Ultrasound Imaging of Placenta Accreta With MR Correlation

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Abstract: Placenta accreta is abnormal placental adherence or invasion of the myometrium or extraterine structures. It is increasing in incidence because of increasing number of cesarean sections and is one of the main causes of excessive postpartum hemorrhage. Recognition of this entity is crucial because improved outcomes have been shown when the antenatal diagnosis of placenta accreta is made. Ultrasound is the first-line tool; magnetic resonance imaging (MRI) is complementary. Ultrasound and MRI features and MRI protocols will be reviewed.

Key Words: placenta accreta, ultrasound, magnetic resonance imaging

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Placenta accreta is an important cause of excessive postpartum hemorrhage. It can result in significant maternal morbidity and mortality. Because of the increased number of cesarean sections, the incidence of placenta accreta is increasing. Improved outcomes have been shown when the antenatal diagnosis has been made, a scheduled cesarean delivery can be performed, and when patients are managed at a tertiary referral center with a multidisciplinary team.1

To facilitate early antenatal diagnosis, we shall discuss the magnetic resonance (MR) and ultrasound imaging findings, MR protocol, and pitfalls in imaging. A brief discussion on pathophysiology and treatment will be presented.

DEFINITION–PATHOLOGY

Placenta accreta has been used as a general term, encompassing three different degrees of placental invasion: placenta accreta vera, placenta increta, and placenta percreta (Fig. 1). Placenta accreta vera is the mildest form in which chorionic villi are attached to, but do not invade, the myometrium. In placenta increta, the chorionic villi partially extend through the myometrium. In placenta percreta, placental tissue extends completely through the myometrium, to the uterine serosa, and may invade adjacent structures, such as the bladder, parametrium, vessels, ureters, colon, or rectum.

The placenta is composed of maternal and fetal components. The decidua basalis is a maternal component arising from the endometrium, whereas the chorionic villi are a fetal component. With a normal placenta, the chorionic villi attach onto the decidua basalis. Placenta accreta occurs when a defect in the decidua basalis allows the chorionic villi to attach directly to or invade into the myometrium.

CLINICAL IMPLICATIONS

There is a wide range in reported incidence of placenta accreta between approximately 1 in 500 to 7 in 10,000 births,2,3 which could be attributed to the lack of consensus in the diagnostic criteria. Histologic diagnosis is the reference standard; however, this likely underestimates the true incidence of placenta accreta because there are many clinical cases of adherent placenta that are not diagnosed as placenta accreta or its variants.

The two most important risk factors for placenta accreta are prior cesarean section and placenta previa. The incidence of placenta accreta has increased dramatically during the past 2 decades, which corresponds to the increasing rate of cesarean delivery. Wu et al2 reported a rise in the rate of cesarean delivery from 12.5% in 1982 to 23.5% in 2002. According to the Centers for Disease Control and Prevention, the rate of cesarean delivery in 2011 is 33%. Prior cesarean delivery increases the risk of placenta accreta by almost 9-fold. The risk of placenta accreta is increased when the placenta is implanted over the cesarean section scar.1

Placenta previa occurs when the placenta partially or completely covers the cervical os and by itself is also a leading cause of antepartum hemorrhage. The risk of placenta accreta with placenta previa in combination with prior cesarean delivery seems to be synergistic and is 11% for one prior cesarean delivery, increasing to 40% and 61% with three and four cesarean deliveries, respectively.4,5

Other procedures such as myomectomy, dilation and curettage, lysis of adhesions for Asherman syndrome, or uterus septum removal also increase risk.6 Other risk factors include advanced maternal age, multiparity, submucosal uterine fibroids, smoking, and chronic hypertension.

IMAGING

Ultrasound is the first-line tool for screening, which is usually performed at 18 to 20 weeks’ gestation. Gray-scale ultrasound has been shown to have a sensitivity of 77% to 87%, a specificity of 96% to 98%, a positive predictive value of 65% to 93%, and a negative predictive value of 98% for
diagnosis of accreta. The presence of multiple findings increases the specificity of ultrasound.

Currently, there is insufficient evidence for routine use of MRI on all suspected cases of placenta accreta. At some institutions, MRI is often performed when accreta is suspected on ultrasound. Magnetic resonance imaging may better delineate the degree of placental invasion and may change surgical management. A prospective review of 300 cases of placenta accreta showed that MRI modified detection of invasion levels in approximately 30% of cases and could accurately depict parametrial invasion when ultrasound could not. Another recent study with 13 patients showed MRI to have a greater sensitivity and specificity compared with ultrasound; however, transvaginal ultrasound was not used in this study.

