Obstetric Emergencies

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Overview

- Physiologic changes in pregnancy
- Obstetric airway
- Hypertensive disorders of pregnancy
- Peripartum hemorrhage
- Amniotic fluid embolism
- Trauma in the obstetric patient

Physiologic Changes

Pulmonary

⇑⇑	⇓⇓
Oxygen consumption	Airway resistance
Minute ventilation	Functional residual capacity
Tidal volume	$PaCO_2$
Respiratory rate	HCO_3
PaO_2	
Closing volume	

Physiologic Changes

Cardiovascular

⇑⇑	⇓⇓
Blood volume	Systolic pressure
Plasma volume	Diastolic pressure
Cardiac output	Peripheral resistance
Stroke volume	Pulmonary resistance
Heart rate	Response to vasoconstrictors
Wall thickness	Supine venous return

Physiologic Changes

Cardiac Output

- Pre-pregnancy CO ➔ 5 L/min
- 1st trimester ↑ 30-50% ➔ 7.5 L/min
- Labor ↑ 40% ➔ 10 L/min
- Post-partum ↑ 75% ➔ 13 L/min!!

Physiologic Changes

Hematologic

⇑⇑

Clotting factors
Coagulability
Fibrinolysis

⇓⇓

Hemoglobin /
Hematocrit
Platelets
Cell-mediated immunity

Physiologic Changes

Neurologic

⇑⇑

Sensitivity to local anesthetics

⇓⇓

Minimum alveolar concentration

Physiologic Changes

Renal

⇑⇑

Blood flow
Renin / Aldosterone
Sodium retention
Glycosuria
Proteinuria

⇓⇓

Creatinine
BUN
Osmolality

Physiologic Changes

Hepatic

⇑⇑ Transaminases

⇓⇓ Albumin
Pseudocholinesterase

Obstetric Airway

Considerations

- Oropharyngeal edema
- Capillary engorgement
- Increased reflux
- Large breasts

Obstetric Airway

Rapid Desaturation

- Decreased functional residual capacity
- Increased O2 consumption

Obstetric Airway

Plan of Attack

- Preparation
  - Short scope handle
  - Difficult airway
  - Size 6.5-7.5 ETT with stylet
- Ramp patient
- Preoxygenate
- Rapid sequence
  - Cricoid pressure
  - Succinylcholine

Figure 1 - Normal Position

Figure 7 - Placement of a Pillow of the same Material for Minor Adjustments (if needed)

Obstetric Airway

Failed Intubation

- Oxygenation adequate?
- Ventilation adequate?

Obstetric Airway

Failed Intubation

Inadequate Oxygenation / Ventilation

- LMA with cricoid
- Surgical airway
- Deliver baby

Obstetric Airway

Failed Intubation

Adequate Oxygenation / Ventilation

- How's the baby?

Obstetric Airway

Failed Intubation

No Fetal Distress

- Wake up patient
- Awake airway
- Regional

Obstetric Airway

Failed Intubation

Yes Fetal Distress

- Inhalational agent with spon't ventilation
- LMA with cricoid
- Follow oxygenation and ventilation
- Deliver baby

Hypertensive Disorders

General

- Pregnancy induced hypertension (PIH)
  - Pre-eclampsia
  - Eclampsia
- Chronic hypertension
- Chronic superimposed on PIH

Pre-Eclampsia

Diagnosis

- Blood pressure of 140/90
- Proteinuria ≥ 3 g/day
- Generalized edema

Pre-Eclampsia

Severe

- Blood pressure of 160/110
- Proteinuria ≥ 5 g/day
- Oliguria < 400 ml/day
- Seizures (eclampsia)
- End organ damage

Pre-Eclampsia

Severe

- HA, seizures, intracranial hemorrhage
- Pulmonary edema or cyanosis
- Abdominal pain, increased LFTs
- Renal failure
- HELLP syndrome
  - Hemolysis
  - Elevated LFTs
  - Low platelets

