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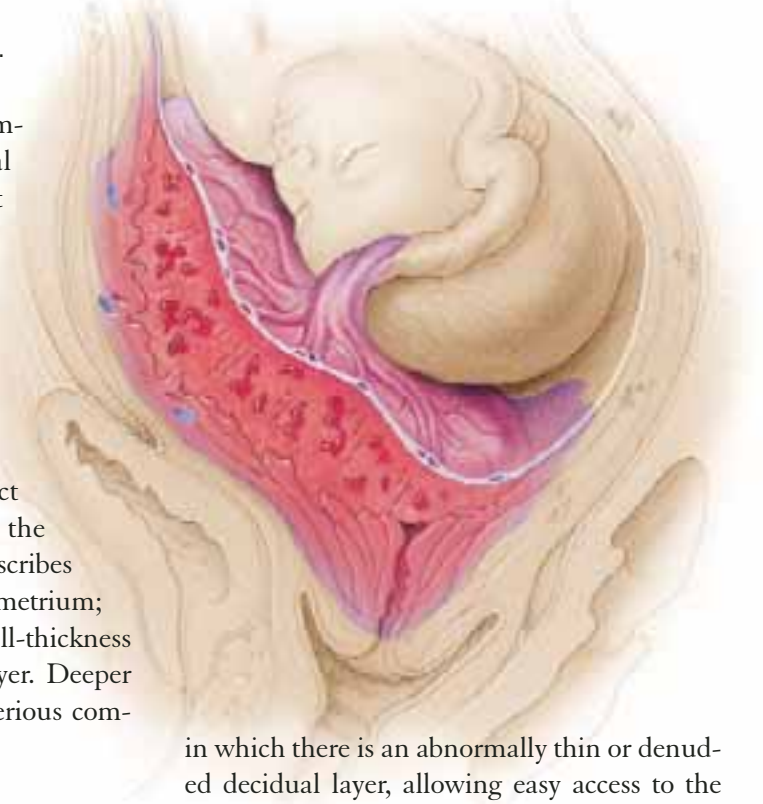
Managing placenta accreta

In the past, surgery was the only option for women with abnormally adherent placentae, but conservative medical management may be an alternative for select patients. Here, the authors review recent trends and describe medical and surgical options.



Placenta accreta is an uncommon but potentially lethal complication of pregnancy. It occurs when the placenta is abnormally adherent to the uterine myometrium as a result of partial or complete absence of the decidua basalis and Nitabuch's layer. The depth of invasion determines the histologic classification: Placenta accreta indicates direct attachment of the placenta to the myometrium; placenta increta describes placental invasion into the myometrium; and placenta percreta indicates full-thickness compromise of the myometrial layer. Deeper invasion is associated with more serious complications.

Incidence and pathophysiology

The incidence of placenta accreta has increased threefold over the past 20 years. Breen and colleagues reported a rate of 1 in 7,000 deliveries in 1977,[1] while a later review suggests an incidence closer to 1 in 2,500 deliveries for the period from January 1985 through December 1994.[2]

Placenta accreta can develop in any setting in which there is an abnormally thin or denuded decidual layer, allowing easy access to the underlying myometrium by the invading trophoblastic tissue. Risk factors include placenta previa, Asherman's syndrome, the existence of a prior hysterotomy scar, and advanced maternal age or parity. The major contributor to the rise in the incidence of placenta accreta appears to be a concurrent increase in the rate of cesarean section, which is associated with an increased risk for placenta previa.[3,4]

When placenta accreta occurs in the setting of a prior hysterotomy, the placenta is implanted over the uterine scar, where the

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decidual layer is already thinned. Clark et al reported the association between placenta accreta and prior cesarean section in a retrospective review of over 97,000 deliveries. They discovered a 5% risk of clinically diagnosed placenta accreta with placenta previa alone, but found this risk increased to 24% with a single prior hysterotomy, to 47% with 2 prior hysterotomies, and to 67% with 3 or more (TABLE 1).[3] Miller and colleagues recently demonstrated that women with placenta previa have a 9.3% incidence of placenta accreta, compared with a 0.005% incidence in women with normally located placentae.[2]

