Obstetric Trauma
Dispatch

Call received @ 1830

- 19 y/o 6 months pregnant female punched & kicked in head, chest and abdomen by boyfriend
- C/O mid chest & abdominal pain

EMS enroute @ 1834
## Victim # 1 Scene Vital Signs

<table>
<thead>
<tr>
<th>Time</th>
<th>B/P</th>
<th>HR</th>
<th>RR</th>
<th>FHT</th>
<th>SPO2</th>
<th>?Assessments Interventions ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1846</td>
<td>110/60</td>
<td>150</td>
<td>32</td>
<td>N/A</td>
<td></td>
<td>Labored resp, breath sounds ↓ bilat.</td>
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<tr>
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<td>C/o abdominal &amp; back pain</td>
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<td></td>
<td></td>
<td></td>
<td>? contractions, small amt blood by vagina, abd tender, bruised</td>
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<tr>
<td>1049</td>
<td>96/50</td>
<td>150</td>
<td>32</td>
<td>94%</td>
<td></td>
<td>18 Gauge LAC, NS</td>
</tr>
<tr>
<td>1052</td>
<td>90/50</td>
<td>146</td>
<td>30</td>
<td>95%</td>
<td></td>
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</tr>
</tbody>
</table>
Physiologic Changes

- >12 weeks abdominal location
- >20 weeks @ umbilicus
- 34-36 weeks at costal margins
- 38-40 weeks head engaged in pelvis
1st Trimester Pregnancy Changes

- Intra-pelvic thick walled uterus
- Fetus protected from direct injury

Risks of Trauma
- Abortion
- Isoimmunization
Isoimmunization

- Rh negative mother
- Rh positive fetus
- Risk in blunt & penetrating trauma
- Causes hemolytic disorder in the newborn
2nd Trimester Pregnancy Changes

- Uterus outside of the pelvis in the abdominal cavity
- Large volume of amniotic fluid

Risks

- Abruptio placenta
- Amniotic fluid embolism
- Premature labor
- Isoimmunization
Abruptio Placenta

- Premature partial or complete separation of the placenta from the uterine wall
- Common cause of fetal death after MVC
Premature Labor

- Uterine contractions > 6 per hour
- Without rupture of the membranes
- With rupture of the membranes
3rd Trimester of Pregnancy

- Thin walled uterus
- Maternal organ displacement
- Compression of the inferior vena cava

Risks
- Pelvic fractures could cause maternal hemorrhage & direct fetal injury
- Abruptio placenta
- Amniotic fluid emboli
- Isoimmunization
- Uterine rupture
Uterine Rupture

- Abdominal tenderness, guarding, rigidity, rebound tenderness
- Profound shock
- Abnormal fetal lie (oblique/transverse)
- Easy palpation of fetal parts
- Free intraperitoneal air
Primary Survey – “A-Airway”

Oxygen consumption ↑ 20%
- Supplemental oxygen – 100%
- Fetus extremely sensitive to hypoxia
- Laryngeal edema from water retention
- Lingual and nasal mucosal swelling from capillary engorgement
- Elevation of the diaphragm shifts the larynx anteriorly

Intubation
- Risk of aspiration higher than routine patients
- ↑ facial adipose tissue
Primary Survey – “B”

Breathing: Rate, Depth, WOB, Breath Sounds

- ↑ Tidal volume
- ↓ Functional residual capacity
- ↑ Respiratory rate – resp. alkalosis
- Diaphragm elevates up to 4 cm in third trimester
Primary Survey – “C”

Circulation: Color, Pulses, Bleeding

- Baseline BP ↓ / pulse
  - IVC compression ↓ systolic BP 30mm Hg
- Cardiac Output ↑ 30-50%
  - Loss of 30-35% of blood volume before hypotension occurs (steals from uterus)
  - Fetal distress will precede maternal distress

3rd trimester – Backboard at 15º tilt
- Supine hypotension syndrome
- Goal to displace the uterus off of the vena cava
Hemmorhagic Shock - Bleeding
You Can See or Not See
Primary Survey “C”

Circulation:
- Normal **hypervolemic state**
  - Plasma volume ↑ 50%
- Net physiologic anemia
  - RBC volume ↑ 20-30%
- Cross-matched blood preferred
  - Not available → RH-Neg required
- Higher risk of Disseminated Intervascular Coagulopathy (DIC)
Primary Survey – D, E, F

Circulation:
- Normal maternal EKG changes
  - Flat T
  - Q in III & AVF
  - L axis shift (diaphragm elevation)
- Fetal assessment (FHTs)
  - @ 10-14 wga – doppler stethoscope
  - @ 20 wga – regular stethoscope
  - nl >120bpm and <160 bpm
  - < 23 wga intermittent monitoring
  - >23 wga continuous monitoring

Disability – CHI vs eclampsia

Fetal Heart Tones
Secondary Survey

- Head to Toe examination
- Pregnancy induced hypertension vs CHI
- Inspect perineum & vaginal opening for vaginal bleeding (+ or −) & bruising
- Inspect shape & contour of abdomen
  - Splenic injury most common
  - Decreased peritoneal irritation (tenderness & guarding) after abd organ injury
    - ↑ Fundal height
- Bony pelvis injury
Secondary Survey: Different Injury Patterns

- **Uterine Contractions**
  - Abdominal/back pain or cramping > 6 per min.
  - Time & palpate contractions

