Obstetric Anesthesia: Clinical Updates & Challenges

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Disclosure Statement

- I have **no** financial disclosures that would be a potential conflict of interest regarding this presentation.

Obstetric Anesthesia

We have the responsibility to care for those experiencing their…

- First day of life
- Last day of life
- Best day of their life
- Worst day of their life

Dosing for Cesarean Section (CS)

1. Spinal
   - Commonly bupivacaine 0.75% hyperbaric solution
   - Dose range: 8-12 mg[1]
     - ED_{95} 11.2 mg (1.5 mL)[2]
     - Study dose included 10 mcg fentanyl + 0.2 mg Duramorph[2]
   - Duration of action ~2.5 hours[1]
     - Adding epinephrine can increase duration (100-200 mcg)[1]
   - Postoperative analgesia: Duramorph 50-200 mcg[1,2]

Dosing for CS

2. Epidural
   - Commonly lidocaine 2% w/ epinephrine 1:200k dilution
   - Dose range: 5 mL boluses totaling 15-25 mL[1]
   - Consider additives to increase speed of onset:
     - Sodium bicarbonate 8.4% (1-2 mL)[3]
     - Fentanyl (50-100 mcg)[3,4]
   - Postoperative analgesia: Duramorph 1-3 mg[1]

Dosing for CS[1]

3. Combined Spinal-Epidural
   - Full vs Partial spinal dosing
   - Epidural test dose
4. Continuous Spinal Anesthesia
   - Proper communication & labeling
   - New placement vs Prior utilization for labor pain
   - Catheter dead space considerations

Hemodynamic Management for CS

1. Prevention of hypotension
   - Left uterine displacement (15 degrees)[1]
   - Crystalloid co-loading (500-1000 mL)[5]
   - Consider ondansetron 4 mg IV at time of spinal[6-8]
2. Treatment of hypotension
   - Phenylephrine (50-100 mcg boluses)[1]
   - Ephedrine (5-10 mg boluses)[1]

Inadequate Analgesia

1. You have performed a spinal anesthetic for a scheduled repeat CS on a morbidly obese patient (BMI 45). During the procedure you obtained (+) pre-injection swirl and (-) post-injection swirl. Pt subsequently fails the “Allis test” for next 20-min.
   - S&S of no spinal relief?
   - S&S of partial spinal relief?

Neuraxial Options for Labor Pain[9]

1. Epidural analgesia
2. Combined spinal-epidural analgesia (CSE)
3. Single-shot spinal analgesia
4. Continuous spinal analgesia
5. Dural puncture epidural analgesia

Epidural Drug Administration

1. Continuous epidural infusion
2. Patient controlled epidural anesthesia
3. Programmed intermittent epidural bolus[10]
   - Fewer provider rescue boluses
   - Less total local anesthetic consumption
   - Equitable analgesia as compared to continuous epidural

Epidural Placement

- You are preparing to perform an epidural anesthetic. Prior to placement, the RN encourages the husband to go ahead and stand in front of the patient to support her.
  - Is this a potential issue?

Hospital sued over deadly faint

Husband assisted in delivery room

The Boston Globe

By Reuters | July 8, 2005

[redacted]- A California woman is suing a hospital for wrongful death because her husband fainted and suffered a fatal injury after helping delivery room staff give her a pain-killing injection.

[redacted], filed the suit against [redacted] state court last week.

[redacted] husband, [redacted], was asked by [redacted] staff to hold and steady his wife while an employee inserted an epidural needle into her back, court papers said.

The sight of the needle caused [redacted], to faint and he fell backward, striking his head on an aluminum cap molding at the base of the wall.

[redacted] delivered the couple's second child, a boy, later that day. [redacted] however, suffered a brain hemorrhage as a result of his fall and died two days later, the lawsuit said.

