

# Obstetrical Trauma: Are we ready for it?

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# Objectives

- Identify common mechanisms of injury in the pregnant patient and fetus
- Describe the anatomic and physiologic changes of pregnancy and their effects on treatment
- Outline treatment priorities and assessment of the pregnant patient and fetus
- Describe the conditions that are unique to the pregnant trauma patient

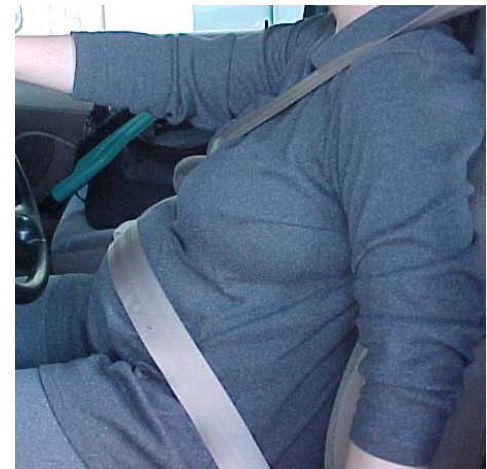


# Trauma in Pregnancy

- Leading cause of death in women during reproductive years
- Most common non-obstetric cause of maternal death and disability
- Common major traumas: motor vehicle collisions, falls and assaults.



**Proper seat belt placement**



**Improper seat belt placement**

# Trauma in Pregnancy

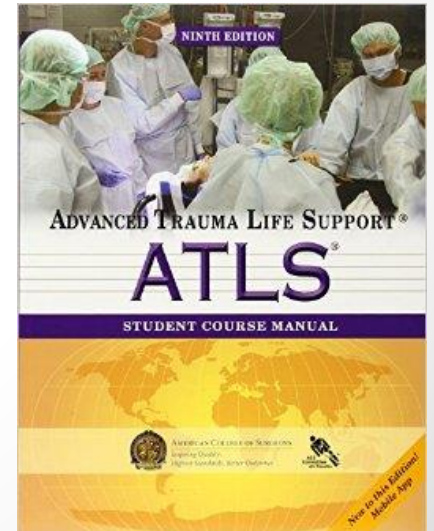
Incidence of trauma increases as pregnancy progresses:

- 8% in first trimester
- 40% in second trimester
- 52% in third trimester



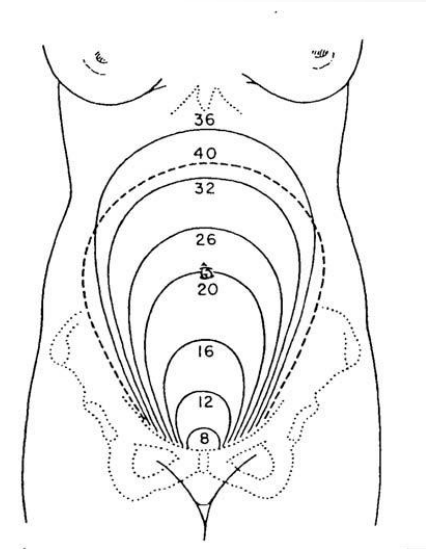
# Trauma in Pregnancy

- ATLS Protocol remains the same
- Anatomic and physiologic changes of pregnancy change the pattern of injury and the physiologic response to injury
- Two patients requiring treatment!

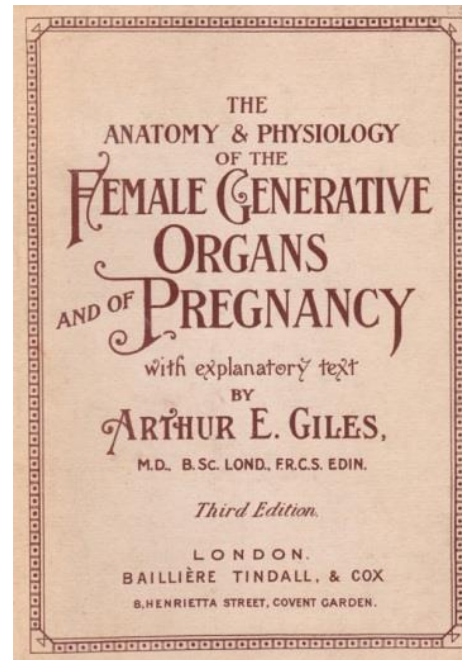


# Anatomic Changes

- First trimester
  - Intrapelvic
- Second trimester
  - At the umbilicus at 20 weeks
- Third trimester
  - Reaches costal margin at 34-36 weeks
  - Large and thin-walled

