

HELLP ME!

Maternal Emergencies that Exist Beyond the Laboring Pregnant Patient

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Life Flight Network

Maternal Emergencies

- Hypertensive Disorders of Pregnancy
 - Preeclampsia, Eclampsia, Gestational Hypertension, Chronic Hypertension
- HELLP Syndrome
- Amniotic Fluid Embolism
- Ante/Postpartum Bleeding
- Pregnancy and Trauma

Pre-Eclampsia

- Defined as:
 - New onset of hypertension and either proteinuria OR end-organ dysfunction OR both after 20 weeks of gestation in a previously normotensive woman.
 - * Edema not longer required for this diagnosis.
 - Can be classified as Mild or Severe

Mild Pre-Eclampsia

- Blood pressure $>140/90$
- >300 mg/dL Protein in a 24 hour urine collection

Severe Pre-Eclampsia

- SBP > 160 or DBP >110 (? recorded on 2 occasions, 6 hours apart)
- Proteinuria
- ? Oliguria
- Visual disturbances
- Epigastric pain; Nausea & vomiting
- Pulmonary edema
- HELLP syndrome
- ? Fetal growth restriction

Eclampsia

- Defined as:
 - The development of grand mal seizures in a woman with preeclampsia (in the absence of other neurologic conditions that could account for the seizure).

Gestational Hypertension

- Defined as:
 - Hypertension without proteinuria or other signs/symptoms of preeclampsia that develops after 20 weeks of gestation.
 - It should resolve by 12 weeks postpartum.

Chronic Hypertension

- Defined as:
 - Chronic/preexisting hypertension is defined as systolic pressure ≥ 140 mmHg AND/OR diastolic pressure ≥ 90 mmHg that antedates pregnancy
 - OR is present before the 20th week of pregnancy (on 2 occasions)
 - OR persists longer than 12 weeks postpartum.

Complications

- Placental abruption
- Acute kidney injury
- Cerebral hemorrhage
- Hepatic failure/rupture
- Pulmonary edema
- DIC (disseminated intravascular coagulation)
- Progression to eclampsia

Mortality

- In the United States, preeclampsia/eclampsia is one of four leading causes of maternal death
 - Hemorrhage
 - Cardiovascular conditions
 - Thromboembolism
 - Preeclampsia/eclampsia

1:100,000 live births results in maternal death due to preeclampsia.

Risk Factors

- Past history of preeclampsia
- First pregnancy
- Family history of preeclampsia
- Obesity
- Preexisting medical conditions
 - Pregestational diabetes, BP $\geq 130/80$ mmHg at first visit, antiphospholipid antibodies, BMI >26.1 , chronic kidney disease
- Twin pregnancies
- Advanced maternal age

General Signs & Symptoms

- Severe hypertension: $\geq 160/90$
- Persistent/severe headache
- Visual abnormalities (blurred vision, sensitive to light)
- Upper abdominal/epigastric pain
- Nausea/vomiting
- Dyspnea or retrosternal chest pain
- Altered mental status

What about the baby?

- The consequences from chronic low perfusion to the placenta:
 - Fetal growth restriction
 - Low amniotic fluid
 - Indirectly, this leads to probable preterm delivery, which in itself puts the baby at risk for many complications.



Assessment

- Vital signs- place on cardiac monitor
- Respiratory status
- Neurological status (LOC, HA, blurred vision)
- Epigastric pain
- Deep Tendon Reflexes and Presence/absence of Clonus
- Assess for edema
- Fetal HR by Doppler if able
- Assess uterine activity

Management

- Minimize IV fluid
- Oxygen for saturations $<94\%$
- Place the patient in a left lateral tilt position
- Observe the patient for active labor and for possible placental abruption
- Assess for central nervous system involvement
 - Frontal headache, blurred vision, epigastric pain, changes in reflexes

Medication Management

- **Magnesium Sulfate**

- *Example:* 6 gram bolus over 30 minutes followed by a continuous infusion of 2 grams/hour
- Used more as an anticonvulsant/neuroprotection

- **Labetalol**

- *Example:* 20mg IV. After 10 min may adm. 40mg IV; after another 10 min may adm. 80mg IV. Can also be a continuous infusion.
- Onset 5-10 minutes & duration 3-6 hours. If BP not controlled may administer Hydralazine