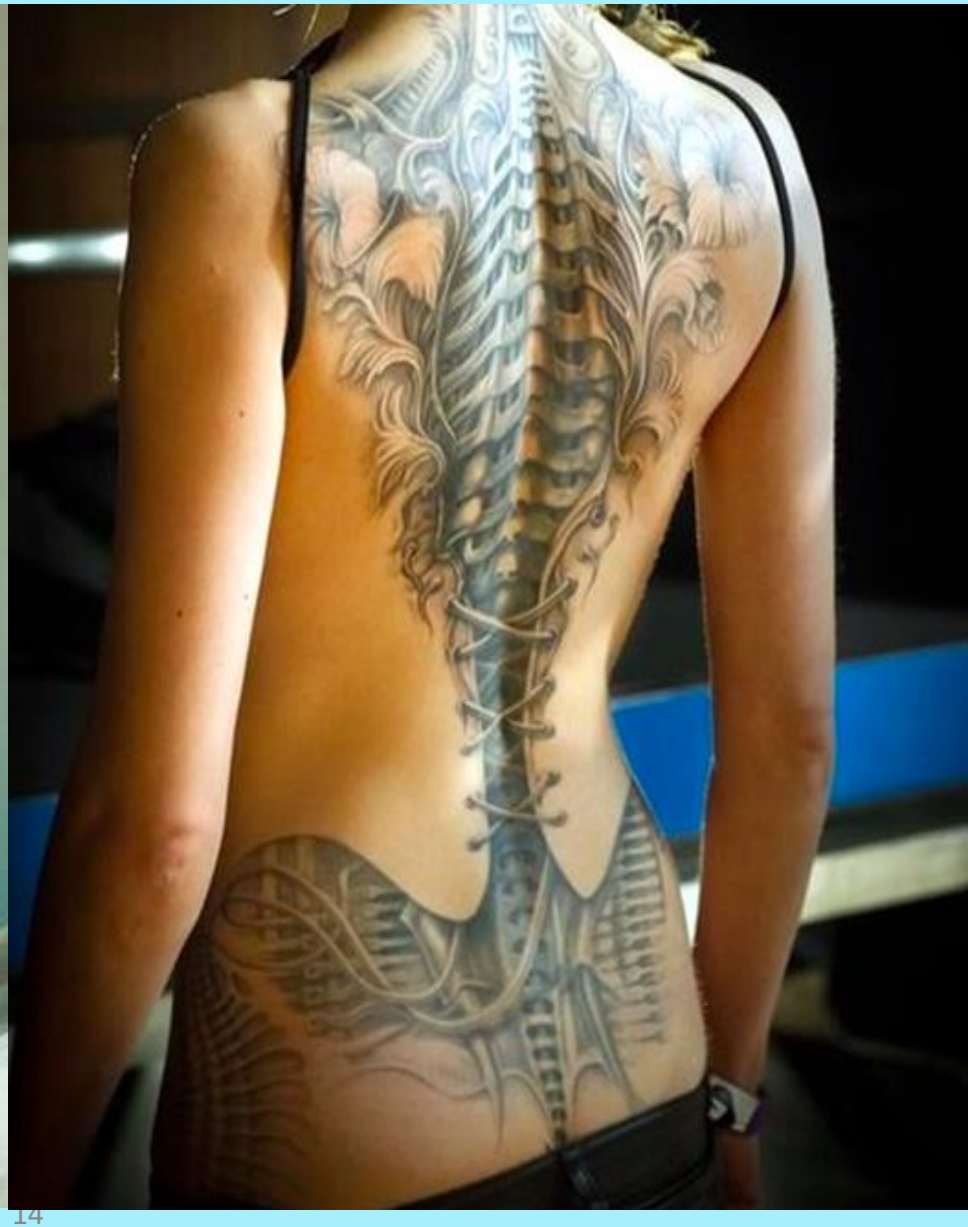
The suit seeks unspecified damages related to [redacted] death and to [redacted] emotional distress at being widowed with two young children.

Because [redacted] was solicited by [redacted] to assist in the epidural, the lawsuit said, the hospital "owed him a duty to exercise reasonable care to prevent foreseeable injuries resulting from his participation."

Case Discussion

https://www.youtube.com/watch?v=O8y9Ji7gTg8

Case Discussion: Tattoos



http://www.galknows.com/back-tattoo-designs/

Case Discussion: Dermal Piercings

https://i.pinimg.com/736x/23/62/42/236242d4041d54d17d11e542749bd0f5--piercings-body-mods.jpg

