

Trauma and Pregnancy

William Schechter, MD

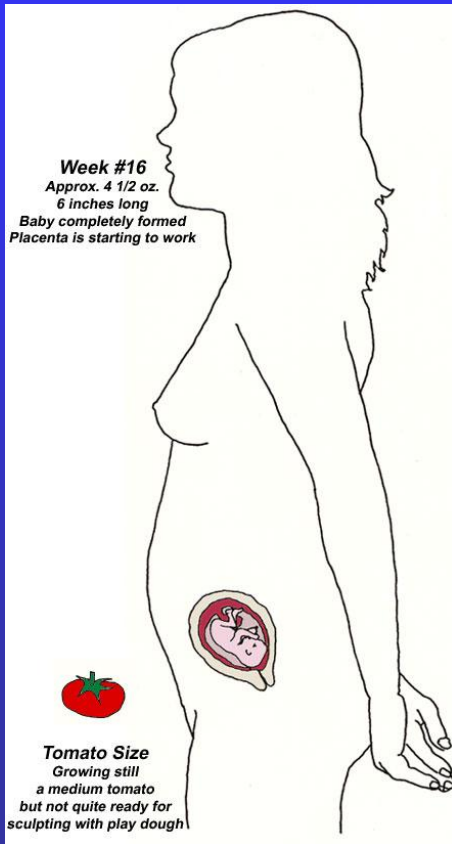


Trauma and Pregnancy

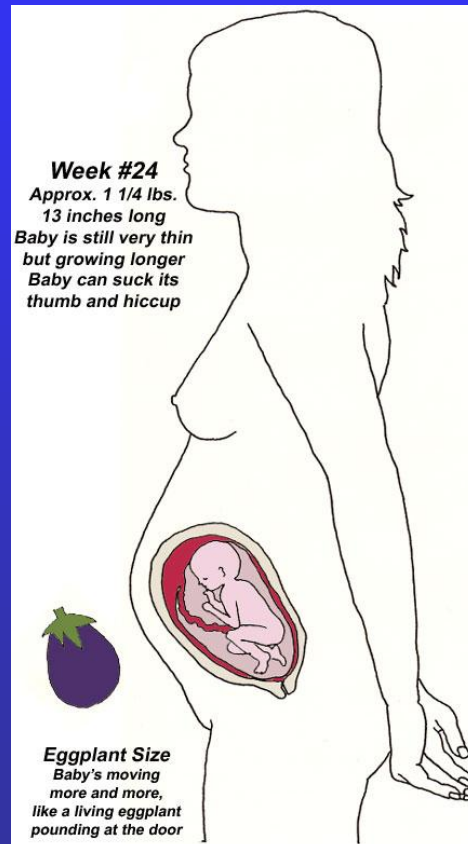
- ATLS Protocol the same
- Physiologic and Anatomic changes of pregnancy change the pattern of injury and the physiologic response to injury
- Two patients requiring treatment!!!



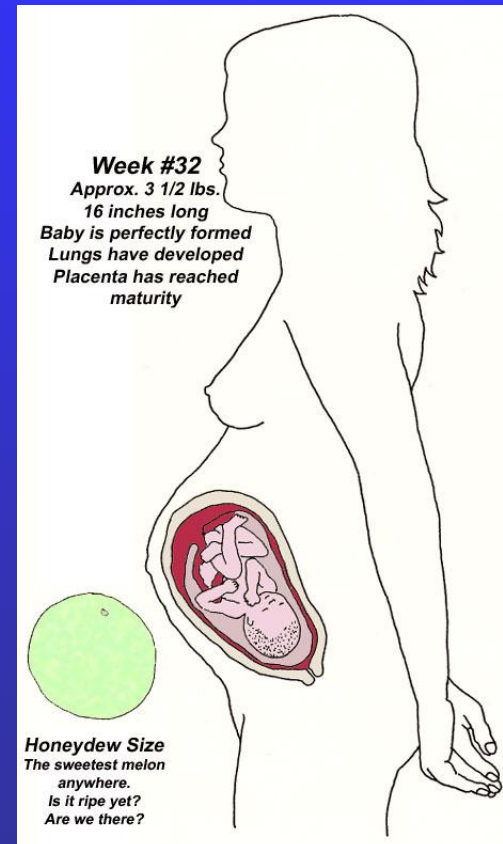
Anatomic Changes



16 weeks



24 weeks



32 weeks



Changes in Blood Volume and Composition

- 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!!!!



