



THE UNIVERSITY OF
TENNESSEE
HEALTH SCIENCE CENTER.

When Two Patients Are Injured: Management of the Pregnant Trauma Patient

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Disclosures

- None

Objectives

- By the end of this session, participants will be able to:
 - Describe the epidemiology, clinical significance, and societal impact of trauma in pregnancy.
 - Apply knowledge of pregnancy-related physiologic changes to the assessment and resuscitation of the injured obstetric patient.
 - Apply evidence-based principles regarding diagnostic imaging in pregnancy.
 - Develop an appropriate fetal surveillance strategy after blunt trauma.
 - Recognize obstetric complications associated with trauma.
 - Describe the indications, timing, and technique for resuscitative cesarean delivery in the setting of maternal cardiac arrest.

Case Presentation

- 28-year-old G2P1001 at 32 weeks gestation
- Restrained driver in a motor vehicle crash
- Complaints: abdominal pain, mild contractions
- Vitals: BP 108/64, HR 108, SpO₂ 99%, RR 20
- Exam: seatbelt sign across lower abdomen

Epidemiology: Why Trauma Matters

- Trauma complicates 6–8% of all pregnancies (1 in 12)
- Leading non-obstetric cause of maternal death in the United States
- Pregnant trauma victims: 2x higher mortality vs. nonpregnant
- 90% of injuries classified as minor
- Most fetal losses occur after “minor” trauma

Mechanism	Rate per 100,000 Live Births
Intimate partner violence	8,307
Motor vehicle crashes	207
Falls	49
Homicide	3
Penetrating trauma	3
Suicide	2

Pregnancy Physiology & Trauma

- **Cardiovascular:**

- CO ↑ 50% | Blood volume ↑ 50% | HR ↑ 15–20 bpm

- **Anatomic:**

- Uterus abdominal after 12 wk | Uterine flow 600 mL/min (not autoregulated) | Aortocaval compression

- **Hematologic:**

- Fibrinogen baseline >400 mg/dL | Procoagulant state

- Vital signs may not change until 15-20% of blood volume is lost

ABCDE Approach: Treat the Mother First

- Maternal stabilization is the best fetal resuscitation
- Perform trauma survey
 - A — Airway: Assume difficult airway; high aspiration risk
 - B — Breathing: $\text{SpO}_2 \geq 95\%$
 - C — Circulation: Left uterine displacement (fundus $\geq$ umbilicus); volume resuscitation
 - D — Disability: Neurologic exam; consider eclampsia
 - E — Exposure: Seatbelt sign, abdominal injuries



Augustin, G. (2023).

Imaging in Pregnancy

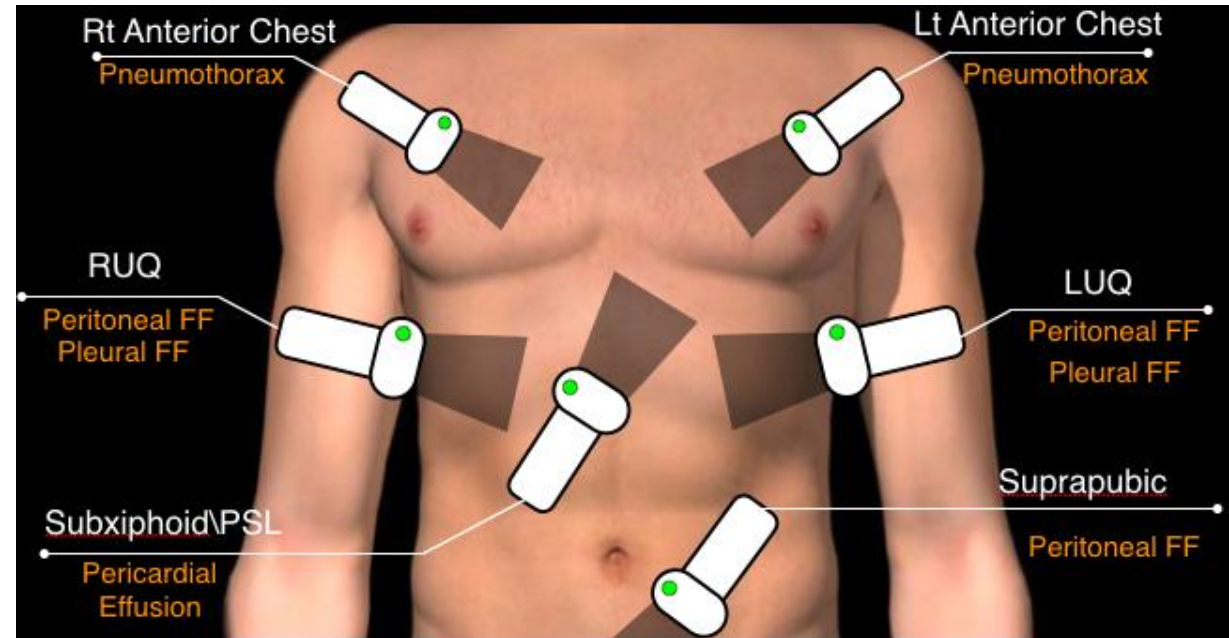
- No study in the diagnostic range (<50 mGy) has been shown to cause fetal harm
- Contrast:
 - Avoid Gadolinium-based MRI
 - Iodinated IV contrast safe when indicated

