International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://theaspd.com/index.php

Placenta Accreta Spectrum: From Abnormal Adherence to Invasive Disorders

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ABSTRACT:
Placenta accreta spectrum (PAS) occurs when all or part of placenta is abnormally attached to the myometrium due to partial or total absence of decidua basalis and improper development of fibrinoid and nitabuch's layer. It encompasses a range of abnormal placental adherence disorders, including placenta accreta, increta, and percreta, characterized by progressive invasion of chorionic villi into the myometrium and beyond. It is associated with prior cesarean delivery, placenta previa, uterine surgery, and assisted reproductive techniques. PAS has emerged as a major contributor to severe maternal morbidity and mortality, owing to its association with life-threatening hemorrhage, massive transfusion, disseminated intravascular coagulation, and multiorgan dysfunction. Prenatal diagnosis through high-resolution ultrasound and magnetic resonance imaging is crucial for optimal management, enabling multidisciplinary planning and delivery at specialized centers. Management strategies vary depending on disease extent, maternal condition, and reproductive wishes, ranging from cesarean hysterectomy to conservative approaches that preserve fertility. Despite advances in imaging and surgical techniques, PAS remains a critical challenge in modern obstetrics, underscoring the need for early risk identification, preventive strategies, and standardized management protocols to improve maternal outcomes.

Keywords: *Placenta accreta spectrum; abnormal placentation; placenta previa; cesarean hysterectomy; conservative management; maternal morbidity; prenatal diagnosis; obstetric hemorrhage; multidisciplinary care.*

INTRODUCTION

Placenta accreta spectrum (PAS) comprises a group of disorders characterized by abnormal adherence of placental villi to the uterine wall, resulting from defective decidualization and absence of the normal Nitabuch's layer. The spectrum includes placenta accreta (superficial adherence to the myometrium), placenta increta (invasion into the myometrium), and placenta percreta (penetration through the uterine serosa, with potential involvement of adjacent organs such as the bladder).The earliest description of abnormal placental adherence dates back to the 19th century, with pathological reports by Josef Friedrich Placenta in 1937 and further characterization by Irving and Hertig in 1937, who established placenta accreta as a distinct entity. Initially regarded as a rare complication, PAS has shown a dramatic rise in incidence over recent decades, mirroring the global increase in cesarean deliveries and uterine surgeries. This trend has transformed PAS from a rare obstetric curiosity into a major contributor to maternal morbidity and mortality. Recognized risk factors include placenta previa, prior cesarean delivery, uterine curettage or myomectomy, advanced maternal age, multiparity, and assisted reproductive techniques. Clinically, PAS is associated with massive obstetric hemorrhage, peripartum hysterectomy, disseminated intravascular coagulation, and maternal organ dysfunction, making it one of the most feared complications of pregnancy. Prenatal diagnosis has become central to management. High-resolution ultrasonography, supplemented in selected cases by magnetic resonance imaging (MRI), allows antenatal detection and risk stratification. In response to the need for standardized classification, the International Federation of Gynecology and Obstetrics (FIGO) introduced 2019 FIGO classification, which recognizes the clinical and histopathological spectrum of PAS, thereby improving diagnostic precision and facilitating uniform management strategies. Today, PAS represents one of the greatest challenges in modern obstetrics. Multidisciplinary management at specialized tertiary care centers, standardized surgical protocols, and ongoing research into preventive and conservative strategies are critical to improving maternal and neonatal outcomes.

CASE SERIES

CASE 1:

A 32 year old G2P2L1A1, 30 weeks,previous 2 LSCS, last child birth- 4 years, central placenta previa with placenta accreta, no comorbids. Came with complaints of spotting Per Vaginum. MRI done at 22 weeks showed central placenta previa,focal interrupted discontinuity or severe thinning of the anteroinferior

