Assessment of the OB Patient Presenting to the ED- Trauma

October 18, 2021

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Favorite thing about Fall?

Chat in Facility, Attendees, and your favorite thing about Fall
Support acknowledgement: HRSA State Maternal Health Innovation Program

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Must attend live Zoom Meeting
Simulation Updates

- Working on a virtual simulation format
- Our Team is excited to develop this type of format
- Developing agendas for in-person site visits
- Simulation Workshop specifically for ED’s
Today’s Speaker
Dr Kokila Thenuwara, MD, MMBS, MME, MHCDS
Trauma in Pregnancy: Priority #1-4
Triage to Transfer

Simulation based education and communication subcommittee
Obstetrics for Emergency Department providers
Kokila Thenuwara MD
October 18th, 2021
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Objectives

When managing pregnant trauma patients, participants will be able to

• Delineate incidence of trauma
• Describe the mechanism of trauma
• Describe assessment and triage of trauma parturients
• Describe steps in patient stabilization
Incidence of Trauma in pregnancy

The most common type of trauma was domestic violence, which increased from 5239/100,000 women to 8307/100,000 live births which was a 58% increase during pregnancy.

The risk of homicide also increased during pregnancy from 2.3/100,000 women to 2.9/100,000 live births.

Incidence of Trauma in pregnancy

Motor vehicle accidents account for a significant portion of trauma during pregnancy.

In a retrospective review of linked national data in Sweden, 207/100,000 live births were complicated by a motor vehicle accident. The mortality risk was 1.4 maternal fatalities and 3.7 fetal fatalities for every 100,000 pregnancies.

Incidence of Trauma in pregnancy

A cross-sectional study from self-reported data in 22 states to the Centers for Disease Control and Prevention estimated that 92,500 pregnant women are hurt each year in motor vehicle collisions, and that most women do not report being counseled about seat belt use during prenatal visits.

The greatest obstetrical risk is abruption, from shear force (coup) or tensile force (countercoup)

Maternal Death

In developed nations trauma is the leading cause of maternal death during pregnancy, 1 of 5 deaths due to trauma is a result of a motor vehicle collision.
Iowa data

- Iowa Maternal Mortality Review: 2015-first half of 2018

- Report 39 deaths reviewed: 22 (56%) of the 39 cases were postpartum deaths. This is an important factor for ED providers.

- 11 cases were pregnancy-related (3 direct and 8 indirect),
- 6 cases were pregnancy associated,
- 19 cases were not related to the pregnancy. For three of the cases, there was not enough information to determine if the death was related to the pregnancy or not.
Iowa data

The leading causes of the pregnancy related deaths were cardiac-associated and hemorrhage. Other causes included pre-eclampsia, pulmonary embolism, pneumonia, infection. The rate for pregnancy-related causes of death which was 9.4/100,000 live births.
Iowa data

Non pregnancy related deaths (motor vehicle crashes, suicides, overdose and homicides due to domestic violence, cancer and others) occurred at a rate of 16.2/100,000 live births.

This rate is almost double the rate for pregnancy-related causes of death which was 9.4/100,000 live births.
Iowa data- Cause of Death

- Eclampsia 1
- Hemorrhage 2
- Pulmonary embolism 1
- Asthma 1
- MVA 7 6/7 no seat belts
- Suicide 6 (gunshot 4, hanging 2)
- Homicide 3 (all gunshot)
- Cancer 4
- Cardiac 4
- Pneumonia 1
- Substance abuse OD 6
- Other 3
Pregnancy may be an incidental finding during the evaluation of a patient with traumatic injuries.

A single-center, retrospective study of female patients ages 15 to 40 years who received care at Trauma Center at the University of Maryland Medical Center found that the prevalence of pregnancy was 3%.

Further, in 8% of these pregnant trauma patients, the pregnancy was diagnosed during the trauma evaluation.\(^9\)
Beyond the usual trauma patient:

• Consider anatomic and physiologic changes of pregnancy
• Trauma causing obstetrical complications
• Fetal well being and management of complications
Physiologic and Anatomic Changes of Pregnancy
Cardiovascular

- Increase in cardiac output up to 40% due to increase in heart rate and stroke volume
- Decrease in systolic and diastolic blood pressure leading to decrease in mean arterial pressure
- Decrease in systemic vascular resistance
- Increase in plasma volume and, to a lesser extent, an increase in red blood cell mass leading to a physiologic anemia of pregnancy
- Increased blood flow to uterus and bladder
Clinical application

• Signs of hemorrhagic shock may not develop until as much as 35% of blood volume is lost as a result of these physiologic changes.