Changes in Blood Volume and Composition

- White Blood Count elevated in pregnancy (15,000)
- Fibrinogen and clotting factors increased
- Albumin level 2.2-2.8



Hemodynamic Changes in Pregnancy

- Cardiac Output is increased by 1.0-1.5 liters/minute after the 10th week of pregnancy
- Hypotension may be due to vena caval compression by the uterus—Place patient left side down!!



Hemodynamic Changes in Pregnancy

- Heart rate increases 10-15 beats/minute—consider “tachycardia of pregnancy” when evaluating Heart Rate during Stage “C” of the Primary Survey.



Blood Pressure

- Should be relatively normal.
- If patient is hypotensive, turn patient to the left thereby releasing uterine pressure from the vena cava decreasing venous return to the heart.
- Treat hypotension with aggressive fluid resuscitation if blood pressure does not improve rapidly.



Venous Pressure

- CVP variable
- Venous hypertension in lower extremities



Respiratory Changes

- Increased O_2 Consumption
- Elevated diaphragm
- 30-40% increase in tidal volume and minute ventilation
- $PaCO_2 = 30-35$ mm Hg
- Intubation may be challenging b/o airway edema
- Relaxed LES + Delayed Gastric Emptying = Increased Risk of Aspiration



Renal Function

- Glomerular Filtration Rate increased in pregnancy
- BUN and Creatinine decrease in pregnancy
- Glycosuria common
- Mild hydronephrosis a physiologic response to uterine compression of the ureters



Musculoskeletal

- Symphysis pubis widens by the 7th month. Sacroiliac joint spaces increase – may create confusion in interpretation of Pelvic X-rays



Eclampsia

- Seizures
- Hypertension, hyperreflexia, proteinuria, peripheral edema
- May mimic Head Injury in the Trauma Patient!!



Thrombotic Disease and Pregnancy

- Pregnancy may induce a hypercoagulable state
 - Increased activity of Clotting Factors
 - Decreased Fibrinolysis
- Venous Hypertension due to Uterine Pressure on the Inferior Vena Cava
- Incidence of DVT of 0.1-0.2%
- Lower Extremity Sequential Compression Devices recommended
- Heparin and Low Molecular Heparin ok in pregnancy
- Coumadin **CONTRAINDICATED** because of severe fetal malformations



Anesthetic Considerations

- Teratogenicity of Anesthetic Agents
- Anesthetic Drugs and Maternal Physiology



Scoring System for Medication Teratogenicity

- A Safety established by human studies
- B Presumed safety established by animal studies
- C Uncertain safety: no human or animal studies show teratogenicity
- D Unsafe: evidence of risk which may be justified in certain clinical circumstances
- X Highly Unsafe



Teratogenicity and Anesthetics

- Almost all anesthetic drugs are Category C drugs. No anesthetic drugs have been listed as definitely teratogenic



Anesthetic Drugs and Maternal Physiology

- Paralytic drugs do NOT cross the placenta
- Drugs used in Anesthesia are (with reasonable certainty) safe in pregnancy
 - Inhalation anesthetics
 - Local anesthetics
 - Muscle relaxants
 - Narcotics
 - Benzodiazepines



Radiology, Trauma and Pregnancy

*Benefits to the Mother outweigh small
risks to the fetus*



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 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
 - Risk increases by 0.06% per 1 Gy of fetal exposure
- Risk negligible < 5 rads exposure
- Risk increases > 15 rads exposure
- Most diagnostic procedures have no measurable risk
- Therapeutic Procedures have greatest risk



Approximate Fetal Radiation Dose

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



Primary Survey

Airway: as per all patients

Breathing: High diaphragms in late stages of pregnancy

Circulation: If low risk of spinal injury, nurse left side down

**REMEMBER: THE PREGANT PATIENT
CAN LOSE A LOT OF BLOOD BEFORE
ABNORMAL BP AND PULSE!!!**



Additional Monitors

- Fetal Heart Monitoring
- Fetal Ultrasound
- Maximum fetal radiation dose = 5 rads



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.



Primary Concerns with Blunt Abdominal Trauma

- Abruptio Placenta
 - Leading cause of fetal death in injured mother
 - DIC may occur
- Ruptured Uterus
 - 0.6% of blunt abdominal trauma in pregnancy



Goals of Treatment of the Severely Injured Pregnant Patient

- Goal 1
 - SAVE THE MOTHER
- Goal 2
 - Save the Fetus if possible



Emergency Cesarean Section

- Limited Role
- Primarily in unstable mother who is not responding to Fluid Management given in the Primary Survey
- 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!!!!



Summary

- Primary Survey
- Stage of Resuscitation
- Secondary Survey
- **SAVE THE MOTHER FIRST!!!**
- Limit fetal radiation to 5 rads
- Limited role for emergency cesarean section