Imaging Study	Fetal Dose (mGy)
Chest X-ray	~0.01
Chest CT	~0.66
Abdominal X-ray	~3.0
CT abdomen/pelvis	13–25
Pelvic CT	~50
Background radiation (1 yr)	~1

“Necessary imaging should never be withheld from a pregnant patient” -ACOG

Maternal FAST Exam

- Triage tool for trauma patients
 - Positive FAST + hemodynamic instability → OR
 - Negative FAST + clinical concern → proceed to CT
- Less sensitive in pregnant vs. nonpregnant patients



Downeast Emergency Medicine

- Negative FAST does not rule out significant injury or abruption

Fetal Evaluation After Trauma

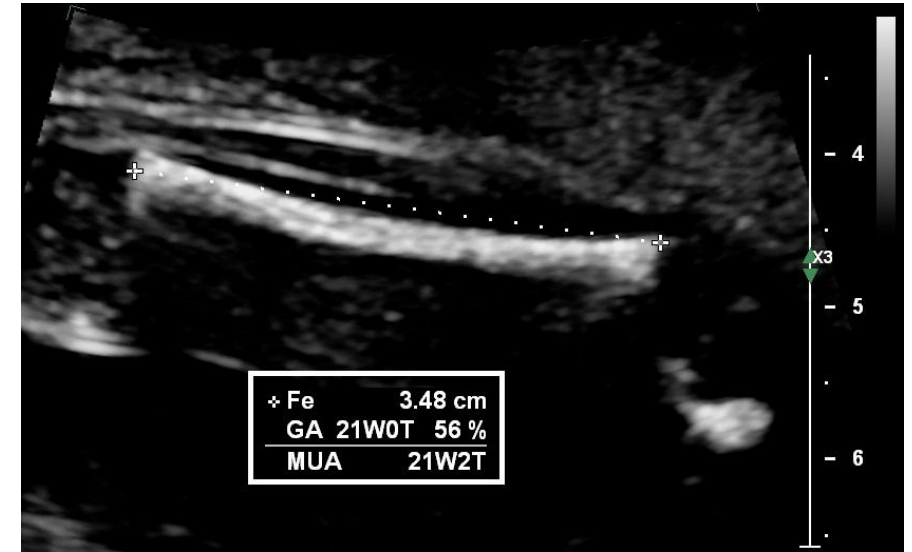
- **Step 1: Confirm fetal heart tones**
- **Step 2: Focused History Mnemonic — CODE**
 - Complications of pregnancy
 - Obstetric history and provider
 - Dating method and estimated due date
 - Event details (fluid, bleeding, contractions, fetal movement, pain)

