

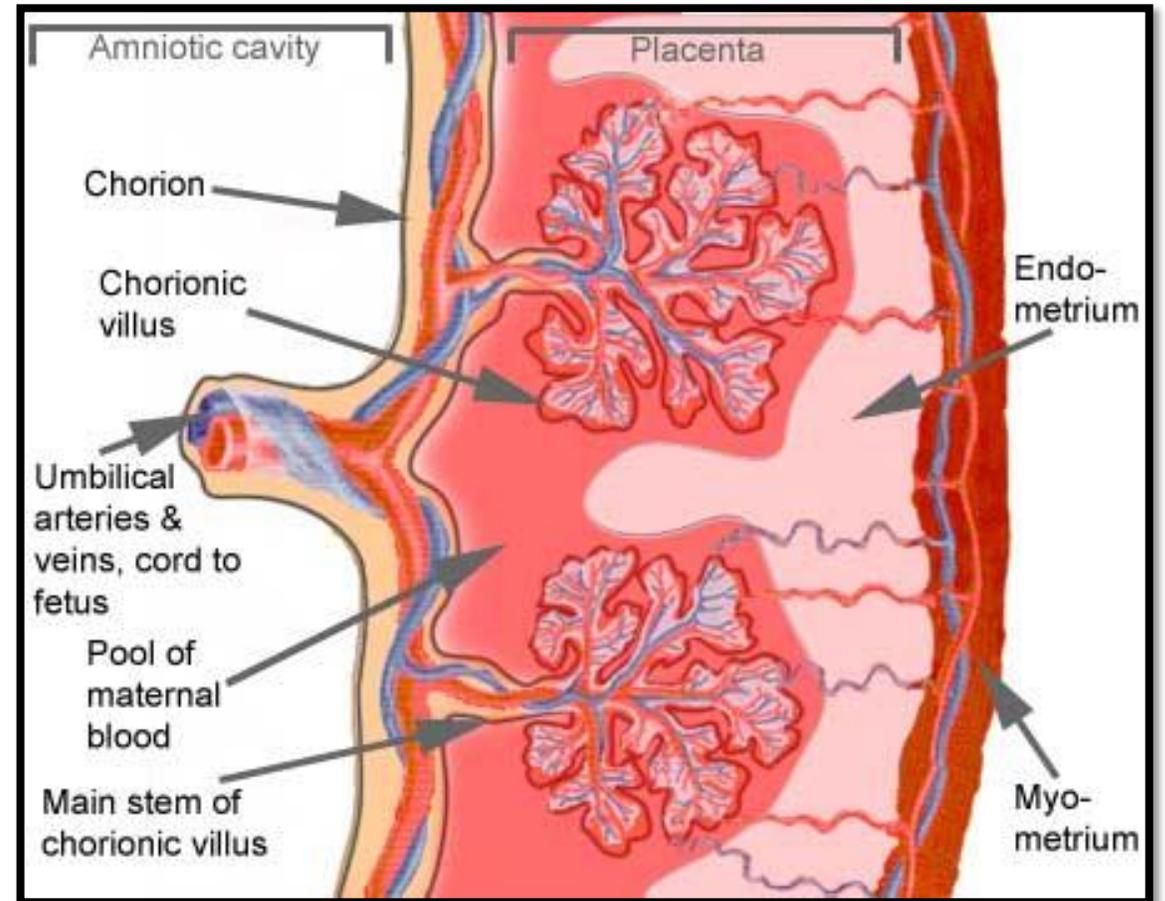
# MORBIDLY ADHERENT PLACENTA

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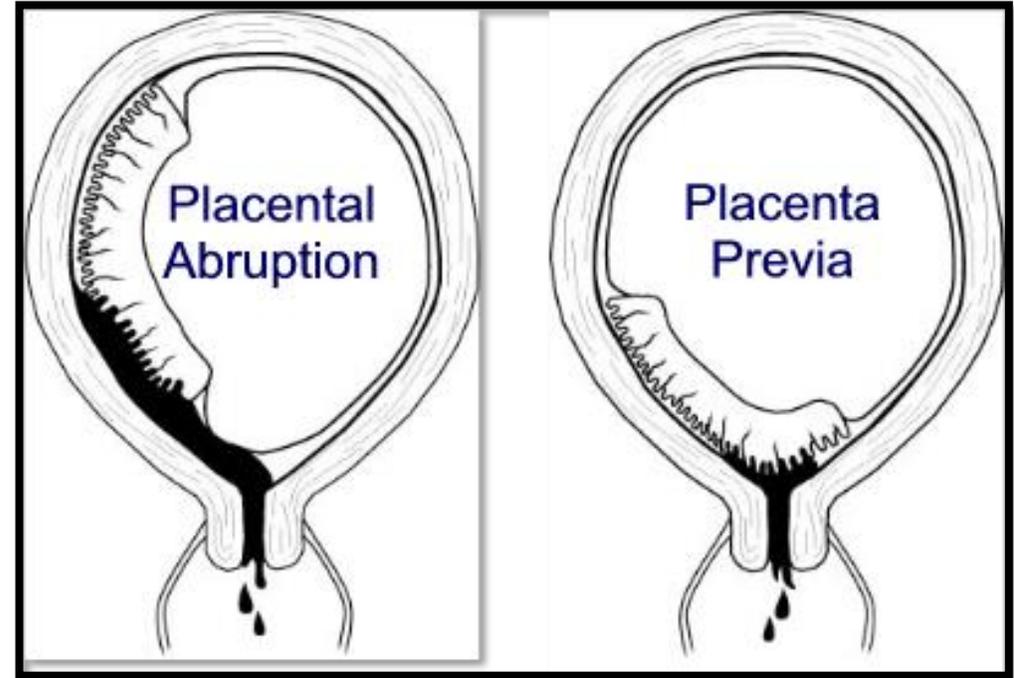
# NORMAL PLACENTAL STRUCTURE

- Normal placentation results from adherence of the blastocyst to the decidualized endometrium
- Fully developed normal placenta has a structure on cross section seen in the image
- Important points to note