- **Hydralazine**

- *Example:* 10mg IV over 2 minutes; may repeat q 20 min PRN
- Onset 5-10 minutes & duration 2-4 hours

Seizures

- With the progression from pre-eclampsia to eclampsia, the patient has neurologic irritability with the onset of seizures.
 - During transport, decrease stimuli and be prepared with suction and airway management
 - If the patient seizes:
 - Protect the airway
 - Administer medications per protocol (Magnesium and Ativan)

HELLP Syndrome

- Defined as:
 - Hemolysis, Elevated Liver Enzymes, Low Platelets
 - Probably represents a severe form of preeclampsia, but this relationship remains controversial. HELLP may be an independent disorder. (Many women do not have concurrent hypertension or proteinuria).

Signs & Symptoms: HELLP

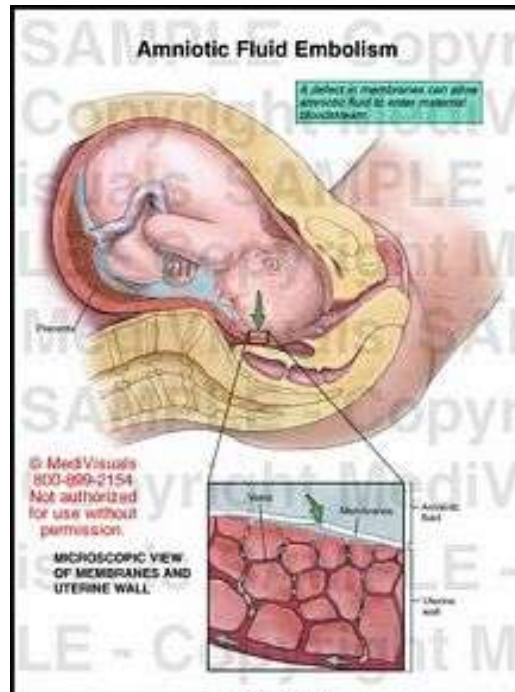
- *Epigastric or RUQ tenderness
- Nausea and/or vomiting
- Headache
- General malaise
- Jaundice
- Bleeding if coagulopathy present: hematuria, GI bleeding, DIC
- Hypertension (85% of cases)
- Severe pre-eclampsia: SBP >160, DBP >110, proteinuria, edema, seizures

