



Manual on

IMAGING IN OBSTETRICS AND GYNECOLOGY

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Placenta Accreta Spectrum

Smita Dhengle

Placenta accreta is a serious obstetric complication characterized by the abnormal adherence of the placenta to the uterine wall. This condition can lead to significant maternal morbidity and mortality due to complications such as severe hemorrhage, infection, and the need for surgical interventions like hysterectomy. The prevalence of placenta accreta has been rising, primarily due to increased cesarean delivery rates, with estimates suggesting it occurs at approximately 1 in 533 pregnancies.

■ NORMAL PLACENTA

It is made of two layers: Decidua and superficial myometrium, the decidua containing the tip of the spiral arteries and the superficial myometrium containing the spiral and basal arteries.

In normal placentation, there is hypoechoic retroplacental space known as *Clear Zone*.

The appearance of the clear zone changes with advancing gestational age, location of placenta in the uterine cavity and direct pressure by the ultrasound probe (Fig. 1).

Uterine Scar

Muscles including myometrium do not heal by regenerating muscle fiber leading to collagen + myofiber disarray, tissue edema, inflammation and elastosis.

Scar tissue is thinner and less elastic and more prone to injury than the intact muscle therefore lower uterine segment is thinner and contains less muscle fiber leading to C section scar defect.

Placenta Accreta Spectrum

It is the failure of normal decidualization in an area of a previous uterine scar.

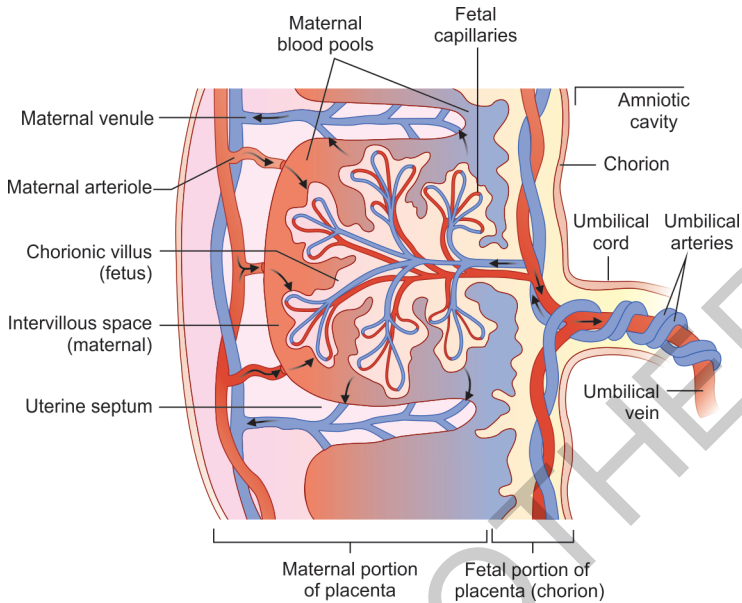


Fig. 1: Blood vein system of placenta.

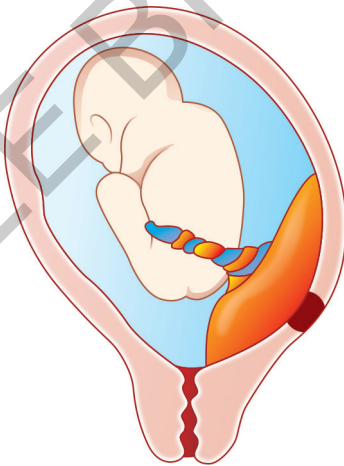


Fig. 2: Placenta accreta.

There are three main types of placenta accreta, classified based on the depth of placental invasion:

1. *Placenta accreta*: The placenta attaches deeply to the uterine wall but does not penetrate the muscle (**Fig. 2**).
2. *Placenta increta*: The placenta invades the myometrium (muscle layer of the uterus) (**Fig. 3**).

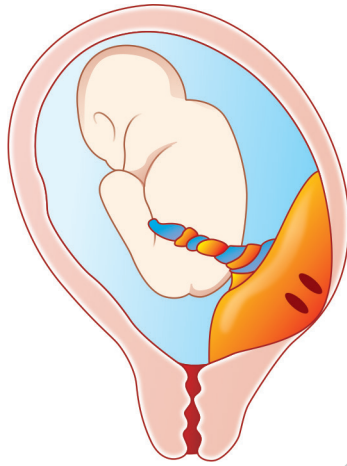


Fig. 3: Placenta increta.