• Elevated blood pressure in a pregnant patient at 20 weeks or more gestational age should warrant evaluation for preeclampsia.

• Pregnant patients should be placed in the left lateral decubitus position to minimize the occurrence of supine hypotension.

• Essential to maintain maternal blood pressure to enable sufficient tissue perfusion to allow adequate oxygen delivery because blood flow to the pregnant uterus can increase to 600 mL/minute (compared to 60 mL/minute for the nonpregnant patient).
Respiratory

• Decreased functional reserve capacity by 20% to 30%, leading to increased inspiratory capacity
• Increased tidal volume by 30% to 50% with minimal increase in respiratory rate, leading to increased minute ventilation
• Elevation of the diaphragm
• Edema of the upper airway mucosa, making airway management more challenging
Clinical application

• Apnea can lead to **hypoxia rapidly**
• Oxygen by face mask if patient is hypoxic
• Secure patient’s airway to **avoid aspiration**
Hematologic

- Increase in total blood volume by up to 45%
- Increased levels of fibrinogen, D-dimer, factors VII, VIII, X, and von Willebrand factor
- Decrease in protein S levels and resistance to activated protein C
- Prothrombotic state
Clinical application

• Physiological anemia
• Prothrombotic state
Gastrointestinal

• Smooth muscle relaxation, leading to reduced lower esophageal sphincter tone
• Increased production of gastrin, leading to increased gastric acidity
Clinical application

• Increased risk of aspiration
Renal

- Progressive increase in glomerular filtration rate to 40% to 50% above baseline
- Decreased serum levels of creatinine, blood urea nitrogen, and uric acid
- Hydronephrosis and hydroureter without obstruction
Clinical application

• **Normal renal laboratory parameters** may mask impending renal impairment.
Anatomic Changes
Fundal height by weeks of gestation

First 12 weeks of pregnancy, uterus remains within the pelvis.
At 20 weeks reaches the level of the umbilicus
Between 34 and 38 weeks reaches and then the costal margin
As the uterus grows, there is cephalad displacement of intra-abdominal organs.
As the uterus increases in size, it can **compress adjacent structures**, such as the inferior vena cava.

During the late third trimester, the **diaphragm can be displaced cephalad** by as much as 4 cm. thus if need to place a tube thoracostomy at a site one to two rib interspaces more superior than in a nonpregnant patient.

As a result of upward displacement into the relatively protected thoracic space, there is **some protection of the bowel** in cases of blunt abdominal trauma.
Obstetric complications from trauma during pregnancy

• contractions/ preterm labor
• fetal maternal hemorrhage
• spontaneous abortion
• premature rupture of membranes
• preterm birth
• uterine rupture
• placental abruption
• intrauterine fetal demise.
Obstetric complications

The primary focus of initial management should be on the welfare of the mother.

The best initial treatment of the fetus is to stabilize the mother because fetal outcome is directly related to aggressive and early stabilization of the mother.
Case Scenario

• 26-year-old healthy G1P0, 34 weeks gestation, following a motor vehicle collision, is brought by the hospital EMS, to your ED. She is responsive, breathing (maintaining her airway) and her BP recorded at the site was 80/40, HR 100 beats/min.

• Air care cannot transport patient due to hazardous weather conditions
Primary survey: ATLS

- Airway
- Breathing
- Circulation
- Displacement, Delivery, Disability
- Evacuate, Early Obstetric Warning Signs
Primary survey: ATLS

Airway

• Determine patency.
• Pregnant patients desaturate quickly if apneic- decreased FRC and increased oxygen demand
• Preoxygenation with high flow oxygen mask
• Secure definitive airway- Difficult airways are encountered in approximately 5% of pregnant patients. The rate of failed tracheal intubation is many times higher in pregnant patients as compared to general surgical patients (0.4% vs. 0.04%)
• Rapid sequence intubation with cricoid pressure
• Orogastric tube placed for suctioning of gastric contents to reduce risk of aspiration.
Primary survey: ATLS
Breathing