Management: HELLP

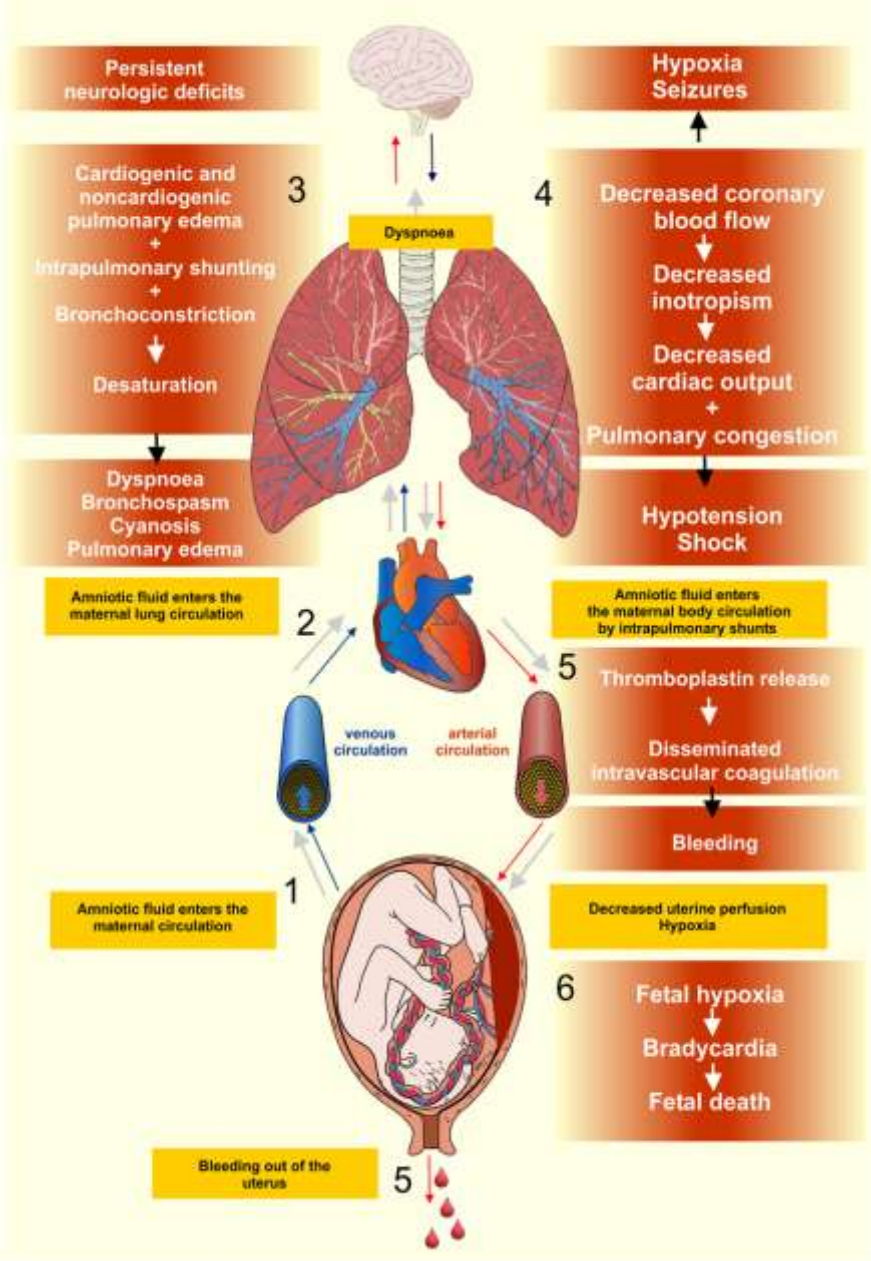
- Similar to hypertensive disorder management
- Transport in left lateral tilt
- Oxygen if saturations $<94\%$
- Treat hypertension per protocol
- Assess patient for uterine activity
- Assess fetal heart tones with Doppler (if available)
- Patient may need platelet, RBC or Fresh Frozen Plasma transfusion(s) prior to delivery

Amniotic Fluid Embolism Syndrome

- Obstetric emergency in which the amniotic fluid, fetal cells, hair or other debris enters the mother's blood stream via the placental bed of the uterus and triggers an allergic-like reaction.



- Originally thought that fetal cells and debris occluded the pulmonary vasculature.
- Currently, it is considered that the fetal antigens enter the maternal circulation triggering a response similar to SIRS: Systemic Inflammatory Response Syndrome: activating the coagulation cascade which leads to DIC and inflammatory suppression of myocardial function.



- Risk Factors
 - Multiparity: >5 live births
 - Advanced maternal age: > 35 years
 - Precipitous labor
 - Trauma
 - Rupture of membranes, rupture of uterine veins
 - Possibly: C/S, instrument vaginal delivery, abruption, previa, cervical lacerations or uterine rupture

AFES Presentation

- Rare: between 1-12 per 100,000 deliveries
- When the fluid and fetal cells enter the maternal pulmonary circulation, there is profound respiratory failure with cyanosis and cardiovascular shock.
- Usually then followed by seizures and coma

AFES Management

- There is no specific treatment for amniotic fluid embolism
- Prognosis:
 - Maternal mortality is high
 - Patients with AFE die within the first hour of onset of symptoms
 - Of those who survive this first time period, 50% develop a coagulopathy and 7% are neurologically impaired
 - Neonatal survival can be quite good if delivered quickly. The neurological status of the infant is directly related to the time elapsed between maternal arrest and delivery.