Earlier literature suggested that MRI was superior to ultrasound only in evaluating posterior placentas. Other studies have shown that these modalities are comparable, and are complementary, because one modality may show the correct finding when the other modality is equivocal.

NORMAL ULTRASOUND APPEARANCE OF THE PLACENTA

Prenatal ultrasound is generally performed transabdominally; however, if needed, transvaginal ultrasound is safe and can also be performed for thorough evaluation of the lower uterine segment.

The placenta is uniformly hyperechoic with respect to the hypoechoic myometrium. The retroplacental clear space (Fig. 2A) is a hypoechoic linear structure at the junction of the placenta and the myometrium and is thought to correspond to dilated vessels in the decidua basalis.

In the third trimester, there is increased heterogeneity caused by vascular lakes and calcification. Regular retroplacental vascularity should be present, with occasional vessels extending into the placenta (Fig. 2B) corresponding to the maternal spiral arteries entering between the cotyledons.

ULTRASOUND FINDINGS

Placental lacunae are multiple irregular vascular spaces in the placenta. They are the most sensitive sign with the highest positive predictive value for placenta accreta (Fig. 3). They have been associated with placenta accreta in 87.5% of high-risk patients, and the likelihood increases with a greater number of lacunae. Lacunae should be differentiated from placental lakes, which are rounder, with no flow, and are seen in normal placentas. If numerous vascular lacunae are seen, the placenta should be evaluated for other supporting findings.

The location of placental implantation is important to assess because accreta was found in 29% of cases with implantation over the cesarean section scar. Clinical history is also important, and particular attention should be paid to known areas of uterine surgery, such as myomectomy, should the placenta be implanted there.

Lobularity and irregularity of the placental myometrial junction (Fig. 4A) has also been described with placenta accreta and seems to be analogous to the irregularity and focal bulging seen on MRI.
In a small series, thinning of the myometrium to less than 1 mm in the presence of large placental lacunae was reported to have a sensitivity of nearly 100% and a specificity of 72% to 79%. Focal thinning and loss of the myometrium are useful when seen in combination with other findings such as lacunae and irregularity of the placental myometrial junction.

As the retroplacental clear space is believed to represent decidua basalis, nonvisualization of this space is thought to be associated with placenta accreta. However, loss of clear space when observed in isolation is not a reliable diagnostic sign. A high false-positive rate of up to 50% has been reported, as the clear space is frequently not visible in anterior placentas.

**FIGURE 3.** Lacunae and hypervascularity of the uterine-bladder interface in pathologically proven placenta increta in a 27-year-old woman at 31 weeks' gestation with 1 prior cesarean section. A, Transabdominal transverse ultrasound with irregular vascular lacunae (arrows) within the placenta. B, Transvaginal sagittal ultrasound performed for better evaluation of the uterine–bladder wall interface with color Doppler. Interface hypervascularity (white arrows) and turbulent flow in the lacunae (black arrow). Bladder (*).

**FIGURE 4.** Placental bulging and loss of the uterine-bladder interface in a 33-year-old woman at 17 weeks' gestation, with 3 prior cesarean sections, presenting with a gush of blood from her vagina. Surgery and pathology showed placenta percreta involving the lower uterine segment anteriorly and bladder invasion. A, Transabdominal sagittal ultrasound showing placenta previa and bulging of the placenta into the posterior lower uterine segment and cervix (arrows). B, Transabdominal sagittal ultrasound showing bulging of the placenta into the bladder with loss of the uterine bladder interface (arrow) and large lacunae (L). C, Transabdominal sagittal color Doppler ultrasound showing extension of placental vessels to the bladder (arrow) and flow within the lacunae (curved arrow). D, Transvaginal transverse ultrasound showing myometrial thinning (white arrow) to less than 1 mm, with large placental lacunae (L). E, Axial SSFSE T2 MRI showing interruption of the outer myometrial line representing uterine serosa (arrowhead). Hypointense bands along with marked myometrial thinning, without loss of the outer myometrial serosal line elsewhere (arrows). Laminaria were placed within the cervix for possible dilation and curettage and because of vaginal bleeding (curved arrow). F, Sagittal SSFSE T2 MRI showing percreta at the anterior lower uterine segment cesarean section scar with bulging and interruption of the myometrium (thin arrow). Bulging of the placenta at the bladder with loss of overlying myometrium and bladder wall thickening (thick arrow). Myometrium (arrowheads).
and in the third trimester. This clear space is optimally identified in posterior, rather than anterior, placentas because of optimization of the focal zone of the transducer. However, with current technology, this clear space can be more easily identified then noted in prior publications.