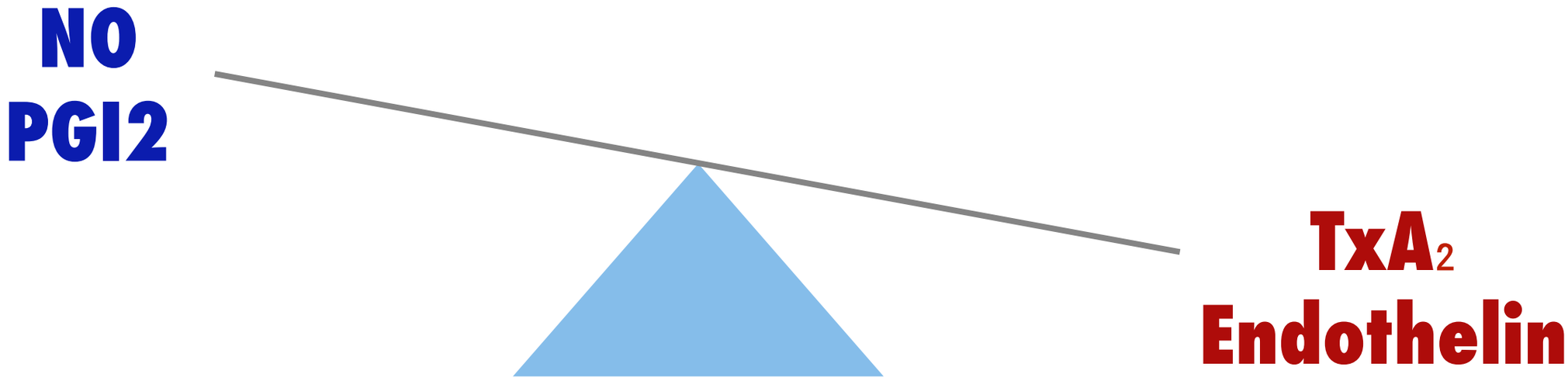
Pre-Eclampsia

Fetal Effects

- Placental infarction
- Growth retardation
- Abruption
- Infection
- Intracranial hemorrhage

Pre-Eclampsia

Pathophysiology



Favors ***vasocontriction*** and ***platelet aggregation***

Pre-Eclampsia

General Management

- Bed rest
- Antiseizure medication
- Antihypertensive agents
- Delivery

Pre-Eclampsia

- Delivery is definitive treatment
- Goals of management
  - Prevent / treat seizures
  - Treat hypertension
  - Optimize organ perfusion
  - Correct coagulopathy

Pre-Eclampsia

- Mild cases
  - Bed rest
  - Htn
    - Fetal surveillance
- Refractory cases: delivery
- Severe: 24-48 hrs aggressive management after delivery

Pre-Eclampsia

Magnesium

Pros	Cons
Anti-seizure	Cardiac arrest
Anti-hypertension	Respiratory depressant
Uterine vasodialator	Prolong NMBs
⇓ renin/angiotensin	⇓ uterine tone
⇓ platelet aggregation	Prolongs labor
Bronchodialation	⇑ blood loss
	Neonatal depression

Treat toxicity with calcium but watch out for seizures!

Pre-Eclampsia

Anti-hypertensives

- Hydralazine
- Labetolol
- β-blockers
- Ca channel blockers
- Methyldopa
- Nitroglycerine
- Nitroprusside
- Clonidine

NO ACE-inhibitors!

Goal: decrease risk of IC hemorrhage

Optimize tissue perfusion

Pre-Eclampsia

- Coagulopathy
  - Check PT, INR, hematocrit, platelets, fibrinogen
- Management:
  - Whole blood / PRBC's /platelets
  - FFP/ cryoprecipitate
- Regional anesthesia contraindicated with coagulopathy

Pre-Eclampsia

Anesthetic Management

- *Preoperative*
  - Control BP
  - Ensure hydration
  - Assess organ damage
- *Postoperatively*
  - Monitor for end organ damage
- *Intraoperatively*
  - Regional vs general
  - Exaggerated BP response

Pre-Eclampsia

Regional

Pros	Cons
Good pain control	Contraindicated in shock
Attenuates BP response	Contraindicated in low platelets
Improves uterine blood flow	Airway not secured
Spon't ventilation	
⇓ thrombus formation	

Pre-Eclampsia

General

Pros	Cons
Better hemodynamic control	Have to secure airway
Airway secured	Less pain control
	Hemodynamic response to laryngoscopy

Peripartum Hemorrhage

General

- *Antepartum Bleeding*
  - Previa
  - Abruption
  - Uterine rupture
  - Vasa previa
- *Postpartum Bleeding*
  - Uterine atony
  - Retained placenta
  - Placenta acreta
  - Uterine inversion
  - Genital trauma

