Trauma in Pregnancy

Sudave Mendiratta, MD, FACEP
Goal

• Deliver superior care to the gravid trauma patients
Objectives

- Understand maternal physiologic changes in pregnancy
- Establish treatment and assessment priorities for mother and fetus
- Apply risk:benefit to fetal radiation
- Review the major causes of trauma in the gravid
Fetal Viability?
Anatomic and Physiologic Changes in Pregnancy
Physiologic Changes

- Blood Volume?
- Hematocrit?
- White count?
- Cardiac output?
- Respiratory changes?
3. Pulmonary alterations of pregnancy. ERV indicates expiratory reserve volume; FRC, functional residual capacity; IC, inspiratory capacity; RV, reserve volume; TLC, total lung capacity.
Management

• A
• B
• C
• D
• E
Management

- Airway - Aspiration
- Breathing - Difficult to vent
- Circulation - Failure to recognize shock, maternal-fetal hemorrhage
- Disability - CHI vs Eclampsia
Patient Positioning

Manual Displacement of the Uterus

Cardiff Wedge
Direct Fetal Trauma

- Occurs later in pregnancy
- High energy mechanisms
- Poor outcomes
Fig. 2. The arrow points to an empty fetal calvarium from liquefaction of the brain as a result of severe intracranial hemorrhage from blunt abdominal trauma.

Case 1

- 25F EGA 28 weeks
- s/p low speed MVC
- c/o lower abdominal pain
- spotting blood
Placental Abruption

- Most common cause of fetal loss
- Subtle presentation
- Can occur after minor trauma
Placental Abruption

• Incidence 1:80 Pregnancies
• Leading Cause of Fetal Death
• Risk Factors
  • HTN
  • Preeclampsia
  • Trauma
  • Diabetes
  • Cocain/Smoking
A External bleeding due to abruptio placentae

B Internal (concealed) bleeding due to abruptio placentae
# Signs and Symptoms

<table>
<thead>
<tr>
<th>Finding</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal Bleeding</td>
<td>78</td>
</tr>
<tr>
<td>Uterine Tenderness</td>
<td>66</td>
</tr>
<tr>
<td>Fetal Distress</td>
<td>60</td>
</tr>
<tr>
<td>Contraction</td>
<td>17</td>
</tr>
<tr>
<td>Uterine Hypertonia</td>
<td>17</td>
</tr>
<tr>
<td>Fetal Death</td>
<td>15</td>
</tr>
</tbody>
</table>
Diagnosis of Abruption

- Ultrasound?
- Labs: DDimer + Coags
- KB
- Monitoring - at least 4 hours
- MR
Extended Fetal Monitoring

- >4 contractions / hour
- Membrane rupture
- Vaginal Bleeding
- Serious Maternal Injury
- Fetal Tachycardia
- Late Decelerations
Kleihauer-Betke

- Used to detect fetal blood in the mother’s serum
- If mother is Rh negative - give RhoD IgG (even if K-B negative)
Fetal Monitoring
Fetal Monitoring

Normal

Normal Acceleration

Poor variability
Fetal heart rate

Uterine tone/contractions

Case 2

- 25F EGA 28 weeks
- s/p high speed MVC
- c/o dyspnea, chest wall crepitus, diffuse abdominal pain, combative
- femur deformity, head laceration
Management

• A
• B
• C
• D
• E
Management

• I got the basics.....

• But can I CT the patient?
Fetal Radiation

- ACOG and ACR - no official guidelines
- OK to use when the benefits to the mother outweigh the risks to the fetus
Fetal Radiation

• Measurement
  Rad (radiation absorbed dose)
  Grey (1 rad = 1 centiGy; 100 rads = 1 Gy)

• Radiation is most harmful early in pregnancy (cells are dividing rapidly)
Fetal Radiation

- Radiation in weeks 8-25 affects the CNS
  - >10 rads - decreased IQ
  - >15 rads - 6% risk of MR
  - >100 rads - severe MR
- After 25 weeks - hematologic malignancy
  - Risk increases after 15 rads exposure

<table>
<thead>
<tr>
<th>Study</th>
<th>Dose (rads)</th>
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</thead>
<tbody>
<tr>
<td>Chest X-ray</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pelvis</td>
<td>0.04</td>
</tr>
<tr>
<td>CT Head</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>CT Chest</td>
<td>0.01-0.2</td>
</tr>
<tr>
<td>CT Abdomen</td>
<td>0.8-3.0</td>
</tr>
<tr>
<td>CT Pelvis</td>
<td>2.5-7.9</td>
</tr>
<tr>
<td>Spine series</td>
<td>0.37</td>
</tr>
<tr>
<td>9 month background dose</td>
<td>0.1</td>
</tr>
<tr>
<td>IMAGING STUDY</td>
<td>UTERINE RADIATION DOSE (MRAD)*</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Plain-film Radiography</td>
<td></td>
</tr>
<tr>
<td>Cervical spine</td>
<td>Undetectable</td>
</tr>
<tr>
<td>Thoracic spine</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Chest (PA)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Chest (AP)</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Extremities (femur)</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Hip</td>
<td>10–210</td>
</tr>
<tr>
<td>Lumbar spine</td>
<td>31–400</td>
</tr>
<tr>
<td>Pelvis</td>
<td>140–2200</td>
</tr>
<tr>
<td>KUB</td>
<td>200–503</td>
</tr>
<tr>
<td>Intravenous pyelogram</td>
<td>503–880</td>
</tr>
<tr>
<td>Urethrocytogram</td>
<td>1500</td>
</tr>
<tr>
<td>Computed Tomography</td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Thorax</td>
<td>10–590</td>
</tr>
<tr>
<td>Abdomen</td>
<td>2800–4600</td>
</tr>
<tr>
<td>Pelvis</td>
<td>1940–5000</td>
</tr>
<tr>
<td>Angiography</td>
<td></td>
</tr>
<tr>
<td>Cerebral</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Cardiac catheterization</td>
<td>&lt;500</td>
</tr>
<tr>
<td>Aortography</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>
Fetal Radiation