Disruption of the uterine serosa–bladder line (Fig. 4B) has a good specificity but poor sensitivity. Endovaginal scanning should also be performed with a partially full bladder to facilitate visualization of the uterine bladder junction.

Compared with gray-scale ultrasound, power and color Doppler have not been shown to improve the diagnostic sensitivity. However, several findings may be helpful. Placenta accreta may be suggested by hypervascularity of the uterine serosa–bladder interface and markedly dilated vessels over the peripheral subplacental zone. Transabdominal, or even better endovaginal, ultrasound with a partially filled bladder may be useful to demonstrate loss of the uterine serosal/bladder interface but also demonstrate vessels protruding into the bladder in cases of placenta percreta (Fig. 4C). However, along the same lines, visualization of vascularity in the bladder wall does not equate to placenta accreta because there is early invasion into the myometrium.

NORMAL MRI APPEARANCE OF THE PLACENTA

The placenta is normally homogeneous and moderately T2 hyperintense. The myometrium can be intermediate or high signal intensity on T2-weighted images. Myometrial...
contractions consisting of transient, focal, ill-defined T2 hypointense thickening can also be seen.\textsuperscript{31}

The myometrium typically has a trilaminar appearance on T2-weighted or bSSFP images (Fig. 7A).\textsuperscript{30} The thin inner hypointense layer corresponds to the decidual myometrial interface and represents the retroplacental clear space.\textsuperscript{32} A thicker hyperintense myometrial layer contains the arcuate vessels. The thin outer hypointense layer corresponds to the serosa.\textsuperscript{30} The placental myometrial interface is best seen on single shot fast spin echo (SSFSE) techniques T2 images\textsuperscript{33} and is less distinct on balanced steady state free precession (bSSFP) images.

Normal regular subplacental vessels are seen within the myometrium (Fig. 7B).\textsuperscript{9} Occasionally, a few small vessels also cross the placenta, typically near the umbilical cord insertion.\textsuperscript{9}

With increasing gestational age, the placenta becomes slightly more hypointense and slightly more lobular and heterogeneous.\textsuperscript{29} In the third trimester, the cotyledons can be visualized, with intervening fine septations that are regularly spaced (Fig. 7C).\textsuperscript{9}

**MRI PROTOCOL**

Typically, patients are imaged supine; however, patients may also be imaged in the left lateral decubitus position if they prefer. The patient’s feet should be placed first into the scanner to minimize claustrophobia. Although not standard practice, oxygen can be given via nasal cannula, if needed, to decrease fetal motion.\textsuperscript{7} Breath holding should be performed when possible. The bladder should be partially full because it aids in visualization of the myometrial/bladder interface (Fig. 8).

T2-weighted images are the most important sequences in imaging placenta accreta and should be obtained in all 3 planes. Imaging should be monitored by a radiologist. Additional focused oblique axial or coronal sequences perpendicular to the

**FIGURE 7.** Normal placenta. A, Sagittal SSFSE T2 MRI. The three layers of the normal myometrium are seen. The hypointense outer myometrial layer (arrows) and inner myometrial layer (arrowheads) surround the hyperintense inner layer. B, Sagittal FSE T2 MRI showing normal subplacental vascularity (arrows). C, Coronal SSFSE T2 MRI shows a homogeneous placenta with normal thin septations (arrows).

**FIGURE 8.** The importance of having a partially filled bladder in a 42-year-old woman at 30 weeks’ gestation with placenta percreta and 1 prior cesarean section. Magnetic resonance imaging performed because of suspicion of percreta on routine ultrasound. At surgery, bladder invasion and percreta of the anterior lower uterine segment was found. Sagittal SSFSE T2 MRI with bladder partially decompressed (A) and full (B). Placental nodularity (thick arrow) indenting the bladder is more apparent with a full bladder (B). There is loss of the myometrium at the anterior lower uterine segment (thin arrow) and over the bladder (thick arrow) where there is also bulging. Myometrium (arrowhead).
placental myometrial interface can be performed at questionable areas if needed. Fast sequences such as SSFSE (Single Shot FSE on General Electric scanners, HASTE on Siemens scanners, Single Shot TSE on Philips scanners) and bSSFP sequences (FIESTA on General Electric scanners, TrueFISP on Siemens scanners, and b-FFE on Philips scanners) have decreased fetal and maternal motion artifacts. Longer FSE T2 sequences have better resolution and signal-to-noise ratio, however, are more susceptible to motion artifact because of their long acquisition times. Parallel imaging techniques can also decrease motion artifact while retaining resolution.