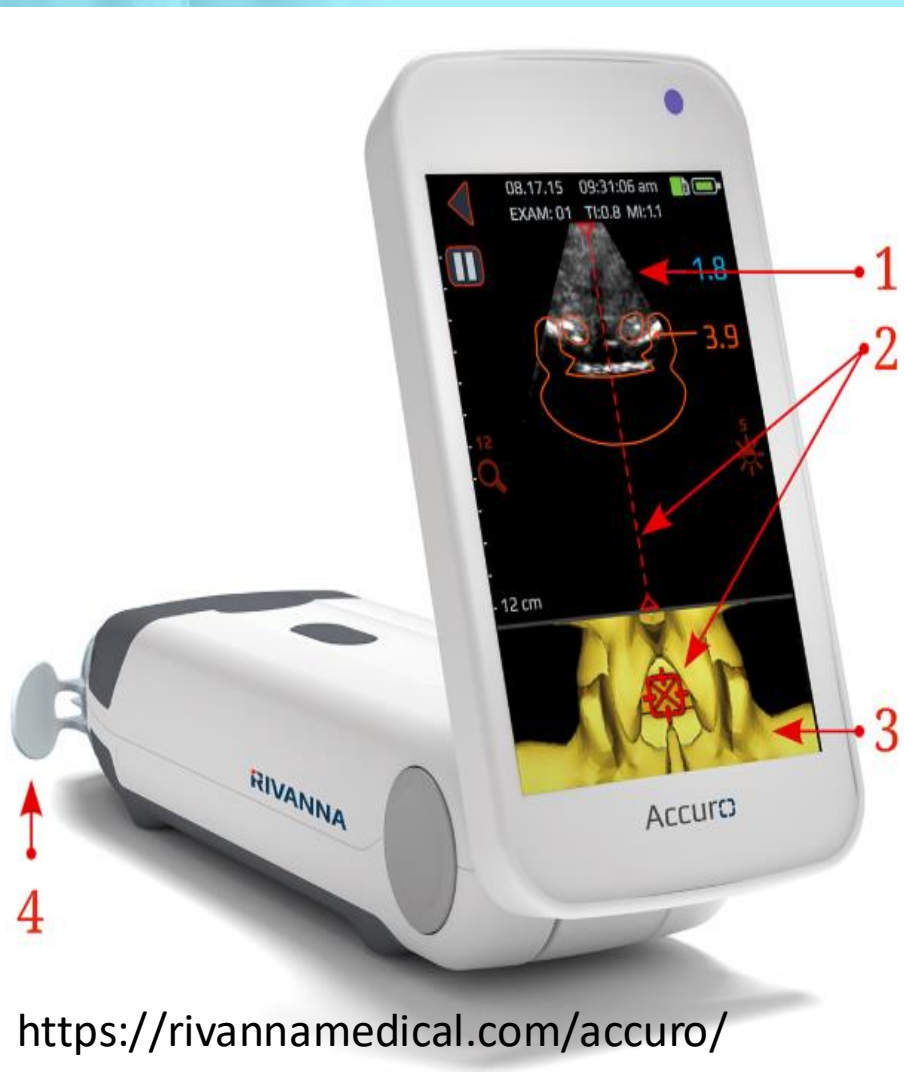
Difficult Neuraxial Placement

- You are attempting to perform a neuraxial anesthetic for CS on a patient
  - 160 cm; 120 kg
  - PMH: obesity; moderate scoliosis
  - Multiple spinal attempts of various gauge and length
  - Tuohy needle utilized without success

Neuraxial Ultrasound

- Pros[11]
  - Increased accuracy of interspace identification
  - Accurate prediction of epidural & intrathecal depth
  - Increased success & ease of procedure
- Cons[12]
  - Learning curve
  - May be less helpful for experienced practitioners
  - May not be beneficial with easily palpated landmarks

Neuraxial Ultrasound



https://rivannamedical.com/accuro/

Previous Spinal Surgery

- You are called to evaluate a patient recently admitted for labor induction (G1PO).
  - 165 cm; 80 kg
  - Labs: WNL
  - PMH: Unremarkable
  - PSH: Harrington Rods placement
  - Birth plan: Epidural

Previous Spinal Surgery

http://qualitylife4u.com/wp-content/uploads/2013/07/scoliosis2.jpg

Previous Spinal Surgery[13]

- Challenges:
  - Difficulty with proper positioning
  - Challenging placement due to scarring and hardware
  - Increased risk of unintentional dural puncture
  - Increased risk of inadequate epidural coverage
- Considerations:
  - Utilize past imaging and/or pre-procedural ultrasound
  - Consider CSE for labor and spinal for CS
  - Consider placing epidural early

Post-Dural Puncture Headache (PDPH)

- You are called to postpartum unit to evaluate a patient with classic signs and symptoms of PDPH.
  - Pt had a planned CS
  - Review of documentation reveals multiple spinal attempts and success with a 24-gauge Quincke
  - All labs and vital signs WNL
  - What is your approach to treatment?

PDPH

- Causes[14]
  - Spinal anesthesia
  - Unintentional dural puncture
- Prophylaxis?
- Treatment[14,15,18]
  - Conservative: hydration, analgesics, caffeine
  - Moderate: Transnasal sphenopalatine block
  - Aggressive: Epidural blood patch

Thrombocytopenia[16]

- Typically defined as platelets < 150,000/microL
- Platelet count tends to ↓ throughout pregnancy
- ~1% present with platelet count < 100,000/microL
- Causes:
  1. Gestational thrombocytopenia (59%)
  2. Preeclampsia/HELLP (22%)
  3. Immune related (11%)
  4. Other: DIC, Antiphospholipid syndrome (8%)

Thrombocytopenia

- You are called to evaluate a recently admitted pt:
  - Abnormal platelet count of 73,000/microL
  - All additional labs return normal
  - Patient denies any significant past medical history
  - Vitals WNL
- Anesthesia plan:
  - What if the plan is for vaginal delivery?
  - What if the plan is for cesarean delivery?