Antipartum Hemorrhage

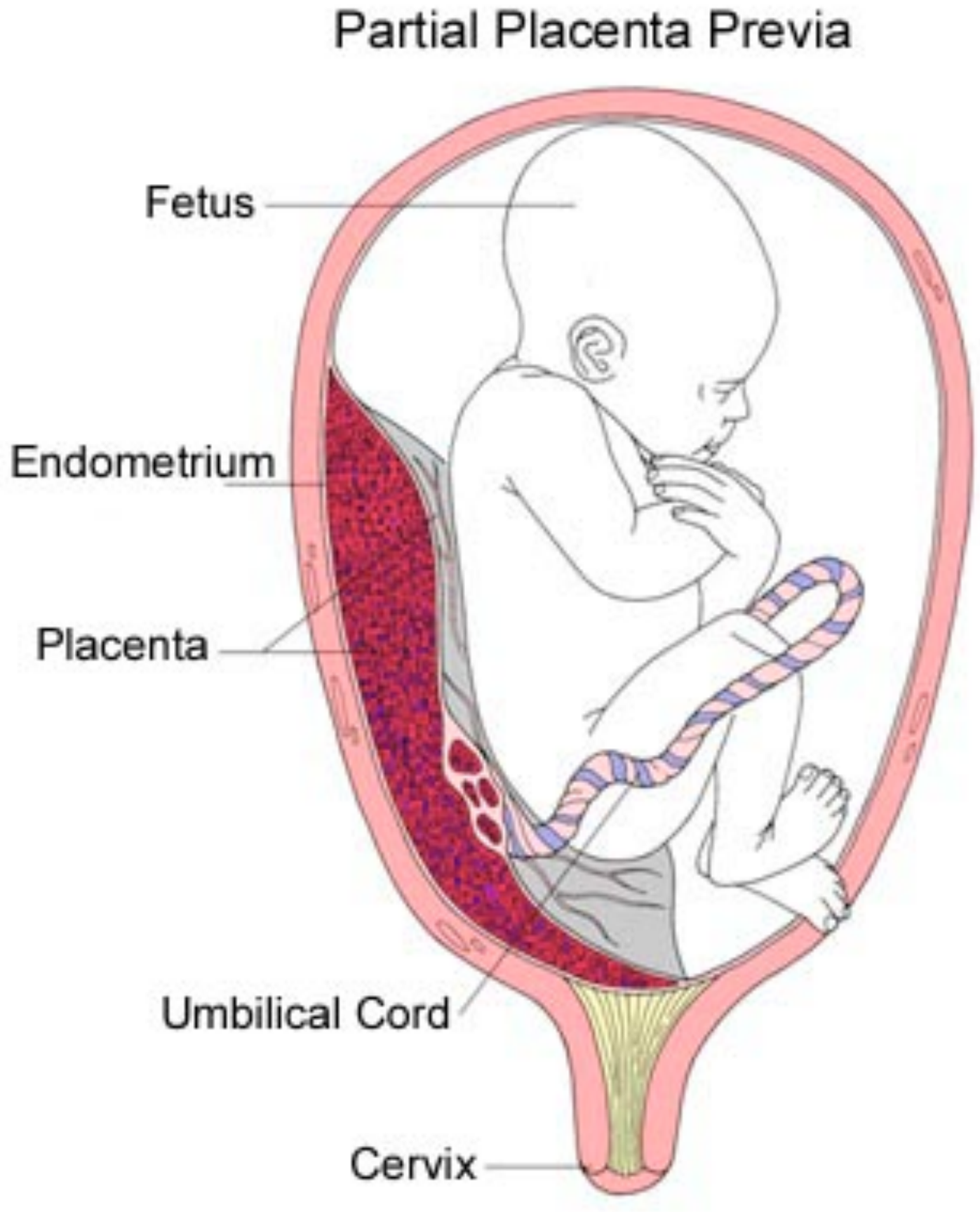
General

- 8% of all pregnancies > 22 weeks
- Most common in 3rd trimester
- Many times associated with abnormal fetal presentation