At least 1 fat-saturated T1 in phase gradient echo sequence can be used to show hemorrhage as T1 hyperintense. T1-weighted images are not generally used for evaluating placental invasion because the placenta and myometrium are similar in signal intensity. Slice thickness should range from 4 to 6 mm. Thinner slices can be used when focusing on an area of suspicion. Partial volume averaging is an issue that can also be avoided by verifying a finding on more than 1 plane of imaging.

Intravenous contrast has been used at some institutions to better delineate the placental myometrial interface. Given that contrast is excreted into the amniotic fluid and swallowed by the fetus, its use is controversial because the long-term risks to the fetus are unknown. A recent study in mice revealed gadolinium-based contrast use showed only very small amounts of contrast in the fetus and amniotic fluid, and none was detectable after 24 hours in the fetus and 48 hours in the amniotic fluid. The ACR guidance document for safe MRI practices recommends that intravenous gadolinium should be avoided during pregnancy and should only be used if absolutely essential. At our institutions, contrast is not routinely used. Some authors report that they only use contrast in select cases, such as when delivery will occur a few days after contrast administration or if there will be pregnancy termination.

Diffusion weighted imaging (DWI) is a relatively novel technique applied to evaluation of placenta accreta. As the placenta and myometrium are often similar in T2 signal intensity, DWI can also be used to better delineate the placental myometrial border (Fig. 9). However, the spatial resolution and signal-to-noise ratio of this sequence are generally low; B0/B1000 fusion images with color coding can be used to better show the placental/myometrial interface. We also perform B500 images and have found that these images have improved signal-to-noise ratio, although the contrast between the myometrium and placenta is less. In addition, DWI is also less susceptible to motion artifact.

MRI FINDINGS OF PLACENTA ACCRETA

The most useful MRI findings are dark intraplacental bands, placental heterogeneity, and placental bulging. Gross extraterine placental extension and tenting or nodularity of the bladder are also helpful when seen. Early MRI criteria of an
indistinct myometrium and loss of the T2 dark uteroplacental interface have been found to be less helpful.33

**PLACENTAL HETEROGENEITY/DARK INTRAPLACENTAL BANDS**

Placental heterogeneity is usually secondary to dark bands. In 1 series, all patients with placental invasion had moderate or marked placental heterogeneity.43

Dark bands may be related to increased vascularity or placental infarcts/fibrin deposition based on the appearance on images. These dark bands represent abnormal placental vascularity if they correspond to hyperintense structures on bSSFP images (Fig. 10).35 If they remain hypointense on bSSFP images, they are thought to represent fibrin deposition in the placenta and were seen to correspond histologically to placental hemorrhage and infarction.15 However, normal heterogeneity may be seen with increasing gestational age.29 Placental heterogeneity also shows a high interobserver reliability in both experienced and inexperienced readers.44

As the placenta typically becomes more heterogeneous as pregnancy progresses, a mild to moderately heterogeneous placenta in the late third trimester may be difficult to evaluate for invasive placental invasion.26,43 Dark bands, in contrast to normal heterogeneity in the late trimester, typically extend from the placental myometrial interface (Fig. 11A), with a random distribution and varying thickness.9

Alamo et al44 reported that dark intraplacental bands were the single best MRI feature predicting placental invasion. In another study, the volume of dark intraplacental bands correlated to increasing degrees of placental invasion.12 The sites of the dark bands that represented hemorrhage and infarcts also corresponded to histologic areas of abnormal placenta.12 In another recent study, the greater experience of the reader correlates with improved specificity and sensitivity.34 However, the sensitivity for dark intraplacental bands was similar between junior readers with less than 3 years of practical body MRI experience and senior readers with greater than 5 years of body MRI experience.44

Some authors have stated that invasive placenta is unlikely when the placenta is homogeneous.9,31 However, there have been instances of abnormal placenta in the absence of lacunae, which may correspond to dark bands.18,25 Certainly, invasive placenta is less likely in relatively homogeneous placentas83; however, all imaging findings should be taken together to come to a conclusion,31 as in Figure 12, where there is also loss of the myometrium and lacunae seen on ultrasound.