  - Placenta is the interface with the endometrium
  - Stays a good distance away from the myometrium



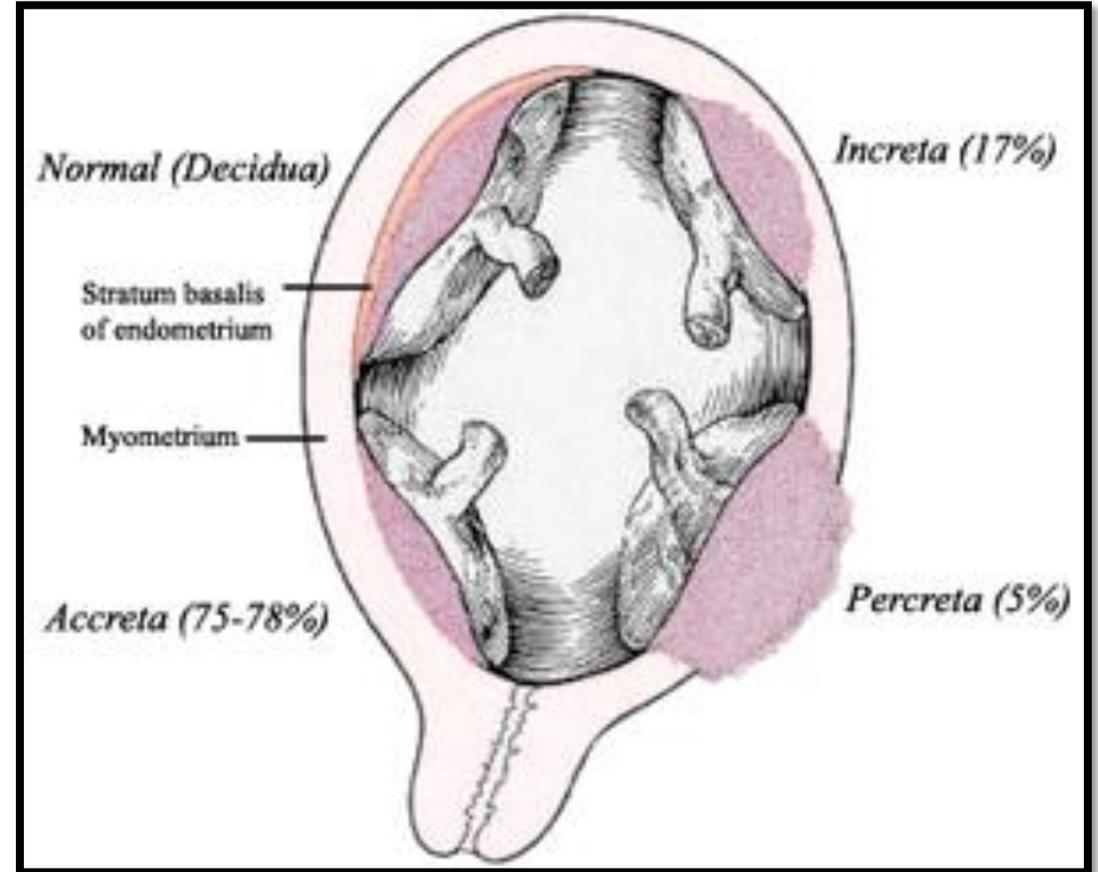
# ABNORMAL PLACENTATION

- Abnormal placentation includes
  - Most common
    - Placental abruption
    - Placenta previa
  - Less common
    - Cesarean scar ectopic pregnancy
    - Cervical pregnancy
  - Increasing in incidence
    - Accreta spectrum



