

Trauma in Pregnancy: A Systematic Approach

Fadi G. Mirza, M.D.,¹ Patricia C. Devine, M.D.,¹ and Sreedhar Gaddipati, M.D.¹

ABSTRACT

Trauma in pregnancy remains one of the major contributors to maternal and fetal morbidity and mortality. Potential complications include maternal injury or death, shock, internal hemorrhage, intrauterine fetal demise, direct fetal injury, abruptio placentae, and uterine rupture. The leading causes of obstetric trauma are motor vehicle accidents, falls, assaults, and gunshots, and ensuing injuries are classified as blunt abdominal trauma, pelvic fractures, or penetrating trauma. Many of the assessment and management aspects of obstetric trauma are unique to pregnancy, although initial evaluation and resuscitation should always be maternally directed. Once maternal stability is established, vigilant evaluation of fetal well-being becomes warranted. Continuous fetal heart monitoring, ultrasonography, computed tomography, open peritoneal lavage, and/or exploratory laparotomy may be indicated in a case of obstetric trauma. In view of the significant impact of trauma on the pregnant woman and her fetus, preventive strategies are paramount.

KEYWORDS: Trauma, pregnancy, uterine rupture, blunt trauma, pelvic fractures

Although the 20th century has witnessed a remarkable decline in maternal mortality in the United States, little progress has been made during the last 2 decades.¹ In fact, according to Centers for Disease Control and Prevention, there has been a slight increase in this rate over the past few years, reaching 13 deaths per 100,000 births in 2004. Trauma complicates up to 7% of all pregnancies and is the leading cause of non-obstetric maternal deaths, accounting for ~46% of all maternal deaths.²⁻⁶ The most common causes of trauma during pregnancy are motor vehicle accidents (49%), falls (25%), assaults (18%), guns (4%), and burns (1%).⁷ Several risk factors have been linked to obstetric trauma, including younger age, drug use, alcohol use, and domestic violence.⁸⁻¹¹ In fact, pregnancy itself has been identified as a risk factor for trauma, with the attacks

often aiming at the gravid abdomen to cause fetal injury.^{12,13}

The American College of Obstetricians and Gynecologists (ACOG) in its educational bulletin that tackles this subject subdivides trauma in pregnancy into three different types: blunt abdominal trauma, pelvic fractures, and penetrating trauma.¹⁴ The uniqueness of management in any case of obstetric trauma lies in the fact that two individuals, mother and fetus, are at risk and require proficient evaluation and management. However, it is imperative to remember that the mother's stability and survival remain the top priorities, and all efforts should be directed toward resuscitation of a pregnant patient in jeopardy. Hence, similar to a non-pregnant patient, initial resuscitation and management of a pregnant trauma patient should be consistent with

¹Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Columbia University Medical Center, New York, New York.

Address for correspondence and reprint requests: Fadi G. Mirza, M.D., Clinical Fellow in Maternal-Fetal Medicine, Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Columbia University Medical Center, 622 W. 168th Street, New York, New York 10032 (e-mail: fgm2107@columbia.edu).

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the advanced trauma life support protocols, which follow the ABCDE pattern: airway, breathing, circulation, disability, and exposure.

BLUNT ABDOMINAL TRAUMA

The impact of blunt abdominal trauma on the fetus depends to a high degree on the gestational age at the time of injury. For instance, direct injury to the uterus and fetus prior to 13 weeks of gestation is highly unlikely given their protection by the bony pelvis.¹⁴ Accordingly, trauma in the first trimester is usually not associated with a miscarriage, with the exception of profound hypotension and associated hypoperfusion of the uterus and its contents. The maternal implications of trauma during pregnancy also depend on gestational age. It is well known that enlargement of the uterus after 18 to 20 weeks of gestation compresses both the inferior vena cava and aorta in the supine position, increasing the likelihood of hypotension and decreased uterine perfusion.¹⁴ The assessment and management of any case of blunt abdominal trauma also depend to a great extent on the gestational age at the time of injury in addition to other factors like the degree of maternal injury and mechanism of injury. For instance, evaluation of the fetal well-being is dictated primarily by gestational age. Accordingly, the workup of a case of trauma in a viable pregnancy warrants a period of continuous fetal heart rate monitoring, whereas this is not indicated or at times impossible in a "previable" gestation. Moreover, gestational age is an important variable in any management decision. In cases where continuous fetal heart rate monitoring is pursued, electing expectant management versus expedited delivery on the basis of fetal heart rate findings can be significantly influenced by gestational age.