**INTERRUPTED MYOMETRIUM**

Focally interrupted myometrium has also been described as a useful sign (Fig. 4E).31,33 A focally interrupted myometrial border was found to be the second most predictive feature of invasive placenta in the study by Alamo et al44; however, accurate recognition of this finding showed the most variability between experienced and inexperienced readers.

**PLACENTAL BULGING**

Leyendecker et al31 suggest that placental bulging is the most useful sign in isolation. They note that the contour of the placenta should appear as a smooth arc; focal bulging that could indicate abnormal placenta may disrupt this arc (Figs. 11, 12). Gentle lobulations may occur in normal placentas, but the placental myometrial interface should not be disrupted.

Bulging of the lower uterine segment that was described by Lax et al45 is also useful for diagnosis. Other authors have found this finding to be less helpful because it can be seen with normal pregnancies.44 There are two descriptions of bulging: (1) a diffuse bulge in the uterine contour resulting in loss of the normal inverted pear shape of the uterus (this can also be seen in normal pregnancies) or (2) a smaller focal bulging of the placenta into the myometrium.9 The latter has been reported to be more helpful.34

Focal nodular bulging into the bladder, analogous to that seen on ultrasound, is also suspicious for placental invasion (Figs. 4F, 11B). Disruption of the normal zonal anatomy of the cervix also suggests invasion.31

**EXTRAUTERINE PLACENTAL EXTENSION**

Infiltration of the pelvic organs and tenting of the bladder are findings of extraterine invasion and are relatively specific when present.9

**FIGURE 10.** Differentiation between dilated intraplacental vessels and hemorrhage/infarct at 32 weeks’ gestation, with placenta percreta found in surgery and pathology, in a 37-year-old woman with 4 prior cesarean sections and suspicion of accreta on routine ultrasound. A, Sagittal FSE T2 MRI shows a complete previa and multiple irregular dark bands (curved arrow and thin arrows). Nonvisualization of the myometrium anteriorly (thick arrows). Myometrium (arrowheads). B, Sagittal FIESTA MRI shows that one of the T2 dark bands is hyperintense (curved arrow), thus corresponding to a dilated vessel, whereas another dark band remains dark on FIESTA (thin arrows), corresponding to areas of fibrin deposition that may be related to hemorrhage or infarct. C, Transvaginal sagittal ultrasound shows multiple lacunae (arrows).

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Magnetic resonance imaging has been reported to be better than ultrasound at depicting extrauterine involvement such as parametrial invasion.11

THINNING OF THE MYOMETRIUM/LOSS OF THE INNER MYOMETRIAL LAYER

Part or all of the normal trilaminar appearance of the placenta may be lost in placenta accreta.30 However, loss of these layers may also be seen in normal placentation.31 The myometrium becomes significantly thinned, often diffusely, in the late third trimester.33 Thus, imaging in the second trimester or early third trimester is preferred.44 There is also, typically, thinning of the myometrium over the spine.33

Thinning of the myometrium, when seen alone, may contribute to false-positive examinations.9 Even in technically adequate examinations, the placental myometrial junction may be lost, particularly in patients with prior cesarean delivery.33,43 When thinning of the myometrium is seen, the presence of other imaging findings should be sought for diagnosis of abnormal placentation.9

PITFALLS

Suspicious findings should be confirmed in two planes whenever possible.33 False-positives may occur when a finding is seen only on one plane because of the normal curvature of the uterus.33

FIGURE 11. Dark bands and bulging in a 23-year-old woman at 25 weeks' gestation with 3 prior cesarean sections and pathologically proven placenta increta. She presented with vaginal bleeding. A and B, Sagittal FSE T2 MRI showing a heterogeneous placenta with multiple irregular dark bands (thin arrows) many extending from the placental myometrial interface. There is bulging with loss of the anterior myometrium at the cesarean section scar (thick arrows). The placenta is nodular indenting the anterior-superior bladder in B (curved arrow). Myometrium (arrowheads).