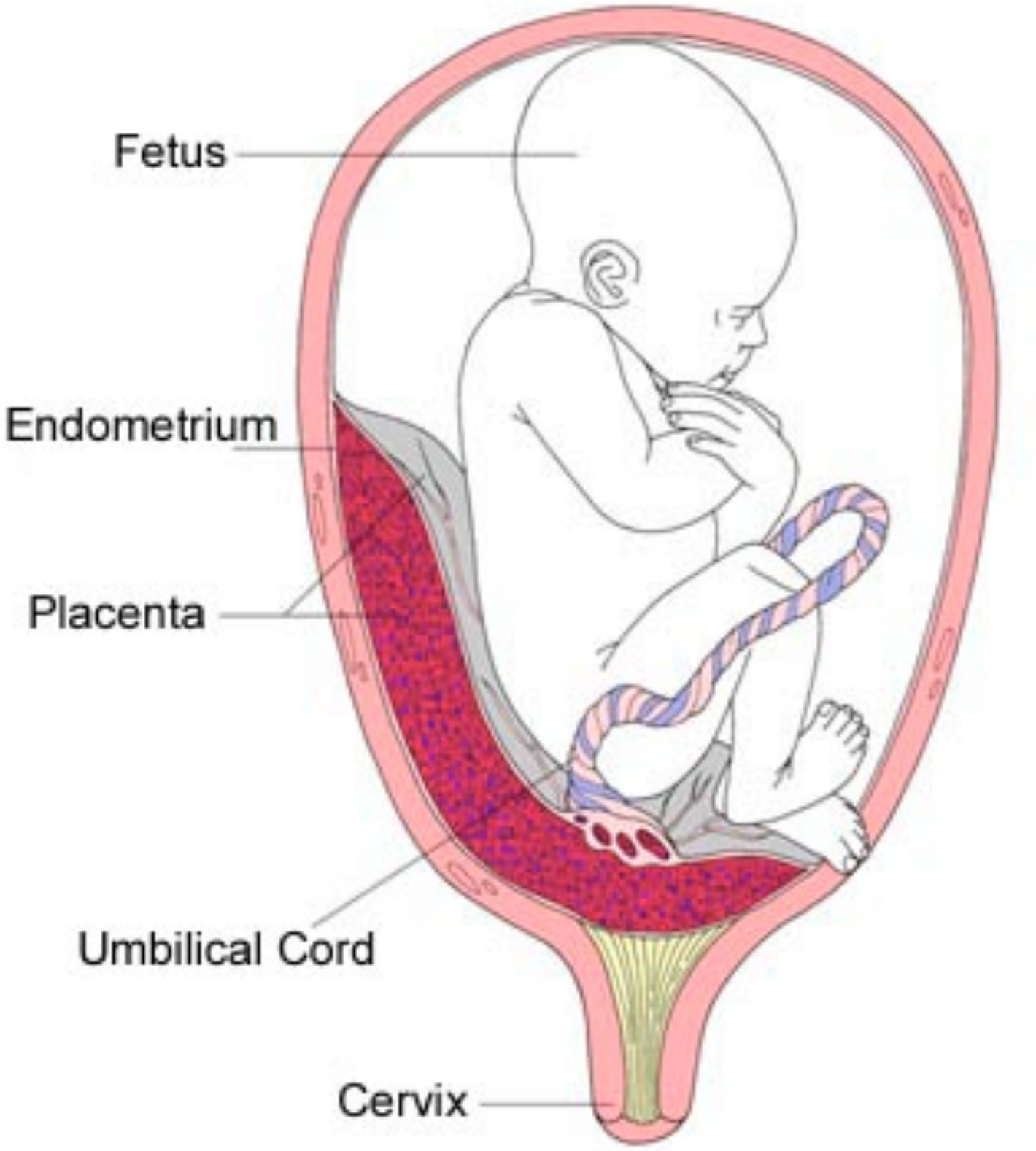
Antipartum Hemorrhage

Placenta Previa

- Implantation of placenta in lower uterine segment in front of presenting fetal part
- 1 in 200 3rd trimester pregnancies
- Several types: Low lying, Partial, & Total


Partial Placenta Previa
Fetus
Endometrium
Placenta
Umbilical Cord
Cervix

Total Placenta Previa



Antipartum Hemorrhage

Risk Factors for Placenta Previa

- Advanced age
- Multiparity
- Prior cesarean section
- Prior uterine surgery

Antipartum Hemorrhage

Placenta Previa

- *Pathophysiology*
  - Placental tearing
  - Poor uterine contraction
- *Signs and Symptoms*
  - Painless bleeding
  - Rarely in shock
  - Ultrasound

