

# Placenta Accreta: Spectrum of US and MR Imaging Findings<sup>1</sup>

## ONLINE-ONLY CME

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## LEARNING OBJECTIVES

After reading this article and taking the test, the reader will be able to:

- Discuss the various forms of placenta accreta and the importance of recognizing these entities at screening US.
- List the most important risk factors for placenta accreta.
- Describe the signs of abnormal placentation at US and MR imaging.

## TEACHING POINTS

See last page

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Placenta accreta (PA) encompasses various types of abnormal placentation in which chorionic villi attach directly to or invade the myometrium. PA is a significant cause of maternal morbidity and mortality and is now the most common reason for emergent postpartum hysterectomy. Its prevalence has risen tenfold in the United States over the past 50 years, primarily due to the increasing percentage of pregnant patients undergoing primary and repeat cesarean sections. Placenta previa and previous cesarean section are the two most important known risk factors for PA. Accurate prenatal identification of affected pregnancies allows optimal obstetric management. Ultrasonography (US) remains the diagnostic standard, and routine US examination at 18–20 weeks gestation affords an ideal opportunity to screen for the disorder. Placental lacunae and abnormal color Doppler imaging patterns are the most helpful US markers for PA. In recent years, there has been increased interest in magnetic resonance (MR) imaging for the evaluation of PA, since it can provide information on depth of invasion and more clearly depict posterior placentas. The most reliable MR imaging findings are uterine bulging, heterogeneous placenta, and placental bands. Focal interruptions in the hypointense myometrial border may also be helpful. PA is a clinical and diagnostic challenge that is being encountered with increasing frequency. Clinicians should be aware of the clinical issues, risk factors, and imaging findings associated with PA to facilitate optimal case management.

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**Abbreviations:** PA = placenta accreta, RARE = rapid acquisition with relaxation enhancement

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## Introduction

**Placenta accreta (PA) occurs when a defect of the decidua basalis allows the invasion of chorionic villi into the myometrium.** PA is classified on the basis of the depth of myometrial invasion. In placenta accreta vera, the mildest form of PA, villi are attached to the myometrium but do not invade the muscle. In placenta increta, villi partially invade the myometrium. The most severe form is placenta percreta, in which villi penetrate through the entire myometrial thickness or beyond the serosa (Table 1) (2).

The clinical consequence of PA is massive hemorrhage at the time of placental separation. Blood loss averages 3–5 L and can lead to disseminated intravascular coagulopathy, adult respiratory distress syndrome, renal failure, and even death. Hysterectomy is often required, leading to serious comorbidities such as cystotomy (15.4% of cases), ureteral injury (2.1%), and pulmonary embolus (2.1%), with 26.6% of patients admitted to the intensive care unit (3–6). Placenta percreta can also lead to the destruction of adjacent organs, most often the bladder, or surgical injury of pelvic structures due to loss of tissue planes.

The prevalence of PA is difficult to determine accurately. The standard of reference is confirmation of the diagnosis with histologic findings; however, bleeding can sometimes be controlled without hysterectomy. In such cases, pathologic analysis is not available, and the clinical findings of (a) difficulty in manually removing the placenta or the need for surgical removal or, (b) uncontrolled bleeding after placental separation in a well-contracted uterus are generally used to determine the presence of PA. Unfortunately, pathologic diagnosis will lead to underestimation of the true prevalence of PA, and the use of clinical criteria will likely lead to overestimation. Two recent large studies conducted in the United States suggest a prevalence of one in 2500 deliveries, with both studies using clinical as well as pathologic diagnoses (1,3). Several studies, both in the United States and abroad, suggest a higher prevalence of about one in 500 deliveries (7,8). The reason for this difference in prevalence is unclear. However, all studies suggest that the prevalence of PA has been increasing, and that PA has become the most common reason for emergent postpartum hysterectomy (7).

**Prior cesarean section and placenta previa are the two most important risk factors for PA (3–8).** Deficiency of the decidua basalis at the site of the scar is thought to be the causative factor.

**Table 1**  
**Classification of PA**

Classification	Depth of Invasion
Placenta accreta vera	Villi are attached to the myometrium but do not invade the muscle
Placenta increta	Villi partially invade the myometrium
Placenta percreta	Villi invade up to or beyond the uterine serosa

The cesarean section rate in the United States is now near 30%, and repeat cesarean deliveries in particular have increased. As these rates have increased, there has been a concomitant increase in PA. Previous cesarean section increases the odds of having PA by about 8.7 (7). Placenta previa with previous cesarean sections compounds the risk. In women with known placenta previa, 3% of those with no previous cesarean section had PA, compared with 11% of those with one previous cesarean section. As the number of cesarean sections increases, so does the risk. Among women with placenta previa, 40% of those with two previous cesarean sections and 61% of those with three previous cesarean sections have PA. These statistics illustrate the importance of the number of cesarean sections as a risk factor for PA (3–8).

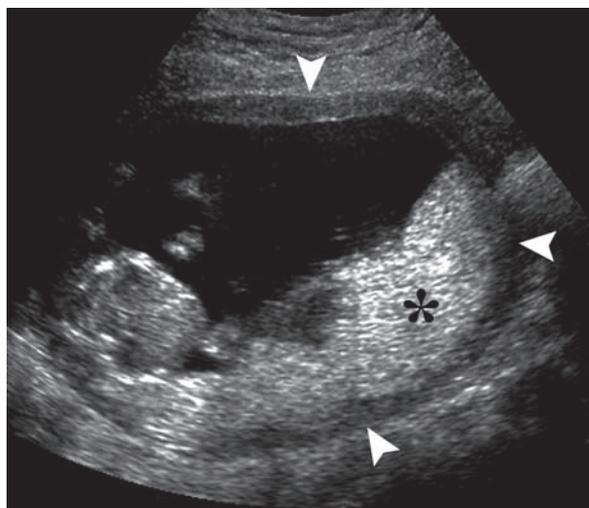
Advanced maternal age, uterine anomalies, previous uterine surgery, dilation and curettage, and myomectomy are additional but relatively minor risk factors (7). Maternal age greater than 35 years increases the odds of having PA by 3.2. However, this risk factor is most likely due to multiparity. Women with PA often have abnormally high second-trimester serum markers with elevated levels of  $\alpha$ -fetoprotein and human chorionic gonadotropin (8). Abnormal placentation in any form often raises the level of these biologic markers.