# MORBIDLY ADHERENT PLACENTA: *A SPECTRUM*

- Placenta accreta spectrum of disorders occur secondary to abnormal adherence of the placenta to the myometrium, instead of the decidua
- This abnormal adherence has important clinical implications that can result in severe maternal and neonatal morbidity and mortality



# WHY SHOULD WE UNDERSTAND THIS CONDITION?

- Non-separation of placenta leads to
  - Massive hemorrhage
  - Associated complications
    - Disseminated intravascular coagulation (DIC)
    - Multiorgan dysfunction and/or failure

- Correction and treatment of hemorrhage often requires
  - Massive transfusion
  - Intensive care unit (ICU) admission
  - Interventional radiologic procedures
  - Hysterectomy
- Overall increase in morbidity
- Overall increase in mortality

**MAIN REASONS FOR INCREASED  
IN ANTENATALLY DIAGNOSED  
PLACENTA ACCRETE SPECTRUM**

Increased recognition of risk  
factors

Availability of obstetric  
ultrasonography



**MAIN REASONS WHERE PLACENTA  
ACCRETA SPECTRUM IS ENCOUNTERED  
AT THE TIME OF DELIVERY**

Inability of the obstetrician / provider of  
obstetric care to identify risk factors

Non-availability of obstetric  
ultrasonography

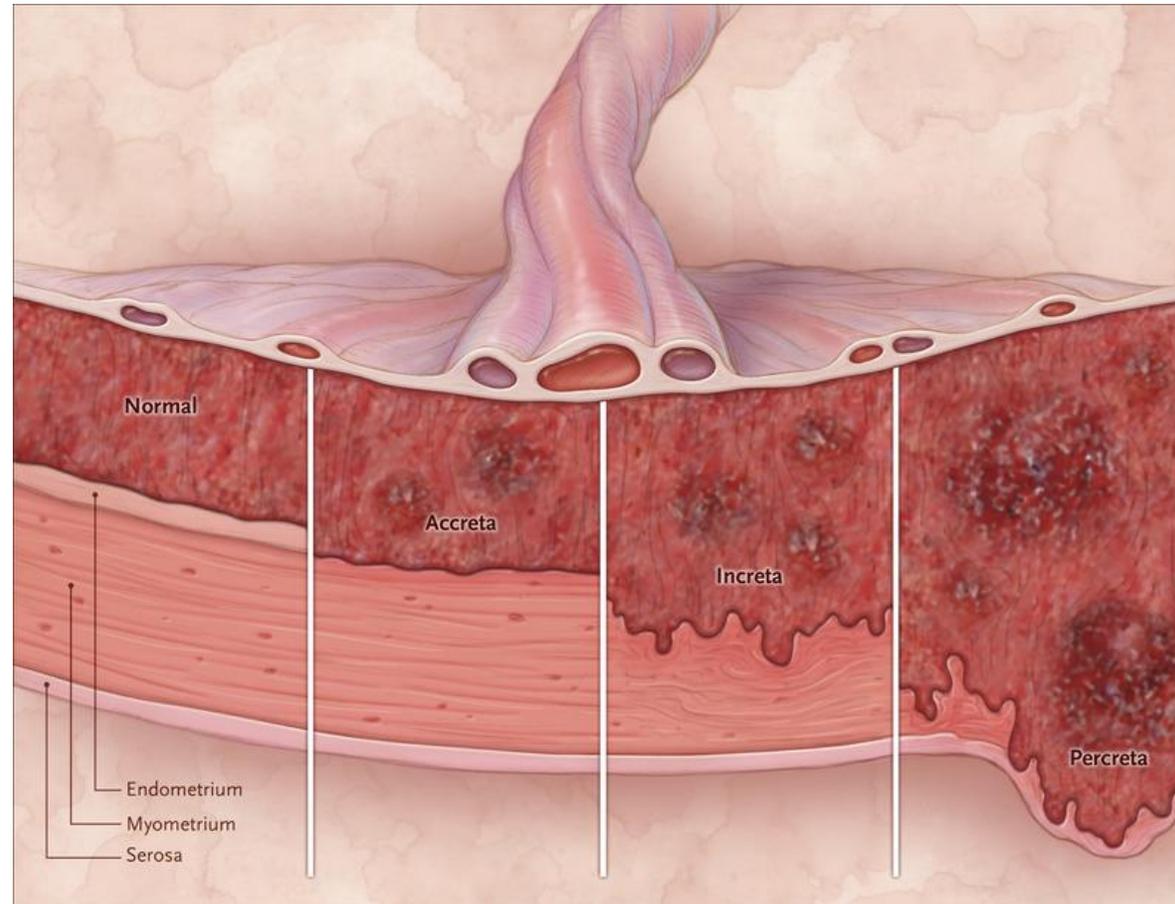


**IMPORTANT FOR ALL OBSTETRICIANS TO  
KNOW ABOUT THE PLACENTA ACCRETA  
SPECTRUM OF DISORDERS TO ENSURE  
EARLY RECOGNITION OF RISK FACTORS  
AND TO DIAGNOSE THE CONDITION  
ANTENATALLY AND NOT INTRAPARTUM**

# GRADES OF THE DISORDER

- The term 'placenta accreta' has been used to describe a single pathologic entity, as well as a generic term for the disease spectrum
- Placenta accrete (vera): If the placenta attaches to, but does not invade into, myometrium
- Placenta increta: If the placenta invades into the myometrium, but not beyond
- Placenta percreta: When the placenta invades through the serosal layer and potentially beyond
- In this spectrum, placenta accreta is the most common and placenta percreta the least common

# MORBIDLY ADHERENT PLACENTA



# EPIDEMIOLOGY

- Substantial increase in the rate of rate of cesarean delivery over the past few decades
- As the cesarean rate has increased, the incidence of placenta accreta spectrum disorders has increased
- Between the 1960s and 2002, there has been a nearly 60-fold increase, from 1 in 30,000 pregnancies to 1 in 533
- As placenta accretas have increased, the indications for peripartum hysterectomy have changed
- Placenta accreta now accounts for up to 47% of cases of obstetric hysterectomy

# PATHOPHYSIOLOGY

- The pathophysiology of placenta accreta disorders is uncertain
- The result is abnormal adherence of the trophoblasts surrounding the blastocyst to and/or through the myometrium