Antepartum/Postpartum Bleeding

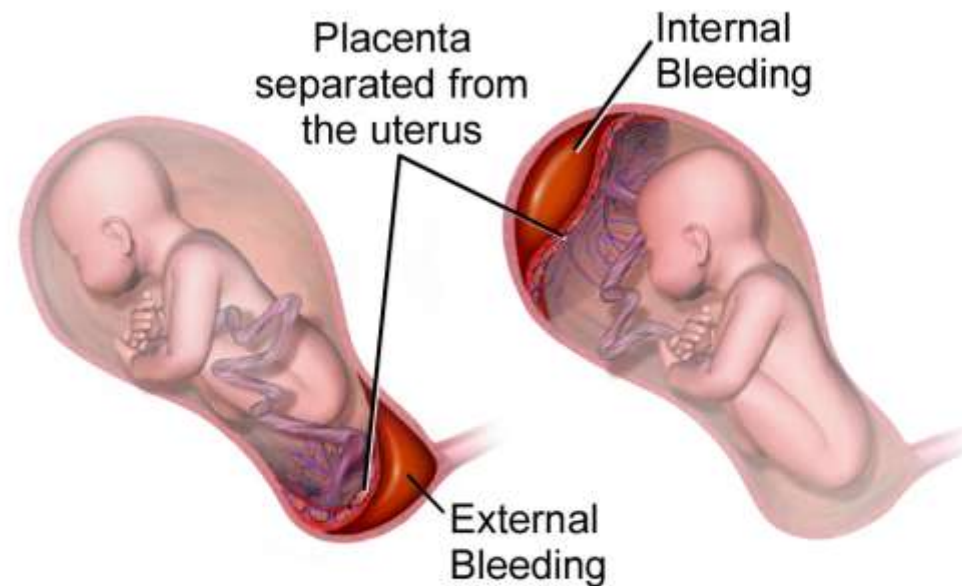
- Placental Abruption
- Placenta Previa
- Uterine Rupture
- Post Partum Hemorrhage
- Trauma

Goals of Treatment

- The goal is to prevent maternal and/or fetal demise by maintaining hemodynamic stability and blood flow to the uterus as evidenced by normal vital signs, normal fetal heart rate.

Placental Abruption

- Bleeding that causes partial or total placental detachment prior to the delivery of the fetus.



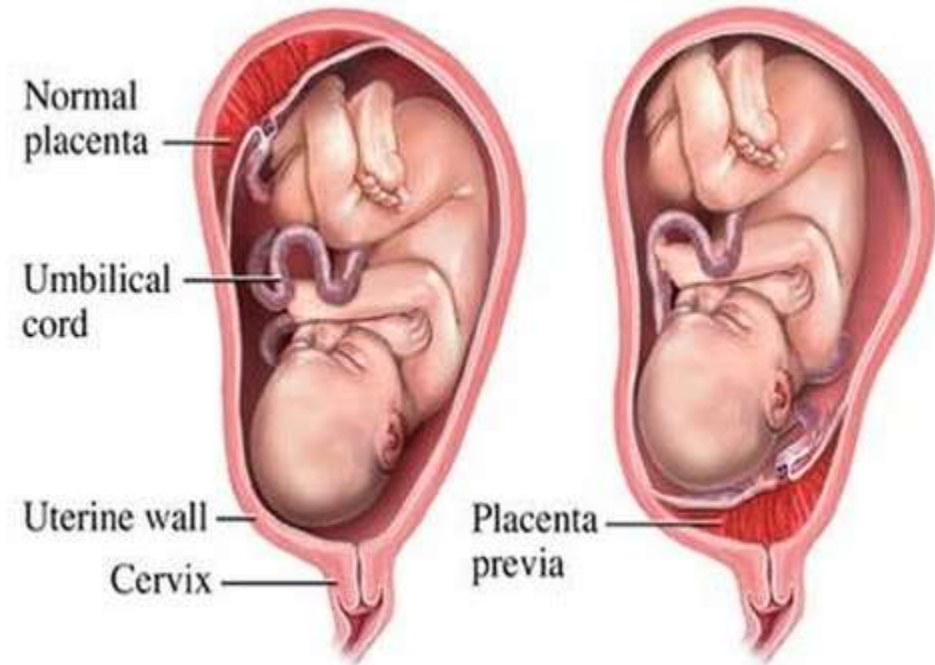
Abruptio Placenta (Placental Abruption)

Placental Abruption

- Sign and Symptoms:
 - Vaginal bleeding, abdominal pain, hypertonic uterine contractions, non-reassuring fetal heart rate
 - Bleeding is usually dark red
- Contributing causes:
 - Uterine abnormalities, smoking, drug use (cocaine), hypertension, multiparity, premature rupture of membranes >24hrs, history of previous abruption.

Placenta Previa

- The presence of placental tissue that extends over the internal os, after 20 weeks gestation.