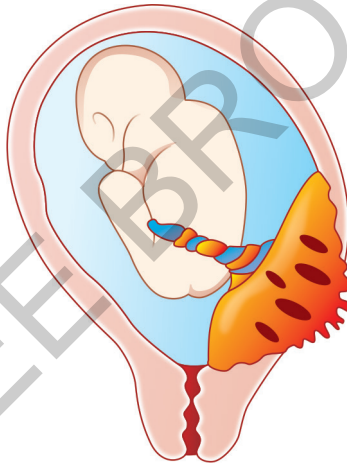


Fig. 4: Placenta percreta.

3. *Placenta percreta*: The placenta penetrates through the uterine wall and may attach to adjacent organs, such as the bladder (**Fig. 4**).

PAS disorder may coexist within same placenta (**Fig. 5**).

■ RISK FACTORS

Several factors increase the risk of developing placenta accreta:

Direct Surgical Scar

- Surgical termination of pregnancy
- Dilatation and curettage

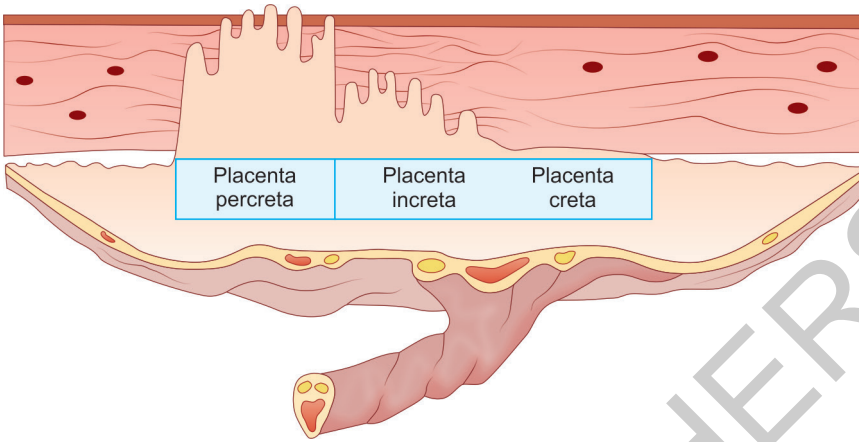


Fig. 5: PAS disorder in same placenta.

- Myomectomy
- Endometrial resection
- Previous cesarean section
- The main risk factor for PAS is previous C-section delivery and placenta previa in the current pregnancy
- In the presence of placenta previa, the risk of PAS increases:
 - 3% in those without a previous cesarean section
 - 10% after 1 previous CS
 - 40% after 2 previous CS
 - 60% after 3 previous CS
 - Scar in the myometrium of the lower uterine segment—encourages both implantation of the blastocyst in the area of the scar and abnormal adherence or invasion of placental villi within the scar tissue.

Poor vascularization and tissue oxygenation in the area of a cesarean scar is associated with local failure of re-epithelialization and decidualization and has an impact on both implantation and placentation.

Nonsurgical Scar

- Uterine artery embolization
- Endometritis
- Chemotherapy and radiation
- Intrauterine devices
- Asherman syndrome

Uterine Anomaly

- Bicornuate uterus
- Adenomyosis
- Myotonic dystrophy

■ DIAGNOSIS

Placenta Accreta Spectrum: Ultrasound Signs

Loss of the Clear Zone

In this hypoechoic retroplacental zone is not visible it is found in about 70% of cases (**Fig. 6**)

Myometrial Thinning

The myometrium under the placenta measures <1 mm or becomes undetectable (**Fig. 7**).

This sign is found in about 50% of affected cases and *not a strong ultrasound marker for PAS*.

Scar dehiscence: The myometrium can become so thin that the placenta can be seen through it at delivery (**Fig. 8**).

Uterine window represents deficient myometrium rather than abnormal placentation. The placental bladder border is smooth and regular.

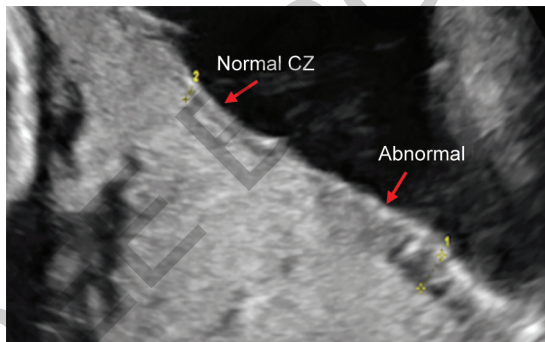
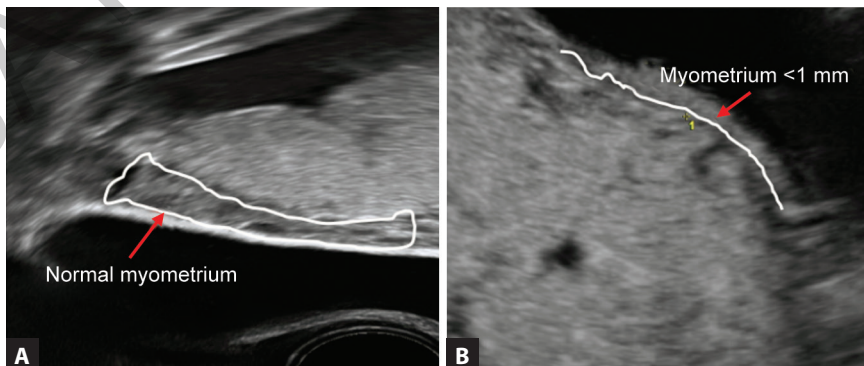


