Treatment of Trauma in Pregnancy

EMC 420: Maternal & Child Emergency Care

D. Trigg, MD

- Essential treatment for all trauma in pregnancy : ensure adequate maternal and fetal oxygenation and perfusion.
- Treatment of the pregnant trauma victim begins with
  - Same order of priorities discussed in assessment: C A B C D E F

Goals of Therapy

- Optimize maternal and fetal health
- Critical therapeutic actions include
  - Competent assessment,
  - Treatment interventions,
  - Communication with other members of the medical team
  - Emotional support of the patient and family

Rules and Strategies

In simple, minor accident or in a life-threatening crisis, the paramedic needs

- Plan with rules and strategies
- First rule of trauma management of the pregnant patient is to treat the pregnant patient's "ABCs."
  - Vigorous attention to maternal O2 and circulation is the same priority for both the pregnant and non-pregnant patient
- Second rule: there is no such thing as "minor" trauma in the last 20 weeks of pregnancy

Most Effective Initial Intervention

- Most common causes of fetal death : maternal hemorrhage, maternal death, and abruptio placentae
- Initial intervention is aggressive correction of hypovolemia and hypoventilation
- Maternal stabilization provides fetal stabilization
  - Inadequate stabilization may result in maternal circulation being maintained at expense of fetal circulation
  - Inadequate ventilatory stabilization results in maternal and fetal hypoxia

Critical Actions : Airway / Breathing

Recognize and treat:

(1) An absent gag

(2) Poor respiratory effort and/or rate, and

(3) Tension pneumothorax;

And administer high flow 02 by the appropriate route.[4] (see table 25 - 5.)

Breathing

- Interventions indicated for a rate < 18 and a tidal volume < 800 mL.
- In intubation, the controlled ventilatory rate of 25 - 30 will produce the desired maternal pCO2 of 30.[21]
- For tension pneumothorax needle thoracostomy
  - NO lateral 4th or 5th intercostal site : may enter the abdominal cavity
  - Anterior 2nd intercostal / midclavicular site avoids this complication

Circulation

- While above interventions proceeding
- Other team members may be initiating circulatory stabilizing procedures:
  - Controlling major bleeding
  - 2 IV's, trauma tubing, NS 2000 mL rapidly while reassessing vital signs
  - Blood is drawn for dextrostik and for lab studies.
- Positioning the patient on left side - after immobilization

Inferior Vena Cava

- Reduced cardiac output (CO)
  - Failure to deflect the uterus away from inferior vena cava will markedly reduce CO
- Patient should remain on left side at all times - unless this is absolutely impossible
  - 6" rolled towel beneath the backboard will provide sufficient elevation

Underestimation of Internal Bleeding

- Potential pitfall in management of circulation : underestimation of internal bleeding
  - (e.g. in a pelvic fracture).
- No obviously abnormal VS
  - Life-threatening hemorrhage, with 30 - 35 % blood volume loss (class III shock) before abnormal VS detected

Volume of Crystalloid

- In second half of pregnancy, volume resuscitation for hypovolemia may need to be 50 % greater
- Aggressive volume resuscitation : <u>not</u> likely to result in volume overload [4, 18]

Pneumatic Antishock Garment (PASG) in Pregnant Patient

- In nonpregnant patient, appropriate to consider PASG after or during initiation of IVs
- In pregnant patient, routine use not recommended
- NO studies have demonstrated effectiveness of PASG for trauma in pregnancy
- Application of the abdominal compartment
  - Considered contraindicated after 20th wk
  - Uterine compression of IVC : decrease venous return and preload.[4, 6, 21, 25]
- Lower extremity air splint; facilitate IV access.
- Leg compartments increases PVR (afterload) in pregnant trauma patient
  - Might benefit low PVR - but not studied [21]

Disability : AVPU and Pupils

Quick neurological for structural or metabolic abnormalities.

- For signs of uncal herniation, hyperventilate
  - Rate over and above the usual tachypnea of pregnancy require a rate : 30 (if hyperventilation goal: pCO2 30)
- For hypoglycemia: D50W, 50mL

Expose / Monitors

- Patient adequately exposed
- Monitors (cardiac, BP, pulse oxymetry, CO2)
- VS reassessed
- Patient's response to initial therapy reassessed
  - If no response to 2 L of NS,
    - O negative blood in ED

Brief Paramedic Obstetric Evaluation

- After airway, oxygenation, fluid resuscitation, a brief paramedic obstetric evaluation may be performed - ideally, prior to communication with the emergency department
- "the four F's":
  - Fluids,
  - Fundus,
  - Fetal age, and
  - Fetal distress, if possible - with the latter being more effectively accomplished in-hospital.