Antipartum Hemorrhage

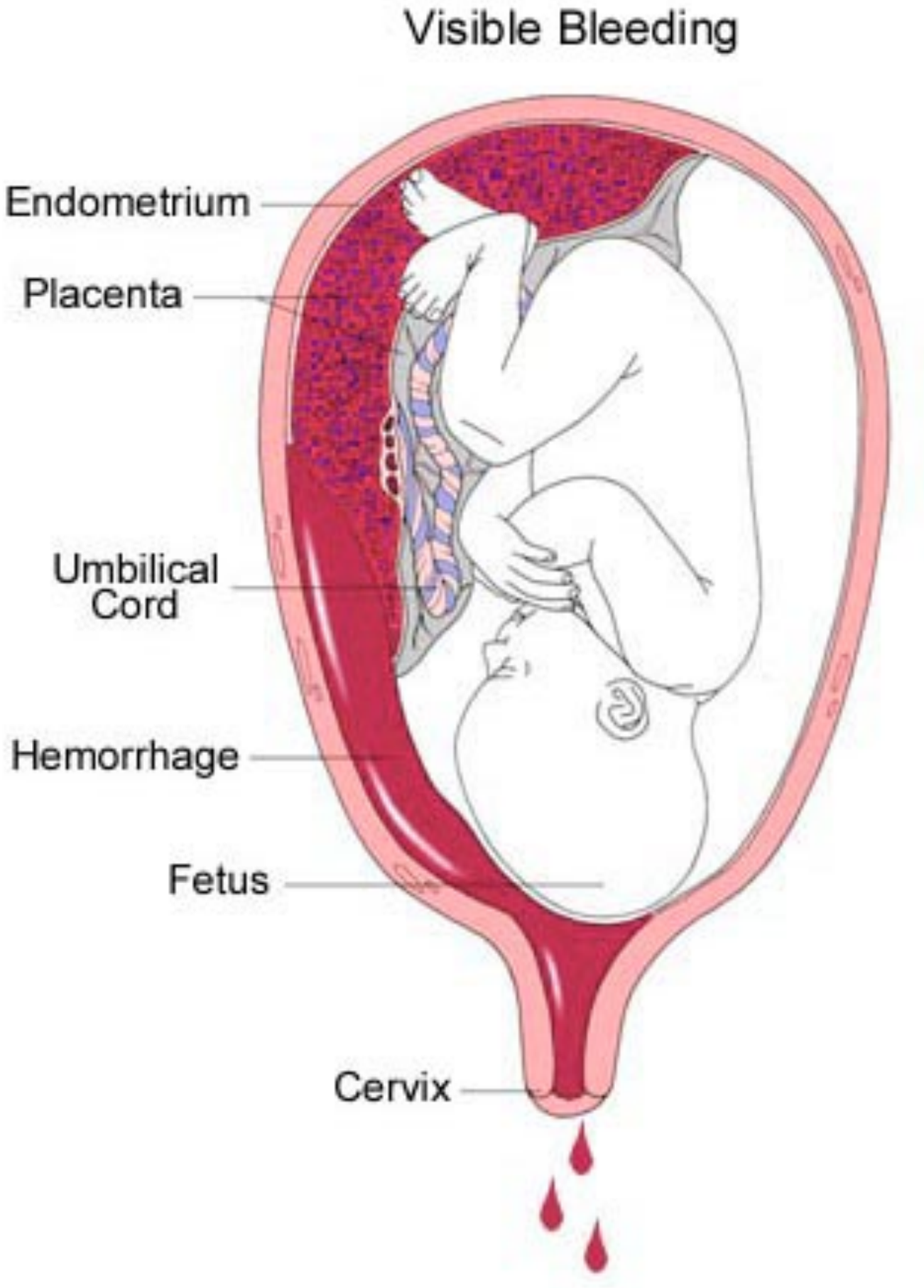
OB Management of Previa

- Tocolysis
- Cesarean section
- Hysterectomy
- Ligation of hypogastric or uterine arteries
- Increased incidence of placenta acreta