TABLE 1
Incidence of placenta accreta in women with placenta previa and prior hysterotomy

NUMBER OF HYSTEROTOMIES	INCIDENCE
0	5%
1	24%
2	47%
3 or more	67%

Diagnosis

In the past, diagnosis was typically made clinically, suggested by significant postpartum hemorrhage or a placenta that did not separate easily from its uterine attachment. The result was treatment in an emergent setting at the time of delivery. Today, thanks to a better understanding of risk factors and improved diagnostic testing, nearly half of all cases of placenta accreta are diagnosed antepartum.[5] Earlier diagnosis makes it possible for the clinician to prepare in advance for delivery and its potential complications, thus improving the ultimate outcome.

Prenatal diagnosis. The assessment of placental morphology and location is a standard part of the obstetric ultrasound examination, allowing many cases of abnormal placentation to be diagnosed antenatally. Ultrasonographic diagnostic criteria (TABLE 2) for placenta accreta include the following:

- thinning or loss of the hypoechoic retroplacental myometrial zone to less than 2 mm[6,7];
- absence of the hypoechoic myometrium in the lower uterine segment between the placenta and bladder[6];
- thinning or disruption of the hyperechoic uterine serosa-to-bladder interface[6];
- focal exophytic masses or extension of the placenta beyond the myometrial boundaries[6,7]; and
- lacunar flow within the placenta with prominent venous lakes.[8]

While these findings are not definitive, they are highly suggestive of the diagnosis. Most authors agree that ultrasound has a sensitivity and specificity exceeding 85% in the detection of this condition.[6,9] Transvaginal studies may be preferable to transabdominal ultrasound for improved resolution. In addition, Doppler velocimetry may allow for better identification of venous lakes and areas of increased vascularity within the myometrium. The sonographic detection rate is reduced

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KEY POINTS

- Placenta accreta occurs in approximately 1 in 2,500 deliveries.
- Risk factors include placenta previa, Asherman's syndrome, the existence of a prior hysterotomy scar, and advanced maternal age or parity.
- Almost 50% of all cases of placenta accreta are diagnosed antepartum.
- MRI combined with ultrasound has a sensitivity of 100% in identifying placenta accreta.
- Medical management should be considered only when the patient wishes to preserve her fertility and when no active uterine bleeding is present.
- Gravid hysterectomy has been associated with a mortality rate of 7.4%, with a 90% incidence of transfusion, a 28% incidence of postoperative infection, and a 5% incidence of ureteral injuries or fistula formation.

TABLE 2

Ultrasound criteria for diagnosis of placenta accreta

Thinning of the hypoechoic retroplacental myometrium to <2 mm
Absence of the hypoechoic myometrium in the lower uterine segment between placenta and bladder
Disruption of the hyperechoic uterine serosa-to-bladder interface
Extension of the placenta beyond the myometrial boundary
Lacunar flow and venous lakes within the placenta

when the placenta is located posteriorly.

In cases where ultrasound is equivocal, magnetic resonance imaging (MRI) is a useful adjunct. MRI provides better delineation of tissue planes, including the placenta, myometrium, and vasculature. Kay reported 3 cases where MRI was used to identify placenta previa when ultrasonic findings were equivocal.[10] Similarly, Levine et al demonstrated a sensitivity of 100% for the identification of placenta accreta using MRI with ultrasound,[9] and Thorp and colleagues demonstrated the efficacy of MRI in delineating bladder involvement in a case of placenta percreta.[11] As would be expected, MRI has proved most useful when the placenta is located posteriorly. Besides being safe for both mother and fetus, MRI requires little in the way of preparation. Unfortunately, it lacks portability and is more expensive to perform than ultrasound.

Consider medical management only when **no active uterine bleeding** is present.

