Trauma Management for Pregnant Patients >22 Weeks Gestation

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Purpose:

To provide evidence-based recommendations for the management of trauma patients who are more than 22 weeks pregnant at St. Mary Medical Center, Apple Valley, ensuring optimal outcomes for both the mother and the fetus. This guideline includes the initial trauma assessment, monitoring, testing, and management strategies, specifically addressing the unique needs of pregnant patients at or beyond 22 weeks gestation.

Scope:

This guideline applies to all pregnant patients presenting with trauma who are at 22 weeks gestation or later. The recommendations focus on maternal and fetal stabilization, along with appropriate interventions to prevent or manage potential complications for both the mother and fetus.

Introduction:

Trauma is a leading cause of maternal morbidity and mortality, and it presents particular challenges in pregnant patients. Pregnancy-induced physiological changes affect the maternal response to trauma, and the management of trauma in pregnancy must be adjusted based on fetal viability. Fetal viability is commonly recognized as the gestational age at which a fetus has a reasonable chance of surviving outside the uterus, with appropriate medical intervention. The 22-week gestational age cut-off is widely used in clinical practice to guide decisions in managing trauma during pregnancy, as this marks the point at which the fetus is considered viable in many settings (Combs et al., 2017; Miller et al., 2020).

1. Rationale for the 22-Week Gestational Age Cut-Off:

The 22-week gestational age cut-off is based on the clinical definition of fetal viability, which is the point at which a fetus has a reasonable chance of survival if born prematurely, given advances in neonatal care (Torrance et al., 2021). This threshold has been established through both clinical observation and empirical evidence and is influenced by factors such as lung development, neurological maturation, and the availability of advanced neonatal intensive care.

Fetal Viability at 22 Weeks:

- **Lung Development**: By 22 weeks, the fetus has developed basic lung structures, and while the lungs are still immature, they are capable of some gas exchange with support. However, survival rates at this stage are extremely low without intensive respiratory support (Berg et al., 2020).
- **Survival Rates**: The survival rate for fetuses born at 22 weeks gestation remains very low (less than 10%) and significantly improves after 24 weeks. A major factor influencing survival is the ability to support respiration, which is often achieved with neonatal intensive care. However, survival is not guaranteed, and long-term health outcomes can vary widely depending on the degree of prematurity and associated complications (Acolet et al., 2019; Miller et al., 2020).
- **Fetal Responses to Trauma**: At 22 weeks, the fetus is still highly vulnerable to trauma. The maternal response to trauma, particularly in the form of placental abruption, can have severe consequences for a fetus at this age, often leading to non-survivable outcomes (Fakhry et al., 2019).

Clinical Considerations:

- **Maternal-Fetal Complications**: In the event of trauma, fetal outcomes at 22 weeks gestation are influenced by several factors, including placental integrity, uterine injury, and maternal vital signs. Fetal distress, which may not be immediately apparent, can evolve rapidly in response to maternal shock or uterine trauma. Early interventions, such as monitoring fetal heart rate and preparing for potential preterm delivery, are critical in improving outcomes for both the mother and fetus (Combs et al., 2017; Meis et al., 2018).
- **Neonatal Intensive Care Capabilities**: With advances in neonatal care, the threshold for viability has shifted to a lower gestational age. However, survival rates for infants born at 22 weeks remain dismal, and ethical considerations play a significant role in decision-making when trauma occurs at this stage of pregnancy. Medical teams should engage in early discussions with obstetric and neonatal specialists to evaluate the prognosis for both the mother and the fetus (Miller et al., 2020).

