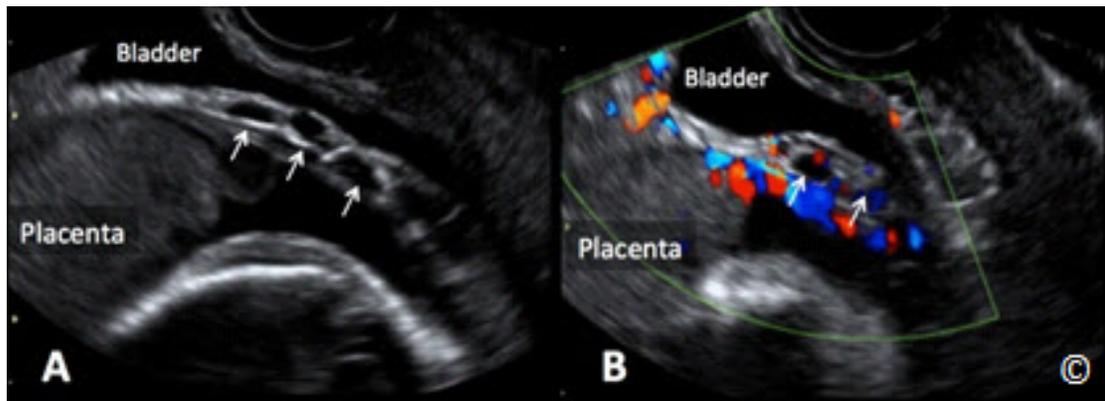


Figure 8.21 A and B: Transvaginal ultrasound in grey scale (A) and color Doppler (B) in a pregnancy with an anterior placenta accreta with abnormalities of the uterine serosa-bladder interface line. Note the presence of abnormal vascularity in the posterior wall of the bladder (A and B - arrows). Placenta and bladder are labeled.

Another important marker in the third trimester includes abnormality of the uterine serosa-bladder interface. This includes interruption of the line, thickening of the line, irregularity of the line, or increase line vascularity on a color Doppler (26, 27) (**Figure 8.21 A and B**). The normal uterine serosa-bladder interface is a thin line that is smooth with no irregularities or vascular signals. Other sonographic findings include extension of the villi into the myometrium, serosa, or bladder, retroplacental myometrial thickness of less than one millimeter, and turbulent blood flow through the lacunae on Doppler ultrasonography.

Overall, grey scale ultrasonography is a good tool for the prenatal diagnosis of placenta accreta in women at risk for this abnormality. Its sensitivity has been reported in the range of 77-87% with a specificity of 96-98%, a positive predictive value of 65-93% and a negative predictive value of 98%. It should be the primary tool for the diagnosis of placenta accreta and should be used exclusively in the great majority of cases. **Table 8.6** lists the diagnostic ultrasound findings in placenta accreta.

TABLE 8.6

Ultrasound Diagnostic Findings in Placenta Accreta

- Gestational sac implanted in the lower uterine segment
- Cesarean section scar implantation
- Multiple vascular lacunae in the second trimester
- Loss of normal hypoechoic retroplacental zone
- Multiple vascular lacunae in the third trimester
- Abnormality in uterine-serosa-bladder interface
- Retroplacental myometrial thickness of less than 1 millimeter
- Turbulent blood flow on color Doppler through the lacunae
- Extension of villi into myometrium, serosa or bladder

MRI FINDINGS IN PLACENTA ACCRETA

Although this represents an electronic book on obstetric and gynecologic ultrasound, we added this section on MRI findings in placenta accreta for completeness sake and to highlight the value of ultrasound as the primary modality for the diagnosis of placenta accreta. MRI findings that are suggestive of placenta accreta include the presence of uterine bulging, heterogeneous signal intensity within the placenta, dark intra-placental bands on T2-weighted images, abnormal placental vascularity, focal interruptions in the myometrial wall, tenting of the bladder, and direct visualization of the invasion of nearby organs (26, 28, 29). MRI should be reserved for cases in which ultrasound is non-diagnostic such as in obese patients with a posterior placenta. When ultrasound or MRI is used concomitantly on the same patients, the findings of the most aggressive diagnosis should be used in guiding management (30). The authors believe that transvaginal ultrasound is the optimum imaging modality for the assessment of placenta accreta and should be used exclusively in most cases.