Some established biochemical markers have been applied in novel ways in diagnosing placenta accreta. For example, Zelop et al retrospectively reviewed the cases of 11 women who had undergone cesarean hysterectomy for placenta previa with accreta and compared them to 14 women with placenta previa alone. In 5 of 11 cases, women with accreta had alpha-fetoprotein (AFP) levels greater than 2 multiples of the median (MOM), compared to none in the previa-only group.[12] This suggests that abnormal placental attachment results in myometrial invasion with increased diffusion of fetal AFP into the maternal circulation.

Hung and colleagues reviewed over 9,000 deliveries in the Taiwan Down Syndrome Screening Group.[13] After other causes of elevated maternal AFP were excluded, regression analysis showed a relative risk of 8.3 for the presence of accreta when AFP levels exceeded 2.5 MOM in the second trimester. Ophir et al reported 2 cases of women with elevated creatine kinase levels as early as 22 weeks' gestation who subsequently were diagnosed with placenta accreta.[14] The investigators theorized that trophoblastic invasion of the myometrium results in muscular damage and elevated serum creatine kinase levels. While more studies are needed, serum markers may exist for the presence of accreta, providing another asset for earlier diagnosis and preparation.

Medical management

In recent years, reports of select patients undergoing medical management for placenta accreta have begun to appear. Although the number of these patients has been small, with some women ultimately requiring surgical intervention, the vast majority have done well. Even so, medical management should be considered only when the patient wishes to preserve her fertility and when no active uterine bleeding is present. Adequate discussion of the potential risks and benefits also is crucial.

Methotrexate (MTX) is the cornerstone of medical management, although case reports also have described the use of antibiotics, uterotonics, surveillance with ultrasound, and the monitoring of human chorionic gonadotropin (hCG) levels. There is no agreed-upon

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regimen for the use of MTX or adjunctive therapies such as antibiotics and oxytocin. However, after reviewing the relevant literature, we can suggest some general guidelines.

At the time of delivery, the cord and membranes should be ligated as high as possible. Broad-spectrum antibiotics, for prophylaxis, and oxytocin should be administered during the initial 72 hours. In addition, ultrasound should be performed daily to monitor involution and placental vascularity, which should decrease over time.

If hCG levels plateau, placental vascularity persists, or placental involution stalls after this initial 72-hour period, MTX should be administered (1 mg/kg) on alternate days for a total of 4 to 6 doses. Medical management should be stopped if liver function tests are 2 or more times the normal value or there is evidence of thrombocytopenia (platelet levels below 100,000), neutropenia (white blood cell count below 2,000), or renal dysfunction (creatinine levels greater than 1.5 mg/dL). If the patient becomes clinically unstable or placental tissue fails to resolve following MTX therapy, hysterectomy should be considered.

Expectant management is another valid approach in select cases (**TABLE 3**). It is more likely to be successful when vascularity is no longer present on ultrasound examination of the placenta. Panoskaltsis and colleagues reported 2 cases of expectant management.[15] In 1 case, the placental mass and vascularity regressed spontaneously with time following vaginal delivery, and normal menses resumed at 9 months postpartum. In the second case, MTX was given when the placental mass maintained vascularity on ultrasound exam at postpartum day 12. Ultimately, this mass involuted to a 5-cm mass without vascularity at 1 year. Normal menses resumed, and hCG levels returned to zero. Follow-up in these patients has been short. Fertility has yet to be documented in either patient, although the resumption of menses is an encouraging sign.

When it is successful, medical management has many potential benefits. A woman retains her future fertility and avoids the morbidity and mortality of gravid hysterectomy. Even with antenatal diagnosis of placenta accreta, gravid hysterectomy can result in high-volume blood loss and coagulopathy due to the difficult nature of the procedure.[5] Proponents of medical management would further argue that there are few disadvantages to attempting medical management in clinically stable patients, provided follow-up is close. Even when a placental mass fails to resolve or vascularity or vaginal bleeding occurs, an interval of even a few days after delivery may simplify hysterectomy due to uterine involution and a concurrent decrease in vascularity.

