CARING FOR TWO: THE PREGNANT TRAUMA PATIENT

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OBJECTIVES – TO REVIEW

- Epidemiology
- Pregnancy physiology
- Evaluation & management
  - EGA on the fly
  - Rh isoimmunization
  - radiologic studies
  - recognizing shock
  - when to “get the baby out”
  - postpartum hemorrhage
  - perimortem C-section
  - don’t forget MgSO4 neuroprotection, BMZ lung maturity when appropriate

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TRAUMA IN PREGNANCY

- 6-8% of all pregnancies
- leading non-obstetric cause US maternal death

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Pregnant per 100,000 live births</th>
<th>Non-pregnant per 100,000 women</th>
<th>Study design</th>
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<tr>
<td>Intimate partner violence*</td>
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<td>Homicide</td>
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<td>2.3</td>
<td>Retrospective cohort</td>
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OUTCOMES - TRAUMA IN PREGNANCY

Increase:
- spontaneous abortion
- spontaneous rupture of membranes
- **placental abruption** (40% of severe injuries) “like a potato chip inside of a tennis ball” (inelastic placenta and elastic myometrium); > 60% have no vaginal bleeding
- uterine rupture
- preterm delivery
- cesarean delivery
- fetal death
- maternal death


PLACENTAL ABRUPTION

- Clinical diagnosis
- Contractions most sensitive indicator
- May or may not have vaginal bleeding
- Leading cause of fetal death after trauma
- Uterine blood flow 600 ml/min 3rd trimester

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UTERINE RUPTURE

- rare - occurs <1% all trauma
- high fetal mortality
- identify by shock and baby palpable in abdomen

CV PHYSIOLOGY OF PREGNANCY

RECOGNIZING SHOCK

• CV changes in pregnancy - difficult to diagnosis shock.
• Vasoconstriction decreases uterine blood flow ~30%, commonly resulting in fetal hypoxia and fetal bradycardia (2 patients).
• Do not rely solely on maternal vital sign changes to aggressively manage OB trauma.
• If traditional signs and symptoms of hypovolemic shock are exhibited, fetal mortality can be as high as 85%.
• Hypovolemic shock most often not present until >30% of the total blood volume is lost.

TRAUMA EVALUATION – PRIMARY SURVEY

A - Airway
B - Breathing
C – Circulation
D – Disability
E – Estimated gestational age
F – Fetal heart tones
TRAUMA EVALUATION – SECONDARY SURVEY

• Routine Trauma Exam
• FAST
• CEFM (continuous external fetal monitor (if > 23 wks gest)
• Placental location
• +/- Vaginal exam (after US)

EXTERNAL FETAL MONITORING

• Should be placed ASAP
• Should include maternal pulse oximetry
• At least 4 hours, unless
  • Abdominal tenderness
  • Contractions > 6/hour in any one of 1st 4 hours
  • If present, monitor 24 hours, transfer UWMC

OUTCOMES DEPEND ON EGA

Fetal Viability dependent on EGA:
• Mortality ~ 50% at 23-24 weeks and among survivors, morbidity > 50%
GESTATIONAL AGE

BPD x 4 = approximate GA

Check RH - Fetal Isoimmunization

- Occurs even in 1st trimester
- Only takes 1 fetal cell/50,000 maternal cells
- Easily preventable
- Rhogam is 300 mcg and covers 30cc fetomaternal hemorrhage (FMH)
- Fetoplacental blood volume is approximately 100 mL/kg
- Massive FMH is > 20% or > 20 mL/kg
- Estimate FMH = % fetal cells (KB result) x 5000 mL (maternal blood volume estimate)

Radiologic Studies in Pregnancy

- CT Exam of Choice
- MRI Not Recommended
- Fluoroscopy As Needed
INTIMATE PARTNER VIOLENCE IN PREGNANCY

PREGNANCY INTIMATE PARTNER VIOLENCE

RISKS:
• Teens
• Substance abuse
• HIV positive

Likely other family members are abused

RADAR
• Routinely screen every patient
• Ask - be direct, kind, without judgment
• Document findings
• Assess safety
• Review options, provide referrals

http://www.cdc.gov/reproductivehealth/violence/intimatepartnerviolence/jdp_slide.htm