- **Palpate for fundal height & fetal movement**

- **Auscultate - Fetal Heart Tones/Maternal Heart Tones**

- **Inspect for blood or fluid from the vagina, in the urine, or blood @ urinary meatus**

- **Patterns of abuse**
  - Bruising
  - Inconsistent story
Secondary Survey +

Placental abruption

- Minor trauma (5%)
- Major trauma (40-65%)
- High fetal mortality (30-68%)
- Risk factors: ejection, ISS>9, fetal distress, maternal tachycardia

Signs & Symptoms

- Tense tender abdomen with premature uterine contractions or uterine hypotonia
- Maternal hypertension/hypotension
- ↑ Fundal height, fetal distress, cramping, and/or bleeding
History

- Mechanism of injury
- Restraints, airbag deployed
- Domestic abuse
- Last menstrual period
- Estimated date of confinement (delivery)
- Problems or complications during this or other pregnancies
- Presence of uterine contractions or abdominal or back pain
- Fetal movement
Management of the Mother

A – Airway - ↑ risk of aspiration

B – Oxygen – 100%

C – Resuscitate the mother
   - Intravenous fluids LR or NS not D5W
   - Starting at 20-24 weeks - Displace the uterus – 15 degree tilt, to the left side

D – Disability
   - Ecclampsia vs CHI

E – Exposure/Environment

F – Fetal distress
Left Uterine Displacement Using 1-Handed Technique

Left Uterine Displacement Using 2-Handed Technique

Maternal Cardiac Arrest

First Responder

- Activate maternal cardiac arrest team
- Document time of onset of maternal cardiac arrest
- Place the patient supine
- Start chest compressions as per BLS algorithm; place hands slightly higher on sternum than usual

Subsequent Responders

Maternal Interventions

Treat per BLS and ACLS Algorithms

- Do not delay defibrillation
- Give typical ACLS drugs and doses
- Ventilate with 100% oxygen
- Monitor waveform capnography and CPR quality
- Provide post–cardiac arrest care as appropriate

Maternal Modifications

- Start IV above the diaphragm
- Assess for hypovolemia and give fluid bolus when required
- Anticipate difficult airway: experienced provider preferred for advanced airway placement
- If patient receiving IV/IO magnesium prearrest, stop magnesium and give IV/IO calcium chloride 10 mL in 10% solution, or calcium gluconate 30 mL in 10% solution
- Continue all maternal resuscitative interventions (CPR, positioning, defibrillation, drugs, and fluids) during and after cesarean section

Obstetric Interventions for Patient With an Obviously Gravid Uterus*

- Perform manual left uterine displacement (LUD) — displace uterus to the patient’s left to relieve aortocaval compression
- Remove both internal and external fetal monitors if present

Obstetric and neonatal teams should immediately prepare for possible emergency cesarean section

- If no ROSC by 4 minutes of resuscitative efforts, consider performing immediate emergency cesarean section
- Aim for delivery within 5 minutes of onset of resuscitative efforts

*An obviously gravid uterus is a uterus that is deemed clinically to be sufficiently large to cause aortocaval compression

Search for and Treat Possible Contributing Factors (BEAU-CHOPS)

- Bleeding/DIC
- Embolism: coronary/pulmonary/amniotic fluid embolism
- Anesthetic complications
- Uterine atony
- Cardiac disease (MI/ischemia/aortic dissection cardiomyopathy)
- Hypertension/preeclampsia/eclampsia
- Other: differential diagnosis of standard ACLS guidelines
- Placenta abruptio/previa
- Sepsis
Patient in a 30° Left-lateral Tilt

Fetal Distress

- Fetal bradycardia
- Prolonged decelerations - 60 secs
- Recurrent late decelerations
Fetal Heart Rate Deceleration

*Type I Early Deceleration*

Head compression with onset of FHR deceleration as uterus contracts, before the peak of contraction. Ends as the contraction ends, with return to baseline.

*Type II Late Deceleration*

Uteroplacental Insufficiency - Begins after contraction, continues after contraction is over with a gradual return to baseline.

- Turn patient to left lateral position.
- Oxygen @ 10 L/min via NRB mask.

*Type III Variable Deceleration*

Umbilical cord compression

- Change patient position.
- Oxygen @ 10 L/min via mask.
Emergency C-section

- Considered if >? 23 - 26 weeks gestation with FHT present

- Fetal distress = prompt delivery
  - Maternal survival 100%
  - Fetal survival 73%

- Section within 4-5 minutes of cardiac arrest
Fetal Mortality

#1 Cause = maternal death

#2 Cause = placental abruption

Seatbelt use decreased severe fetal complications

- 82% Fetal Complications - no seatbelt
- 27% Fetal Complications- with seatbelt
UW Policy for Admission

- ATLS protocol (ED physician, Trauma team, Gynecology, PICU/NICU attendings)
- STAT U/S (if unknown gestational age)
- ED or OR C-Section/delivery
  - Baby to Meriter
- Minor injury involving single body system
  - Transfer to Meriter for OB monitoring
- Unstable or major injuries
  - UW admission for trauma care
  - Notify Meriter triage if > 20 wga
Where Should You Transport

- Nearest hospital?
- Nearest perinatal or obstetric center?
- Level One Trauma Center?
- It just depends . . .
Transported to a Level One Trauma Center

Determined needs were for a Trauma Center initially

- Multiple facial fractures
- Right hemopneumothorax
- Rib lateral fractures
- Contusions over upper extremities
- Questionable spine injury-no deficits
- Partial abruption of placenta
- Mother & baby lived