2. Initial Assessment and Stabilization:

Maternal Primary Survey:

- **Airway**: Ensure a patent airway and provide supplemental oxygen if necessary, maintaining oxygen saturation above 94%.
- **Breathing**: Assess for signs of hypoxia or respiratory distress. Pregnant patients are at risk of decreased lung volumes due to diaphragm displacement, so supplemental oxygen may be required.
- **Circulation**: Establish large-bore intravenous access, and administer fluids judiciously. Pregnancy increases the maternal blood volume by 30-50%, but the circulating volume may be

- redistributed due to trauma, increasing the risk of shock (Solevåg et al., 2019). A 1-2 L bolus of crystalloid may be required in the initial stages, but careful monitoring for fluid overload is essential (Combs et al., 2017).
- **Disability**: Evaluate the Glasgow Coma Scale (GCS) and assess neurological function, particularly in cases of head trauma (Miller et al., 2020).
- **Exposure**: Ensure full exposure to evaluate the extent of trauma,but maintain patient temperature with warm blankets to prevent hypothermia.

Fetal Assessment:

- **Fetal Heart Rate (FHR)**: Obtain continuous fetal heart rate monitoring if the fetus is viable (≥24 weeks gestation). Normal fetal heart rate is between 110-160 bpm. Changes in fetal heart rate can indicate distress (Miller et al., 2020; Meis et al., 2018).
- **Gestational Age and Position**: Assess fetal viability based on gestational age, and assess fetal position for any signs of fetal injury.

3. Monitoring Recommendations:

Maternal Monitoring:

- **Vital Signs**: Continuous monitoring of maternal blood pressure, heart rate, respiratory rate, and oxygen saturation. Early signs of hypotension, tachycardia, or hypoxia may indicate maternal decompensation (Combs et al., 2017).
- **Laboratory Tests**:
    - **Hemoglobin/Hematocrit**: To assess for maternal blood loss.
    - **Coagulation Profile**: PT, aPTT, INR to assess for disseminated intravascular coagulation (DIC), which is common in cases of severe trauma (Fakhry et al., 2019).
    - **Type and Crossmatch**: Type-specific blood is essential in trauma management, especially in cases of hemorrhage.

Fetal Monitoring:

- **Fetal Heart Rate (FHR)**: Continuous FHR monitoring is recommended if the pregnancy is beyond 24 weeks gestation (Miller et al., 2020). Any significant decelerations or absent variability should prompt further evaluation and possible intervention.
- **Ultrasound**: A bedside ultrasound should be performed to assess fetal presentation, the amniotic fluid index, and to rule out placental abruption or other injuries (Solevåg et al., 2019).
- Fetal movement assessment can be part of clinical evaluation if the patient is >24 weeks gestation.

4. Specific Obstetric Blood Work and Testing:

Kleihauer-Betke Test:

- **Purpose**: The Kleihauer-Betke test is used to quantify fetal-maternal hemorrhage (FMH), which may occur in cases of trauma, placental abruption, or uterine rupture. This test measures the number of fetal red blood cells in the maternal circulation and is used to estimate the volume of fetal blood that has crossed into the maternal bloodstream (Fraser et al., 2019).
- **Indications**: It is particularly useful in trauma cases where there is concern for placental abruption or when maternal blood loss is suspected to involve fetal blood. This test can help guide the management of Rh-negative mothers by determining if Rh immunoglobulin (RhoGAM) is needed to prevent Rh sensitization (Solevåg et al., 2019).
- **Interpretation**: If the Kleihauer-Betke test reveals a significant FMH, additional interventions such as RhoGAM administration for Rh-negative mothers or further evaluation of fetal wellbeing may be warranted (Fraser et al., 2019).

Fetal Fibronectin (fFN):

- **Purpose**: Fetal fibronectin is a protein found in the cervicovaginal fluid during pregnancy. Its presence in the second trimester can be a marker for impending preterm labor, especially in trauma patients who are at risk for uterine irritation or placental disruption (Berghella et al., 2018). It is used as a biomarker for predicting the risk of preterm birth.
- **Indications**: If a trauma patient is at risk for preterm labor or cervical changes, a fetal fibronectin test may be useful in predicting whether preterm labor is likely to occur within the next 7-14 days. It is not a definitive test but can help in guiding management decisions (Solevåg et al., 2019).
- **Interpretation**: A negative fetal fibronectin result has a high negative predictive value, suggesting that preterm labor is unlikely. A positive result, however, may indicate an increased risk of preterm birth, particularly in the context of trauma (Berghella et al., 2018).