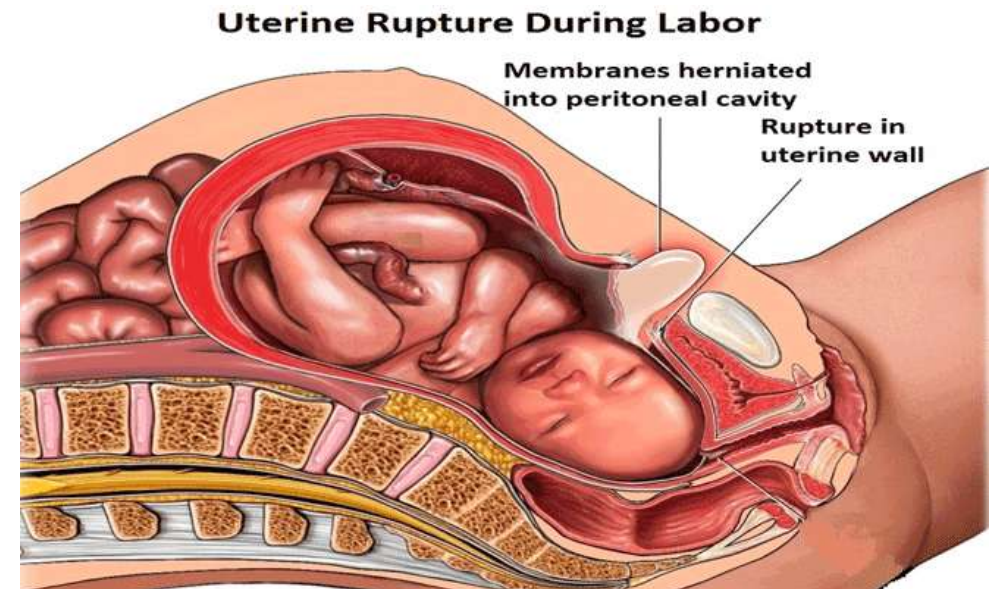
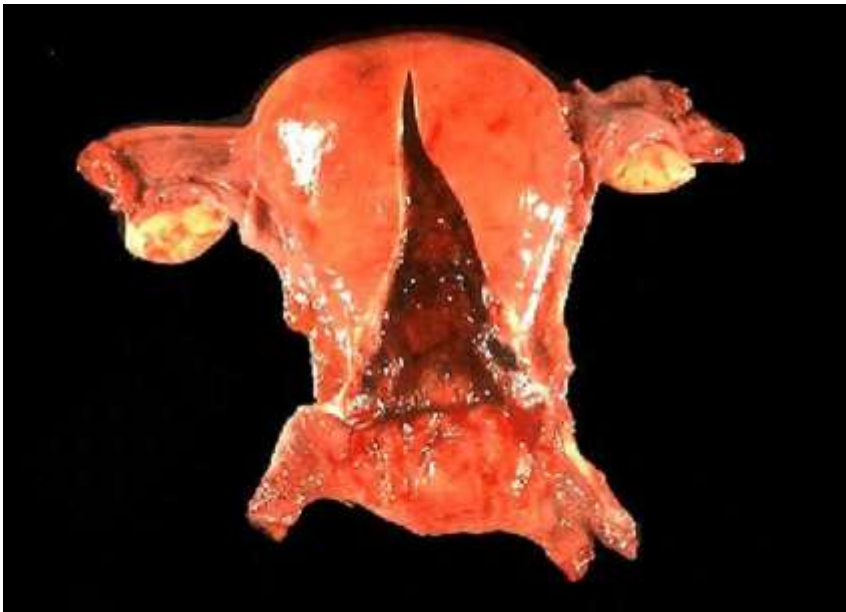


Placenta Previa

- Signs and symptoms:
 - Painless vaginal bleeding; can be serial
 - Usually bright red blood
- Contributing causes:
 - History of previous previa, history of previous cesarean sections, multiple gestation pregnancy, previous uterine surgical procedures

Uterine Rupture

- Can be defined as related to a previously scarred uterus (i.e. previous surgery)
- OR incidence with a unscarred uterus



Uterine Rupture

- Signs and Symptoms:
 - Fetal heart rate abnormalities, possible vaginal bleeding, sudden or worsening abdominal pain, changes in uterine contractions, or cessation of labor, maternal hypotension/tachycardia
- Contributing Causes:
 - trauma, congenital weakness of myometrium, >40 weeks gestation, history of prior uterine surgeries, infant > 4000 grams estimated fetal weight