Antipartum Hemorrhage

Placental Abruption

- Premature separation of placenta
- 0.5-1.8% of all pregnancies


Visible Bleeding
Endometrium
Placenta
Umbilical Cord
Hemorrhage
Fetus
Cervix

Antipartum Hemorrhage

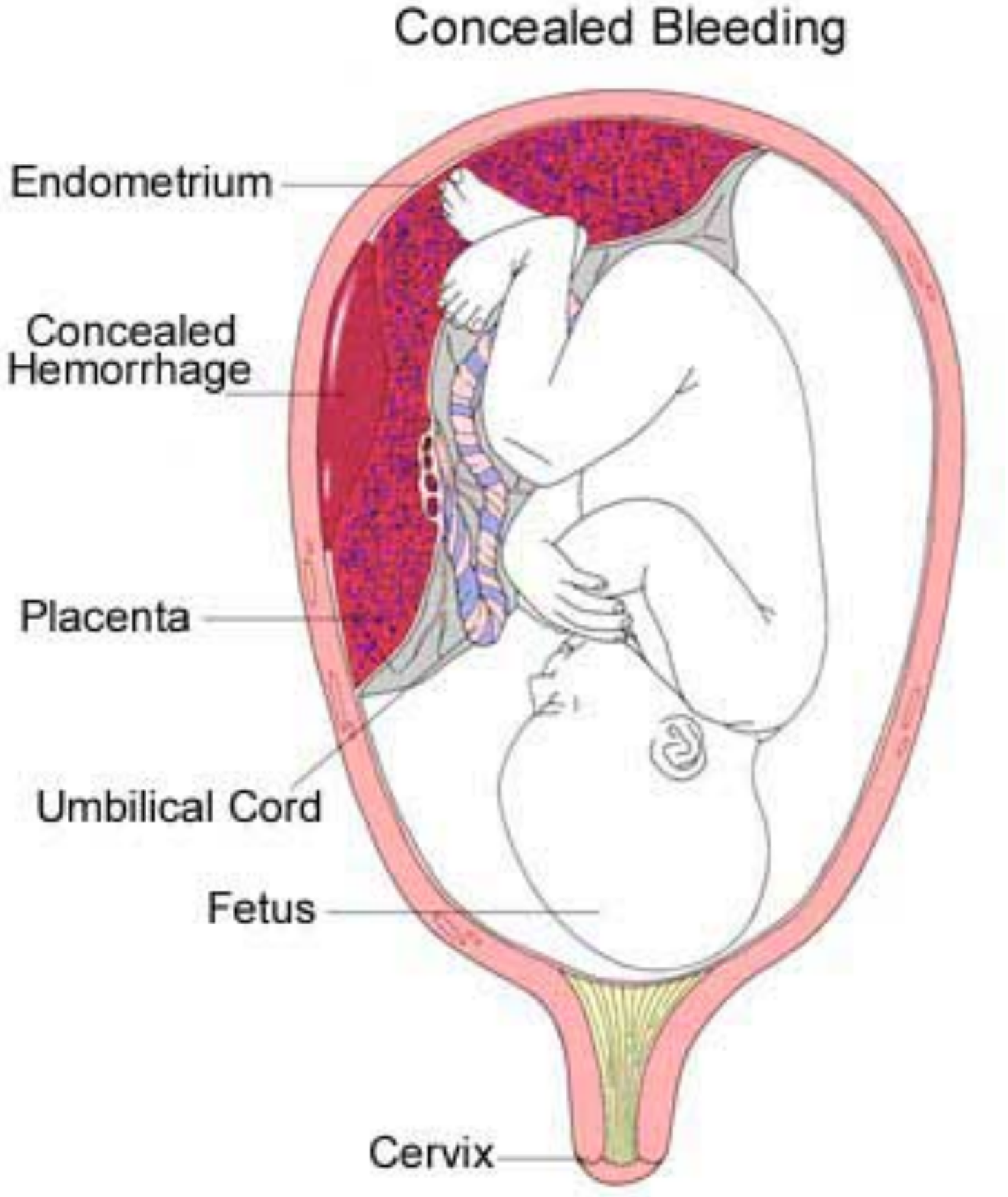
Risk Factors for Abruption

- Hypertension
- Trauma
- Placenta previa
- Fibroids
- Cocaine
- Smoking
- Multiparity
- Advanced age
- Previous abruption

Antipartum Hemorrhage

Abruption

- *Pathophysiology*
  - Arterial rupture
  - ⇓ contractions
  - DIC
  - Amniotic embolism
- *Signs and Symptoms*
  - Painful bleeding
  - Coagulopathy
  - Blood may be concealed!


Concealed Bleeding
Endometrium
Concealed
Hemorrhage
Placenta
Umbilical Cord
Fetus
Cervix

Antipartum Hemorrhage

Complications of Abruption

- Shock
- DIC
- Uterine atony
- Postpartum bleed
- Pituitary necrosis
- Fetal demise

Antipartum Hemorrhage

OB Management of Abruption

- IV volume / transfusion
- Delivery
- Treat uterine atony

Antipartum Hemorrhage

Uterine Rupture

- Rupture of the uterus
- 1 in 1000-3000 pregnancies
- 3 types
  - Spontaneous
  - Trauma
  - Scar dehiscence

Antipartum Hemorrhage

Risk Factors for Abruption

- Uterine surgery
- Trauma
- Oxytocin
- Multiparity
- Uterine anomalies
- Placenta percreta
- Macrosomia
- Fetal malposition