**Accurate prenatal identification of affected pregnancies allows optimal management because timing and site of delivery, availability of blood products, and recruitment of a skilled anesthesia and surgical team can be arranged in advance (4).** Cesarean section is usually planned at 36 weeks gestation to minimize the risk of spontaneous labor. Surgical planning concerning matters such as site of incision and need for uterine artery balloon occlusion can be individualized. Detailed maternal counseling, including that con-

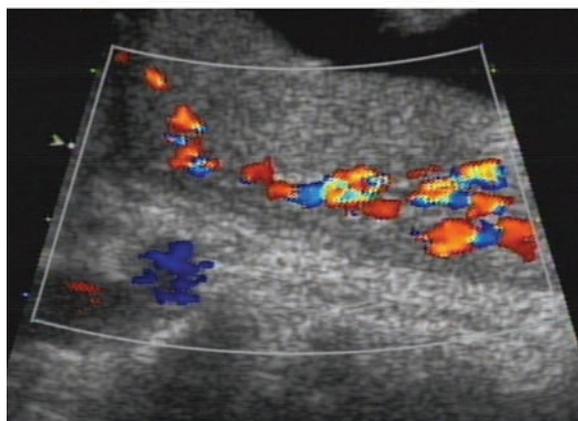
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a.



c.



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**Figure 1.** (a) Transverse transabdominal US image shows the hyperechoic placenta (\*) surrounded by the hypoechoic myometrium (arrowheads). (b) Sagittal transabdominal US image shows a thin, hypoechoic line (arrowheads) at the inner aspect of the myometrium representing a subplacental clear space. (c) Sagittal transabdominal US image shows a normal organized pattern of subplacental blood flow that parallels the myometrium.

cerning the desire for future fertility, can be taken into consideration during delivery planning. At some centers, conservative management with the placenta left in situ to spontaneously involute has been successful (9). This may be the treatment of choice if the patient desires future fertility. The prenatal diagnosis of PA also permits the family to be better prepared for a potential life-threatening obstetric complication.

In this article, we review the technical aspects of the use of ultrasonography (US) and magnetic resonance (MR) imaging in the evaluation of PA. In addition, we discuss and illustrate the normal appearance of the placenta and myometrium at these two modalities, along with US and MR imaging findings that may indicate the presence of PA.

### US Evaluation

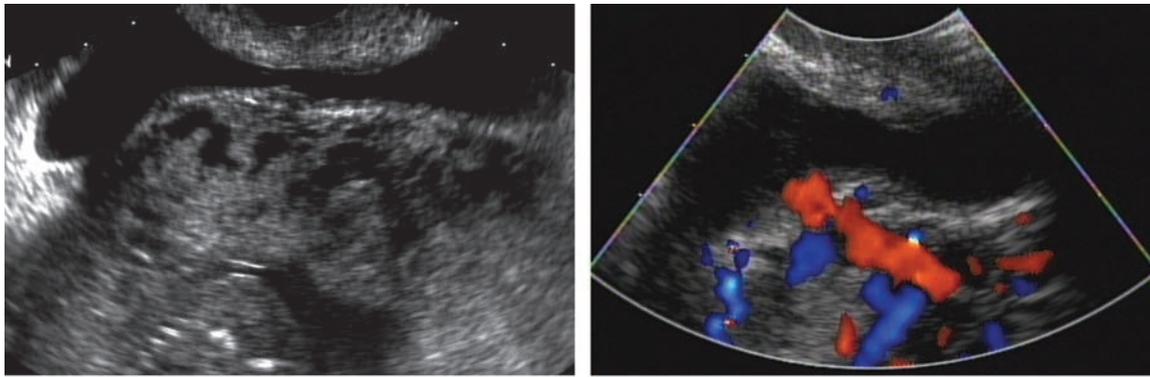
US has been the primary diagnostic tool for PA and has been shown to help detect this disorder in 50%–80% of cases (4,10,11). Most patients will present for a US examination at 18–20 weeks gestation, which provides an ideal opportunity to screen for the disorder. Inquiring whether the

patient previously underwent cesarean section or uterine surgery is recommended practice. With high-risk patients, a targeted evaluation of the anterior myometrium and bladder wall should be performed. At our institution, the lower uterine segment is evaluated using the highest-frequency transducer that can produce an adequate image, which is often a 5-MHz transducer. Transabdominal imaging is performed with the patient's bladder full. Transvaginal US is always performed when the placenta is low lying or placenta previa is present.

There has been a long-standing interest in US screening for PA. US findings were first presented by Kerr de Mendonca in 1988 (12) and Finberg and Williams in 1992 (13). The rising cesarean section rate and resultant increased prevalence of PA have revived interest in the US features of this disorder.