***Obstetric Emergency!

Post Partum Hemorrhage

- Obstetrical emergency
- A major cause of maternal morbidity and mortality
- If managed properly, it is one of the most preventable causes
- Can be Primary (early) or Secondary (late)
- Defined by the volume of blood loss:
 - >500 ml after vaginal birth
 - >1000 ml after cesarean section

Post Partum Hemorrhage

- Causes: 4 T's:
 - **Tone**: * uterine atony most common cause
 - **Tissue**: retained placenta
 - **Trauma**: lacerations
 - **Thrombin**: clotting disorders
- The potential is high after a delivery related to the fact that late in pregnancy the uterine artery blood flow is 500-700ml/min (approx. 15% of cardiac output)

Types of Post Partum Hemorrhage

- Primary (Early PPH)
 - Occurs in the first 24 hours after delivery
 - Related to atony, trauma, coagulopathies
- Secondary (Late PPH)
 - Occurs >24 hours after delivery and up to 12 weeks post partum; peaking at 2 weeks post partum
 - Most common cause is uterine atony due to retained placenta; or history of primary PPH or possibly arteriovenous malformation

Post Partum Hemorrhage

- Signs and Symptoms
 - Bleeding that is greater than expected
 - Hypovolemia symptoms: hypotension, tachycardia, pallor, confusion, hypoxemia

PPH Management

- Monitor rate and volume of bleeding
- Supportive interventions- based on suspected etiology
 - IV access: 16g in anticipation for fluids/blood administration
 - Treat for shock
 - Fluids, oxygen

Trauma & Pregnancy

- Motor vehicle accidents and domestic/intimate partner violence account for most cases of maternal major trauma.
- Challenges with the pregnant trauma patient are unique in the sense that with the presence of a fetus, there are now two patients whom are potentially at risk.



Physical Changes in Pregnancy

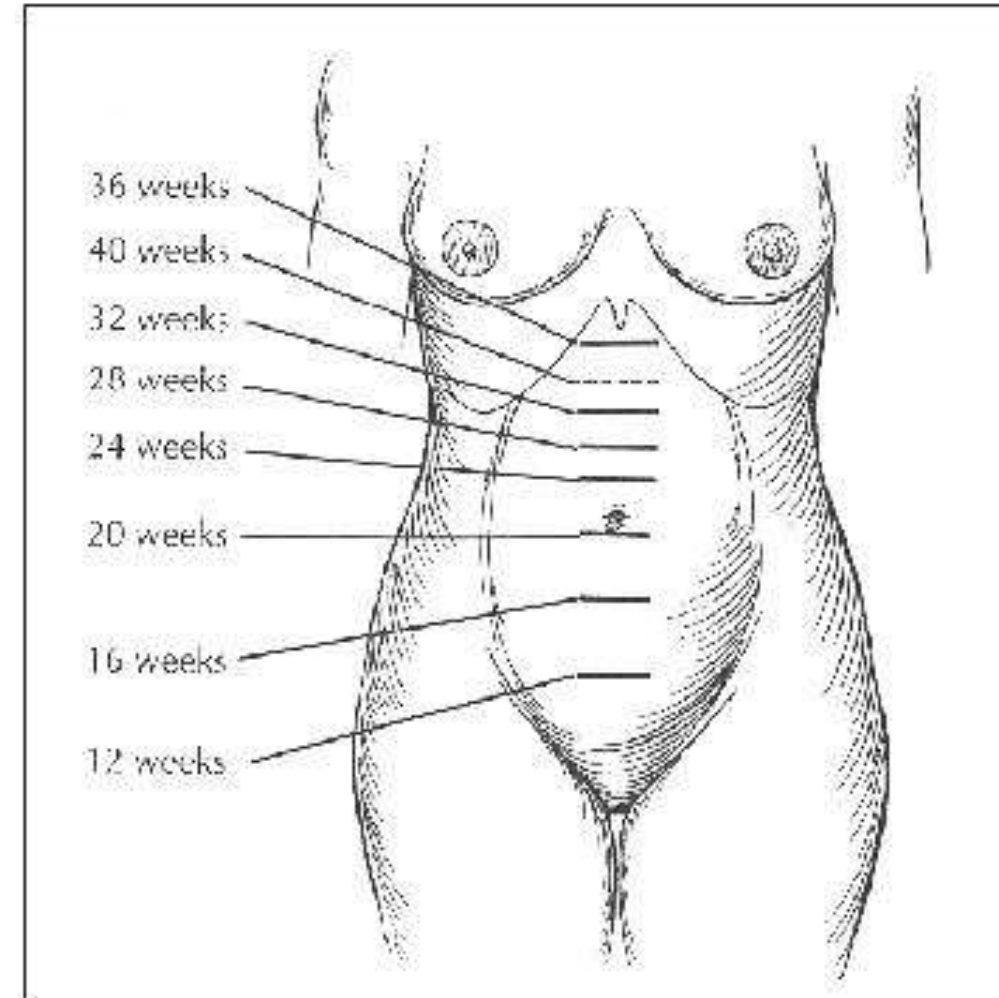
- Cardiovascular:
 - Cardiac output increases by 20% at 8 weeks and continues to rise until approx. 30 weeks where it plateaus at 50% above baseline
 - Supine position at term can lower CO by 25-30%
- Pulmonary:
 - Oxygen consumption increases, and by >20 weeks there is a displacement of the diaphragm
 - Normal ETCO₂ is 25-35 for her
- Hematological:
 - Pregnancy is a procoagulant state
- Gastrointestinal:
 - Increased risks of aspiration due to decreased esophageal tone and increased intraabdominal pressure