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Opponents of medical management suggest that it increases the risk of sudden hemorrhage, infection, and/or emergent surgery. While there have been reports of infection, all cases were confined to endometritis and were well controlled with an oral antibiotic regimen. One case report describes a patient given MTX for 6 weeks (50 mg per week). Human chorionic gonadotropin levels decreased, the placental mass was resolving, and there was no evidence of vascularity on ultrasound. However, when a suction dilatation and curettage (D&C) was performed for mild bleeding at 8 weeks postpartum, a massive hemorrhage occurred. Ultimately, the patient required a transfusion of 18 units of packed red blood cells and emergent hysterectomy.[16]

Opponents of medical management suggest it increases the **risk of sudden hemorrhage**.

Surgical management

Surgical options for the management of placenta accreta are dictated by the patient's clinical status, comorbidities, age, CONTINUED

If hemorrhage occurs, follow a **stepwise approach** to ensure hemostasis.

and parity, as well as the desire to preserve future fertility. Practitioners should be prepared to manage placenta accreta when suspicious radiologic findings or significant risk factors are present. However, radiologic studies are subject to interpretive errors and definitive diagnosis can be made only at the time of delivery. The physician should lay the groundwork for surgery by counseling the patient extensively regarding possible complications and outcomes.

Preoperative considerations. The best way to decrease surgical complications is through adequate preparation. To that end, the following steps should be considered when planning an operative delivery for a patient with suspected placenta accreta[17]:

- Notify anesthesia staff of the potential for a prolonged procedure with significant blood loss.
- Assemble an adequate surgical team, including backup by an experienced gynecologist, gynecologic oncologist, general surgeon, or urologist.
- Notify the blood bank of the potential need for significant blood products in the form of packed cells, clotting factors, and platelets. (Blood should be present in the room at the start of the procedure.)
- Ensure that items such as compression boots, a warming blanket, and a 3-way Foley are available. (The 3-way catheter allows the bladder to be back-filled to check for incidental cystotomy.)
- Consider ureteral stent placement to aid in the identification and protection of ureters if significant dissection is indicated.[5]
- Consider preoperative placement of angiocatheters for intraoperative embolization of the hypogastric arteries to control operative bleeding.[18,19]
- If bladder involvement is suspected, preoperative cystoscopy can confirm the diagnosis, allowing mobilization of the urology team.

Intraoperative considerations. Thought also should be given to the actual surgical approach prior to beginning the procedure. Attention to seemingly mundane details can significantly reduce operative complications. Suggestions include the following:

- Make a vertical skin incision to provide optimal exposure to the surgical field.[20]
- Carefully examine the pelvis to identify any abnormal collateral blood supply and involvement of the sidewall by the placenta.
- Take the time to create a bladder flap, unless there are significant adhesions or clear involvement of the bladder by the invading placenta. The flap will make gravid hysterectomy easier to perform and reduce the possibility of incidental cystotomy.
- Carefully consider the type of uterine incision to be made. If at all possible, incisions should be made away from the placenta.[5]
- Attempt to develop a cleavage plane between the placenta and uterus.[21] If this fails, as much of the placental mass as possible should be manually extracted. Areas of defect or bleeding should be oversewn with chromic suture in an attempt to gain hemostasis. This technique is most useful when there is partial separation of the placenta with only a focal accreta. If the area of the accreta is large but not deep, localized repair of any myometrial defects should be attempted. A sharp curettage of the area in question also may aid in removal of the placental mass, but likely will require oversewing the uterus in order to obtain hemostasis.

The obvious imperative in delivering a gravida with a known abnormal placentation is the safety of both the mother and fetus. The secondary goal is to minimize morbidity, which is tantamount to minimizing blood loss and avoiding disseminated intravascular coagulation (DIC). When faced with excessive hemorrhage, a stepwise approach to securing hemostasis should be pursued.

