Obstetric Hemorrhage

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Uterine Blood Flow

- Uterine blood flow increases progressively during pregnancy from about 100 mL/min in the nonpregnant state to 700 to 900 mL/min (~10% of cardiac output) at term gestation. 44,45 Approximately 80% of the uterine blood flow perfuses the intervillous space (placenta) and the remainder perfuses the myometrium.

Obstetric Hemorrhage

- Hemorrhage during pregnancy carries significant morbidity and is a leading cause of maternal death worldwide.

- The term *placenta accreta* is often used to include the three subtypes of accreta vera, increta, and percreta. Placenta accreta vera is an abnormal adherence to the myometrium with an absent decidual line of separation.
- Placenta increta is abnormal implantation and growth of the placenta into the myometrium, and placenta percreta is growth of the placenta through the uterine wall with placental implantation onto surrounding tissue that might include bladder, bowel, ovaries, or other organs surrounding the uterus.

In patients with a known placenta previa, the rates of accreta are 3%, 11%, 40%, and more than 60% with zero, one, two, and three or more prior uterine incisions

- If the diagnosis of placenta accreta or percreta is made before delivery, preoperative interventions such as bilateral common iliac artery balloon catheter insertion or selective embolization of uterine vessels near the time of delivery could be considered, but efficacy remains unclear

Management of Massive Obstetric Hemorrhage

- Successful management of a massive obstetric hemorrhage requires excellent communication and coordination of all perioperative disciplines, transfusion of blood products should initially be guided by the clinical situation and patient assessment rather than waiting for laboratory values to return.

- Cryoprecipitate or fibrinogen concentrate should be considered if decreased fibrinogen is present or likely
- TEG and rotational thromboelastometry (ROTEM) can be used as tools for both diagnosis and treatment of hemorrhage-related coagulopathy

- tranexamic acid should be considered when initial medical therapy for postpartum hemorrhage fails
- Tranexamic acid can cross the placenta and into breastmilk and it is recommended to wait until the cord is clamped to administer the drug.

- Tranexamic acid is contraindicated in patients with active venous thromboembolism, significant renal disease, and subarachnoid hemorrhage.
- Cell salvage has been used successfully in numerous published cases of obstetric hemorrhage despite the theoretic concern of amniotic fluid embolism.

- the peripartum obstetric team should consider use of invasive options, including uterine balloon tamponade, compression sutures, ligation of uterine vessels, and use of interventional radiology for arterial embolization if the patient is stable for transport.
- If these options fail or are not feasible, a hysterectomy should be performed.

Table 49.7

Factors	Class I	Class II	Class III	Class IV
Blood loss (mL)	750	750-1500	1500-2000	2000 or more
Blood loss (% blood volume)	15	15-30	30-40	40 or more
Pulse (beats/min)	100	100	120	140 or higher
Blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure (mm Hg)	Normal or increased	Decreased	Decreased	Decreased
Capillary refill test	Normal	Positive	Positive	Positive
Respirations per minute	14-20	20-30	30-40	35
Urine output (mL/h)	30	20-30	5-10	Negligible
Central nervous system: mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic
Fluid replacement (3-1 rule)	Crystalloid	Crystalloid	Crystalloid + blood	Crystalloid + blood

Maximum ABL calculation

Definition

EBV calculation: body wt (kg) x average blood volume (ml/kg)

ABL= [EBV x (Hi-Hf)]/Hi

Where:

EBV=Estimated Blood Volume

Hi= initial hemoglobin

Hf= final hemoglobin

Average blood volumes

Premature Neonates 95 mL/kg

Full Term Neonates 85 mL/kg

Infants 80 mL/kg

Adult Men 75 mL/kg

Adult Women 65 mL/kg

Good Luck