Physical Changes in Pregnancy

- Uterine:
 - Less than 12 weeks gestation, the uterus is protected by the bony pelvis
 - Pelvic vasculature is dilated in pregnancy
 - Uterine blood flow is approx. 600ml/min in the third trimester

Figure 1. Distance From The Symphysis Pubis In Centimeters As A Measure Of Gestational Age

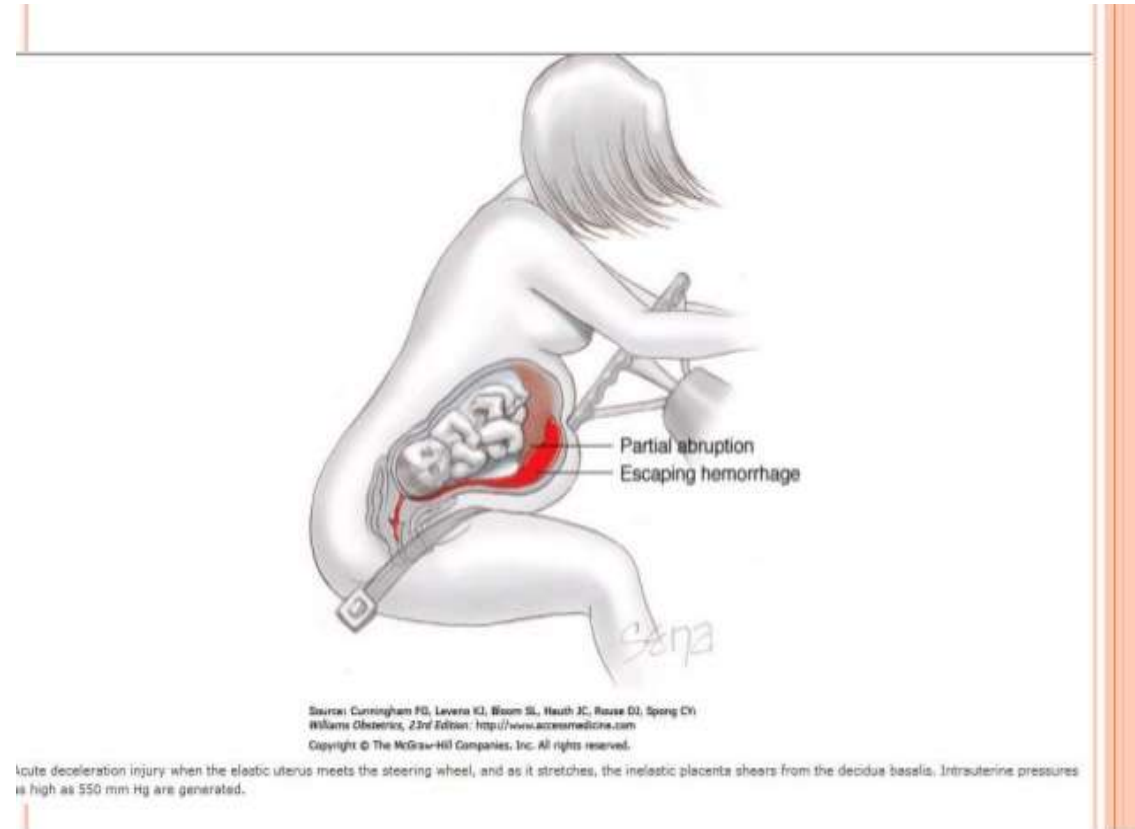
- Fundal height at umbilicus
- = approx. 20 weeks gestation