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First, the physician should be aggressive with the administration of blood products to avoid cardiogenic shock and coagulopathy. Second, the uterus should be packed for persistent oozing and reassessed in 12 to 24 hours. The uterine blood supply should be sequentially ligated, beginning with the uterine arteries and proceeding to the lower uterine and ovarian vessels.[22] While ligation of the hypogastric arteries may reduce blood flow to the uterus, both Clark and Evans reported that such ligation was associated with a failure rate (for controlling hemorrhage) exceeding 50% because of extensive collateral pelvic circulation.[23,24]

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In cases of balloon occlusion or embolization of the internal iliac arteries for pelvic hemorrhage, a reduction in blood loss and improved visualization of the operative field have been reported, although use in the specific setting of placenta accreta is limited.[18,19,25-27] The common approach is axillary, with the catheter tip placed in the bilateral anterior hypogastric arteries prior to beginning the surgery.[19] Balloon inflation occurs after delivery of the fetus.

Hysterectomy may become necessary if uterine bleeding cannot be controlled. While attempts may be made to salvage the uterus, immediate hysterectomy is indicated should the patient become unstable.[16] Given the significant vascular supply of the cervical branch of the uterine artery and the abnormal placentation in the noncontractile portion of the uterus, the cervix will likely need to be removed at the time of hysterectomy.

Surgical management carries the potential for significant morbidity and mortality. O'Brien and colleagues found a mortality rate of 7.4% with a 90% incidence of transfusion, a 28% incidence of postoperative infection, and a 5% incidence of ureteral injuries or fistula formation in 109 cases of gravid hysterectomy

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TABLE 3

Medical management of placenta accreta: a review of the literature

AUTHOR	DIAGNOSIS	TREATMENT	EVALUATION	RESULT
Panoskaltsis (case 1), 2000[15]	• Adherent placenta at delivery • Ultrasound/MRI diagnosis of increta	• Cord ligation • Antibiotics/oxytocin for 3 days • 4 units packed red blood cells	• Weekly ultrasound	• 6-cm mass with decreased vascularity at 2 weeks • Mild endometritis at 4 weeks • Tissue passed at 8 months • 2- x 1.5-cm mass, no vascularity at 9 months with normal menses
Panoskaltsis (case 2), 2000[15]	• Adherent placenta at delivery • Ultrasound/MRI diagnosis of increta	• Cord ligation • Antibiotics/oxytocin for 3 days • MTX 50 mg qod x 6 doses plus folic acid 6 mg qod x 2 doses	• Weekly hCG • Weekly ultrasound	• hCG dropped from 24,000 U/L to 5,000 U/L by PPD 12 with 8- x 6-cm mass, persistent vascularity on ultrasound MTX • 8- x 6-cm mass, decreased vascularity at 3 weeks • 7- x 6-cm mass, no vascularity at 6 weeks • hCG zero at PPD 52 • 5- x 5-cm mass at 12 months; normal menses
Buckshee, 1997[30]	• Adherent placenta at delivery • Ultrasound diagnosis of accreta	• Cord ligation • Ciprofloxacin and metronidazole gel • MTX 50 mg IM plus folic acid 6 mg IM on alternate days until hCG zero (PPD 6)	• hCG qod • Ultrasounds done intermittently	• hCG zero PPD 6 • Decreased size of mass on ultrasound PPD 10 • Tissue passed PPD 18 • Normal uterus by ultrasound at 6 weeks
Jaffe, 1994[16]	• Percreta diagnosed antenatally	• Cord ligation • Drain in uterus at time of C-section • MTX 50 mg/wk x 6 weeks	• Weekly hCG • Weekly ultrasound	• Ultrasound showed decreased mass and no vascularity at 4 weeks • hCG 52 at 5 weeks • Mild vaginal bleeding and 3-cm dilated cervix at 7 weeks; D&C followed by emergent hysterectomy
Komulainen, 1995[31]	• Adherent placenta at delivery	• Antibiotics/oxytocin	• Weekly hCG • Weekly exams	• D&C 4 months postpartum • Normal menses after breastfeeding • Normal pregnancy 3+ years later