FIGURE 12. Loss of the myometrium and necessity for ultrasound correlation in a 23-year-old woman at 27 weeks' gestation with 3 prior cesarean sections with pathologically confirmed placenta percreta anteriorly at the cesarean section scar. A, Sagittal SSFSE T2 MRI showing that the placenta is only mildly heterogeneous, without dark bands. There is disruption of the normal smooth arc of the placental myometrial contour, with a small bulge and focal interruption of the myometrium (arrow). Normal myometrium (curved arrow) is hyperintense to the placenta (p). B, Transabdominal ultrasound shows lacunae (arrow) that were not well seen on MRI.
The differentiation between accreta and increta and between increta and percreta, without gross invasion into surrounding structures, remains difficult. More experienced readers had a sensitivity of 75% and a specificity of 68% in differentiating the types of invasion in 1 study. These authors also showed that it was easier to differentiate placenta percreta from placenta accreta and increta. Several authors have noted that the most difficult differentiation on imaging was between placenta accreta and increta. In addition, infarcts that develop in a normal mature placenta can be misleading. In 1 study, dark intraplacental bands seen before 30 weeks accurately corresponded to areas of abnormal placentation.

**MANAGEMENT**

Optimal management of placenta accreta involves a multidisciplinary team approach with predelivery planning. Cesarean delivery is recommended before 36 weeks gestational age to avoid complications. Cesarean hysterectomy, without attempted removal of the placenta, has the lowest morbidity and is the preferred treatment. Others have reported some success with conservative management without hysterectomy; however, there was significant maternal morbidity. The American College of Obstetricians and Gynecologists does not recommend this latter approach unless there is a strong desire for future pregnancy and the patient is hemodynamically stable and willing to accept the risks. In a study that evaluated 167 women conservatively treated with retained placenta accreta, the majority of retained placentas spontaneously resorbed, whereas 10% needed hysterectomy. Ultrasound and MRI have also been used to monitor patients after conservative treatment by leaving the abnormally adherent placenta in the uterus. Ultrasound can be performed transabdominally or with sonohysterography, showing the retained placenta attached to the myometrium and sometimes having Doppler vascularity. Serial ultrasound used to monitor conservatively treated patients shows a decreased size or the persistence of the retained placenta. Magnetic resonance imaging of Placenta Accreta

**FIGURE 13.** Retained placenta percreta in a 26-year-old woman with a history of 3 prior cesarean sections and 2 prior dilation and curettage, most recent for a missed first trimester abortion presenting with menorrhagia and dysmenorrhea. A, Sagittal transabdominal ultrasound shows a large heterogeneous mass in the lower uterine segment (arrows). B, Color and spectral transverse Doppler shows large disorganized Doppler flow (arrows). C, Contrast-enhanced computed tomography shows the same mass causing a mass effect on the bladder, with large vessels extending to the superior bladder wall (arrows). D, MRI sagittal FSE T2 shows the retained percreta invading the thickened bladder wall (arrows).
imaging shows enhancement and T2 hyperintensity in the majority of retained placenta (Fig. 13) and can help determine which are more likely to spontaneously pass by determining the surface area of attachment. A small study showed that an attachment area of less than a semicircle indicated that the retained placenta was more likely to pass spontaneously. Another study postulated that delayed enhancement between the retained placenta and myometrium was thought to correspond to decidua basalis, and thus, if this was absent, then the etiology of the retained placenta was accreta. A recent study showed that, in post-embolization patients, decreased placental enhancement in the early postcontrast phase correlated with faster resorption.

INTERVENTIONAL RADIOLOGY
Current evidence is insufficient to firmly recommend the endovascular techniques of intra-arterial balloon catheter placement or embolization for reducing maternal morbidity. There are mixed results regarding preoperative endovascular placement of internal iliac artery balloons. Some have reported success with decreased transfusion requirements and a shorter duration of surgery. However, others have reported no difference in transfusion requirements or increased blood loss after endovascular intervention. Although rare, complications do occur such as arterial aneurysm formation or leg ischemia. Collateral flow between the external iliac and femoral arteries with the internal iliac system could explain the lack of consistent success with internal iliac occlusion. Pelvic artery embolization has recently been reported to have a slightly higher success rate (90.7%) than balloon tamponade.

CONCLUSIONS
Placenta accreta is increasing in incidence likely because of the increased rates of cesarean delivery. The antenatal diagnosis of placenta accreta is important to decrease maternal morbidity and mortality. Ultrasound remains the first-line examination. However, recent trends indicate a greater use of placental MRI as a complementary imaging modality. Interpretation of the MRI findings should be done in conjunction with review of the ultrasound findings. Multiple imaging findings on both ultrasound and MRI should be then used to make this diagnosis. The most reliable findings have been shown to be placental lacunae on ultrasound and dark intraplacental bands and focal bulging on MRI.

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