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
- Minute ventilation
- Tidal volume
- Respiratory rate
- PaO₂
- Closing volume

↓↓
- Airway resistance
- Functional residual capacity
- PaCO₂
- HCO₃⁻
Physiologic Changes

Cardiovascular

↑↑
- Blood volume
- Plasma volume
- Cardiac output
- Stroke volume
- Heart rate
- Wall thickness

↓↓
- Systolic pressure
- Diastolic pressure
- Peripheral resistance
- Pulmonary resistance
- Response to vasoconstrictors
- 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
• 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
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 spontaneous 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 $\geq 5$ 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**

**NO**

**PGI2**

**TxA2**

**Endothelin**

Favors *vasoconstriction 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
- Anti-seizure
- Anti-hypertension
- Uterine vasodilator
- $\downarrow$ renin/angiotensin
- $\downarrow$ platelet aggregation
- Bronchodilation

Cons
- Cardiac arrest
- Respiratory depressant
- Prolong NMBs
- $\downarrow$ uterine tone
- Prolongs labor
- $\uparrow$ 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**
- Good pain control
- Attenuates BP response
- Improves uterine blood flow
- Spon’t ventilation
- ↓ thrombus formation

**Cons**
- Contraindicated in shock
- Contraindicated in low platelets
- Airway not secured
Pre-Eclampsia

General

Pros
Better hemodynamic control
Airway secured

Cons
Have to secure airway
Less pain control
Hemodynamic response to laryngoscopy
Peripartum Hemorrhage

General

• Antepartum Bleeding
  - Previa
  - Abruptio placentalis
  - Uterine rupture
  - Vasa previa

• Postpartum Bleeding
  - Uterine atony
  - Retained placenta
  - Placenta acreta
  - Uterine inversion
  - Genital trauma
Antepartum 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
Antipartum Hemorrhage

Risk Factors for Placenta Previa

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

**Placental Abruption**

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

Risk Factors for Abruption

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

Abruption

- Pathophysiology
  - Arterial rupture
  - ↓ contractions
  - DIC
  - Amniotic embolism

- Signs and Symptoms
  - Painful bleeding
  - Coagulopathy
  - Blood may be concealed!
Antipartum Hemorrhage

Complications of Abruption

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

OB Management of Abruption

- IV volume / transfusion
- Delivery
- Treat uterine atony
Antepartum Hemorrhage

Rupture of the uterus

1 in 1000-3000 pregnancies

3 types

- Spontaneous
- Trauma
- Scar dehiscence

Uterine Rupture
Antipartum Hemorrhage

Risk Factors for Abruption

- Uterine surgery
- Trauma
- Oxytocin
- Multiparity
- Uterine anomalies
- Placenta percreta
- Macrosomia
- Fetal malposition
Antepartum 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
- β2 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
Drugs Management of Atony

- **Oxytocin**
  - ↓BP, tachycardia, SIADH (rare)

- **Methylergonovine (Methergine)**
  - ↑BP, CV compromise, pulmonary / brain edema

- **Prostaglandin F₂ (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

- β₂ 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
Postpartum Hemorrhage

Risk Factors for Accreta

- Previous cesarean section
- Any prior uterine surgery
- Placenta previa
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
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, PGF₂
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
Pelvic Fracture

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