Antipartum Hemorrhage

Signs of Uterine Rupture

- Painful bleeding
- Altered contractions
- Fetal distress
- Loss of fetal presenting part

Antipartum Hemorrhage

Complications of Rupture

- Shock
- Fetal demise
- Death

Antipartum Hemorrhage

OB Management of Rupture

- Cesarean section
- Surgical fixation
- Hysterectomy

Antipartum Hemorrhage

- Management
  - Is parturient hemodynamically stable
  - Is fetus viable
  - Ensure adequate IV access
  - Regional vs general
  - ? Invasive monitoring
  - Blood products available

Postpartum Hemorrhage

Definition

- > 500 ml of blood loss in 24 hours
- Hemostasis occurs because of...
  - Uterine contraction
  - Maternal hypercoagulability

Postpartum Hemorrhage

Uterine Atony

- Most common cause of postpartum bleeding
- "Floppy" uterus unable to tamponade bleeding

Postpartum Hemorrhage

Risk Factors for Atony

- Multiparity
- Polyhydramnios
- Uterine infection
- Retained placenta
- Uterine anomalies
- Placenta previa
- Prolonged labor
- Inhaled agents
- β_2 agonists
- Magnesium
- Nitroprusside
- Nitroglycerin
- Ca channel blockers

Postpartum Hemorrhage

OB Management of Atony

- External manipulation
  - Bimanual compression
  - Uterine massage
- Drugs
- Surgery
  - Hysterectomy
  - Ligation of arteries

Postpartum Hemorrhage

Drug Management of Atony

- Oxytocin
  - ⇓ BP, tachycardia, SIADH (rare)
- Methylergonovine (Methergine)
  - ⇑ BP, CV compromise, pulmonary/brain edema
- Prostaglandin F_2 (Hemabate)
  - Bronchospasm, hypoxia