- In pregnancies not complicated by accreta, trophoblast invades the endometrium until they reach Nitabuch's layer (spongiosus layer of the decidua)
- Upon reaching this layer, cytotrophoblasts cease invasion and begin to differentiate into the placental tissue needed for a successful pregnancy

# PATHOPHYSIOLOGY

- An association between the increasing numbers of cesarean deliveries and the risk of subsequent placenta accreta
- This association is thought to be owing to malrepair of the endometrium and/or decidua basalis
- With the subsequent pregnancy, cytotrophoblasts invade decidualized endometrium, but fail to encounter the spongiosus layer and do not encounter the normal signal to stop invasion
- Instead, trophoblasts continue their invasion to an abnormal degree

# PATHOPHYSIOLOGY

- Histopathologic evaluation of placenta accreta specimens support this theory; they show trophoblast invasion of the myometrium without evidence of a decidual layer in between
- Trophoblast inclusions (inner layer of syncytiotrophoblasts, outer layer of cytotrophoblasts contained solely within chorionic villi) also are more common in placenta accreta specimens compared with normal placentas
- Decidual natural killer cells also are fewer in patient with placenta accreta

# PATHOPHYSIOLOGY

- Relative hypoxia of cesarean scar tissue (resulting from fibroblast-based repair and decreased vessel concentration) may also be involved in the pathophysiology of Accreta
- Cytotrophoblast invasion is stimulated by invasion—not until they reach spiral arterioles do the trophoblasts differentiate and change behavior, allowing for spiral arteriole reorganization and increased oxygen tension and delivery.
- The relative hypoxia of the cesarean scar tissue may recruit preferentially the blastocyst to implant in areas that result in an increased risk of placenta accreta.
- The increased incidence of previas and accretas in women with multiple cesareans (and therefore increased relatively hypoxic tissue) supports this theory

# MOST IMPORTANT RISK FACTOR : CS

- Immaterial of the true pathophysiology of abnormal placentation, multiple studies support the substantially increased risk of placenta accreta in women with a history of multiple cesarean deliveries.
- The majority of placenta accretas occur in multiparous women, especially in those with at least 1 prior cesarean delivery.
- As the number of prior cesarean's increase, so does the risk of encountering a placenta accreta, increta, or percreta.
- For example, women with a history of 3 or 4 cesareans have at least a 2% chance of accreta; women underdoing their sixth or greater cesarean delivery (having had at least 5 previous cesarean sections) have a more than 3-fold higher risk of accreta