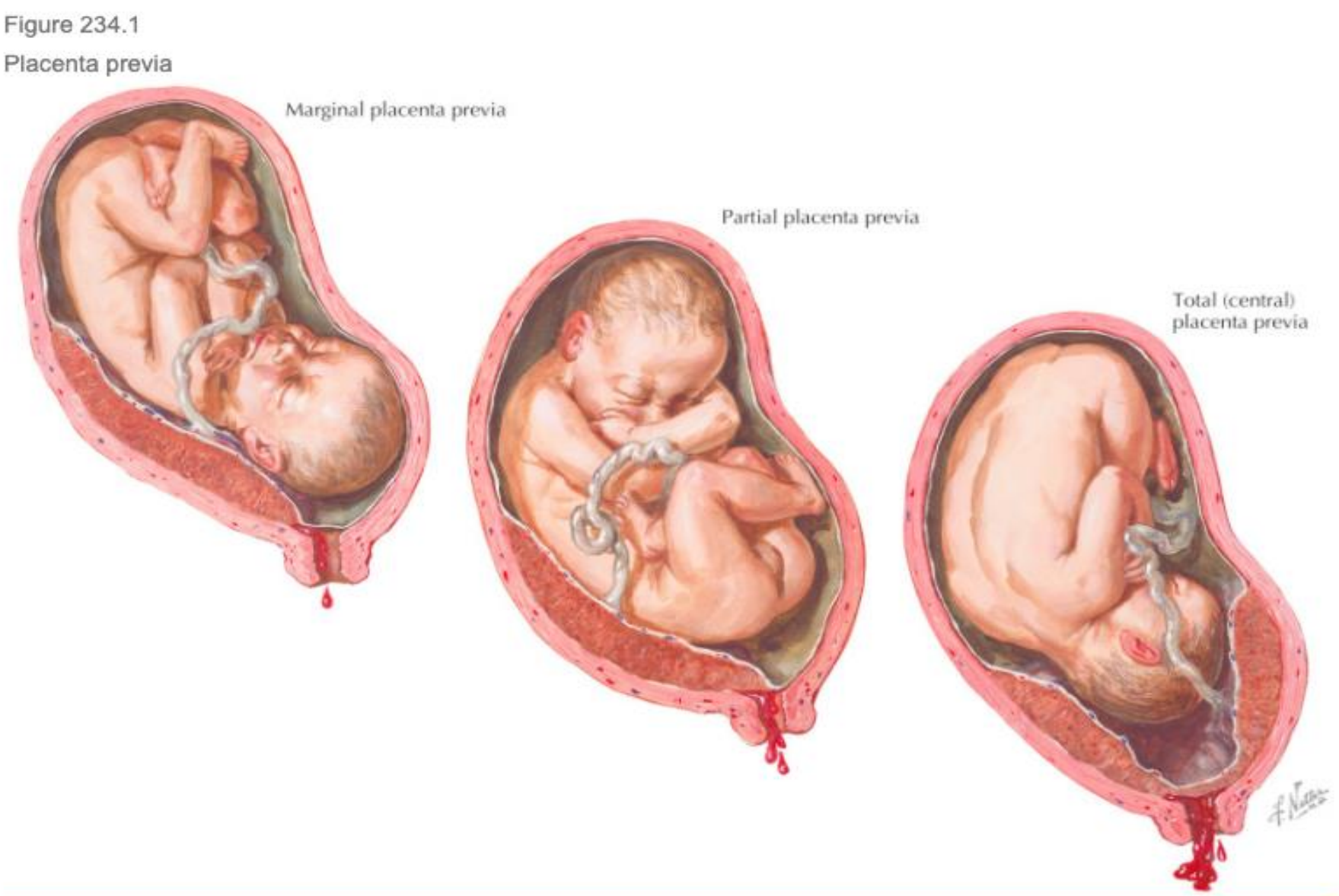
Peripartum Hemorrhage[17]

- Antepartum Hemorrhage
  - Placenta previa
  - Placental abruption
  - Uterine rupture
- Postpartum Hemorrhage
  - Uterine atony
  - Retained placenta
  - Uterine inversion
  - Placenta accreta

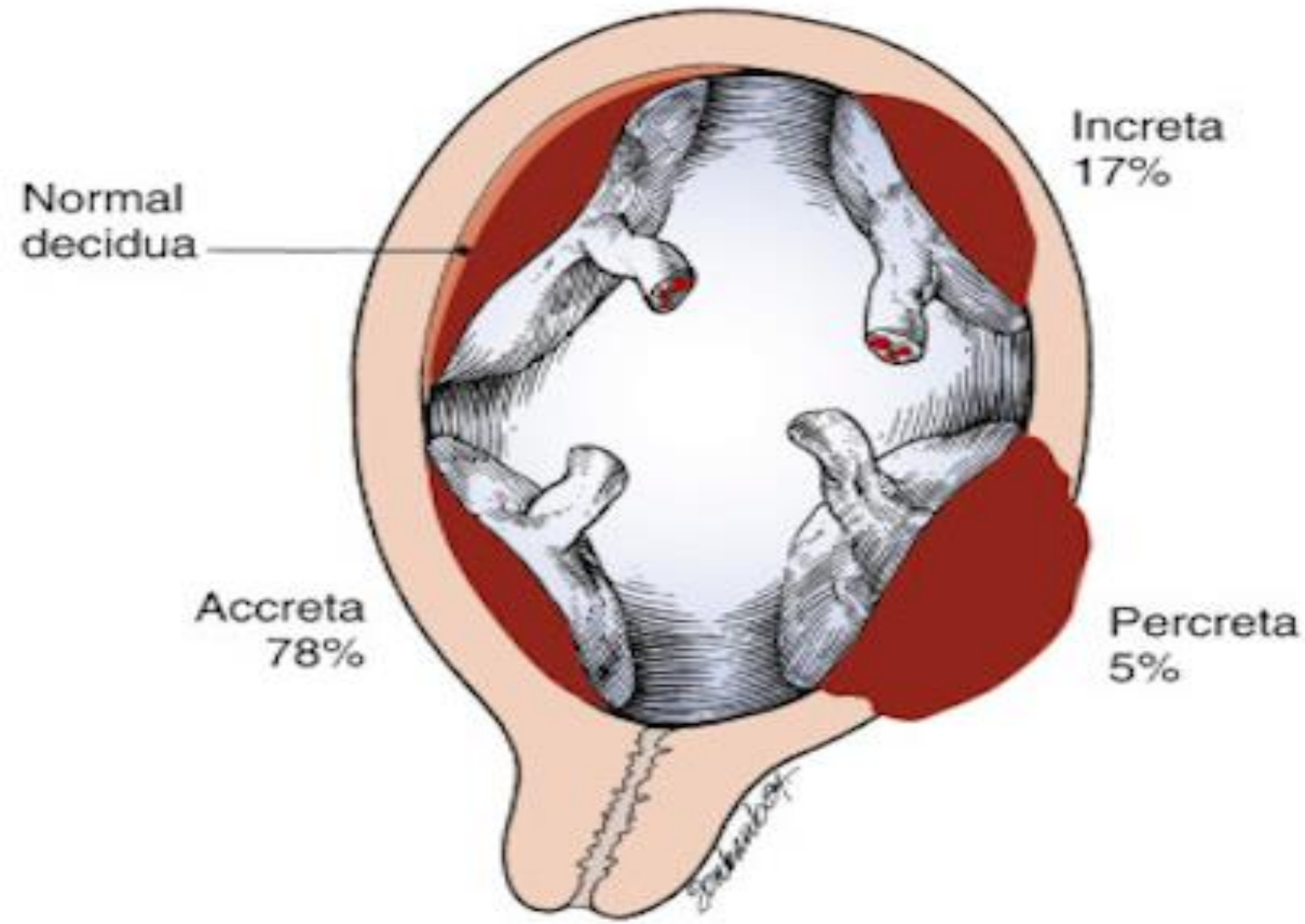
Peripartum Hemorrhage[17,18]