### Normal US Appearance of the Placenta and Myometrium

The placenta is normally seen as a focal mass that causes indentation of the gestational sac and is more hyperechoic than the underlying myometrium. The myometrium is seen as a thin, well-demarcated rim of hypoechoic tissue (Fig 1a). In the second trimester, the placenta is



**Figure 2.** Placental lacunae. **(a)** Transverse transvaginal US image shows multiple tortuous hypoechoic structures within the placenta. **(b)** Transverse transabdominal Doppler US image helps confirm that the hypoechoic spaces are vascular and therefore represent placental lacunae.

homogeneous and granular in echotexture. By the third trimester, calcifications and multiple vascular lakes are often seen, which can give the placenta a more heterogeneous appearance. Adjacent to the myometrial side of the placenta is a thin, subplacental clear space (Fig 1b). Normal placental blood flow patterns consist of a large amount of retroplacental myometrial blood flow. This flow forms a regular continuous pattern, with an occasional vessel dipping into the placental parenchyma (Fig 1c). This pattern is believed to correspond to the 15–20 cotyledons that are fed separately by the maternal spiral arteries originating from the myometrium.

### US Findings in PA

Placenta previa, placental lacunae, abnormal color Doppler imaging patterns, loss of the retroplacental clear space, and reduced myometrial thickness have all been described in PA. An irregular bladder wall has been described with placenta percreta (10).

**Placenta Previa.**—Multiple studies have confirmed that placenta previa significantly increases the risk for PA (6.8%–10% among affected women) (1,4). However, only 88% of cases of PA are associated with placenta previa (1). A finding of placenta previa should elicit a detailed evaluation for PA, including color Doppler imaging and a transvaginal examination. We have seen two cases of PA without placenta previa. In both cases, the patient had a history of multiple cesarean sections.

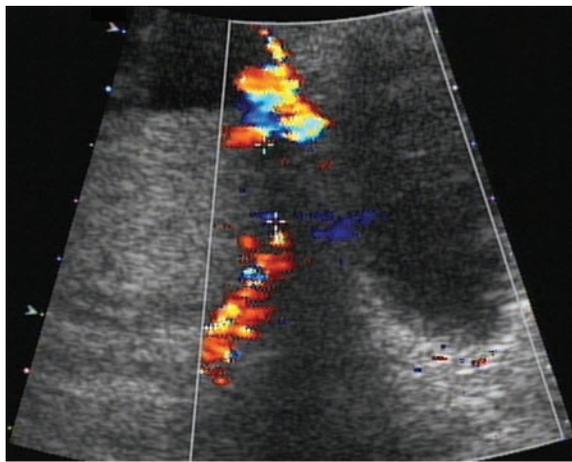
**Placental Lacunae.**—First described by Finberg and Williams in 1992, placental lacunae have been the most predictive US finding for PA (10,11,13–15). Intraplacental lacunae are vascular structures of varying size and shape that are found in the placental parenchyma, creating a “moth-eaten” or “Swiss cheese” placental appearance (Fig 2). They are indistinct and often appear to be parallel linear vascular channels extending from the placental parenchyma into the myometrium. These entities differ from vascular lakes in that they appear more indistinct and show turbulent flow, whereas lakes appear more rounded with laminar flow. The pathologic correlate and mechanism of development are unknown. In our experience, lacunae become more prominent in the third trimester.

According to the literature, visualization of lacunae has the highest sensitivity in the diagnosis of PA, allowing identification in 78%–93% of cases after 15 weeks gestation, with a specificity of 78.6% (11,14,15). Increasing numbers of lacunae are associated with increased risk for PA. All cases of PA in one study had at least four placental lacunae (14).

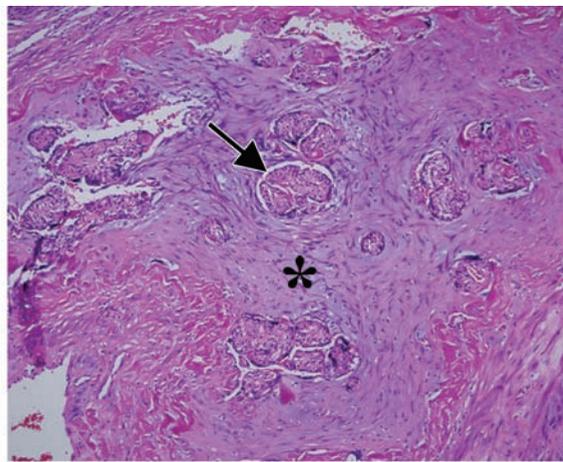
### Abnormal Color Doppler Imaging

**Patterns.**—Color Doppler imaging findings in PA consist mainly of case reports describing turbulent flow in placental lacunae. Twickler et al (16) mapped color flow in 20 cases of PA using only US to evaluate turbulent lacunar blood flow. They found that all cases of PA had turbulent flow in placental lacunae. Whether color Doppler flow imaging added any sensitivity or specificity to gray-scale imaging was not reported.

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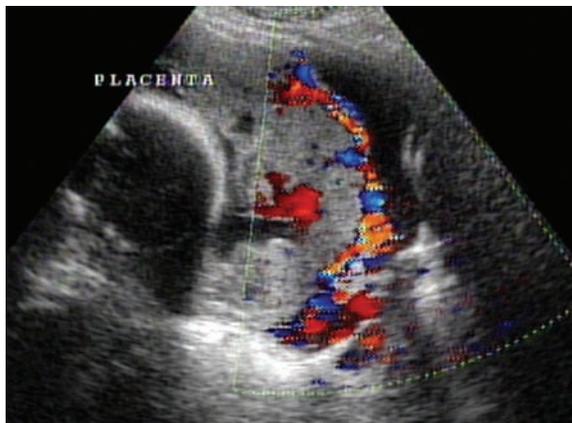


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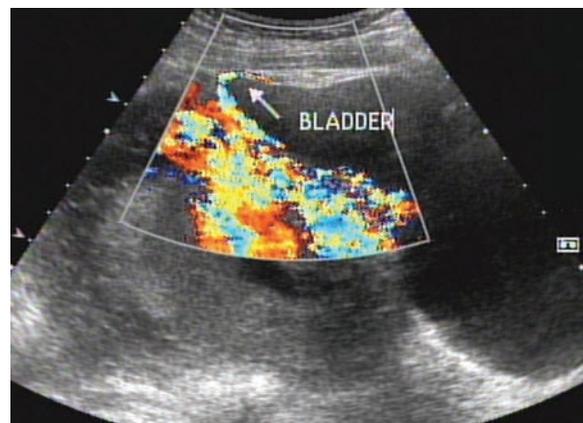


b.