# PLACENTA PREVIA : AN IMPORTANT RISK FACTOR

- Although accreta can occur without placenta previa, the presence of a placenta previa and a history of multiple cesareans increase drastically the risk of abnormal placentation involving a previous cesarean scar
- Even with just 1 previous cesarean delivery, the presence of a placenta previa should increase the clinician's suspicion for a possible placenta accreta

# OTHER RISK FACTORS

- Other uterine surgeries
  - Uterine curettage
  - Myomectomy
  - Hysteroscopic surgery
  - If Asherman's syndrome develops (most commonly after, but not limited to, uterine curettage), the risk of accreta seems to be particularly high
- Other risk factors
  - Prior endometrial ablation
  - Uterine embolization (arterial or fibroid specific)
  - Pelvic irradiation

# OTHER RISK FACTORS: INCONSISTENT ACROSS STUDIES

- A history of abnormal placentation in a previous pregnancy (specifically placenta accreta spectrum disorders)
- Current placenta previa without history of cesarean delivery also increases the risk of accreta
- Disorders that result in or indicate abnormal endometrial histologic architecture
- Advanced maternal age
- Increasing parity

# PREVENTION

- Primary Prevention of placenta accrete: Avoiding multiple cesarean deliveries or other uterine surgeries, for which societal and economic as well as medical issues need to be considered
- Goals include both prevention of the first cesarean (primary prevention) and in identifying and encouraging appropriate trial of labor after cesarean.
- Potential secondary prevention methods
  - Alterations in surgical technique: Areas of active investigation
  - Double layer versus single layer
  - Incorporation of endometrium versus non-incorporation of endometrium
  - Use of revascularization-promoting topical agents.

# DIAGNOSIS

- The gold standard continues to be histologic examination of the placenta and uterus with documentation of abnormal trophoblast invasion of the myometrium
- However, this is only possible when a hysterectomy is performed
- Although this is often done, it does not occur in every case
- Accreta is considered to be present when the placenta is “abnormally adherent”
- Diagnosis is extremely subjective and can be controversial
- Most authorities only consider cases that require additional surgical interventions to control bleeding

# DIAGNOSIS

- Obstetric ultrasonography has improved dramatically the antenatal diagnosis of placenta accreta spectrum
- This is highly desirable, given the high morbidity and mortality associated with placenta accreta
- Several studies suggest that outcomes can be optimized with prenatal diagnosis to levels similar of less complicated accretas
- Imaging modalities for antenatal diagnosis include ultrasonography and MRI

# ULTRASONOGRAPHY

- USG is reported to have a sensitivity of 80% to 90% and a specificity of nearly 98% for diagnosis and exclusion of diagnosis of placenta accreta, respectively
- Variation in the accuracy statistics of USG with few studies showing only 65%
- Ultrasonographic quality, ultrasonographer skill, and clinician experience are further contributors to sensitivity and specificity
- Knowledge of the clinical scenario and risk factors improves the accuracy of ultrasound

# USG: THE BEST SCREENING TEST

- Ultrasound findings suggestive of accreta can vary and depend on gestational age and placental development
- In the first trimester, a finding of a gestational sac implanted low and anterior in the uterus is concerning for accrete
- Loss of the retroplacental– myometrial zone can also potentially be seen in the first trimester
- The most helpful finding on USG is to identify presence of placenta previa
- The presence of a placenta previa drastically changes the likelihood of placenta accreta
- Performance is assuredly worse in low-volume centers

- Ultrasonographic findings of normal placentation include a uniform, homogenous placenta and bladder
- There should be a distinct intervening echolucent zone (myometrial zone) between the placenta and bladder

- (Image to be inserted)

# USG FINDINGS IN PLACENTA ACCRETA

- The lack of a homogenous appearance and the varying sizes of lacunae give the placenta a “swiss cheese” appearance
- Doppler velocimetry often detects lacunar turbulence
- Increased vascularity of the bladder–placenta interface and vessel crossing of placenta–uterine wall interface
- Turbulent flow and the presence of lacunae are most consistently associated with accreta

# MRI

- MRI is a newer modality for diagnosis of accreta and is not performed routinely in all centers
- Excellent sensitivity and specificity of MRI: Almost as high as 90% and 98%, respectively
- MRI has highly predictive accuracy in assessing
  - Depth of invasion
  - Topography of invasion using uterine bulging
  - Focal interruption of the myometrium
  - Bladder tenting
  - Intraplacental bands

# MATERNAL BLOOD MARKERS?

- Biomarkers in maternal blood may aid in the diagnosis of placenta accreta
- Current putative markers include alpha-fetoprotein, cell-free fetal/placental DNA, placental mRNA, cell-free human placental lactogen mRNA, b-human chorionic gonadotropin, pregnancy-associated plasma protein A, and creatinine kinase
- These analytes are generally markers of placental damage and/or abnormal placental development
- Although these markers show promise in accreta diagnoses, they are not accurate enough to use clinically at this time

**Recommendation****Grade of Recommendation***Diagnosis of Placenta Accreta Spectrum*

Although ultrasound evaluation is important, the absence of ultrasound findings does not preclude a diagnosis of PAS; thus, clinical risk factors remain equally important as predictors of PAS by ultrasound findings.