Communication : Report to the ED

- (1) The patient's present condition, including interventions necessary
- (2) The response to initial therapy
- (3) The gestational age by history (if this is known) and/or the estimated fundal height [fetal age] by examination, and, of course
- (4) The estimated time of arrival at the ED

This will facilitate ED preparation and mobilization of a multidisciplinary team, if indicated

Reassess / Stabilize / Secondary Survey

- After communication has occurred
- VS reassessed
- Consider
  - NG tube and urinary catheterization.
    - Catheterization provides valuable information :
      - (1) Renal output [reflective of adequate perfusion], and
      - (2) The presence of blood in the urine.
      - In traumatic shock, gross blood in urine suggests diagnosis of pelvic fracture and/or retroperitoneal hemorrhage.
- Secondary survey completed

Special Considerations

- Treatment for Traumatic Maternal Arrest
- Minor Trauma
- Informed consent for refusals
- Medications to avoid in trauma in pregnancy
- Emotional care of the maternal trauma patient
- Fetomaternal hemorrhage

Traumatic Maternal Arrest

- By completion of primary assessment and stabilization, should evident
  - If maternal VS are not returning (or if maternal injuries are not compatible with life).
- After vigorous attempts to resuscitate patient have failed (or in a patient who would otherwise meet the criteria for infield pronouncement of death),
  - Paramedic should immediately assess the fetus
  - By this time in the assessment, the only pertinent question:
    - Is the fetal age 25 weeks or more?

Fetal Age and Fundal Height

Paramedic may choose to document and communicate fetal age

Qualitatively in terms of fundal height, such as:

- "below the umbilicus,"
- "just above the umbilicus," or
- "well above the umbilicus."

Maternal Resuscitation

- Resuscitation efforts continued until arrival in ED
  - Unless countermanded by protocol or by on line medical direction
- When chest compressions indicated
  - May be facilitated by 6-in backboard elevation
- ET hyperventilatory rate should be >30 to optimize pO2 and pCO2 levels

Early Communication with ED

- Is critical, allowing for mobilization of resources such as neonatology.
- Radio communication : brief and blunt, such as:
  - "We are transporting a pregnant traumatic arrest to your facility;
  - Fundal height is 'well above the umbilicus;'
  - CPR is in progress;
  - ETA is 4 minutes."

ED C-Section

Immediately upon arrival if:

- Fundal height exceeds the umbilicus and
- Clinical signs of fetal life are present (e.g., Doppler ultrasound confirmation of fetal heart beat).
- Maternal resuscitation efforts may continue after a perimortem delivery
- In absence of adequate neonatology support in ED, paramedic may be asked to assist with neonatal or maternal resuscitation.

Minor Trauma

- Critical that paramedic have a consistent and thorough approach to minor trauma in pregnancy.
- Potential pitfalls include:
  - Failure to do a paramedic obstetric exam
  - Failure to transport to a facility that will conduct electronic obstetric monitoring
  - Failure to adequately give and document informed consent to a patient refusing transport
  - Giving false reassurance og good outcome
  - Administering inappropriate drugs

Every Minor Injury

- Maternal primary survey and VS quickly obtained.
- Then, as indicated, paramedic obstetric exam (Fluids / Fundus / Fetal age / Fetal heart rate)
- Every minor trauma pregnant patient with a fundal height above the umbilicus ($\geq$ 25 weeks gestation) requires transport for obstetric electronic monitoring
  - Even pregnant patients with no apparent signs of pelvic, low back, or abdominal injury.
  - Significant fetal or uteroplacental injury, without obvious injury, may occur .[6, 21]

Informed Consent for Refusals

- OB-refusals are always problematic.
- Understanding epidemiology of minor trauma in pregnancy: better equipped to inform patient who wishes to refuse transport.
- Patient should be informed that even though her injury is minor, "this may result in serious complications of pregnancy, such as fetal death, in as much as 5 % , or 1 in 20 times, with this kind of injury."
- Documentation : risks and inadvisability of refusal were understood by the patient.

Medications in Trauma in Pregnancy

- Medications for pain, nausea, or asthma
- Morphine - acceptable
- Ketorolac (Toradol) - safety not established
- Promethazine (Phenergan) - safety, particularly in first 3 mo, has not been established.
- Minor trauma and asthma, albuterol - probably safe.
  - Has not been studied in trauma
  - Fetal and placental blood flow and fetal distress have not occurred with albuterol.[40]

Contraindicated Medications

- Terbutaline (Brethine) and epinephrine
  - Sometimes used in asthma
  - Contraindicated after blunt trauma [21, 25]
  - Neither is drug of choice
  - Terbutaline interferes with normal uterine contraction monitoring
  - Epinephrine: vasoconstriction may decrease uterine blood flow and fetal oxygenation.[21, 25]

Premature Contractions

- Common complication; may occur after minor trauma.
- 90 % of premature contractions will spontaneously disappear, and are usually benign.[6]
- Contractions which do not stop
  - Often associated with uteroplacental injury such as abruptio placentae.
  - Stopping uterine contractions limits ability to diagnose serious complications

