

Massive Hemorrhage Leading to Shock State and Cardiac Arrest Requiring ECMO During Cesarean Delivery for Placenta Accreta

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Introduction

Placenta accreta spectrum (PAS) disorder is characterized by abnormal placental attachment with varying degrees of myometrial invasion and in severe cases, neighboring anatomical structures. PAS is managed with Cesarean delivery and hysterectomy, although uterine-sparing techniques can be offered to select patients.

The most concerning complication associated with PAS is massive hemorrhage, with the average estimated blood loss in accreta patients approximately 3 liters, and 40% of percreta patients requiring 10 or more PRBC units (1). For patients with a higher likelihood of major bleeding, general anesthesia before delivery may be favorable to facilitate large-volume resuscitation, avoid conversion during hemodynamic instability, reduce hypotension secondary to sympathectomy from neuraxial anesthesia, and maximize patient comfort (2). Adequate intravascular access, invasive monitoring, blood products, and rapid transfusion equipment should be obtained and readily available.

Delivery requires multidisciplinary coordination with departments including but not limited to the blood bank, interventional radiology, vascular surgery, neonatology, and critical care. Refractory bleeding despite endovascular and surgical measures can lead to additional complications such as shock state and cardiac arrest, as seen in our patient. Therefore, the accessibility of intraoperative echocardiography, ECMO, and cardiac bypass services should also be considered prior to delivery.

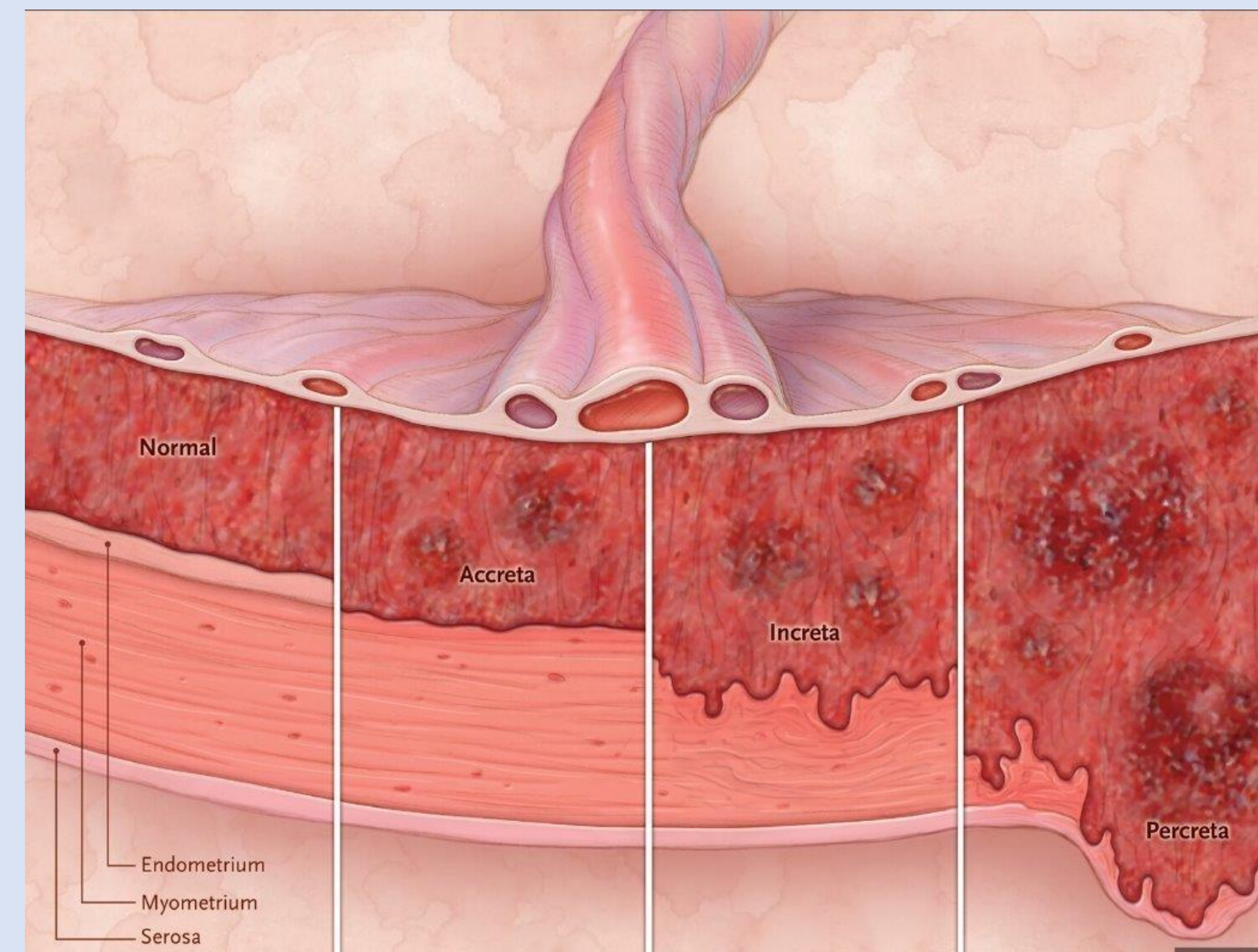


Figure 1: Unknown artist. New England Journal of Medicine. <https://www.perinatology.com/Reference/glossary/P.htm>. Accessed October 25, 2024.