1A Strong recommendation, high-quality evidence

It is unclear whether MRI improves diagnosis of PAS beyond that achieved with ultrasonography alone. Accordingly, MRI is not the preferred recommended modality for the initial evaluation of possible PAS.

1B Strong recommendation, moderate-quality evidence

Women with suspected PAS diagnosed in the antenatal period based on imaging or by clinical acumen should be delivered at a level III or IV center with considerable experience whenever possible to improve outcomes.

1B Strong recommendation, moderate-quality evidence

## *Management*

Optimal management involves a standardized approach with a comprehensive multidisciplinary care team accustomed to management of PAS.

1B Strong recommendation, moderate-quality evidence

Delivery at 34 0/7–35 6/7 weeks of gestation is suggested as the preferred gestational age for scheduled cesarean delivery or hysterectomy absent extenuating circumstances in a stable patient. Earlier delivery may be required in cases of persistent bleeding, preeclampsia, labor, rupture of membranes, fetal compromise, or developing maternal comorbidities.

1A Strong recommendation, high-quality evidence

In the setting of hemorrhage, data from other surgical disciplines support the use of a range of 1:1:1 to 1:2:4 strategy of packed red blood cells: fresh frozen plasma: platelets.

1A Strong recommendation, high-quality evidence

Conservative management or expectant management should be considered only for carefully selected cases of PAS after detailed counseling about the risks, uncertain benefits, and efficacy and should be considered investigational.

2C Weak recommendation, low-quality evidence

Abbreviations: MRI, magnetic resonance imaging; PAS, placenta accreta spectrum.

# MANAGEMENT OF PLACENTA ACCRETA

- **ENSURING ANTENATAL DIAGNOSIS**

- The antenatal diagnosis of placenta accreta spectrum is critical because it provides an opportunity to optimize management and outcomes.

- **SYSTEMS EQUIPPED FOR HANDLING THE CONDITION**

- Established infrastructure and strong nursing care and access to a blood bank capable of employing massive transfusion protocols should help guide decisions about delivery location.

- **MULTIDISCIPLINARY TEAM APPROACH**

- Optimal management involves a standardized approach with a comprehensive multidisciplinary care team (experienced obstetricians and maternal–fetal medicine subspecialists, pelvic surgeons, urologists, interventional radiologists, obstetric anesthesiologists, critical care experts, general surgeons and neonatologists).

# DIAGNOSIS IN THE PREVIABLE PERIOD

- When the diagnosis of placenta accreta spectrum is made in the previable period, possibility of pregnancy termination for maternal indications given the significant risks of maternal morbidity and mortality should be discussed
- However, there are currently no data to support the magnitude of risk reduction, if any
- Further, pregnancy termination in the setting of suspected placenta accreta spectrum also carries risk, and the complexities of counseling should be undertaken by health care providers who are experienced in these procedures

# Management of placenta accreta spectrum: Best consensus management

- Performing a cesarean delivery followed immediately by cesarean hysterectomy before the onset of labor improves maternal outcomes, yet the optimal timing remains unclear
- Although individual factors are relevant, a window of 34 0/7–35 6/7 weeks of gestation is suggested as the preferred gestational age for scheduled cesarean delivery or hysterectomy absent extenuating circumstances in a stable patient

# MANAGEMENT: TIMING OF DELIVERY

- Earlier delivery may be required in cases of persistent bleeding, preeclampsia, labor, rupture of membranes, or fetal compromise, or developing maternal co-morbidities
- Waiting beyond 36 0/7 weeks of gestation is not advised because approximately one half of women with placenta accreta spectrum beyond 36 weeks require emergent delivery for hemorrhage
- Use of antenatal corticosteroids for lung maturation is appropriate in women with antenatally diagnosed accreta and anticipated delivery before 37 0/7 weeks of gestation