Postpartum Hemorrhage

Retained Placenta

- Generally occurs with induced labor

- May occur spontaneously

Postpartum Hemorrhage

OB Management of Retained Placenta

- Manual removal
- Uterine relaxation

Postpartum Hemorrhage

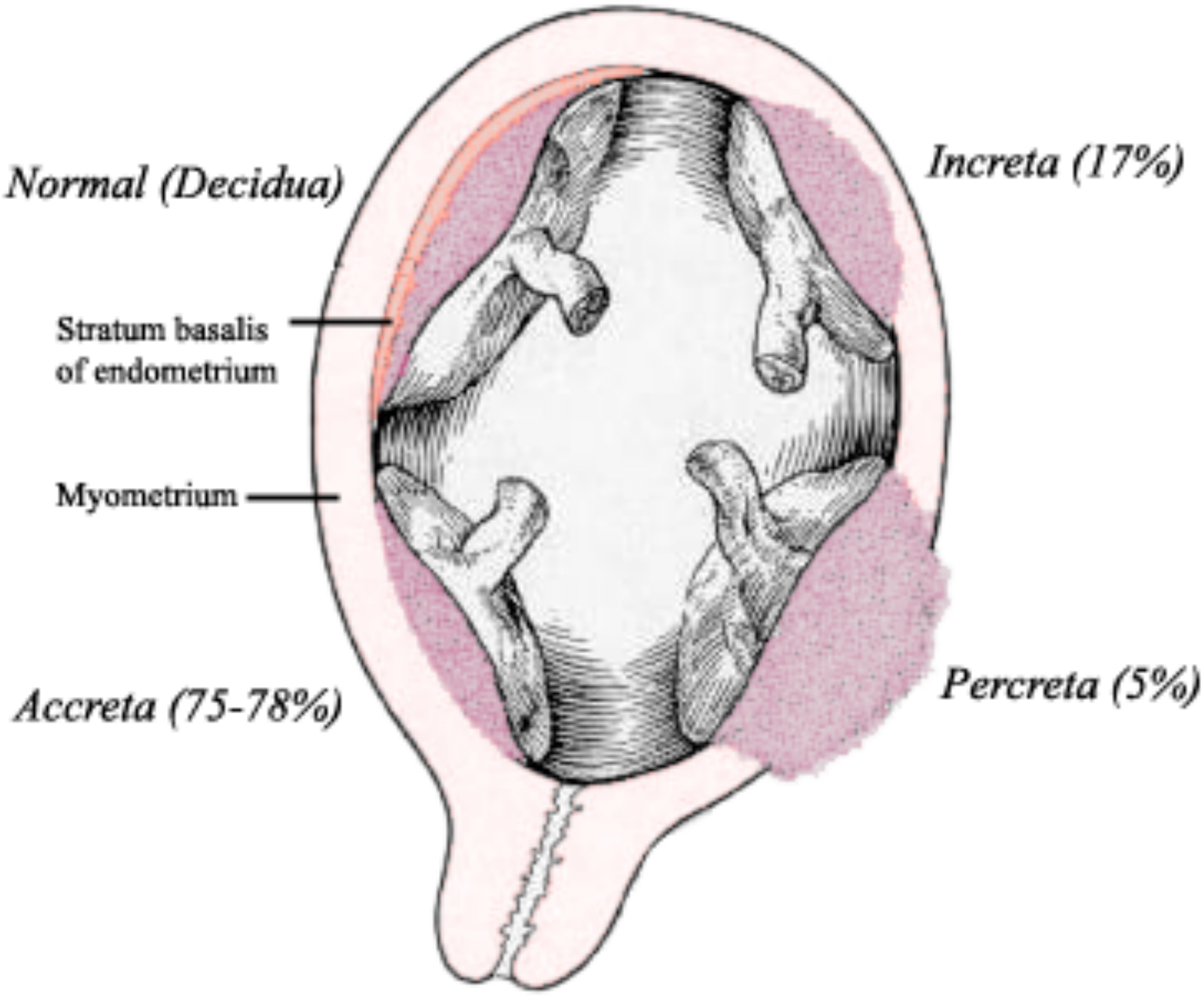
Uterine Relaxation

- β_2 agonists
- Magnesium
- Indomethacin
- Nifedipine
- Nitroglycerin

Postpartum Hemorrhage

Placenta Accreta

- Abnormal attachment of placenta to the myometrium
- 1 in 2,500 pregnancies
- 3 Types: accreta, increta, percreta
- Associated with massive blood loss


Normal (Decidua)
Increta (17%)
Stratum basalis
of endometrium
Myometrium
Accreta (75-78%)
Percreta (5%)

Postpartum Hemorrhage

Risk Factors for Accreta

- Previous cesarean section
- Any prior uterine surgery
- Placenta previa

Postpartum Hemorrhage

OB Management of Accreta

- Cesarean section
- Blood transfusion
- Hysterectomy
- May require removal of other organs

Postpartum Hemorrhage

Uterine Inversion

- Turning inside out of the uterus
  - Uterine atony
  - Fundal pressure
  - Umbilical cord retraction
  - Uterine anomalies

Postpartum Hemorrhage

OB Management of Accreta

- Manual replacement as quick as possible
- Uterine relaxation followed by contraction
- May require surgery

Peripartum Hemorrhage

Management

- Prepare for massive transfusion
  - Large bore IVs vs. central line
  - Type and cross
  - Fluid warmer
- Airway control
- Resuscitation of mother and fetus
- Disease specific treatments

Amniotic Fluid Embolism

General

- 1 : 20,000 deliveries
- 86% mortality!
- Pre-, Intra-, or Post-Delivery
- Imbalance of chemical mediators
  - Prostaglandins
  - Leukotrienes

Amniotic Fluid Embolism

Symptoms

- Tachypnea
- Cyanosis
- Shock
- Profuse bleeding

Amniotic Fluid Embolism

Pathophysiology

- Cardiovascular collapse
  - Pulmonary vascular obstruction
  - Anaphylaxis-like
  - Left ventricular dysfunction
- Disseminated Intravascular Coagulation
- Uterine Atony

Amniotic Fluid Embolism

Management

- Cardiovascular collapse
  - Resuscitation with pressors, fluid
  - Closed chest compression
- Disseminated Intravascular Coagulation
  - Platelets and coagulation factors
- Uterine Atony
  - Oxytocin, methergine, PGF_2

Trauma

General

- Leading cause of non-obstetric mortality
- Usually from motor vehicle accidents
- Assault is common
- Mortality is the same as if not pregnant

Trauma

Common Complications

- Placental Abruption
- Uterine Rupture
- Pelvic Fracture
- Disseminated Intravascular Coagulation

Trauma

Pelvic Fracture

- High incidence of fetal/maternal mortality
- Increased risk for abruption
- Open and percutaneous fixation are safe

Trauma

Disseminated Intravascular Coagulopathy

- Common with obstetric disorders
- Activation of coagulation system
- Deposition of fibrin with microvascular thrombi
- Consumption of coagulation factors
- Imbalance of clotting and bleeding

Trauma

Management of DIC

- Treat underlying disorder
- Coagulation factors and platelets
- Consider heparin

The End