Fig. 6: Hypoechoic retroplacental zone.



Figs. 7A and B: (A) Normal myometrium; (B) Myometrium <1 mm.

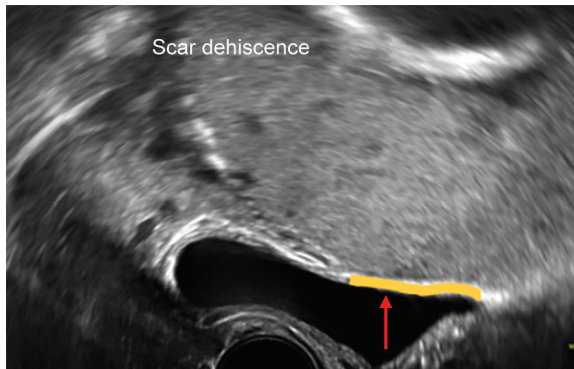


Fig. 8: Scar dehiscence.

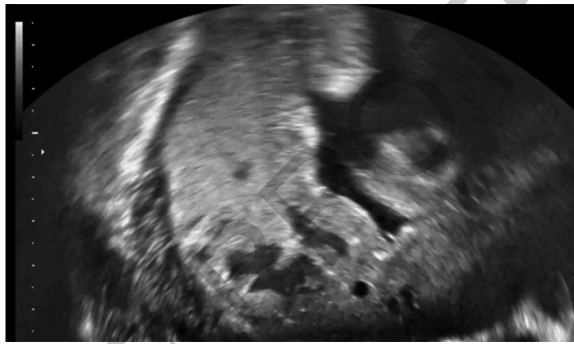


Fig. 9: Placental lacunae.

TABLE 1: Placental lacunae vs. lakes.

<i>Lacunae</i>	<i>Lakes</i>
Irregular margins	Regular margins
Numerous	Fewer
Feeder vessel commonly seen	Feeder vessel uncommonly seen
High velocity blood vessel seen	

Placental Lacunae

- It is the most common ultrasound sign in PAS (**Fig. 9**). It is formed due to distorted cotyledons and interlobular septa.
- Lacunae have direct high velocity maternal blood from a radial or arcuate artery, the peak systolic velocity is often >10 cm/sec. Their shape is not influenced by the filling of the bladder or pressure from the probe.

Table 1 shows the difference between lacunae and lakes.

Bladder Wall Interruption

It is the irregularity of the bladder wall between the placenta and the bladder due to massive developing of dilated vessels between the anterior uterine wall and the posterior bladder wall.

Placental Bulge

Placental bulge represents villous invasion deep into the myometrium distorting the uterine shape, the placenta bulges into the surrounding tissue, usually the bladder (**Fig. 10**).

Exophytic Mass

- Seen only in the case of placenta percreta (**Fig. 11**)
- It is the invasion of placental tissue through the myometrium into extrauterine organs.

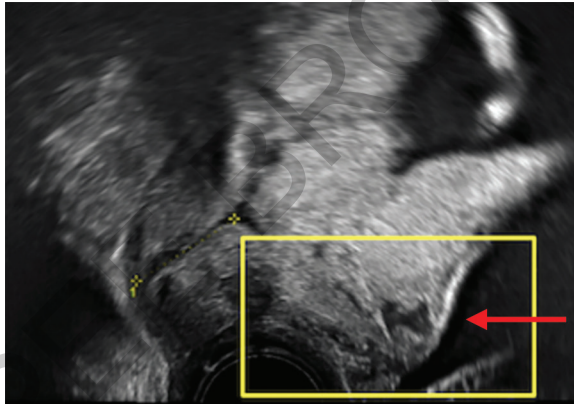


Fig. 10: Placental bulge.

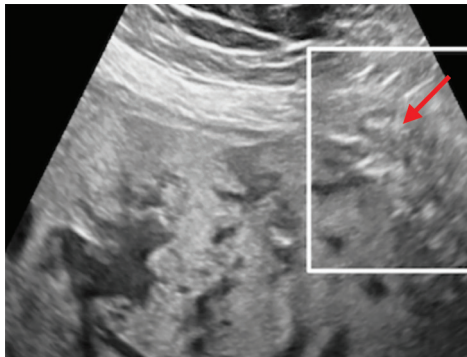


Fig. 11: Exophytic mass.