**Figure 3.** PA. (a) Sagittal transabdominal US image shows a gap in the myometrial blood flow in the lower uterine segment. (b) Photomicrograph (original magnification,  $\times 400$ ; hematoxylin-eosin stain) shows chorionic villi (arrow) completely surrounded by reactive myometrium (\*), findings that are consistent with PA.



**Figure 4.** PA. Sagittal transvaginal Doppler US image shows increased vascularity around the uterus with placental lacunae.



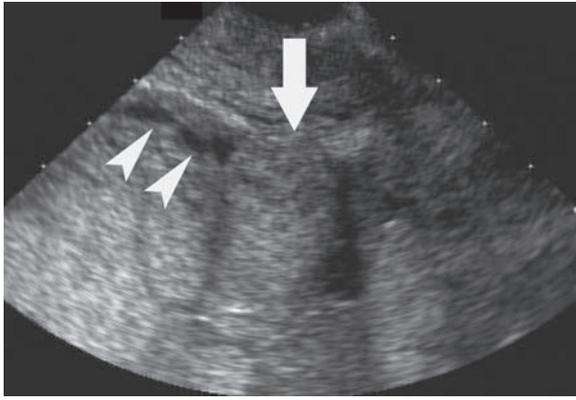
**Figure 5.** PA. On a sagittal transabdominal Doppler US image, extensive vascularity is seen along the anterior portion of the lower uterine segment and appears to extend up to and around the bladder.

We have found that color flow mapping is more informative if it is used to characterize the pattern of retroplacental blood flow. Settings should be used that show continuous retroplacental blood flow away from the area of interest. Disruption of the normal continuous color flow appearance resulting in a gap in myometrial blood flow was seen in all of our cases of PA evaluated with color Doppler imaging (Fig 3). This gap is thought to represent the site of placental invasion into the myometrium.

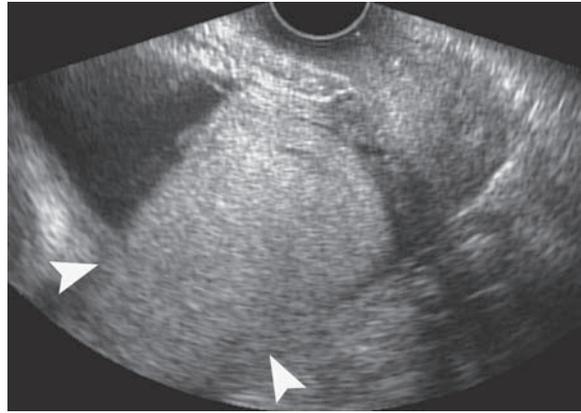
In cases of placenta percreta, numerous large blood vessels are often seen surrounding the myometrium, possibly caused by the invasion of surrounding structures. However, increased vas-

cularity is seen even in milder forms of PA (Fig 4). This may be due to different levels of expression of vascular endothelial growth factors and their receptors in the placentas of patients with PA (17). Invasion can also create an irregular bladder wall with extensive associated vascularity (Fig 5).

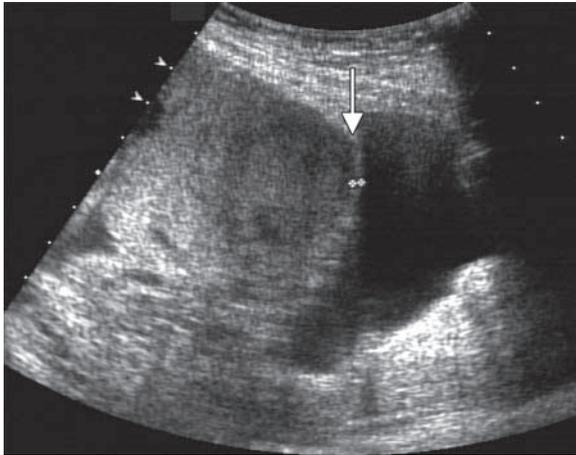
**Loss of Retroplacental Clear Space.**—A retroplacental hypoechoic line is usually seen with normal placentation (Fig 1b). Absence of this



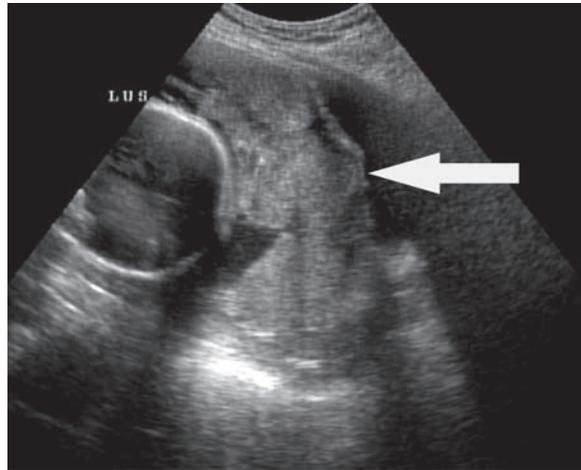
**Figure 6.** PA. On a sagittal transvaginal US image, the placenta is seen traversing the hypoechoic subplacental zone (arrowheads) and appears to be bulging into the myometrium (arrow).



**Figure 8.** PA. Sagittal transvaginal US image shows the placenta extending posteriorly without any normal myometrium (arrowheads). Loss of the retroplacental clear space in this region is also noted.