# PRE-OPERATIVE HEMOGLOBIN OPTIMIZATION

- Anemia during pregnancy should be evaluated and managed accordingly based on specific diagnosis
- Optimizing hemoglobin values during pregnancy is priority
- When iron deficiency is noted, all efforts—including oral replacement or intravenous infusions—can be employed
- Notification and collaboration with the blood bank is recommended for large-volume blood transfusion
- This is particularly relevant in cases that are difficult to cross match
- Estimates of perioperative blood loss in cases of placenta accreta vary widely
- Autologous advance blood donation and serial hemodilution strategies are infrequently used and not routinely recommended

# HOSPITALIZATION OR BEDREST: DOES IT HELP?

- Bedrest (or decreased activity) or pelvic rest, or both, is of unproven benefit in all settings, including placenta accreta spectrum, although in the past it was often advised, especially in the setting of bleeding.
- Women with complications will benefit from hospitalization
  - Antenatal bleeding
  - Preterm labor
  - Preterm prelabor rupture of membranes
- Issues such as distance from a hospital or referral center and other logistic considerations also may influence the decision to hospitalize
- Individual preference

# PREOPERATIVE URETERIC STENT PLACEMENT

- The value of preoperative ureteric stent placement in cases with noted bladder involvement is unclear and is left to a case-by-case evaluation
- Collaboration with a urologic surgeon or a gynecologic oncologist is advisable in cases with suspected urologic involvement
- The role of preoperative placement of catheters or balloons into pelvic arteries for potential interventional radiologic occlusion also is controversial
- Because serious complications such as arterial damage, occlusion, and infection may occur, routine use is not recommended

# INTRAOPERATIVE MANAGEMENT

- The most generally accepted approach to placenta accreta spectrum is cesarean hysterectomy with the placenta left in situ after delivery of the fetus
- Attempts at forced placental removal often result in profuse hemorrhage and are strongly discouraged
- If an antenatal diagnosis of placenta accreta spectrum is uncertain or the preoperative diagnosis is unclear, a period of intraoperative observation for spontaneous uterine placental separation is appropriate as long as preparations for uterine removal are in place
- Some clinicians will rapidly close the uterine incision and then proceed with hysterectomy after verification that the placenta will not spontaneously deliver

# INTRAOPERATIVE MANAGEMENT

- Choice of skin incision is left to operator judgment, although many employ vertical incisions for better access and visualization
- Wide transverse incisions are acceptable
- Inspection of the uterus after peritoneal entry is obtained is highly recommended to discern the level of placental invasion and specific placental location, which allows for optimizing the approach to the uterine incision for delivery and likely hysterectomy
- Whenever possible, the incision in the uterus should avoid the placenta, which sometimes makes a nontraditional incision necessary
- Cystoscopy is sometimes necessary to discern anatomy if bladder involvement is suspected on direct visualization

# INTRAOPERATIVE MANAGEMENT

- In most cases when hysterectomy is necessary, a total hysterectomy is required because lower uterine segment or cervical bleeding frequently precludes a supracervical hysterectomy
- Extensive vascular engorgement with challenging anatomy is common
- Having the most experienced pelvic surgeons involved from the outset is recommended
- Careful dissection in the retroperitoneal space with attention to devascularization of the uterus is to be considered

# MONITORING OF VITAL PARAMETERS IS CRITICAL

- Close monitoring of volume status, urine output, ongoing blood loss, and overall hemodynamics is critically important during these cases
- Frequent and ongoing dialogue between surgical, anesthesia, and intraoperative nursing staff are recommended
- Ensure all are continuously apprised of current status, ongoing blood loss, and expectations about future blood loss

# Protocols to manage massive blood transfusion should be followed

- Use of hemorrhage checklists are strongly encouraged
- Ongoing attention to blood loss, hemoglobin, electrolytes, blood gas, and coagulation parameters is important to determine needs for replacement
- 1:1:1 to 1:2:4 strategy of packed red blood cells: fresh frozen plasma: platelets

# INTRAOPERATIVE CONTROL OF HEMORRHAGE

- Internal Iliac artery ligation may decrease blood loss,
  - Efficacy has not been proved
  - May be ineffective because of collateral circulation.
  - Ligation can be difficult and time consuming
  - Easily performed by mainly by experienced surgeons.
- Interventional radiology
  - Helpful when there is no single source of bleeding that can be identified at surgery.
  - Difficult to safely perform in unstable patients and the equipment and expertise are not available in all centers.
- Other methods
  - Pelvic pressure packing
  - Aortic compression or clamping.