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Maternal Risks with Trauma

- Preterm labor
- Placental abruption
- Uterine rupture
- Hemorrhage
- Shock
- DIC
- Death



Fetal Risks

- Preterm birth
- PROM (premature rupture of membranes)
- Meconium at delivery
- Cesarean birth
- Neonatal respiratory distress syndrome
- Death

Maternal/Fetal Assessment: Trauma

- Uterine palpation
- Bleeding
- Monitor frequency/intensity of uterine contractions
- Bleeding?
- Gestational age
- Fetal heart rate: 110-160 bpm (Doppler)

Placental Trauma

- Placental abruption
- Ruptured uterus
- PROM
- Cord prolapse

Goals/Management

- Initial goals are to assess maternal airway, breathing and circulation; establish maternal cardio/pulmonary stability
- **Treat the pregnant trauma patient as a trauma patient first!**
- If you need to intubate
 - Pre-oxygenate, assume a difficult airway and note increased risk of aspiration
- Cervical Spine Immobilization
 - Spinal precautions for all suspected spinal cord injury patients. If patient is on a board, utilized left lateral tilt of the board, and remove as soon as possible.

Management

- Vital Signs q 5 minutes
- Left lateral tilt position
- O₂ by NC or NRM
- 2 large bore IVs (16g)
- Fluids to keep SBP >90-100
- Consider blood administration if 2L fluids and no response in BP (caution with vasopressors)
- Be sure to let the receiving facility know the patient is pregnant



The gravid uterus compresses the vena cava in supine position



30° left lateral decubitus unloads vena cava



Alternative method: manual shift of uterus

Case Study

- Dispatched to transport a patient from a Free-Standing Emergency Room to be admitted at a near by hospital
- 33 year old Hispanic multiparous female presented with complaints of back and abdominal pain. She also has had nausea and vomiting.
- She states she is 7 months pregnant. G3P2
- No allergies, no medications.

Case Study

- BP 223/123
- HR 86
- T 97.6
- RR 20
- Alert, oriented. DTRs normal, no clonus, no headache or blurred vision, no edema, PERRL.
- Breath sounds clear and equal bilaterally

Case Study

- Lab work:
 - WBCs and LFTs slightly elevated
 - 1+ proteinuria and small amount of blood –UA
 - Everything else reported as WNL

Case Study

- Abdominal Ultrasound : normal (noting viable pregnancy)
- Scanned and was negative for Aortic Dissection
- Received 2 liters of LR
- Morphine and Zofran: brief relief of symptoms
- Dilaudid and Ativan: brief relief of symptoms
- Doppler check of baby: FHT 142

- BP 155/107

Case Study

- Magnesium bolus 2gm
- Labetalol 20mg
 - 164/93 FHR 154
 - Pt is now sleepy, but awakens and is able to tell you she still is having the abdominal pain especially right upper quadrant.
 - You package her and transport her to the hospital
 - Her BP now is 100/60..... ☹️

Hallmarks

- HELLP syndrome develops in $< 1\%$ of pregnancies, but in 10-20% of pregnancies with PIH or severe PIH
- Abdominal pain: epigastric , RUQ pain
- Hypertension in 85% of cases
- Most are between 28-36 weeks gestation, but it can present up to 7 days post-partum
- Treating the maternal symptoms and assessing the fetal status are priorities; as is the decision to deliver the infant.

HELLP

- The outcome can be good, but serious complications can also occur:
 - Abruptio, acute renal failure, sub-capsular liver hematoma/rupture, pulmonary edema, retinal detachment



Questions?