Trauma and Considerations Unique to Pregnancy

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KEYWORDS

• Trauma • Pregnancy • Protocol • Physiology

KEY POINTS

- Fifty percent of fetal losses occur after "minor trauma."
- Proper seat belt use in pregnancy reduces adverse fetal outcomes in motor vehicle crashes.
- Clinical signs of hemorrhage and shock are delayed in pregnant women.
- Prioritize maternal stability before fetal assessment.
- Displace the gravid uterus to prevent aortocaval compression.

INTRODUCTION

Trauma complicates 6% to 7% of all pregnancies and requires multidisciplinary education and training for both trauma and obstetric (OB) teams to achieve the best outcome. The importance of this is emphasized by the statistics, which show trauma to be the leading cause of non-OB maternal death that also results in an annual loss of 4000 fetuses.[1,2] Although the great majority of OB trauma is considered minor, this statement can be misleading, because 50% of fetal losses occur in what is often considered to be minor trauma. Only 4 per 1000 OB trauma cases lead to inpatient admission; however, the delivery rate after admission is 24% to 38%.[2–6]

Systems such as the Injury Severity Score and Revised Trauma Score exist in the trauma arena to categorize patients and attempt to quantify risk of adverse outcome. Higher scores reflect greater injury. However, these systems have not been found to be applicable to outcomes in OB cases. A population-based study of 10,000 pregnant women examined outcomes in relation to Injury Severity Score. Women were categorized by those who required delivery at the time of their trauma admission and those who were delivered at a later time. An Injury Severity Score of greater than 10 was

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associated with the highest risk of adverse outcome; however, those dyads with a score of less than 10 remained at increased risk of abruption, uterine rupture, and maternal and fetal death.[3] Owing to the limitations of these scoring systems and trauma providers' lack of consistent OB experience, it is important to understand mechanisms for certain adverse maternal and fetal/neonatal outcomes incurred as a result of trauma, as well as caveats to pregnancy physiology that make some injuries more likely and detection of maternal compromise more difficult.

MATERNAL AND FETAL RISK

Common pregnancy-associated risks in trauma include preterm contractions, preterm labor, preterm delivery, abruption, fetal and neonatal death, and uterine rupture. Motor vehicle crashes (MVCs) are the most common source of OB trauma (two-thirds of all cases), followed by falls, intimate partner violence (IPV), assault, and suicide.[1,7–10]

Although the severity of the MVC is associated most strongly with adverse outcomes, even minor collisions can result in fetal demise.[10,11] Correct seat belt use and air bag deployment decrease the risk of maternal injury and fetal loss.[12–15] However, even with this, at a speed of 20 mph, the risk of adverse fetal event is still as high as 12%.[11] IPV often escalates during pregnancy and is thought to exist in 20% of pregnancies. IPV can take many forms (falls, MVCs, gunshot wound, stabbing, strangulation, blunt trauma) and should be screened for in all trauma patients.[16,17]

Blunt trauma can occur as a result of falls, MVC, or assault. Upper abdominal injuries include risks to the spleen and liver.[18,19] The bowel is less often injured as a result of blunt trauma because it is shielded by the gravid uterus. Although rare, uterine rupture can occur (most often posterior and fundal) with a fetal mortality rate approaching 100%. Fetal injury can also occur and may not be perceptible until after delivery. Fetal–maternal hemorrhage occurs in up to 10% of blunt trauma cases.[1,6,9,18,20]

Penetrating abdominal trauma most often occurs as a result of gunshot, stabbing, assault, or attempted suicide. A larger uterus, owing to late gestational age or multiple gestation, is more likely to sustain injury. Bowel injury is somewhat prevented by the gravid uterus, but should be more strongly suspected in upper abdominal stab wounds.[21] Gunshot wound injuries are variable and determined by distance from the gun, entry point, unseen visceral path, and exit point.

Pelvic fracture is most often seen as a result of MVC or serious fall. Open pelvic fracture is associated with increased risk for bowel injury, other maternal structural injury, and maternal and fetal death.[22] Fetal head injuries can occur as a result of pelvic fracture when the fetus is vertex. If a fracture is deemed stable and the pelvic inlet and outlet are not compromised, vaginal delivery can still be attempted.

Abruption occurs in 7% of trauma cases, most of which are considered "minor."[1,9,23–25] When the uterus decelerates owing to a sudden stop, the continued inertia of the amniotic fluid can create negative pressure on the uteroplacental interface. This inertia, along with shearing force and stretching at the uteroplacental interface, can create separation and resultant retroplacental bleeding. Abruption most often occurs as the result of an MVC, but can occur in any setting with the right combination of intrauterine inertia and shearing force. It may not be apparent clinically until more than 24 hours after trauma.[23,26] Abruption is associated with worse neonatal outcomes than gestational age–matched controls, including death, cerebral palsy, intraventricular hemorrhage, asphyxia, and periventricular leukomalacia.[27] Classically, an abruption presents as vaginal bleeding with abdominal or back pain, although 10% may be concealed (no vaginal bleeding). The amount of vaginal bleeding is not necessarily predictive of the size of the abruption. Coagulopathy can develop in 10% of