- Placenta previa
  - Typically presents as painless vaginal bleeding
  - Increased risk of placental adherence (e.g. accreta)
- Placental abruption
  - Typically presents as painful vaginal bleeding
  - Increased risk of DIC
- Uterine rupture
  - Typically presents as continuous abdominal pain
  - Increased occurrence with TOLAC

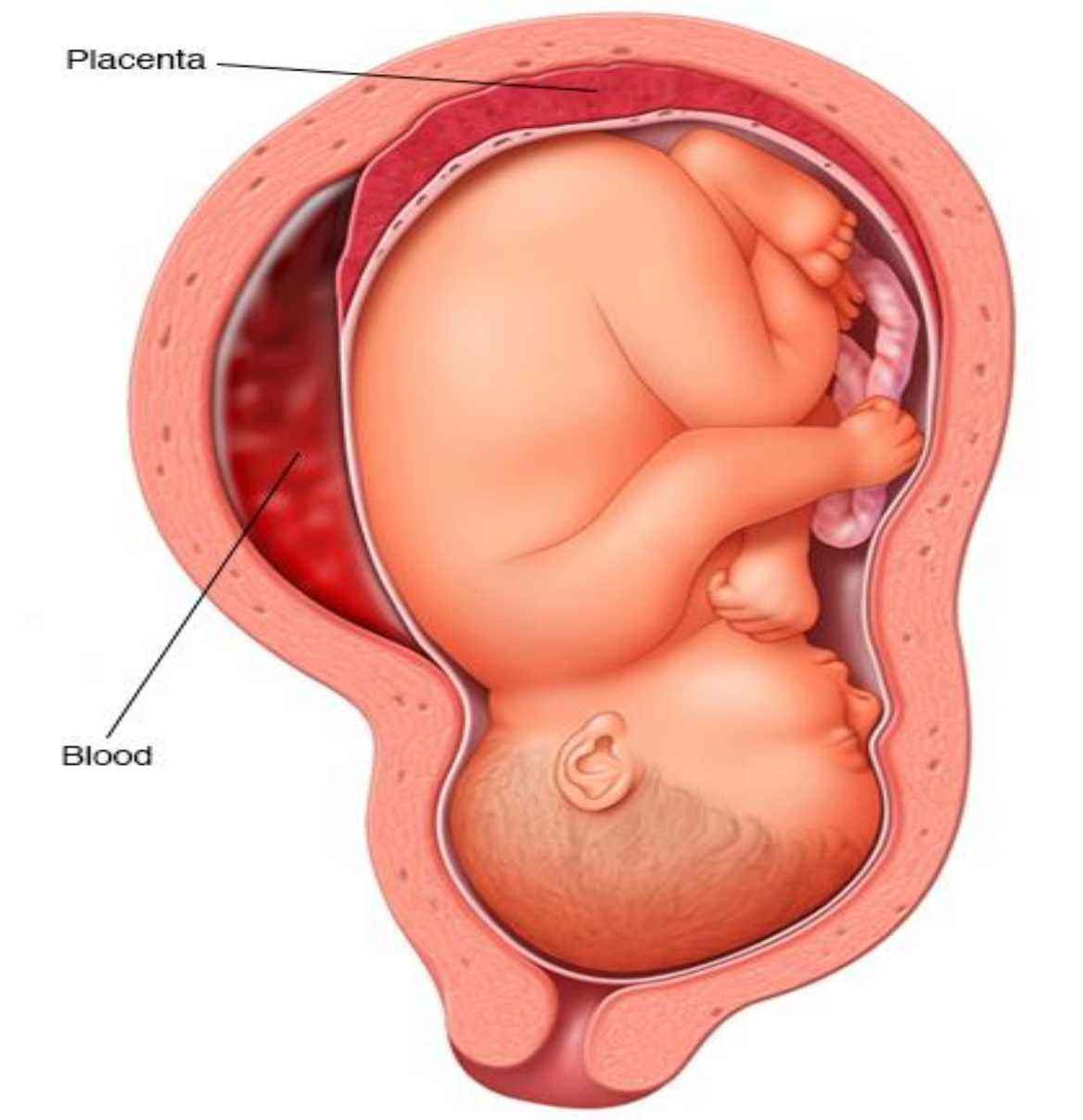
Placenta Previa[18]