COMPLICATIONS OF PLACENTA ACCRETA

Complications of placenta accreta are many and include damage to local organs, postoperative bleeding, amniotic fluid embolism, consumptive coagulopathy, transfusion-related complications, acute respiratory distress syndrome, postoperative thromboembolism, infectious morbidities, multi-system organ failure, and maternal death (31). Genital ureteral complications are common and include cystotomy in about 15% of cases and ureteral injury in about 2% of cases (16).

MANAGEMENT OF PLACENTA ACCRETA

Successful management of placenta accreta is dependent on its recognition prenatally and a planned delivery with the best available resources. When resources are limited such as in a low-resource (outreach) setting, the authors recommend the following management steps, which may help to optimize outcome of the mother and the newborn:

- 1) Ensure availability of blood ahead of scheduled surgery. The blood should be immediately available for transfusion in the operating room
- 2) Plan your surgery with a multidisciplinary team approach, even in low-resource settings. Ensure your best nursing team, anesthesiologist, surgeons and allied health care team are involved in the management of the patient.
- 3) Obtain consent for hysterectomy prior to initiating surgery.
- 4) Studies have shown that the optimum time for a planned delivery for a patient with placenta accreta is around 34-35 weeks following a course of corticosteroid injection (30). This optimizes outcome for the mother as 93% of patients with placenta accreta report hemorrhage after 35 weeks and this planned delivery has been shown to result in shorter operating room times, lower frequency of transfusions, and lower intensive care unit admission (31, 32). This decision needs to be balanced with the nursery capability in the low-resource settings as the risk-benefit analysis may shift based upon the newborn outcome.
- 5) Most favor general anesthesia as the anesthesia method of choice and preparation should include large bore intravenous access with central lines, compression stockings, padding and positioning to prevent nerve injury, and avoidance of hypothermia (33, 34).
- 6) Map the placental localization using ultrasound and plan the uterine incision to avoid entry through the placenta if possible. Use ultrasound intra-operatively directly on the uterus if needed. You can protect the abdominal probe with a sterile glove, use sterile gel on the uterus, (peritoneal fluid usually suffice), and scan the uterus directly to localize the placental upper edge and incise the uterus in such a way to avoid entry through the placenta. This will minimize bleeding while delivering the newborn and assessing for the next step.

- 7) If a decision is made to proceed with a hysterectomy, consider supra-cervical hysterectomy as an option. It requires less operative time and is associated with less bleeding. Proceed with cesarean hysterectomy while keeping the placenta attached. On occasions however, a supra-cervical hysterectomy may not control bleeding and a complete hysterectomy is needed.
- 8) Conservative management of placenta accreta has been reported. In a series reporting on conservative management of placenta accreta in 167 pregnancies where the placenta was left attached in the uterine cavity after delivery of the newborn, successful conservative management of such cases was achieved in 78 % with spontaneous resorption of the placenta in 75 % of pregnancies (35). Severe maternal morbidity was noted in 6 % of cases (35). This approach should be employed with caution and in select cases where the risk of the hysterectomy is deemed higher than conservative management, especially where resources such as blood replacement or expert pelvic surgery is limited. Note that consideration for broad-spectrum antibiotic coverage, and close follow-up should be considered if conservative management is chosen.
- 9) The use of compression sutures, such as the B-Lynch suture may be helpful in tamponading bleeding and has been used in cases of placenta accreta (36). The physicians caring for pregnancies with placenta accreta should familiarize themselves with these compression sutures prior to the cesarean delivery.
- 10) If blood is available and there is a need for massive transfusion of patients with placenta accreta when a hysterectomy is preformed, it is recommend that a balanced ratio (1 to 1 or 2 to 1) of packed red blood cells to fresh frozen plasma is achieved, as this approach has been shown to reduce morbidity and mortality. Careful monitoring of maternal electrolyte imbalance with massive transfusion should be undertaken.

The successful management of placenta accreta relies heavily on the prenatal diagnosis of this entity. It is thus critical to identify the at-risk pregnancy, recognize the diagnostic capabilities of ultrasound, and carefully prepare for the surgical management by ensuring that the most skilled multidisciplinary team is available. It is through this approach that the outcome is optimized for the mother and newborn.