**Figure 7.** PA. On a sagittal transabdominal US image, the placenta is seen extending to the serosal surface of the bladder without any intervening myometrium (arrow).



**Figure 9.** PA. Sagittal transvaginal US image shows a lobulated placenta extending to the bladder margin without any intervening myometrium (arrow).

hypoechoic line or clear space has been described with PA (Fig 6). However, absence of the hypoechoic line has also been seen in normal pregnancies. McGahan et al (18) found that absence of the clear space alone was not predictive for PA. In fact, its sensitivity and positive predictive value were only 7% and 6%, respectively. We, too, have found that loss of the retroplacental clear space is often seen in normal pregnancies and do not consider it a useful finding when seen alone. However, it is one of the more obvious findings at screening evaluation and should prompt a detailed evaluation for other US markers.

**Reduced Myometrial Thickness.**—An anterior myometrial thickness less than 1 mm (as measured between the echogenic serosa and

the retroplacental vessels) was also reported to be as predictive as placental lacunae for PA by Twickler et al (16), who discovered this finding in nine of 10 cases of PA. To our knowledge, these results have not been repeated in other studies. Our experience has shown this measurement to be difficult to replicate, even with a transvaginal technique. However, we have found that loss of visualization of the myometrium is often seen in cases of PA (Figs 7–9). Thus, at our institution we do not routinely measure myometrial thickness, but evaluate the presence and contour of the myometrium.

The US findings in PA are summarized in Table 2.

### MR Imaging Evaluation

Although US remains the primary modality in the evaluation of placental implantation, in re-

**Table 2**  
**US Findings in PA**

Placenta previa
Placental lacunae with turbulent flow
Irregular bladder wall with extensive associated vascularity
Loss of retroplacental clear space
Myometrial thickness <1 mm or loss of visualization of the myometrium
Gap in the retroplacental blood flow

cent years there has been interest in the use of MR imaging. Some authors have suggested that MR imaging is most clearly indicated when there is a posterior placenta or when the US findings are ambiguous (19). Others have suggested that MR imaging can better define areas of abnormal placentation, modify levels of invasion, and ultimately change surgical management and should be used routinely (20). At our institution, most patients with suspected PA are referred for MR imaging.

The reported sensitivity, specificity, and positive predictive value of MR imaging in PA vary. In a study of 42 patients with inconclusive findings, Warshak et al (11) found the sensitivity and specificity of gadolinium-enhanced MR imaging for PA to be 88% and 100%, respectively. A smaller study by Lam et al (21) showed MR imaging to have a poor sensitivity (38%) in the detection of PA. It is not currently known whether MR imaging or US is superior in the detection of the PA spectrum.

### MR Imaging Protocols

We have investigated suspected cases of PA with both 3-T (Achieva; Philips Medical Systems, Cleveland, Ohio) and 1.5-T (Eclipse; Picker International, Cleveland, Ohio) MR imaging units. T2-weighted images are routinely obtained in all three planes (axial, sagittal, and coronal) with half-Fourier rapid acquisition with relaxation enhancement (RARE) sequences. Axial fat-saturated fast spin-echo T2-weighted and T1-weighted in-phase images were also routinely obtained. True fast imaging with steady-state precession can also be used to help eliminate artifacts caused by maternal and fetal motion, although we did not routinely use this sequence in our protocol. Breath-holding techniques should be used whenever patient tolerance makes them possible. In addition, a phased-array surface coil is used whenever possible. Patients were routinely given oxygen via a nasal cannula to reduce fetal motion. To better evaluate bladder involvement

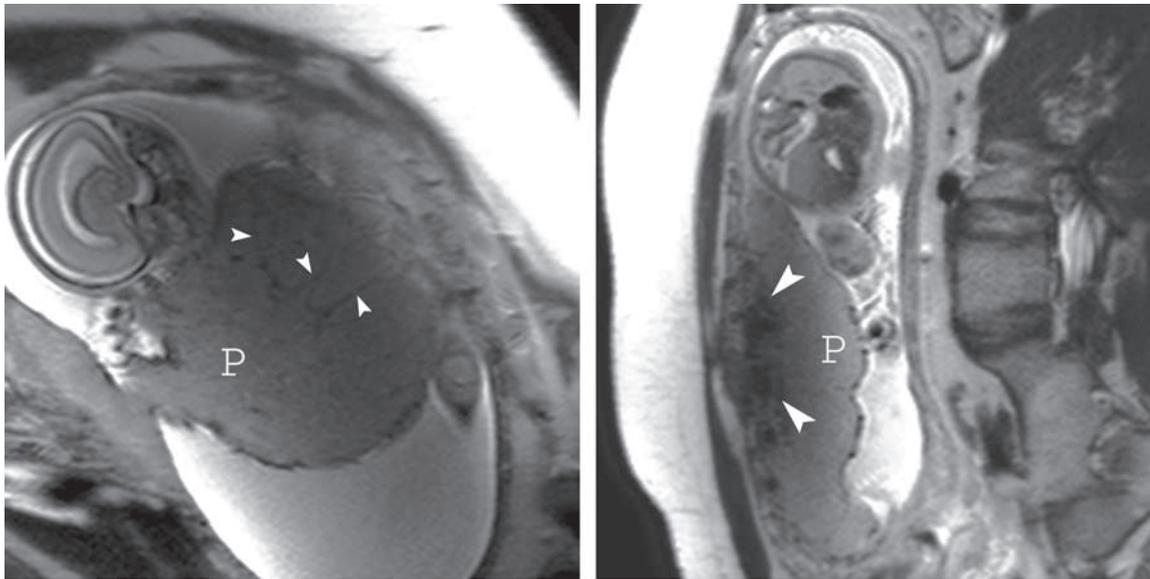
with placenta percreta, the patient's bladder should be at least partially filled. A radiologist should be present at the time of the examination and should guide the technologist when repeat sequences or oblique images are needed. If gadolinium-based contrast material is administered, dynamic contrast material-enhanced images can be obtained through the suspicious areas of the myometrial-placental interface with a fat-suppressed volume-interpolated breath-hold examination.