decidua basalis – suggestive of placenta accreta. However there is no invasion into serosa. Steroids covered at 28 weeks. On examination, Pulse rate -78/minute, BP- 110/80 mmhg, Respiratory rate- 19/min, No pallor, no pedal edema. Per abdomen- uterus corresponding to 28-32 weeks, relaxed, Fetal heart rate good, Suprapubic transverse scar healthy, no tender. Per speculum examination – bleeding through os noted. Baseline investigations showed Hb-10.9 g/dl, total count – 8220 cells/cu.mm, platelet count- 2.15 lakhs/cu.mm, coagulation profile, liver function tests-normal. Pateint was managed conservatively with Inj.Tanexemic acid 1g IV thrice daily. At 30 weeks + 2 days, Patinet had one episode of unconsciousness lasting for 20 seconds, regained consciousness immediately. No involuntary movements or tongue bite or involuntary passage of urine or stools. On examination, patient conscious, oriented to time, place and person. Pallor present. BP-80/60 mmHg, PR- 120/min. Per abdomen- uterus tense, tender, Fetal heart sound present, Suprapubic transverse scar healthy, no tender. NST – prolonged fetal bradycardia upto 90 beats/min. IV fluids rushed, On 6 litres O2. Blood was taken for crossmatching. Informed and high risk consent obtained. Patient was shifted to OT for emergency classical caesarean section with bilateral internal iliac artery ligation with obstetric hysterectomy with bilateral salphingectomy in view of abruptio placenta. Intraoperatively,430 grams of clots removed. Baby did not cry at birth. Bladder serosa normal. Proceeded with bilateral internal iliac artery ligation with obstetric hysterectomy with bilateral salphingectomy. Intraoperative blood loss-5500ml. Six units PRBC, four units FFP, six units RDP, four units cryoprecipitate transfused intraoperatively. Postoperative Hb- 9.5 g/dl, total count- 8880 cells/cu.mm, platelet count- 1.13 lakhs/cumm. Postoperative period was uneventful.

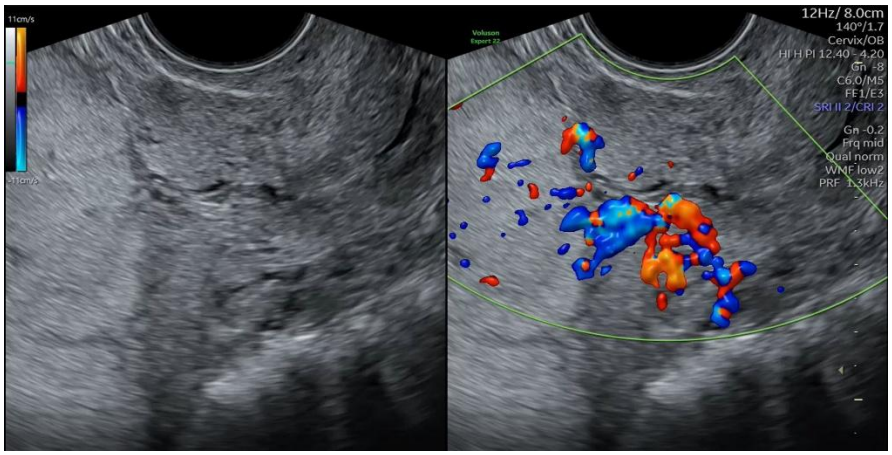

Figure 1: Colour doppler ultrasound highlighting abnormal vascularity typical of PAS.

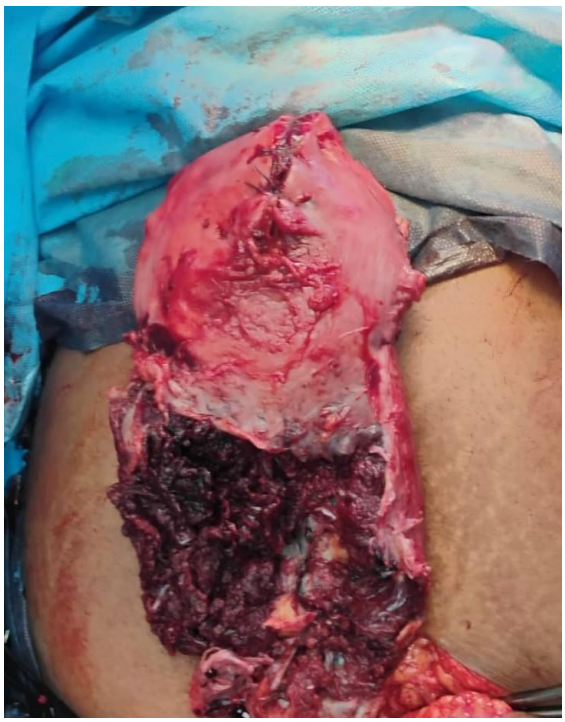
Figure 2: Intraoperative picture showing placenta is encroaching the myometrium

CASE 2:

A 25 year female, G2P1L1, 29 weeks, previous LSCS, last child birth- 2 years, steroids and MgSO4 covered, placenta increta, no comorbids. Patient came with complaints of bleeding per vaginum. On examination, Pulse rate -82/minute, BP- 120/80 mmhg, Respiratory rate- 18/min, No pallor, no pedal edema. Per abdomen- uterus corresponding to 28 weeks, relaxed, Fetal heart rate good, Suprapubic transverse scar healthy, no tender. Per speculum examination – bleeding through os noted. Baseline investigations showed Hb-11 g/dl, total count – 9620 cells/cu.mm, platelet count- 2.46 lakhs/cu.mm.Proceeded with Emergency Classical Caesarean Section with Uterine Artery Embolisation. Uterine artery catheterisation done by interventional radiologist. Midline vertical skin incision made. Classical vertical incision over Uterus. Blood stained liquor drained. Baby delivered. Baby had a weak cry. No signs of placental separation noted. UAE done. Placenta left insitu. Clear urine drained. Postoperative Hb-10.2 g/dl. Patient discharged on POD 5. On POD 25, patient had bleeding per vaginum with passage of clots soaked 3 pads fully in 30 minutes. On examination, Pulse rate- 112/min, BP-96/62 mmHg, SpO2- 96% in room air, Pallor present. Per abdomen examination- uterus corresponds to 16-20 weeks size, midline vertical scar present,healed well. Per speculum – bleeding through os noted. Hb- 3.6 g/dl, total count -6754 cellls/cumm, platelet count- 2.89 lakhs/cumm. Coagulation profile normal. Informed and high risk consent obtained. Proceeded with Emergency Obstetric hysterectomy under general anaesthesia. Intraoperative blood loss- 2 litres. Four units PRBC and four units FFP transfused intraoperatively. Postoperative Hb- 8.2 g/dl, total count – 12984 cells/cumm, platelet count- 2.11 lakhs/cumm. Postoperative period was uneventful.

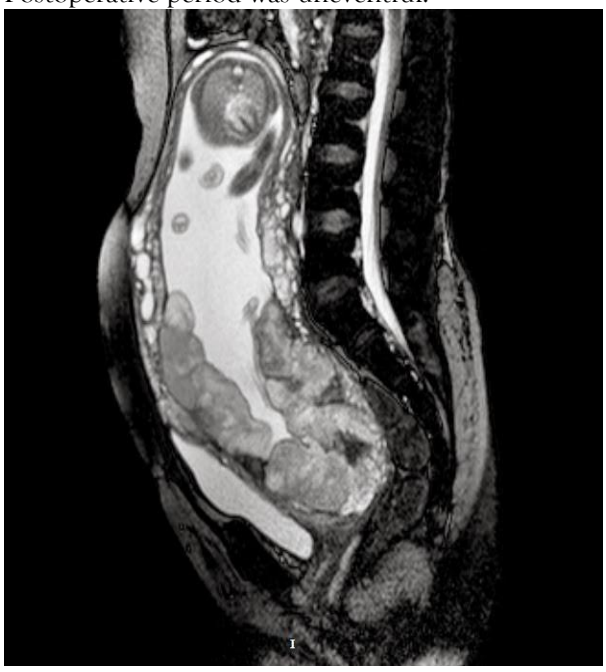

Figure 3: T2-weighted MRI showing placental tissue invading into the myometrium without extending to the serosal surface.

CASE 3:

30 years, G2P1L1, 34 weeks, previous LSCS, last child birth- 4 years, placenta percreta, steroids and MgSO4 covered. On examination , PR- 88/min, BP-130/80 mmHg, RR- 18/min, no pallor or pedal edema. Per abdomen examnination- uterus corresponds to 32-36 weeks, relaxed, cephalic, fetal heart rate good, Suprapubic transverse scar healthy, no tender. Hb-10.5 g/dl, total count – 6540 cells/cumm, platelet count – 1.87 lakhs/cumm. Coagulation profile – normal. Patient was planned for Elective Classical Caesarean Section with bilateral tubal sterilisation with Uterine artery embolisation. Uterine artery catheterisation done. Midline vertical skin incision made. Transfundal Midline incision made. Vessels seen encroaching over the uterine surface. Baby delivered. Baby cried at birth. No signs of placental separation noted. UAE done. Placenta left insitu. Bilateral tubal sterilisation done. Clear urine drained. Intraoperative Blood loss – 3 litres. 6 units PRBC and 8 units FFP transfused intraoperatively. Repeat Hb- 10.2 g/dl. Postoperative period was uneventful. Patient discharged on POD 7.