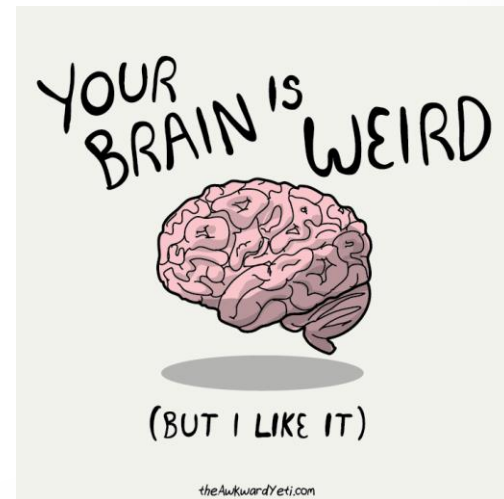


# Physiology of Pregnancy



# Neurologic Changes in Pregnancy

- 25 to 40% decrease in anesthetic requirements
- Loss of consciousness may occur even at “sedative” doses





# Blood Composition in Pregnancy

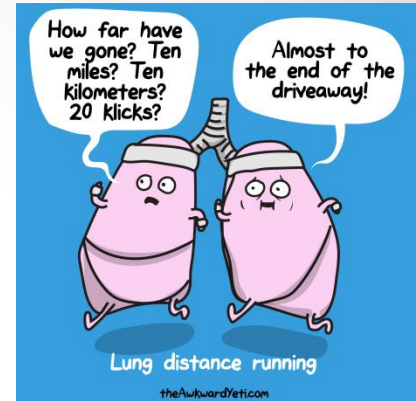
- 40% increase in blood volume
- 25% increase in red cell mass
- Relative anemia (Hct 31-35)
- The mother may lose up to 1500 cc of blood without hemodynamic instability BUT the fetus may be in SHOCK.



# Hemodynamics in Pregnancy

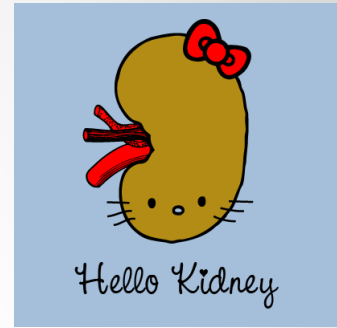
- Cardiac Output is increased by 1.0-1.5 liters/minute
- Heart rate increases
- Hypotension may be due to vena caval compression by the uterus—place patient left side down!

# Respiratory Changes in Pregnancy



- Increased  $O_2$  Consumption
- 30-40% increase in tidal volume and minute ventilation
- Arterial blood gases reflect compensated respiratory alkalosis due to hyperventilation
  - $PaCO_2$  : 25-30 mm Hg
- Relaxed LES + Delayed Gastric Emptying = Increased Risk of Aspiration

# Renal Function in Pregnancy



- Glomerular filtration rate and renal blood flow are increased in pregnancy
- BUN and Creatinine decrease in pregnancy
- Glycosuria common (not proteinuria)
- Mild hydronephrosis a physiologic response to uterine compression of the ureters

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# Musculoskeletal Changes in Pregnancy

- Pelvis less susceptible to fractures
- Relaxation of sacroiliac (SI) joint: Hormonal changes
- Symphysis pubis widened 4 to 8 mm (3rd trimester)
- May create confusion in interpretation of pelvic radiographs

# Thrombotic Disease and Pregnancy

- Pregnancy may induce a hypercoagulable state
  - Clotting factors and fibrinogen are increased
  - Decreased fibrinolysis
  - Venous hypertension/stasis due to uterine pressure on the IVC
- Incidence of DVT of 0.1-0.2%
- Heparin and Low Molecular Heparin ok in pregnancy
- Coumadin CONTRAINDICATED because of severe fetal malformations

# Eclampsia

- Complication of late pregnancy that can mimic head injury
- Signs and Symptoms
  - Seizures
  - Hypertension
  - Hyperreflexia
  - Proteinuria
  - Peripheral edema

# Premature Labor

- Most frequent complication of maternal injury
- Signs and Symptoms
  - Uterine contractions greater than 6 per hour
  - Patient may or may not sense contractions
  - Back pain
  - Vaginal discharge
  - Cervical dilation or effacement



# Abruptio Placenta

- Partial or total separation of placenta from uterine wall
- Maternal mortality from abruption is less than 1%, but fetal death ranges from 20 to 35%
- Signs and Symptoms
  - Vaginal bleeding (70%)
  - Uterine tenderness
  - Frequent uterine contractions or tetany
  - Increasing fundal height
  - DIC may occur

# Uterine Rupture

- Rare - 0.6% of blunt abdominal trauma in pregnancy
- Signs and Symptoms
  - Abdominal tenderness or peritonitis especially in the presence of profound shock
  - Abdominal fetal lie
  - Inability to palpate fundus

# Treatment of the Injured Pregnant Patient

How do I evaluate and treat two patients?

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How do I evaluate and treat two patients?