Case Presentation

- A 30-year-old pregnant G4P3 female with 3 prior C-sections and known placenta accreta presented for scheduled repeat C-section and hysterectomy.
- Spinal anesthesia with hyperbaric bupivacaine was administered to facilitate cystoscopy and placement of ureteral catheters before delivery.
 - A pre-induction arterial line was placed, GETA was induced uneventfully with propofol and rocuronium, and an endotracheal tube was placed with a Glidescope.
 - The GYN-ONC service was called to assist with the hysterectomy.
 - During dissection of the placenta from surrounding tissue, there was active blood loss necessitating a Major Transfusion Protocol and vasopressor support with a norepinephrine infusion.
 - A central line was placed in the right internal jugular vein.
 - Vascular surgery was emergently consulted due to ongoing bleeding which warranted ligation of the bilateral internal iliac arteries, repair of a branch of the left internal iliac vein, and suture ligation of multiple small pelvic vessels.
 - During resuscitation, the patient developed pulseless ventricular tachycardia and ACLS was initiated.
 - ROSC was achieved after cardioversion and 2 rounds of epinephrine.
 - Post-arrest intraoperative TEE showed biventricular dysfunction.
 - A dobutamine and epinephrine infusion was initiated.
 - Cardiothoracic surgery was consulted for ECMO cannulation and performed an emergent thoracotomy. Patient was placed on VA ECMO with central access.
 - Trauma surgery had also placed a REBOA to assist with hemorrhage control, and the balloon was deflated once the patient was placed on ECMO.
 - Due to worsening hyperkalemia and metabolic acidosis, continuous renal replacement therapy was initiated via the ECMO circuit after discussion with CT surgery.
 - Intraoperatively, the patient received a total of 92U PRBC, 66U FFP, 15U platelets, 9U cryoprecipitate, and 5,000 mg RiaStap (fibrinogen concentrate).
 - The patient's abdomen was left open with Abthera placement.
 - She was transferred to the cardiothoracic ICU for postoperative care.

References

1. Snegovskikh D, Clebone A, Norwitz E. Anesthetic management of patients with placenta accreta and resuscitation strategies for associated massive hemorrhage. *Curr Opin Anaesthesiol*. 2011 Jun;24(3):274-81. doi: 10.1097/ACO.0b013e328345d8b7. PMID: 21494133.
2. Warrick CM, Rollins MD. Peripartum Anesthesia Considerations for Placenta Accreta. *Clin Obstet Gynecol*. 2018 Dec;61(4):808-827. doi: 10.1097/GRF.0000000000000403. PMID: 30312187.
3. Melber DJ, Berman ZT, Jacobs MB, Picel AC, Conturie CL, Zhang-Rutledge K, Binder PS, Eskander RN, Roberts AC, McHale MT, Ramos GA, Ballas J, Kelly TF. Placenta Accreta Spectrum Treatment With Intraoperative Multivessel Embolization: the PASTIME protocol. *Am J Obstet Gynecol*. 2021 Oct;225(4):442.e1-442.e10. doi: 10.1016/j.ajog.2021.07.001. Epub 2021 Jul 7. PMID: 34245679.

Post-Operative Management

- The patient returned to the OR on post-operative day (POD) 2 for exploratory laparotomy, abdominal washout, bladder repair, removal of intraabdominal packing abdominal mesh and Abthera replacement.
- Patient underwent mediastinal exploration, ECMO decannulation, and chest closure on POD 4.
- The abdomen was closed on POD 5.
- Patient was extubated on POD 6.
- Due to a posterior bladder leak, patient required bilateral diverting nephrostomy tube placement on POD 22.
- Postoperative course was also notable for a small subdural hemorrhage which remained stable on serial imaging and did not require neurosurgical intervention.
- Patient was ultimately discharged on POD 26 with recovery of renal function and close follow up with interventional radiology for nephrostomy tube management.

Discussion

As demonstrated in this presentation, the management of a pregnant patient with placenta accreta necessitates interdisciplinary coordination and preparation.

In recent years, the advantages of caring for these patients in hybrid operating room suites with interventional radiology and advanced imaging capabilities have been increasingly highlighted. Novel interdisciplinary approaches include multivessel embolization under fluoroscopic guidance by interventional radiology in hybrid suites after delivery to reduce placental blood flow prior to hysterectomy and abdominal closure. Additional benefits include minimizing transport and time delays to indicated treatment (3).

However, more research remains to be done to make recommendations on a specific interdisciplinary strategy to improve patient outcomes as well as understand long-term outcomes of these interventions.