PLACENTAL ABRUPTION

Placental abruption is defined by the presence of bleeding behind or within the placenta. The bleeding may track behind the membranes. The incidence of placental abruption is estimated around 0.5-1% (37), and the clinical presentation is that of painful bleeding with uterine contractions. Unlike placenta previa where the sensitivity for diagnosis by ultrasound is almost 100%, in placental abruption the sensitivity of ultrasound in visualizing hemorrhage is reported to be approximately 50% (38) and thus ultrasound cannot be relied upon for making such

diagnosis when patients are presenting with signs and symptoms suggestive of a placental abruption. Clinical judgment including history, physical exam, findings on the fetal monitor tracing (uterine contraction pattern) and laboratory evaluation should be relied upon primarily in making the diagnosis of abruption. Ultrasound assessment of the placenta is an adjunct test and may be helpful when a placental bleed is noted. A normal ultrasound examination does not rule-out a placental abruption.

Ultrasound findings in placental abruption will show a slightly hypoechoic mass either retroplacental or behind the membranes at the edge of the placenta that mimic an organized blood clot (**Figure 8.22**). Color Doppler will confirm the absence of capillary flow within the content of the blood clot on low velocity scale.

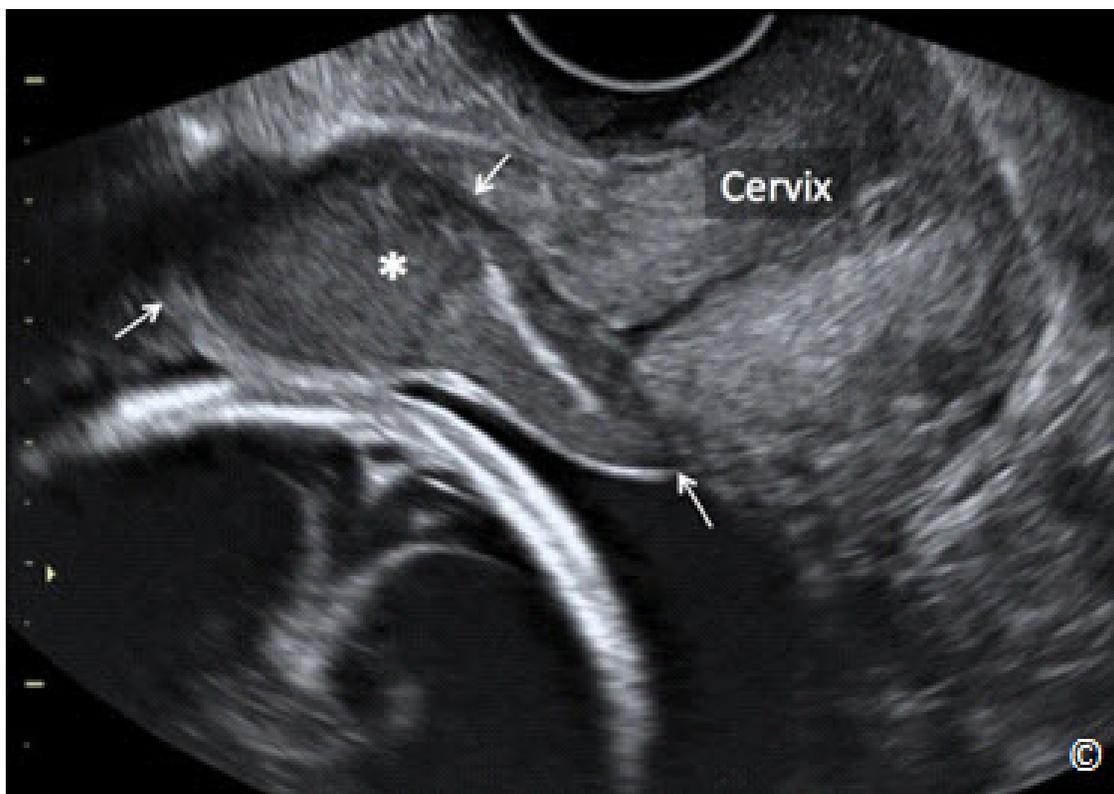


Figure 8.22: Transvaginal ultrasound of a pregnancy with a placental abruption. Note the presence of a blood clot (asterisk and arrows) behind the membranes and in front of cervix (labeled). Note that ultrasound can miss a placental abruption on many occasions – see text for details.

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