MVA IN PREGNANCY
MINOR MVA TRAUMA IN PREGNANCY

Maternal Outcomes following MVA in Washington State 1989-2001†

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<th>No Crash</th>
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<td>Delivery &lt;37 wk</td>
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<td>Fetal distress</td>
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INDICATIONS FOR CESAREAN DURING X-LAP

- Risk of fetal distress exceeds that of prematurity
- Uterine rupture
- Gravid uterus interferes with adequate exploration or repair of maternal injuries (>20 wk)
- Imminent maternal death
- Abruption and maternal DIC with intracranial bleeding
MANAGEMENT MVA AND SHOCK

- Transfuse, 2 large bore IVs
- X-lap vertical incision: general surgery, OB, ortho, urology, peds
- Cesarean delivery
- Call bleeding emergency earlier than later

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POSTPARTUM HEMMORHAGE, DIC

- Fluids wide open
- Call bleeding emergency
- Suspect DIC if fibrinogen <200, platelets < 100
- Give
  - TXA 1 gm IV stat over 10 minutes
  - Pitocin – up to 40 units/L
  - Methergine 0.2 mg intramyometrial
  - Hemabate (carboprost, 15-methyl PGF2-alpha) 1 ampule IM or intramyometrial (0.25 mg)
  - Misoprostol (cytotec, PGE1) 800 mcg per rectum

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GSW IN PREGNANCY

**MANAGEMENT ON ROUTE**

- Maintain SpO₂ > 95%, even if the patient is not showing signs or symptoms of hypoxia.
- Anticipate, prevent and treat shock.
- Maintain CPR.
- Call for OB attending, pediatrics, anaesthesia to be waiting at the door with trauma team.
- Call OR.

**MATERNAL RESUSCITATION**

- CPR non-pregnant achieve 30% normal CO
- CPR left lateral tilt is significantly less effective than when a woman is flat.
- Pregnant CPR at term, lying flat on back achieve 30% of the CO of a non-pregnant woman, and at best achieve 9% normal CO.
- Supine hypotensive syndrome occurs at > 20 weeks, resulting in decreased preload due to uterus on IVC.
- A pregnant uterus consumes 20-30% of CO.

**GSW TO ABDOMEN – FETAL OUTCOMES**

- Fetal mortality up to 70% in GSW to abdomen, whereas < 1% fetal mortality in blunt trauma
- Fetal survivors 90% morbidity
**PERIMORTEM C-SECTION**

For maternal indications:
- After 4 minutes of non-productive CPR, in gestations over 20* weeks
- Concomitant thoracotomy GS

For fetal indications:
- After 4 minutes of non-productive CPR in gestations over 22-24 weeks, but up to 30* minutes after maternal death if fetus is alive

**GUIDELINES PERIMORTEM CESAREAN**


**BURNS IN PREGNANCY**

Urgent cesarean delivery is recommended to improve both maternal and fetal outcomes if:
- ≥ 23 weeks gestation
- TBSA >55%

Parikh P. Obstet Gynecol Surv 2015
Pregnant trauma patient arrives in ER (not undergoing active CPR)

Trauma team conducts primary survey, including FAST exam

OR uses US to assess presence of pregnancy, presence of fetal heartbeat and gestational age

GA < 23 weeks

No fetal heartbeat

• No monitoring necessary
• Rh typing should be done

FHR < 90

• No monitoring necessary
• Rh typing
• Consider abruption if mom unstable
• Continue with normal trauma evaluation

FHR > 90

• CEFM
• Rh typing
• Normal trauma eval
• Speculum exam, cervical check, consider BMZ, MgSO4

GA ≥ 23 weeks (BPD ≥ 5.6cm)

• To OR for C-section

Maternal CPR begun prior to arrival

Never VS

VS in field, blunt trauma

VS in field, penetrating trauma

MATERNAL CPR BEGUN IN ER

If OB team present, potential US for BPD to assess GA (4 x BPD)

If OB not present, C/S by Trauma attending

> 20 weeks (fundus at umbilicus or BPD ≥ 5cm)

C-section (for maternal indication)

At same time in ER

ED thoracotomy

Maternal CPR begun in ER

ED thoracotomy