- Risk / Benefit
- Document discussion with mother
- Document decision making
Case 3

- 25F
- 20 weeks EGA
- Fall while chasing 2 year old son
- Does not speak English
Causes of Trauma
Fig. 4.  A. Improper use of lap seatbelt in pregnancy showing placement across the abdominal dome. B. Proper use of lap seatbelt appropriately placed below the abdominal dome. Illustration: John Yanson. 

BOX 1. LEADING CAUSES OF MATERNAL TRAUMATIC INJURY AND DEATH

Motor vehicle accidents
Violence and assault
   Gunshots
   Stabbing
   Strangulation
Falls
Suicide
Toxic exposures
   Drug overdose
   Poisoning
Burns
Drowning
**Table 2. Prevalence of Domestic Violence in the Health Care Setting.**

**Emergency medicine**
One in four women seeking care in the emergency department for any reason is a victim of domestic violence.³³
Thirty-seven percent of female patients who are treated in the emergency department for violent injury have been injured by their partners.³⁴
One in three women with trauma has been injured by her partner.³⁵

**Obstetrics and gynecology**
One in six pregnant women is abused during her pregnancy.¹³,³⁶,³⁷

**Primary care**
One in four women has been abused at some point in her life.³⁸
One in seven women reports having been abused within the preceding 12 months.³⁸

**Psychiatry**
One in four women who attempt suicide is a victim of abuse.²¹,²²
One in four women who are treated for psychiatric symptoms has been battered.²¹,²²
1 in 4 of women in the ED is a victim of domestic violence

1 in 3 female victims of trauma has been injured by their partner
### Table 3. Potential Clinical Indicators of Abuse.*

<table>
<thead>
<tr>
<th>Physical findings(^\text{11,60})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental trauma</td>
</tr>
<tr>
<td>Any injury, especially to the head and neck (even with a seemingly good explanation), and any fatal injury</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General findings(^\text{18-20})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic abdominal, pelvic, or chest pain</td>
</tr>
<tr>
<td>Somatic disorders</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td>Chronic gynecologic symptoms</td>
</tr>
<tr>
<td>Sexually transmitted diseases and exposure to human immunodeficiency virus through sexual coercion</td>
</tr>
<tr>
<td>Exacerbation of symptoms of a chronic disease such as diabetes, asthma, or coronary artery disease</td>
</tr>
<tr>
<td>Chronic joint or back pain, headaches, numbness, and tingling from injuries</td>
</tr>
<tr>
<td>Noncompliance with medical regimen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Psychological symptoms(^\text{10,11,18})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression and suicidal ideation</td>
</tr>
<tr>
<td>Anxiety symptoms and panic disorder</td>
</tr>
<tr>
<td>Eating disorders</td>
</tr>
<tr>
<td>Substance abuse</td>
</tr>
<tr>
<td>Post-traumatic stress disorder</td>
</tr>
</tbody>
</table>
SAFE screen

Stress/safety
What stress do you have in your relationship?
Do you feel safe in your relationship?

Afraid/abused
What happens when you and your partner disagree?
Has your partner ever threatened or abused you or your children?

Friends/family
If you were hurt, would your friends or family know?
Could you tell them?
Would they be able to help you?

Emergency plan
Do you have a safe place to go in an emergency?
Would you like help in locating a shelter?
Would you like to talk with a social worker or counselor to develop an emergency plan?
Easy DV Screen

• Have you been kicked/punched/beaten in the past year?
• Do you feel safe?
• Does anyone make you scared?
Domestic Violence

- I have missed a victim of domestic violence
Hotline number
National Domestic Violence Hotline: 1-800-799-7233 (24-hour nationwide, in English and Spanish)
Case 4

- 25F
- unknown EGA
- witnessed collapse
- hypotension en route, loss of pulse at arrival
Worst Case Scenario
Perimortem C-Section

- Is the fetus viable?
- Do you have the equipment?
- Is OB back up available?
- Can you care for the newborn?
<table>
<thead>
<tr>
<th>WEEKS’ GESTATION</th>
<th>6-MONTH SURVIVAL (%)</th>
<th>SURVIVAL WITH NO SEVERE ABNORMALITIES (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>56</td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>79</td>
<td>69</td>
</tr>
</tbody>
</table>

Perimortem C-Section

• 4 minutes
• Consent is not necessary
• Improves maternal resus
• Based on case reports
• Only if fetus is viable (>20-22 weeks)
Fig. 11-4. A. Abdominal incision. B. Incision through the fascia and muscles into the peritoneum. C. Inferiorly directed incision. D. Dissection through the peritoneum.
Questions?
Summary

- Changes in pregnancy?
- Can I CT scan the patient?
- Have you considered domestic violence?
- Be prepared for disaster