### Use of Contrast Material

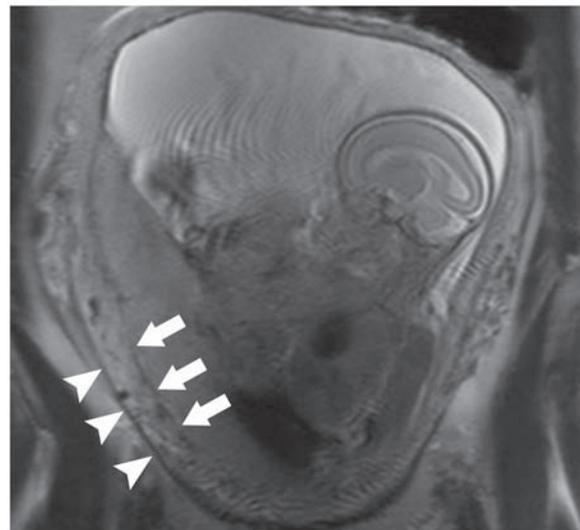
Use of gadolinium-based contrast material in gravid patients is controversial due to its unknown half-life in the fetus. This has been especially true in recent years because prolonged retention of gadolinium has been associated with nephrogenic systemic fibrosis in patients with renal failure. Gadolinium-based contrast material crosses the placental membrane and circulates through the amniotic fluid. The contrast material is subsequently swallowed and likely reabsorbed by the fetus. The effects on the fetus are unknown, although some manufacturers' studies suggest that higher doses may retard development in rats (22). Thus, gadolinium-based contrast material is considered a pregnancy class C drug in whose use risk cannot be ruled out. At some centers, investigators use gadolinium for dynamic contrast-enhanced imaging in PA patients in the belief that the benefits outweigh the risks (11,20). They believe that the contrast material helps more clearly distinguish the placenta from the myometrium and adds to the specificity of the examination. When evaluating PA, we administer gadolinium-based contrast material to selected patients who are scheduled for delivery shortly after MR imaging or to those who have elected to have the pregnancy terminated. However, we do not routinely administer this contrast material to any of our gravid patients. To our knowledge, there has been no study comparing unenhanced with contrast-enhanced MR imaging for the detection of PA.

### Normal MR Imaging Appearance of the Placenta and Myometrium

On T2-weighted images, the placenta has homogeneous intermediate signal intensity and is usually clearly distinct from the underlying myometrium. Linear areas of decreased T2 signal intensity can be seen running through the myometrium, likely representing the normal placental septa. These normal septa are usually regularly



**Figure 10.** (a) Coronal oblique T2-weighted half-Fourier RARE MR image shows a homogeneous placenta (*P*) with thin linear areas of decreased signal intensity in a regular pattern (arrowheads) representing normal placental septa. (b) Sagittal T2-weighted half-Fourier RARE MR image through the uterus shows a homogeneous placenta (*P*) with tortuous areas of hypointensity underneath the placenta (arrowheads) representing normal subplacental vascularity. (c) Coronal T2-weighted MR image shows the three layers of the normal myometrium. The hypointense outer (arrowheads) and inner (arrows) layers surround the more hyperintense middle layer, which contains the vasculature.



spaced and uniformly thin and should not be confused with the thicker and more irregular placental bands that are associated with PA. Placental septa are more often seen when imaging with a 3-T system (Fig 10a). The normal subplacental vascularity can be seen as numerous flow voids just under the placenta (Fig 10b). A few flow voids can also be seen within the placenta and are usually in the region of the insertion point of the umbilical cord.

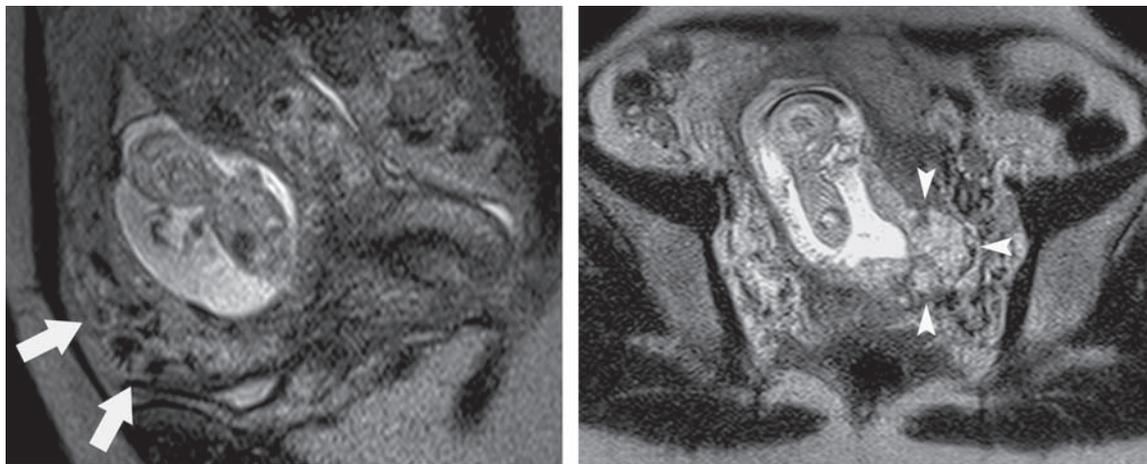
The myometrium has a variable thickness and thins as the pregnancy progresses. It can be seen as three distinct layers of signal intensity (23). The inner and outer layers of the myometrium are seen as thin bands of decreased T2 signal intensity. The middle layer is thicker, has intermediate T2 signal intensity, and often contains multiple flow voids representing the normal myometrial vascularity (Fig 10c). The gravid uterus should be pear shaped, with the fundus and body being wider than the lower uterine segment. The

uterine contour is usually smooth, and focal bulging should not be present.