Fetal FAST

- **Fetal FAST Components:**

- Fetuses — Number of fetuses and position
- Placenta — Location; Previa vs. no previa
- Fluid — Amniotic fluid volume
- Cardiac — Fetal cardiac activity (present/absent; rate)
- Femur length — ≥ 4 cm $\approx$ 22–24 weeks

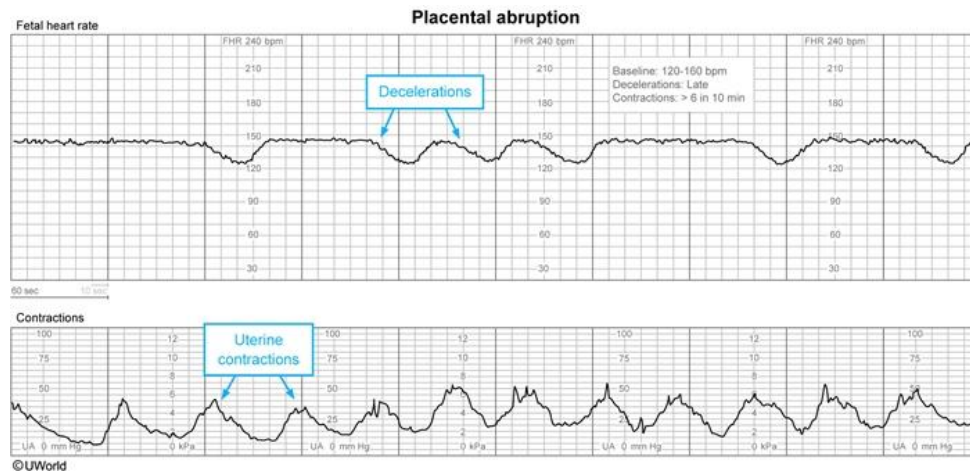
- Fetal FAST answers one question: Is this a viable fetus that may need emergent delivery?



Gynaecologia

Electronic Fetal Monitoring

- Who Gets Monitored?
 - ≥ 24 weeks $\rightarrow$ cEFM & tocometry
 - Below 22–23 weeks: FHT
- How Long?
 - Minimum 4 hours of continuous cardiotocographic monitoring



- STOP at 4 hours if ALL met:
 - Contractions < 6 /hour
 - No bleeding
 - No abdominal pain
 - Category I tracing
 - Stable vitals
- EXTEND to ≥ 24 hours if ANY present:
 - Contractions ≥ 6 /hour
 - Vaginal bleeding
 - Abdominal pain or bruising
 - Abnormal FHR tracing
 - Concerning vitals or coagulopathy

The Rh-Negative Mother

- Fetomaternal Hemorrhage (FMH):
 - Reported in 2.6–30% of pregnant trauma patients
 - Complications: fetal anemia, fetal death, maternal alloimmunization
- Kleihauer-Betke (KB) Test:
 - Quantifies FMH and guides Rhogam dosing
- Management:
 - Step 1: Determine RhD status
 - Step 2: If RhD-negative & ≥ 20 weeks → obtain KB test
 - Step 3: Administer Rhogam (300 300 μg covers 30 mL of fetal whole blood; additional doses guided by KB result)
- RhD-positive patients: KB testing is generally unnecessary

Placental Abruption

- Mechanism:

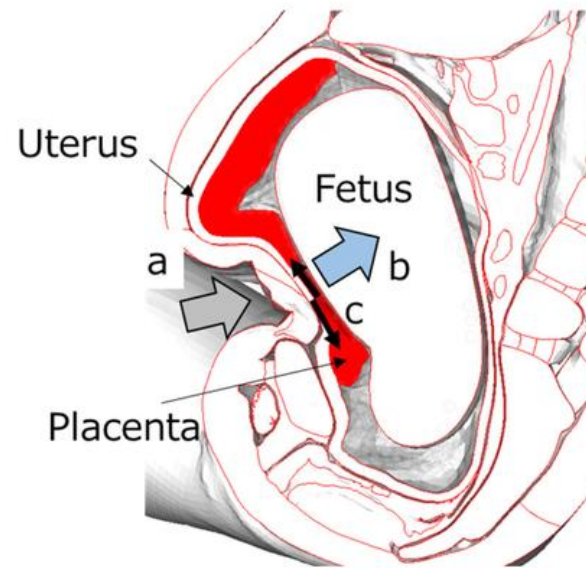
- Shear stress at uteroplacental interface
 - Inelastic placenta
 - Incompressible amniotic fluid

