CARING FOR TWO: THE PREGNANT TRAUMA PATIENT

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OBJECTIVES – TO REVIEW

• Epidemiology/outcomes
• Pregnancy physiology
• Evaluation & management
  - recognizing shock
  - when to “get the baby out”
  - postpartum hemorrhage
  - perimortem C-section
  - Rh isoimmunization
  - preeclampsia

TRAUMA IN PREGNANCY

• 6-8% of all pregnancies experience trauma
• leading non-obstetric cause maternal death in US

Increase:
• spontaneous abortion
• rupture of membranes

• preterm delivery
• cesarean delivery
• uterine rupture
• fetal death
• maternal death

EPIDEMIOLOGY TRAUMA IN PREGNANCY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Controls, no/percent (N=179274)</th>
<th>Uninjured, ISS 0, percent (N=189)</th>
<th>Nonsevere, ISS 1 to 8, percent (N=308)</th>
<th>Severe, ISS 9 or more, percent (N=84)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscarriage</td>
<td>8.5</td>
<td>51.3*</td>
<td>24.6*</td>
<td>13.1</td>
</tr>
<tr>
<td>Abortion</td>
<td>1.4</td>
<td>8.5*</td>
<td>7.4*</td>
<td>13.1*</td>
</tr>
<tr>
<td>Fetal death</td>
<td>8.0</td>
<td>13.5</td>
<td>12.1</td>
<td>5.7</td>
</tr>
</tbody>
</table>
| Fetal viability dependent on gestational age:
  • hCG: detectable 8-10 days after ovulation
  • transvaginal ultrasound detects gestational sac at 5-6 weeks or if hCG > 1500 (1st IRS)
  • doppler: fetal cardiac activity audible at 10-11 weeks
  • fundal height measure from pubic bone, cm ~ weeks gestation (umbilicus ~ 20 wk)

OUTCOMES- TRAUMA IN PREGNANCY

CASE #1

Call from Medic One:
  • "17 year old, about 8 months pregnant hit by her boyfriend in the abdomen with a bat
  • Conscious with abrasions, bruises to arms, legs, torso, abdomen, face
  • Pulse 118, BP 155/86"
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/ipvdp_slide.htm

PREGNANT TRAUMA PATIENT EVALUATION - CASE #1
TRAUMA EVALUATION – PRIMARY SURVEY

A - Airway
B - Breathing
C – Circulation
D – Disability
E – Estimated gestational age
F – Fetal heart tones (check maternal HR)

TRAUMA EVALUATION – SECONDARY SURVEY

• Routine Trauma Exam
• FAST
• Continuous external fetal monitor (if >24 weeks gest)
• Placental location
• +/- Vaginal exam

CASE #1

• Pulse 116, BP 168/110
• Primary and secondary survey negative including FAST
• Gestational age 32 weeks
• Placenta fundal
• FHT 160s

DIFFERENTIAL DIAGNOSIS:
• Preeclampsia
• Drugs (cocaine, meth, opioid withdraw)
• Pain
CASE #1

FHR 160-170 (normal 110-160)
Cervix closed, no vaginal bleeding, contracting

Brown, 2009; Pearlman, AJOG 1990

DIAGNOSIS PREECLAMPSIA

- BP > 140/90 (x 2, 6 hours apart) with proteinuria
- Urine protein > 300 mg/24 hours
- Severe BP > 160/110 (x 2, 6 hours apart)
- H/A, blurry vision, RUQ pain
- Labs: Cr, platelets, Hct, LFTs

PHYSIOLOGY NORMAL LABS IN PREGNANCY

<table>
<thead>
<tr>
<th>LAB</th>
<th>NONPREGNANT</th>
<th>PREGNANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine</td>
<td>0.7-1.0 mg/dL</td>
<td>0.5-0.7 mg/dL</td>
</tr>
<tr>
<td>Hct</td>
<td>35-45%</td>
<td>&gt;32%</td>
</tr>
<tr>
<td>Hgb</td>
<td>12-16</td>
<td>9.5-14</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>150-300 mg/dL</td>
<td>300-600 mg/dL</td>
</tr>
<tr>
<td>Platelets</td>
<td>&gt;180,000</td>
<td>&gt;240,000</td>
</tr>
<tr>
<td>ABG</td>
<td>7.4/100/40/24</td>
<td>7.44/101/28-32/21</td>
</tr>
<tr>
<td>SaO2</td>
<td>Maintain &gt; 85%</td>
<td>Maintain &gt; 95%</td>
</tr>
</tbody>
</table>

Kilpatrick SJ. UpToDate, 2015
CASE #1

- Rh positive
- Cr 0.97, Hct 27, platelets 150, fibrinogen 230, AST 166
- Urine protein 3+
- Headache, blurry vision, RUQ pain
- Abdominal pain
- Tox screen: neg cocaine, pos cannabinoids

Diagnosis – preeclampsia, but why is her Hct low?

MANAGEMENT

- Call OB, Peds, Anesthesia
- Start Magnesium sulfate 4gm IV load, 2 gm IV/hour
- Assess for additional injuries (imaging)
- Continuous fetal monitoring

RADIOLOGIC STUDIES IN PREGNANCY

- CT EXAM OF CHOICE
- MRI NOT RECOMMENDED
- FLUOROSCOPY AS NEEDED
CT abdomen negative. Cervix closed. Late decelerations. Still contracting.