# POSTOPERATIVE CARE

- This often is best provided in an intensive care unit setting to ensure hemodynamic and hemorrhagic stabilization
- Postoperative placenta accreta spectrum patients are at particular risk of
  - Ongoing abdominopelvic bleeding
  - Fluid overload from resuscitation
  - Other postoperative complications given the nature of the surgery
  - Potential for multiorgan damage and the need for supportive efforts

# COMPLICATIONS OF SURGICAL MANAGEMENT

- Despite scheduled delivery in a well-resourced setting with a highly experienced and adequately prepared multidisciplinary team, significant complications can occur.
- The most common are massive and/or persistent hemorrhage, cystotomy, ureteral damage, and bowel injury.
- ICU admission carries additional risks of infection from pneumonia and invasive catheters.
- There is higher risk of venous thromboembolism.
- Higher risk of pyelonephritis.
- Additional complications include injury to large vessels or pelvic nerves; wound, abdominal, and vaginal cuff infections; and the possible need for reoperation.

# ROLE FOR CONSERVATIVE OR EXPECTANT MANAGEMENT?

- Uterine preservation, referred to here as conservative management, is usually defined as removal of placenta or uteroplacental tissue without removal of the uterus.
- Expectant management is defined as leaving the placenta either partially or totally in situ. Because placenta accreta spectrum is potentially life threatening, hysterectomy is the typical treatment.
- Consideration of conservative or expectant approaches should be rare and considered individually.

# CONSERVATIVE MANAGEMENT

- Major complications of treatment of placenta accreta spectrum are loss of future fertility, hemorrhage, and injury to other pelvic organs.
- To reduce these complications, some have advocated conservative or expectant management in patients with placenta accreta spectrum
- For patients with focal placental adherence, removal of the placenta by either manual extraction or surgical excision followed by repair of the resulting defect has been associated with uterine preservation in some cases

# CONSERVATIVE MANAGEMENT

- The “best” candidates for conservative management include women with posterior placenta previa and accreta, a fundal accreta, a partial accrete, or when the diagnosis of accreta is uncertain

# MORBIDITY & MORTALITY

- Severe morbidity, defined as sepsis, septic shock, peritonitis, uterine necrosis, fistula, injury to adjacent organs, acute pulmonary edema, acute renal failure, deep vein thrombophlebitis or pulmonary embolism, or death.
- Mortality is about 6%
- Severe morbidity is extremely common with conservative management

- Maternal mortality has been reported to be as high as 7%, but seems to be less in larger series.
- In less well-resourced settings, mortality has been found to be even higher.
- The rates of morbidity, complications, and mortality are influenced by the type of accreta spectrum disorder present.
- Percretas are associated with an higher incidence of morbidity and mortality.
- Expertise of the delivery center also affects patient outcome.<sup>63</sup> Publication bias and underreporting of outcomes for low-volume facilities likely further increase the discrepancy in outcomes between low and high-volume centers.
- Perinatal mortality has been quoted as high as 25%

# ADJUNCTIVE MANAGEMENT TO CONSERVATIVE APPROACH

- Methotrexate
- Uterine artery embolization postoperative
- Hysteroscopic resection of uterine contents few months postpartum

# KEM EXPERIENCE

## **CASE DISCUSSIONS**

# FOLLOW-UP

- The multiple morbidities of placenta accreta, including psychosocial effects, should prompt close postpartum follow-up
- It is reasonable to consider additional postpartum visits starting at 1 week after delivery
- Close follow-up enables monitoring of delayed and late complications, assessment of emotional well-being, and the ability to offer needed support
- Difficulties with recovery from major surgery, neonatal morbidities and possible mortality, adjustment to lost fertility should all be assessed; appropriate counseling can be helpful and should be offered and made easily available

# FOLLOW UP

- Counseling should also consider subsequent gynecologic care (ie, need for cervical cancer screening in the setting of retained cervix and possible need for hormone replacement therapy in case of oophorectomy).
- For women managed without hysterectomy, counseling should include a discussion of the uncertain risk of recurrent accreta and recommended interpregnancy intervals.
- Subsequent pregnancy in a patient with a previous accreta should prompt early and close monitoring with careful, advanced preparation for antepartum and intrapartum management.

# SUMMARY

- As the incidence of cesarean deliveries have increased, placenta accreta also has increased and is an important cause of maternal and fetal/neonatal morbidity and mortality
- Although multiple cesarean deliveries are the largest risk factor for placenta accreta, previa, increasing maternal age and parity, as well as other uterine surgeries are also important
- In patients at risk for accreta, obstetric ultrasonography performed by an experienced provider should be obtained
- A multidisciplinary team in a center with expertise in managing placenta accreta should care for cases of suspected accreta
- Most cases should be managed by planned cesarean hysterectomy before the onset of labor or bleeding
- Additional research is needed to identify optimal methods of secondary prevention, alternative modalities for diagnosis, surgical techniques, and appropriate conservative management strategies