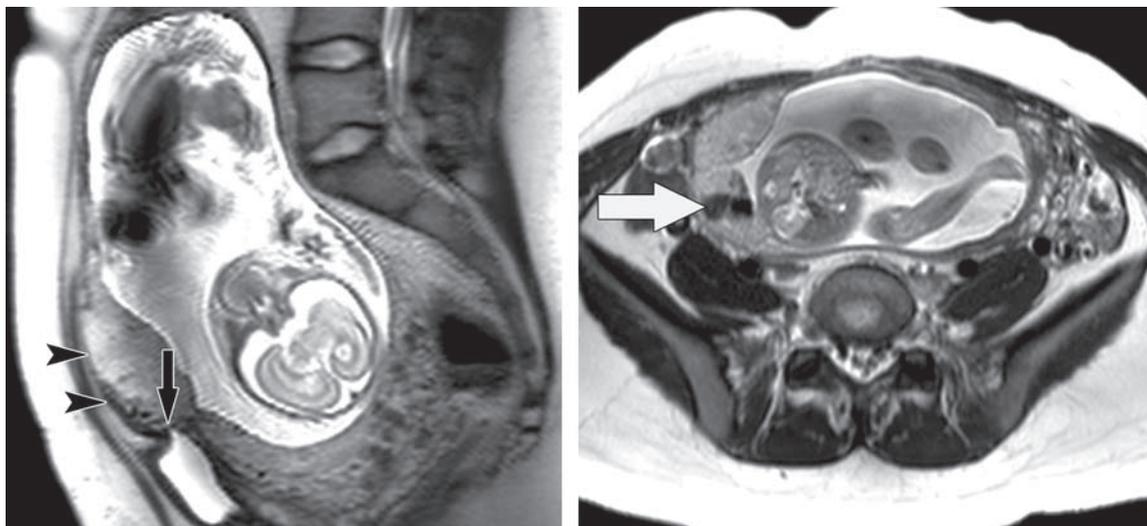
### MR Imaging Findings in PA

Few studies in the literature have examined the specific MR imaging findings in PA, perhaps because this diagnosis remains relatively rare and large series are difficult to compile. A recent study by Lax et al (24) found that the most useful findings were uterine bulging, heterogeneous signal intensity within the placenta, and dark intraplacental bands on T2-weighted images. When uterine bulging is present, a focal outward contour bulge can be seen, or there can be disruption of the normal pear shape of the uterus, with the lower uterine segment being wider than the fundus (Figs 11a, 12a). Heterogeneous signal intensity in the placenta with increased

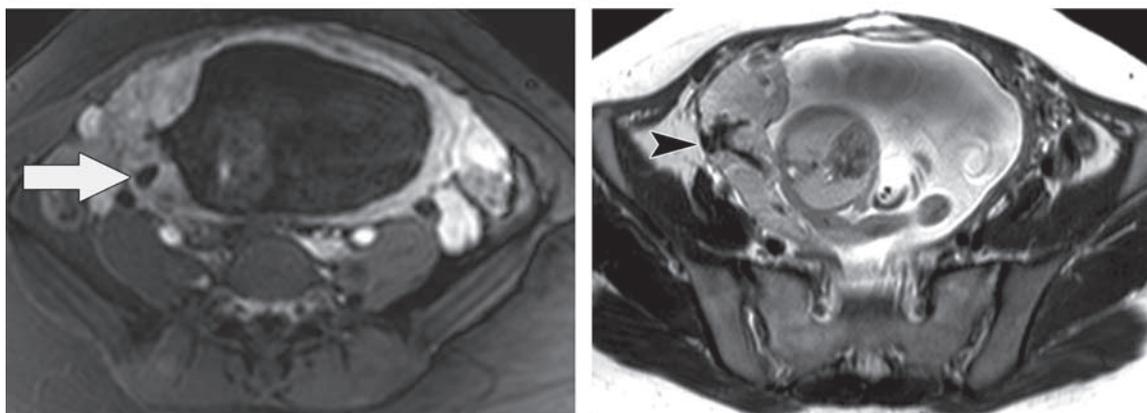
**Teaching Point**



**Figure 11.** Placenta percreta. **(a)** Sagittal T2-weighted half-Fourier RARE MR image shows anterior bulging of the uterus (arrows) with widening of the lower uterine segment. **(b)** Axial T2-weighted half-Fourier RARE MR image shows the higher-signal-intensity placenta extending through the serosal surface along the left posterior and lateral uterine margin with parametrial invasion (arrowheads). Note also the prominent vascularity (represented by the numerous tortuous signal voids) around the uterus.



**Figure 12.** Placenta percreta. **(a)** Sagittal T2-weighted half-Fourier RARE MR image shows bulging of the uterus (arrowheads). “Tenting” of the bladder is also seen along its superior margin (arrow). **(b, c)** Axial T2-weighted **(b)** and contrast-enhanced T1-weighted **(c)** MR images show an area of low signal intensity (arrow) representing hemorrhage in the placenta.