DIFFERENTIAL DIAGNOSIS:
- Abruption
- Uterine rupture
- Placental insufficiency
- Liver or spleen injury

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

CASE #1 CESAREAN DELIVERY
CASE #2

Call from Medic One:
- 39 year old pregnant woman restrained driver in a moderate-speed MVC, air bags deployed
- About 7 months pregnant, conscious, alert
- Pelvic and LE fractures
- ISS 10
- Pulse 104
- BP 116/68

PREGNANCY AND MVA

- Direct blow to abdomen and severe injuries are predictors of worse outcomes
- Preterm labor and abruption are the most common obstetric complications
- Uterine rupture, direct fetal injury, fetal death less common
CASE #2

Patient arrives in ED:
- HR 125, BP 100/60
- Awake, alert, complaining of abdominal pain, leg pain
- First pregnancy
- On backboard left lateral tilt, 25-30 degrees
- Rh negative

Difficult to diagnose hypovolemia
Do not rely on maternal vital signs

Vasoconstriction decreases uterine blood flow ~30%, commonly resulting in fetal hypoxia and fetal bradycardia.
If traditional signs and symptoms of hypovolemic shock are exhibited, fetal mortality can be as high as 85%

Kilpatrick SJ. UpToDate, 2013;
TRAUMA EVALUATION – PRIMARY SURVEY

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

GESTATIONAL AGE

BPD x 4 = approximate GA

CASE #2

• Pulse 112, BP 108/68
• ABC = OK
• D= Open tib-fib fracture, pelvic fracture, multiple abrasions and contusions
• Pelvic fracture -increase fetal head injury, 25-35% fetal mortality, 9% maternal mortality, bladder & urethral injuries
• E = EGA 28 wk, BPD 7, fundus 8 cm above umbilicus
• F= Fetal heart tones 160s
TRAUMA EVALUATION – SECONDARY SURVEY

- Routine Trauma Exam
- FAST
- Continuous fetal monitoring
- Placental location
- +/- Vaginal exam

CASE #2

- FAST exam small amount fluid in abdomen
- Pulse 126, BP 102/61
- EGA 28 weeks
- Placenta fundal
- Fetal monitor placed
- Small amount bleeding and pool of fluid in vagina

DIAGNOSIS:
- Abruption vs labor
- Premature rupture of membranes

RUPTURE OF MEMBRANES

- Increases risk of abruption, infection
- Increased risk cord prolapse

Waters breaking early (PPROM)
CASE #2

- Labs return: Hct 21 Platelets 130 Fibrinogen 190

**DIFFERENTIAL DIAGNOSIS**
- Placenta abruption
- Uterine rupture
- Spleen or liver injury

**INDICATIONS FOR CESAREAN DELIVERY**
- Risk of fetal distress exceeds that of prematurity
- Uterine rupture
- Gravid uterus interferes with adequate exploration or repair of maternal injuries
- Imminent maternal death
- Abruption and maternal DIC with intracranial bleeding

**CASE #2 MANAGEMENT**
- Transfuse, 2 large bore IVs
- X-lap: general surgery, OB, ortho, urology, pediatrics
- Cesarean delivery (2 liters blood in uterus behind placenta)
- Postpartum hemorrhage ensues
POSTPARTUM HEMMORHAGE

• Methergine 0.2 mg IM or intramyometrium
• Misoprostol (cytotec, PGE1) 800 mcg per rectum or buccal
• Pitocin – 30 to 40 units/L
• Hemabate (carboprost, 15-methyl PGF2-alpha) 1 ampule IM or intramyometrium (0.25 mg)
• Fluids wide open
• Call bleeding emergency

RH ISOIMMUNIZATION

• Kleihauer Betke
• Isoimmunization can occur in 1st trimester
• Only takes 1 fetal cell/50,000 maternal cells
• Easily preventable
• Rhogam is 300 mcg covers 30cc of feto-maternal hemorrhage

CASE #3

Call from Medic One:
• 28 year old GSW to back, 29 weeks pregnant
• Just became unresponsive
• VS prior HR118, BP 105/65
• Positive fetal heart tones
• CPR ongoing, arrival 2 minutes

MANAGEMENT ON ROUTE

- Maintain SpO₂ as close to 100% as possible
- Anticipate, prevent and treat shock
- Maintain CPR
- Ask for OB, pediatrics, anesthesia to be waiting at the door

PREGNANT TRAUMA PATIENT EVALUATION - CASE #3

MATERNAL RESUSCITATION

- CPR on a slant significantly less effective than flat
- Supine hypotensive syndrome at > 20 weeks, resulting in decreased preload because uterus on IVC
- CPR non-pregnant achieve 30% normal CO

- A pregnant uterus consumes 20-30% of CO
TRAUMA EVALUATION – PRIMARY SURVEY

A – Airway (intubated)
B – Breathing (none spontaneous)
C – Circulation (no pulse)
D – Disability (exit wound chest)
E – EGA 30 weeks
F – Fetal heart tones 60 bpm

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TRAUMA EVALUATION – SECONDARY SURVEY

• Routine Trauma Exam
• FAST
• CEFM (if >24 wks gest)
• Placental location
• +/- Vaginal exam

Continue CPR and rapidly deliver
Remove fetal monitor to defibrillate

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GUIDELINES PERIMORTEM CESAREAN

For maternal indications: Another rule of 4!
• After 4 minutes of non-productive CPR, in gestations over 20* weeks

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

CASE #3 PERIMORTEM C-SECTION

THANK YOU
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