Emotional Care

- Timely and appropriate initial stabilization first
- For minor trauma : opportunity to provide support
- May be particularly important in assault or DV
- Anticipate pregnancy-related questions, fears, and reactions to stress.
- Earliest response may be denial, anger, guilt, and blaming
- Anticipate the question "Is my baby going to be OK?"
  - "The best thing you can do now for your pregnancy is to take care of yourself. "
  - **"What the baby needs now is more blood and oxygen;** you can help by **lying on your side."**

Patient Who Requests Reassurance

- **"Will everything will be OK with my baby."**
- **While being supportive, avoid prognosticating.**
- **Anxious patient may easily interpret**
  - **"most" as "always ," and**
  - **"not likely" as "never ."**
- **Potential medicolegal ramifications**
  - **e.g., perfectly stable pregnant patient who experienced minor lightning injury (in this case there is a high fetal mortality).**

Emergency Department Care

- Primary stabilization and fetal evaluation
- Ultrasonography [instead of peritoneal lavage]
- NG tube and catheterization
- Imaging (x-ray, CT, MRI) without fetal shielding considered indicated if needed
- Initial blood studies : K.B. test, type + Rh,…

Electronic Obstetric Monitoring

- In all direct or indirect abdominal trauma
- For fetal age of greater than 20 wks
- Must : 4 hrs of fetal and uterine electronic monitoring after time of trauma event.[1, 4, 21, 25]
- Begin monitoring ASAP after maternal VS stabilized
- Abruptio; also maternal shock, fetal compromise.
- Uterine contractions (tocography) extremely accurate in predicting abruptio placentae.
  - Greater than 4 contractions in one hr : abnormal contraction pattern

Fetomaternal Hemorrhage

- Transfusion of fetal blood into maternal blood
- Screening in trauma : KB test; type and rh
- All Rh-negative mothers: anti-Rh prophylactic injection. (RhoGam)
  - After direct or indirect abdominal trauma
  - 300 mic. IM
  - Not critical that injection be given within 24 hrs.
    - Practical to adm prior to the leaving ED

Emotional Support ; Protective Services

- For grief reactions
- For victims of domestic violence
- For sexual assault
- Consultation with
  - Mental health
  - Protective services
  - Law enforcement
  - Crisis counselors for victims of rape
- Familiarity with resources, with state requirements

Admission Criteria

- Transfer all stable patients over 24 wk. to L+D
- Do NOT discharge from ED if :

  > 24 weeks, admitted for ≥ 24 hours if :
  - Vaginal bleeding
  - Rupture of membranes / amniotic fluid leak
  - Evidence of maternal hypovolemia
  - Any serious maternal injury, even VS stable
  - Uterine or abdominal pain / tenderness
  - Abnormalities on uterine ultrasound
  - Abnormal contractions (> *4 / hour)*
  - Abnormal fetal heart rate

Abnormal Fetal Heart Rate

- **“**Non-FHT criteria on “4 F ” assessment (Fluids, Fundus, Fetal age **)**
- **“**Abnormal fetal heart rate
  - **Sustained tachycardia (>160)**
  - **Sustained bradycardia (<120)**
  - **Transient bradycardia occurring late after maternal contraction**
  - **Loss of rate variability**

Treatment of Pregnant Trauma Patient: Priority Setting

- C A B C D E F
- Careful but rapid "A B C process"
  - Will identify critical actions needed to reverse unstable or lethal conditions

Critical Decisions / Critical Actions

- C - Spine
- A irway - RSI, as indicated
- B reathing - high O2 flow rate
- C irculation
  - IV
    - Start: (2), LB, IV crystalloid
    - 2000 mL rapidly and reassess
  - Vena caval : LLD position
- D isability : AVPU

Critical Decisions / Critical Actions

- E xpose
- Stabilize VS
- F etus
  - Palpate uterine fundus
  - Fetal viability ?
  - Fundal ht. / Fetal age
  - Fetal distress ?
- Indication for 4 hr. electronic monitoring ?

Pregnant vs Non-pregnant

Chief Differences: Fetal assessment and circulatory critical actions:

- Left lateral decubitus position
- More aggressive fluids (2L rapid infusion).
- Minor trauma
  - high flow O2, IV, left lateral decubitus, and transfer to an **appropriate** facility for 4 hr uterine and fetal monitoring.
- Serious trauma
  - Familiar priorities and critical actions.

Summary

- **Trauma during pregnancy : common**
- **Systematic approach: familiar, ABC principals**
  - **Exception: minor trauma**
  - ***C A B C D E F***
    - ***With attention to changes in A+P***
    - ***Effective : maternal, fetal, placental complications***
- **Trauma during pregnancy : may be anxiety-provoking and may be tragic**
- **Early recognition and intervention will ensure the best chance for maternal and fetal well-being**