Placenta Accreta, Increta, & Percreta[18]

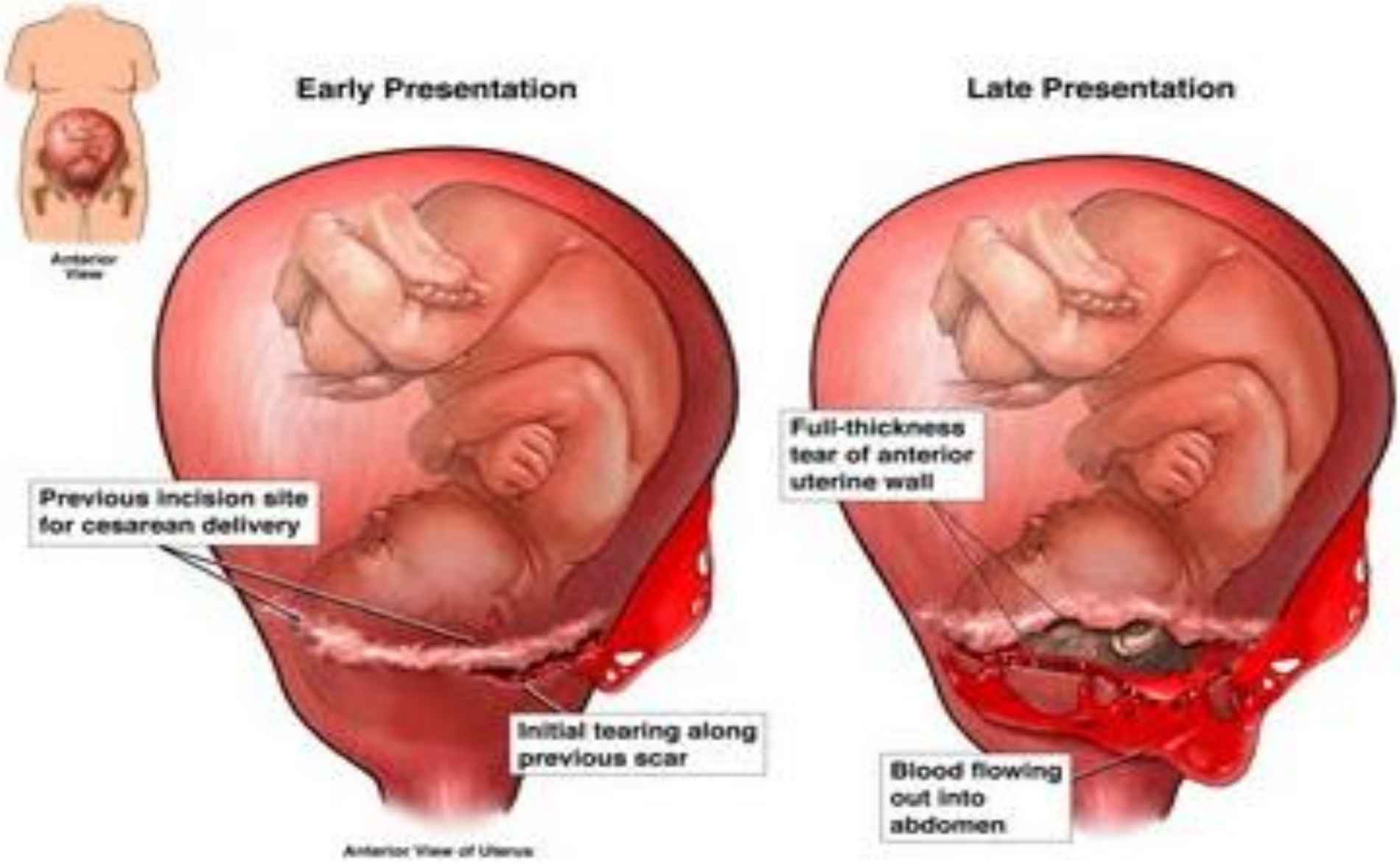


Placental Abruption



http://www.mayoclinic.org/diseases-conditions/placental-abruption/multimedia/placental-abruption/img-20008593