• Ensure adequate ventilation.
• The physiologic changes of pregnancy lead to a reduction in the partial pressure of carbon dioxide (PaCO$_2$) level to between 27 mmHg and 34 mmHg.$^{21}$
• When PaCO$_2$ levels in the pregnant patient are within ranges considered normal in the nonpregnant state, the patient may have impending respiratory failure.
• The fourth or fifth intercostal space anterior to the mid-axillary line instead of the second intercostal space mid-clavicular line as the preferred site for needle decompression.
• If pneumothorax is suspected placement of a thoracostomy tube should be performed one to two rib interspaces superior to the usual location because of the diaphragm elevation seen in pregnancy.$^{3}$
Primary survey: ATLS

Circulation

Look for signs and symptoms of shock
Identifying active sites of bleeding.

Shock in a trauma patient is commonly due to bleeding.

IV access with two large-bore IV cannulas, preferably above the diaphragm should be obtained, blood type and screen should be done at this time.

Aortocaval compression should be minimized by displacing the uterus either manually or left lateral decubitus positioning of the patient.

Treat Hemorrhagic shock should be treated initially with IV crystalloids until blood products are available.

To avoid alloimmunization in Rh (-) females, uncross matched type O Rh (-) blood can be administered until type-specific blood is available.

If there is clinical evidence that shock is caused by tamponade or tension pneumothorax, appropriate procedures should be performed without delay to relieve the cause of the obstruction.
Primary survey: ATLS

Disability

• Disability assessment is a rapid neurologic assessment and The Glasgow Coma Scale
Primary survey: ATLS
Delivery

• Is the patient visibly pregnant
• Is there eminent delivery
• Fetal part is vagina, or perimortem CD
Primary survey: ATLS
Evacuate

• At end of primary survey patient should be stabilized
• Start on transfer workflow
• Call in OB specialist, Anesthesia team

Awareness of Maternal Early Obstetric Warning Signs
Primary survey: ATLS

**Early Obstetric Warning Signs**

• Systolic BP; mmHg <90 or >160
• Diastolic BP; mmHg >100
• Heart rate; bpm <50 or >120
• Respiratory rate; bpm <10 or >30
• Oxygen saturation; % <95
• Oliguria; ml/hr x 2h <35
• Maternal agitation, confusion, or unresponsiveness.
• Patients with hypertension reporting a non-remitting headache or shortness of breath
Secondary Survey-

• Head-to-toe evaluation of the patient
• AMPLE (allergies, medications, past illnesses/pregnancy, last meal, events/environment related to the injury)
• Initiate evaluation of the fetus, with external monitoring of fetus
Secondary Survey- Imaging

• FAST US scan /Peritoneal lavage
• Xray/CT – cervical spine, pelvis for fractures
• Obstetric US
Secondary Survey-Lab investigations

• CBC, CMP, Blood type and Rh, lactate level
• Kleinhauer-Berke test
• Coagulation profile, PT/PTT/Fibrinogen
• Urinalysis
• toxicology
Secondary Survey-Medications

- Anti hypertensives; Labetalol, hydralazine, (IV/PO)
- Tocolytics; terbutaline, nifedipine
- Magnesium; bolus and IV continuous infusion
- Rhogam
- Cytotec, methylergonovine, oxytocin, hemabate
- Tranexamic Acid
- Antibiotics
- Insulin/ Dextrose/IV potassium for DKA
Case Scenario

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Institution specific protocol: based on availability at any given time of

- Providers skilled in OB
- Providers skilled in Anesthesia
- Ability to call in call such providers to your facility during an emergency?

Also consider the following:
- Time taken for them to arrive at your facility.
- Time taken to transfer a patient to the nearest higher care facility by air or ground?

Equipment availability
- What blood products, and how much of it is available at your facility?
- Can you get extra products from a nearby facility? How long will it take to get them to your facility?
- Do you have necessary equipment to perform a delivery and actively manage third stage of labor?
- Do you have necessary equipment to perform a cesarean delivery?
- Do you have necessary equipment to manage a PPH?
AWHONN Maternal Fetal Triage Index (MFTI)

Priority based:
1. Stat
2. Urgent
3. Prompt
4. Non-urgent
5. Scheduled
Questions?

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