DISCUSSION:

Placenta accreta spectrum (PAS) represents a critical obstetric condition that has transitioned from being considered rare to a significant global health concern. The rising incidence parallels the increasing prevalence of cesarean deliveries, making PAS one of the leading causes of peripartum hysterectomy and severe maternal morbidity. Our review highlights the importance of risk stratification, early diagnosis, and multidisciplinary management in optimizing outcomes. The strongest risk factor identified remains a history of prior cesarean delivery, particularly when associated with placenta previa. The risk escalates with the number of cesarean sections, underscoring the importance of judicious use of primary cesarean delivery and efforts to promote vaginal birth when appropriate. Other contributing factors such as uterine surgery, multiparity, advanced maternal age, and assisted reproductive technologies necessitating vigilance in antenatal care. The incidence of PAS after 1 C/S-3.3%,2 C/S-11%,3 C/S-40%. Advances in imaging have revolutionized the antenatal diagnosis of PAS. High-resolution ultrasonography remains the first-line tool, with reported sensitivity and specificity exceeding 85%, while magnetic resonance imaging serves as a useful adjunct in equivocal cases or in mapping deeper invasion. Despite these advances, missed or late diagnoses continue to occur, emphasizing the need for standardized training in ultrasonographic markers and universal risk-based screening strategies. Management of PAS continues to evolve. The traditional gold standard—cesarean hysterectomy with the placenta left in situ—remains the most definitive approach for reducing maternal morbidity and mortality, particularly in high-risk cases. However, conservative management strategies, including uterine-preserving surgery, partial myometrial excision, and expectant management with the placenta left in situ, have gained increasing attention for women desiring future fertility. Triple P procedure includes Perioperative placental localisation, Pelvic devascularisation, Placental non separation. While these approaches may reduce surgical morbidity in selected cases, they carry risks of infection, hemorrhage, and delayed hysterectomy, highlighting the importance of individualized decision-making and careful patient selection. Multidisciplinary care in specialized centers is universally acknowledged as the cornerstone of improved outcomes. Optimal results are achieved when PAS cases are managed by coordinated teams including obstetricians, anesthesiologists, interventional radiologists, urologists, hematologists, and neonatologists. Proactive planning—such as availability of blood products, interventional radiology support, and surgical expertise—has been shown to significantly reduce maternal morbidity. Despite these advances, PAS continues to be associated with considerable maternal and perinatal risks. Research gaps remain in the areas of preventive strategies, including refinement of cesarean delivery practices, exploration of pharmacologic or biologic therapies to limit abnormal placental invasion, and long-term outcomes of conservative management. Standardized international registries and collaborative multicenter studies are crucial to generating high-quality evidence to guide practice. PAS is a growing obstetric challenge with substantial implications for maternal health. While cesarean hysterectomy remains the mainstay of treatment, individualized approaches, improved prenatal diagnosis, and coordinated multidisciplinary care are critical to reducing adverse outcomes. Continued research and international collaboration are needed to advance preventive strategies and refine conservative management options.

CONCLUSION

Placenta accreta spectrum (PAS) has become one of the most formidable challenges in modern obstetrics, driven largely by the rising rates of cesarean delivery and other uterine surgeries. It remains a leading cause of massive obstetric hemorrhage, peripartum hysterectomy, and maternal morbidity and mortality. Early risk identification and accurate prenatal diagnosis are essential to optimize outcomes, with ultrasonography as the first-line tool and MRI serving as a useful adjunct in selected cases. Definitive management with planned cesarean hysterectomy performed at tertiary centers remains the gold standard; however, conservative approaches may be considered in carefully selected women desiring fertility preservation. Multidisciplinary planning, availability of blood products, interventional radiology support, and adherence to standardized surgical protocols are critical to improving maternal and neonatal outcomes. Future directions should emphasize preventive strategies to reduce primary cesarean deliveries, refinement of imaging and conservative techniques, and the establishment of international registries to generate high-quality evidence. With early diagnosis, coordinated multidisciplinary care, and evidence-based management, it is possible to reduce the burden of PAS and improve maternal safety worldwide.

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