AUTHOR	DIAGNOSIS	TREATMENT	EVALUATION	RESULT
Komulainen, 1995[31]	• Adherent placenta at delivery • Ultrasound diagnosis of accreta	• Antibiotics/oxytocin	• Weekly hCG	• Endometritis PPD 16 treated with oral antibiotics • Reduced placenta on ultrasound PPD 16 with hCG of 26 • hCG zero on PPD 54 • Normal pregnancy 1 year postpartum
Legro, 1994[32]	• Adherent placenta at delivery • CT/MRI diagnosis of accreta	• Cord ligation • Cefoxitin/oxytocin for 3 days • MTX 1 mg/kg weekly until hCG zero x 2 weeks (10 doses, 610 mg total)	• Weekly hCG • Weekly ultrasound	• hCG zero at PPD 56 • 1-2 cm echogenic focus at 8 months on ultrasound • Normal pregnancy 2 years later
Raziel, 1992[33]	• Adherent placenta at delivery • Ultrasound diagnosis of accreta	• Cord ligation • Cefazolin 1 g q8h, metronidazole 500 mg q12h • MTX 20 mg on PPD 4 and 5	• Serial hCG • Serial ultrasound	• No change in mass size on PPD 4 MTX • Tissue passed PPD 7 • Ultrasound: reduction in mass on PPD 11 • Normal uterus on ultrasound PPD 12
Hollander, 1988[34]	• Adherent placenta at delivery • Ultrasound diagnosis of accreta	• Antibiotics • Methylergonovine	• Intermittent exams and ultrasounds	• Ultrasound showed decreased mass at PPD 13 • hCG zero at 8 weeks • Normal menses at 4 months
Arulkumaran, 1986[35]	• Adherent placenta at delivery	• Cord ligation • Ampicillin 500 mg q6h, metronidazole 200 mg q8h x 5 days • MTX 50 mg qod x 5 doses with folic acid 6 mg qod x 2 doses	• hCG PPD 12 • Ultrasound PPD 13	• Tissue passed PPD 11 • hCG zero PPD 12 • Normal uterus on ultrasound PPD 13 • Normal menses returned at 8 weeks
Gorodeski, 1982 (series of 8 cases)[36]	• Adherent placenta at delivery	• None	• No information	• 1 patient required TAH for hemorrhage • 2 patients had subsequent normal pregnancies
Oumachigui, 1981 (series of 2 cases)[37]	• Adherent placenta at delivery	• Antibiotics	• No information	• No complications reported

CT = computed tomography; hCG = human chorionic gonadotropin; IM = intramuscular; MRI = magnetic resonance imaging; MTX=methotrexate; PPD=postpartum day; qod = every other day; TAH = total abdominal hysterectomy

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for placenta accreta.[5] All maternal deaths were directly related to excessive blood loss, and the median transfusion quantity was 7 units of packed red blood cells for patients managed surgically. This compares to a rate of 5% for infection[28] and 0.1% for ureteral injuries[29] in simple cesarean sections.

Conclusion

Although hysterectomy traditionally has been the definitive treatment for placenta accreta, clinicians should consider medical management for patients who are clinically stable and wish to preserve fertility. Adequate transfusion facilities; sensitive ultrasound examination and hCG assays; and rapidly responding, highly skilled surgical and anesthesia teams should be available nonetheless. When surgical management is indicated, proper preparation is crucial. If hemorrhage occurs, surgeons should follow a stepwise approach to ensure hemostasis. Further research should focus on preventing hemorrhage, better understanding the mechanism of abnormal placentation, and optimizing medical management regimens. ■

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The authors report no financial relationship with any companies whose products are mentioned in this article.