- Incidence:

- ~10% after MVC
- ~50% after severe abdominal trauma

- Clinical diagnosis:

- Vaginal bleeding
- Abdominal pain / uterine tenderness
- Contractions / uterine rigidity
- Abnormal FHR tracing



a. A lap-belt loading to the abdomen



b. A local deformation of the uterus



c. A shear at an adhesive site between the uterus and placenta

T. Izumiyama et al. (2024)

- Abruption is a CLINICAL diagnosis
- Ultrasound sensitivity is only 24-50%
- Fetal monitoring is best for diagnosis

Obstetric Complications

- **Preterm Labor:**

- Uterine contractions occur in ~40% of pregnant trauma patients
- Preterm labor in ~11%; preterm delivery in ~25%
- Tocolysis may be indicated if no contraindications exist

- **Direct Fetal Injury:**

- Fetal skull fractures reported with pelvic fractures or deceleration injuries

- **Prelabor Rupture of Membranes (PROM):**

- Assess for amniotic fluid pooling on speculum exam

- **Uterine Rupture:**

- Rare (~0.6% of traumatic events) but fetal mortality approaches 100%
- Signs: shock, abnormal FHR, easily palpable fetal parts

When is Delivery Indicated?

- **Indications for Emergency Cesarean Delivery:**

- Persistent abnormal FHR tracing
- Uterine rupture
- Abruptio with coagulopathy, maternal instability, or abnormal FHR
- Maternal cardiac arrest
- Surgical exposure
- Displaced pelvic fracture precluding vaginal delivery

- **Fetal death is NOT an indication for cesarean — except with abruptio with maternal coagulopathy/hemodynamic instability**

Maternal Cardiac Arrest

- The 4-Minute Rule (AHA 2025 Guidelines):
 - Begin preparation for resuscitative cesarean delivery immediately upon cardiac arrest
 - Initiate procedure at 4 minutes if no ROSC. Fetus out by 5 minutes.
 - Perform at the site of arrest
- Why?
 - Relieves aortocaval compression & returns uterine blood to systemic circulation
 - ↑ Maternal survival when delivery ≤ 10 minutes
- Indications:
 - Maternal cardiac arrest at ≥ 20 weeks' gestation (fundus at/above umbilicus)
- Surgical Technique:
 - Vertical midline skin incision; vertical (classical) uterine incision

Case Presentation

- **Return to our patient:**

- 32 wk | MVC | BP 108/64, HR 108 | Seatbelt sign, pain, contractions

- **Management:**

- ABCDE — maternal stabilization first; left uterine displacement
- Labs — CBC, CMP, coagulation studies, fibrinogen, type and screen, RhD status, KB test if RhD-negative
- FAST exam — triage tool; negative FAST does not exclude injury
- CT if clinically indicated — do not withhold
- Continuous electronic fetal monitoring initiated

Case Presentation

- **Monitoring findings at 4 hours:**

- Contractions: 8 per hour
- Mild vaginal bleeding noted
- FHR tracing: minimal variability with positive accelerations and no decelerations

Case Presentation

- **Disposition:**

- Admit to labor and delivery
- Extend monitoring to **≥ 24 hours**
- Administer antenatal corticosteroids
- Serial fibrinogen levels
- If Category III FHR tracing → prepare for delivery

Take-Home Pearls

- **Maternal stabilization is fetal resuscitation**
- **Don't trust normal vitals**
- **Don't withhold imaging**
- **Monitor, monitor, monitor**
 - 4 hours minimum / 24 hours if concerning
- **Know the 4-Minute Rule**
- **Screen for intimate partner violence**

References