Uterine Rupture



http://www.medicallegalblog.com/2011/06/vbac-and-uterine-rupture.html

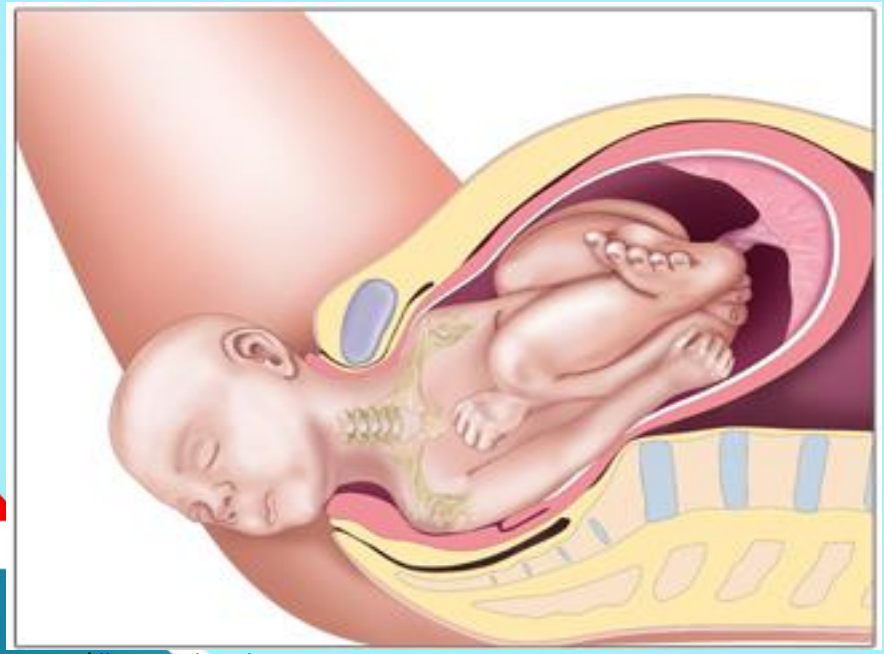
Abnormal Vertex Presentation

- Occiput Posterior ("OP")
  - Failure of fetus to rotate anteriorly
  - ↑ Duration & ↑ Pain of labor
  - Epidural can assist d/t pelvic relaxation
  - Manual, forceps, or vacuum rotation usually necessary

http://www.popout.me/occiput-posterior/

Abnormal Vertex Presentation

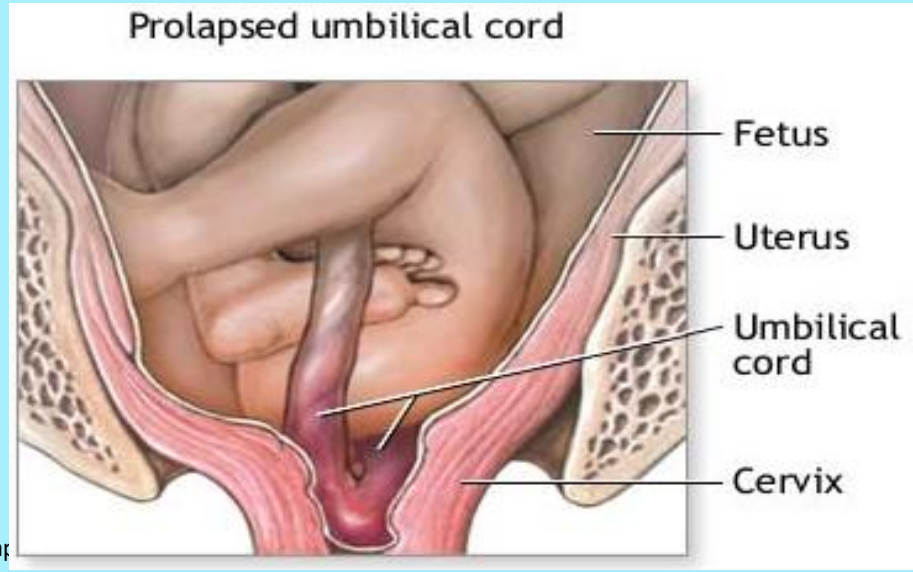
- Shoulder Dystocia
  - Impaction of shoulder against pubic symphysis
  - Complicates 0.2-2% of deliveries
  - Major cause of birth injuries
  - Fetal macrosomia = greatest risk factor



http://www.illustratedverdict.com/projectreview/IllustratedVerdict0309.asp

Umbilical Cord Prolapse

- Diagnosis
  - Sudden fetal bradycardia → physical exam
- Treatment
  - Steep Trendelenburg vs knee-chest position
  - Manual manipulation of cord back into pelvis
  - Immediate cesarean section
  - Anesthesia options?



http://nursingcrib.com/nursing-notes-reviewer/maternal-child-health/umbilical-cord-prolap

Breech Presentation

- Complicates 3-4% of deliveries
- Associated with increased maternal and fetal morbidity/mortality
- 10-fold increase in umbilical cord prolapse
- Most obstetricians only deliver breech by CS
  - Head & shoulders are largest features of fetus