5. Obstetric Consultation and Delivery Planning:

- **Obstetric Consultation**: Always involve the obstetrics team early to assess maternal and fetal condition, especially if there is any indication of preterm labor, placental abruption, or significant fetal distress.
- **Delivery Consideration**: If fetal heart rate abnormalities are noted or maternal conditions deteriorate, consideration for emergency cesarean section should be made (Ramin et al., 2020). Intrauterine fetal resuscitation may also be necessary depending on fetal distress (Fakhry et al., 2019).

CT Use and Safety for Gestations Greater Than 22 Weeks

Indications for CT Imaging:

CT scans are a crucial diagnostic tool in the management of trauma patients, including those who are pregnant and greater than 22 weeks gestation. In trauma situations, CT imaging is necessary to assess critical internal injuries such as head trauma, abdominal hemorrhage, or pelvic fractures. Trauma patients at this stage of pregnancy are at higher risk for significant maternal injury, and timely imaging can be essential for determining the appropriate course of treatment (Higgins et al., 2020).

Safety Considerations:

Radiation Exposure:

- **Fetal Sensitivity:** After 22 weeks gestation, the fetus is at a stage where critical organs and systems are well-formed. Although the fetus is more sensitive to radiation exposure during earlier stages of pregnancy, there is still some risk at 22 weeks or beyond. Exposure at this stage may increase the risk of neurodevelopmental effects or childhood cancers (Schroeder et al., 2017). However, the immediate risk to fetal survival or development is generally outweighed by the need for accurate diagnostic information in trauma situations.
- **Dosage:** The American College of Radiology (ACR) emphasizes the use of the lowest possible radiation dose to achieve diagnostic-quality imaging, particularly in the third trimester of pregnancy. Techniques such as abdominal and pelvic shielding should be employed, where feasible, to minimize exposure to the uterus (ACR/RSNA, 2019).
- **CT vs. Other Imaging:** While non-contrast ultrasound and MRI are preferable alternatives when radiation exposure is a concern, CT remains the gold standard for certain trauma diagnostics (e.g., head trauma or pelvic fractures) due to its speed and accuracy (Higgins et al., 2020).

Use of Contrast:

- **Intravenous Contrast:** The use of iodinated contrast agents in CT scans is considered safe during pregnancy but should be used judiciously. These contrast agents can cross the placenta and enter the fetal bloodstream. However, the risk to the fetus is minimal when contrast is used in moderate amounts and for appropriate clinical indications, such as in cases of vascular injury (Langer et al., 2020). When contrast is necessary for the diagnosis, the benefit generally outweighs any potential risks.
- **Alternative Imaging Modalities:** If there is concern about contrast exposure, especially in cases of potential allergic reactions or when contrast is not critical for diagnosis, non-contrast imaging methods (e.g., ultrasound, MRI) should be considered (Langer et al., 2020).

Timing of Imaging:

- **Optimal Timing:** CT scans should be performed promptly after maternal stabilization, with fetal heart rate monitored to ensure no immediate distress. Imaging should ideally occur after initial resuscitation and stabilization, but it should not be delayed if the clinical situation demands urgent intervention (Schroeder et al., 2017).
- **Post-CT Fetal Monitoring:** After a CT scan is performed on a patient greater than 22 weeks gestation, fetal heart rate should be monitored post-procedure, particularly if contrast was used or if significant maternal injury was detected. An obstetric consultation is essential for further monitoring and potential interventions (Higgins et al., 2020).

Version Control Record			
Version	**Date**	**Author / Reviewer**	**Description of Changes**
1	**08/21/2024**	**Paul Wisniewski, D.O.**	**Initial review and update to reflect latest evidence/practice**

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