- Assess and resuscitate the mother first and then assess fetus before conducting a secondary survey of the mother

# Primary Survey

## Airway:

- Ensure a patent airway (high risk of aspiration)

## Breathing:

- Ensure adequate ventilation and oxygenation. Consider appropriate CO<sub>2</sub> for the stage of pregnancy
- High diaphragms in late stages of pregnancy. (CAUTION: chest tube placement)

## Circulation:

- Uterus should be displaced manually to the left side to relieve pressure on the vena cava
- Crystalloid and early type-specific blood administration are indicated to support physiologic hypervolemia of pregnancy. Avoid vasopressors
- REMEMBER: THE PREGNANT PATIENT CAN LOSE A LOT OF BLOOD BEFORE ABNORMAL BP AND PULSE

# Treatment of the Fetus

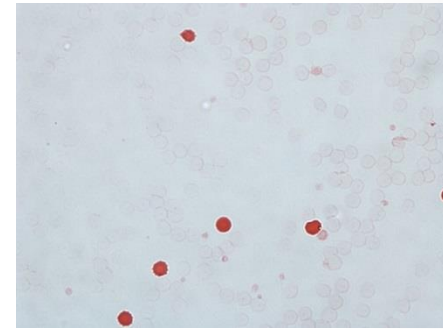
- Abdominal examination of the mother is critically important. (indications for FAST are the same)
- Continuous fetal heart monitoring, tocodynamometer, note fetal movements
- Patients with no risk factors for fetal loss should have continuous monitoring for 6 hours.
- Patients with risk factors should be monitored for 24 hours (**ISS > 9, maternal HR > 110, FHR >160 or <120, ejection during MVC, MCC or pedestrian collisions**).

# Secondary Survey

- In addition to the usual secondary survey, assessment of the pregnant patient should rule out
  - vaginal bleeding
  - ruptured membranes
  - a bulging perineum
  - presence of contractions
  - abnormal fetal heart rate and rhythm
- Early OB consultation
- Consider fetal radiation dose, but don't avoid necessary diagnostics

# Fetomaternal Hemorrhage

- Kleihauer-Betke Test: used to detect fetal cells in the mother's serum

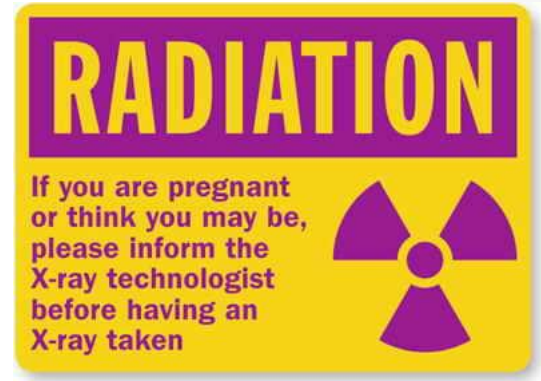


- If mother is Rh negative and possible fetomaternal hemorrhage
  - give Rh immunoglobulin even if Kleihauer-Betke Test negative, give within 72 hours



# Radiation Risk to Fetus

- Teratogenicity
- Birth defects (not proven)
- Increased lifetime risk of malignancy



# Radiation Exposure

- Measurement
  - Rad (radiation absorbed dose)
  - Grey (1 rad = 1 centiGy; 100 rads = 1 Gy)
- Greatest effects of radiation exposure occur between conception and week 25
  - Radiation injury during weeks 1-3 results in death of the implant or embryo
  - Radiation injury during weeks 8-25 affect CNS
    - 10 rads may result in decreased IQ
    - 100 rads may result in severe mental retardation

# Radiation Exposure

- After 25 weeks, greatest risk is childhood hematologic malignancy
  - Background incidence is 0.2-0.3%
  - Risk increases to 0.3-0.4% if exposure > 1 Gy (100 rads)
  - Risk increases by 0.06% per 1 Gy of fetal exposure
- Risk negligible < 5 rads exposure, increases > 15 rads exposure
- Therapeutic procedures have greatest risk

Study	Dose (rads)
Chest X-ray	<0.001
Pelvis	0.04
CT Head	<0.05
CT Chest	0.01-0.2
CT Abdomen	0.8-3.0
CT Pelvis	2.5-7.9
Spine series	0.37
9 month background dose	0.1

# Emergency Cesarean Section

- Limited role
- Little role for perimortem cesarean section if mother has been in shock—the fetus has already been severely hypoperfused for a long period of time
- For other causes of maternal cardiac arrest, may occasionally be successful if performed within 4 to 5 minutes



# Summary

- For the pregnant trauma patient, follow ATLS protocol with appropriate adjustments to account for anatomic and physiologic changes
- Best initial treatment of the fetus is optimal resuscitation of the mother
- Limit fetal radiation to 5 rads
- Limited role for emergency cesarean section



Thank you