Uterovesical Hypervascularity and Bridging Vessels

These are actually dilated vessels within the peritoneum between the bladder and uterus and these vessels do not cross the uterine serosa or penetrate the bladder wall (**Fig. 12**). Color Doppler signals arising in the myometrium and crossing the uterine wall into the bladder. This is not evidence of placenta percreta. Hypervascularization within or under the placental bed is found in about 80% of cases of placenta increta and 75% result from excessive dilatation of the cases of placenta percreta.

Subplacental Hypervascularity

Characterized by abnormal subplacental blood flow.

Lacunae Feeder Vessels

These feeder vessels are often seen entering placental lacunae with high velocity blood flows arising directly from a radial or arcuate artery.

MRI

- Excellent tool for diagnosing the PAS.
- Placental bulge and uterine serosal hypervascularity are useful MRI features for differentiating placenta percreta and increta from placenta accreta (**Fig. 13**).
 - The more extensive and invasive the placenta, the more distorted the vascular architecture should be.
 - Marked heterogeneity and intraplacental dark bands in a T2-weighted image are the most sensitive MRI signs for detecting PAS.
 - In cases with the absence of placental heterogeneity or dark intraplacental banding, evaluation of the uterine contour and myometrial changes may be helpful for diagnosing PAS.
 - The presence of two or more MRI features increases the reliability of a PAS diagnosis.

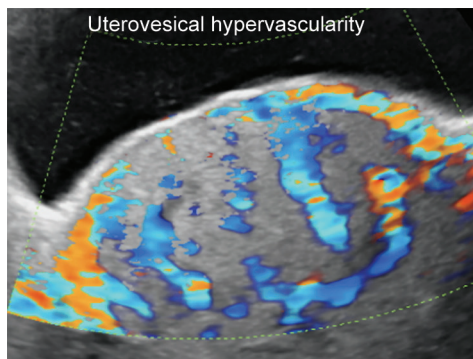


Fig. 12: Uterovesical hypervascularity.

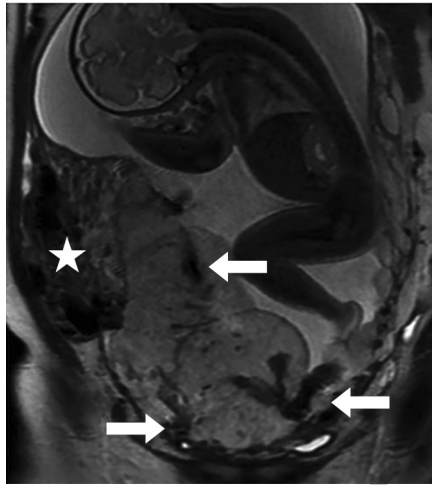


Fig. 13: MRI of placenta percreta.

- Regarding the bladder tenting sign, under- or overdistension of the bladder may cause a false interpretation of this sign.
- Some imaging planes can lead to a false-positive diagnosis of PAS due to the curved shape of the uterus. Suspicious findings should be confirmed in more than one imaging plane.
- MRI should not be used alone. A combined study that includes both MRI and US, in addition to the clinical context, must be performed.

■ MANAGEMENT STRATEGIES

Management of placenta accreta involves a multidisciplinary approach, often requiring careful planning and coordination among obstetricians, anesthesiologists, and surgical teams including interventional radiologists. The primary treatment options include:

- *Cesarean hysterectomy:* This is the most common approach, where the uterus is removed after the delivery of the fetus. This method minimizes the risk of severe hemorrhages that can occur if attempts are made to remove the placenta.
- *Conservative management:* In select cases, particularly when there is a desire to preserve fertility, conservative management may be considered. This approach can include leaving the placenta in situ and monitoring the patient closely, with interventions such as methotrexate or uterine artery embolization. Prophylactic transcatheter uterine artery embolization after the baby is delivered is also being followed.
- *Postpartum care:* Women diagnosed with placenta accreta require close monitoring postpartum due to the risk of hemorrhage and infection. If the placenta is retained, management may involve medication or surgical intervention to address complications.

■ CONCLUSION

Placenta accreta is a complex and increasingly common condition that poses significant risks to maternal health. Early diagnosis and a well-coordinated management plan are essential to improve outcomes for both mother and child. As the rates of cesarean deliveries continue to rise, awareness and understanding of placenta accreta will be crucial for healthcare providers to ensure the safety and well-being of affected patients.

■ SUGGESTED READING

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