Breech Presentation

- External Cephalic Version
  - Manual manipulation of fetus to vertex
  - May be attempted >34 weeks gestation
  - Must be attempted prior to onset of labor
  - Epidural may be requested for version
  - Risks
    - Placental abruption
    - Cord compression

http://ctworkingmoms.com/2014/02/07/my-external-cephalic-version-ecv/

Common Uterotonics[17]

- Oxytocin
  - Administration should start after delivery of the placenta
  - Side effects: hypotension, tachycardia, N/V
- Methylergonovine (Methergine)
  - Dose: 0.2 mg IM: May repeat every 2-4 hours
  - Contraindications: HTN, vascular disease, Raynaud's
- Carboprost (Hemabate)
  - Dose: 250 mcg IM: May repeat >15 min apart (max 2 mg)
  - Contraindication: asthma
- Misoprostol (Cytotec)
  - Dose: 200-600 mcg (PO/sublingual/buccally/per rectum)
  - Increased dosages lead to increased risk of hyperthermia

Peripartum Hemorrhage[17]

- Hemodynamically unstable → GETA w/ RSI
- 2 large-bore IV catheters
- Type and crossmatch
- Goal-directed fluid therapy
  - Consider arterial & central line
- Viscoelastic tests (e.g. TEG or ROTEM)
  - Assess coagulation status
  - Utilized to guide hemostatic resuscitation

Peripartum Hemorrhage[17]

- Tranexamic Acid
  - 1 gram over 10-20 min (may repeat after 30-min)
  - Administer in separate line from blood products
  - Caution during active intravascular clotting (i.e. DIC)
- Uterine Relaxation
  - Necessary for retained placenta or uterine inversion
  - Nitroglycerin 50-200 mcg IV or 400 mcg sublingual
  - Volatile agent 1-3 MAC (if nitroglycerin ineffective)

Massive Transfusion[17]

- No universally accepted definition or protocol
- Example:
  - Initial blood package: 4 units PRBC + 4 units FFP
  - Subsequent blood packages (if necessary):
    - 4 units PRBC
    - 4 units FFP
    - 1 apheresis platelet unit
    - 1 dose cryoprecipitate (10 units)
  - Labs: CBC, CMP, ABG, DIC panel (repeat q 30-60 min)

Massive Transfusion[17]

- Lab results and action:
  - INR > 1.5: Administer 2 units of FFP
  - Platelet < 100,000/µL: Administer 1 apheresis unit
  - Fibrinogen < 200 mg/dL: administer 10 units cryo
- Transfusion maintenance goals:
  - Hemoglobin > 7.5 g/dL
  - Platelets > 50,000/µL
  - Fibrinogen > 300 mg/dL
  - INR < 1.5

Amniotic Fluid Embolism[19]

- Signs & Symptoms
  - Sudden cardiovascular and respiratory collapse
  - Typically ensued by DIC and hemorrhage
- Risk Factors
  - Cesarean Section
  - Instrumental vaginal delivery
  - Placental abnormalities
  - Preeclampsia

Amniotic Fluid Embolism[19]

- Traditional Treatment
  - Supportive care (BLS & ACLS)
  - Massive transfusion protocol
  - Deliver the fetus
  - Vasopressors:
    - Levophed is often first choice
    - Dobutamine if cardiogenic shock occurs

Amniotic Fluid Embolism

- Additional Treatment Considerations
  - Tranexamic acid[19]
    - 1 gram over 10-20 min (may be repeated in 30-min)
  - C1 Esterase Inhibitor Concentrate[20]
    - Case Report Dose: 1000 units
  - A-OK Regimen[21]
    - Atropine 1 mg IV
    - Ondansetron 8 mg IV
    - Ketorolac 30 mg IV

General Anesthesia[22]

- Respiratory compromise is the most common cause of anesthesia-related maternal mortality
  - Airway challenges
  - Increased risk of aspiration
  - Less pulmonary reserve: ↓ FRC + ↑ O2 consumption
- Positioning
  - Consider ramping
  - Maintain left uterine displacement

General Anesthesia

- Preoxygenation
  - Deliver 100% oxygen via tight-fitting mask[22]
  - (+/-) 5-10 L oxygen via nasal cannula[23]
  - If time limited: advise 8 deep breaths over 1-min[24]
- Basic & advanced airway equipment preparedness[22]
- RSI once surgical team is ready
  - Typically: Propofol + Succinylcholine[1]
  - Consider administering adjuncts post-delivery[22]

General Anesthesia

- Maintenance[1]
  - Volatile agent → ~1.0 MAC
    - If fetal distress: administer 100% oxygen
    - If no fetal distress: consider O2+N2O
  - Post-Delivery[1]
    - Consider: Midazolam 2 mg + Fentanyl 100 mcg IV
    - Reduce volatile agent to 0.5-0.75 MAC + O2/N20 (50/50)
  - Postoperative Pain relief
    - If consented, consider administering block (e.g. bilateral TAP)[25]

General Anesthesia[22]

- Extubation
  - Suction gastric contents and oropharynx secretions
  - Administer 100% oxygen
  - Elevate HOB 30-degrees
  - Ensure full return of neuromuscular function
  - Adequate Vt and RR
  - Extubate awake

OB Updates & Challenges

- Questions?
- Email address
  - ljranalli@gmail.com

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