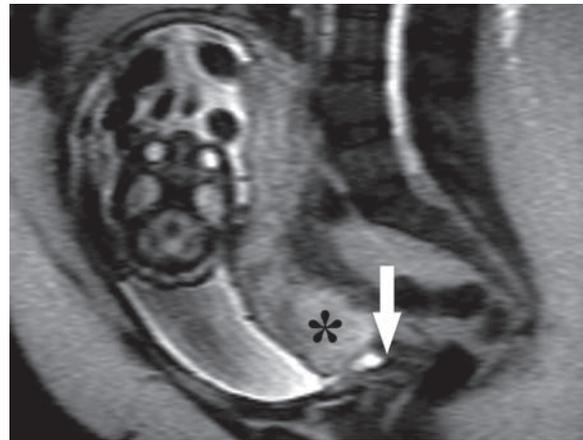
**(c)** Axial contrast-enhanced T1-weighted MR image shows an area of low signal intensity (arrow) representing hemorrhage in the placenta. **(d)** Axial T2-weighted half-Fourier RARE MR image shows low-signal-intensity placental bands extending from the myometrial-placental interface (arrowhead).



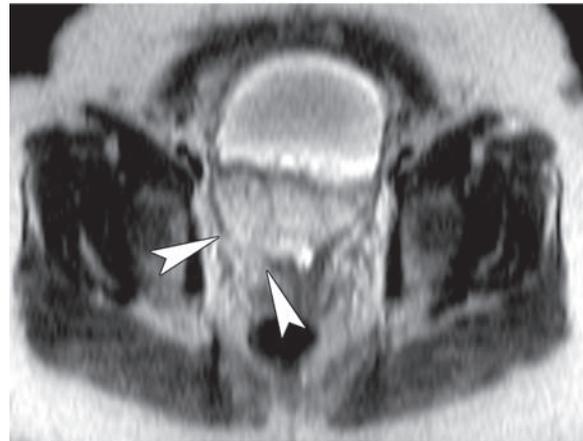
**Figure 13.** PA. Coronal T2-weighted half-Fourier RARE MR image shows discontinuity of the hypointense inner myometrial layer in the lower uterine segment (arrowheads).

vascularity is also associated with placental invasion, especially when the heterogeneity is marked, and may represent either areas of hemorrhage in the placenta or the lacunae that can be visualized at US (Fig 12b, 12c). Dark intraplacental bands can also be seen in patients with PA, appearing as nodular or linear areas of low signal intensity on T2-weighted images (Fig 12d). These bands usually extend from the uterine-myometrial interface and have varying thickness and a random distribution, features that help differentiate them from normal placental septa. They are thought to represent areas of fibrin deposition within the placenta. If the placenta is homogeneous and without placental bands, it is unlikely that the patient has invasive placentation (24).

As the pregnancy progresses, the myometrium can become quite thin and difficult to visualize even at technically adequate examinations. However, when the myometrium is well visualized,



**a.**



**b.**

**Figure 14.** PA. **(a)** On a sagittal T2-weighted MR image, the placenta (\*) is posterior and partially covers the internal os (arrow), findings that are consistent with placenta previa. **(b)** Axial T2-weighted MR image shows loss of visualization of the T2 hypointense inner myometrial layer along the right lower uterine segment (arrowheads).

focal interruptions of the myometrial wall can be seen at the sites of placental invasion (Figs 13, 14) (23). In cases of placenta percreta, placental tissue can be seen extending through the myometrium with occasional invasion of surrounding structures (Fig 11b). Visualization of the placenta directly invading or tenting the bladder is highly specific for placenta percreta (Fig 12a). How-



**Figure 15.** False-positive finding of PA. MR image shows a thin strip of tissue (arrow) that is slightly hyperintense relative to the placenta. This finding is consistent with thinned myometrium in the lower uterine segment, which can be seen in normal pregnancies. The homogeneity of the placenta makes PA unlikely

ever, this is not a sensitive finding, since not all patients have this level of invasion. In our experience, focal thinning of the myometrium is not a reliable sign of invasion, and relying on this sign alone can lead to false-positive interpretations (Fig 15). As at US, increased vascularity around the uterus can be seen in PA. However, this is not a specific finding, since similar levels of increased pelvic vascularity are seen in some normal pregnancies.

The MR imaging findings in PA are summarized in Table 3.

### Summary

The prevalence of PA is increasing, and practitioners should be aware of this entity and its imaging features. Placenta previa and a prior history of cesarean section are the most significant risk factors for PA. Placenta previa in patients with two or more previous cesarean sections raises the risk for PA to 40%–60%. Thus, obtaining a thorough history is critical. US remains the pri-

**Table 3**  
**MR Imaging Findings in PA**

Placenta previa
Uterine bulging
Heterogeneous signal intensity within the placenta
Dark intraplacental bands on T2-weighted images
Focal interruptions in the myometrial wall
Tenting of the bladder
Direct visualization of the invasion of pelvic structures by placental tissue

mary screening modality and can help detect PA in 50%–80% of cases. In our experience, lacunae and an abnormal color Doppler imaging pattern are the most helpful findings. Subplacental clear space and myometrial thickness are less helpful and should be used in conjunction with other findings as evidence for PA. MR imaging is most clearly indicated when US findings are ambiguous or there is a posterior placenta. According to the literature, the most reliable findings are uterine bulging, heterogeneous placenta, and placental bands. Focal interruptions in the hypointense myometrial border can also be seen at sites of placental invasion at MR imaging.

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## Placenta Accreta: Spectrum of US and MR Imaging Findings

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### Page 1906

Placenta accreta (PA) occurs when a defect of the decidua basalis allows the invasion of chorionic villi into the myometrium.

### Page 1906

Prior cesarean section and placenta previa are the two most important risk factors for PA.

### Page 1906

Accurate prenatal identification of affected pregnancies allows optimal management because timing and site of delivery, availability of blood products, and recruitment of a skilled anesthesia and surgical team can be arranged in advance.

### Page 1908

According to the literature, visualization of lacunae has the highest sensitivity in the diagnosis of PA, allowing identification in 78%–93% of cases after 15 weeks gestation.

### Page 1912

A recent study by Lax et al (24) found that the most useful findings were uterine bulging, heterogeneous signal intensity within the placenta, and dark intraplacental bands on T2-weighted images.