Initial laboratory work generally includes complete blood count, basic metabolic profile with electrolytes and glucose, coagulation profile, blood type, and urinalysis. During the workup of a pregnant patient in the setting of abdominal trauma, determining the maternal blood type is of particular importance. According to the ACOG practice bulletin entitled "Prevention of Rhesus Alloimmunization," authorities have agreed that anti-D immunoglobulin should be administered to Rh D-negative women following abdominal trauma.¹⁵ This recommendation is based on the fact that abdominal trauma can be associated with fetomaternal hemorrhage, which in turn may lead to alloimmunization. In fact, it has been suggested that a Kleihauer-Betke test should be performed in all women with significant abdominal trauma to screen for fetomaternal hemorrhage. Additional doses of anti-D immunoglobulin would then be advised in cases of large fetomaternal hemorrhage.

In general, trauma involving pregnancies that have reached viability requires continuous fetal and

uterine monitoring with an external Doppler and tocodynamometer. This technology is paramount for evaluation of the fetal well-being as well as for identifying placental abruption and preterm labor. In a study by Connolly and colleagues, no adverse outcomes directly related to trauma were reported when monitoring was normal and early warning symptoms (bleeding, abdominal pain) were absent. This represents a negative predictive value of 100%.¹⁶ On the other hand, abnormal monitoring, early warning symptoms of vaginal bleeding, uterine contractions, abdominal or uterine tenderness, and a positive Kleihauer-Betke test were not predictive of either preterm labor or adverse pregnancy outcomes. The investigators reported a sensitivity and specificity of 52 and 48%, respectively.

A concerning complication in any case of obstetric trauma is delayed placental abruption, which has been reported up to 6 days posttrauma, hence the importance of prolonged fetal heart monitoring.^{17,18} Unfortunately, fetal heart rate and uterine activity monitoring beyond 20 weeks is characterized by a high negative predictive value for abruption. The latter is unlikely when uterine contractions occur at a frequency of less than one every 10 minutes during a monitoring period of 4 hours.^{14,19,20} On the other hand, at least in one study, placental abruption occurred in 20% of cases in which uterine contractions occurred at a greater frequency.¹⁹ In a study by Morris and colleagues that included 441 cases of trauma in pregnancy, the fetal survival rate was 45%.²¹ Of these, 32 cases underwent emergency cesarean deliveries for fetal distress, maternal distress, or both, culminating in the delivery of 33 infants. Fetal heart tones were not identified in 13 of those cases and, as expected, there were no survivors in this group. In the remaining 20 cases in which a fetal heart rate was documented, all of which were greater than 26 weeks of gestation, 15 survived with infant survival being independent of maternal distress or maternal injury severity score (ISS). The latter is an anatomic scoring system used in trauma patients with multiple injuries. Each injury is assigned a score and is allocated to one of six body regions. Only the highest ISS score in each body region is used, and the three most severely injured body regions have their score squared and added together to produce the injury severity score. It is noteworthy that the five deaths in the group of potential survivors resulted from delayed recognition of nonreassuring fetal heart rate patterns. Because three of the five mothers of these infants sustained mild or moderate injuries, the authors concluded that these deaths were potentially preventable had fetal monitoring been performed with subsequent operative intervention. Although there is a uniform agreement regarding the role of prolonged and continuous monitoring in cases of abdominal trauma in pregnancy, there is controversy around the necessary duration of monitoring, with recommendations ranging from 4 to

48 hours.^{16,17,22} According to numerous sources, 4 hours of continuous monitoring are sufficient in the absence of vaginal bleeding and abdominal pain, uterine contractions more frequent than 1 in 10 minutes, and non-reassuring fetal heart rate tracing.^{16,20,23} Additional monitoring up to 24 hours is warranted with any evidence of more frequent uterine contractions, non-reassuring fetal heart testing, vaginal bleeding, significant uterine tenderness or irritability, serious maternal injury, or rupture of the amniotic membranes.¹⁴

In addition to fetal heart monitoring, ultrasonography is another indispensable tool in the workup of obstetric trauma. In addition to its role in establishing gestational age and placental location, it is an important component of antenatal fetal testing, namely amniotic fluid assessment and biophysical profile.¹⁴ It can also assist in evaluating the extent of fetal injury or identifying demise. Moreover, ultrasonography can be used to recognize a subchorionic hemorrhage or retroplacental clots, although its sensitivity in recognizing a placental abruption in cases of trauma does not exceed 40 to 50%.^{20,22} Ultrasonography may also help identify intra-abdominal fluid, thus increasing the index of suspicion for an intraperitoneal hemorrhage.¹⁴ In this context, free fluid is most often visualized in the left and upper quadrants and pelvis.²⁴ Brown and colleagues examined the accuracy of ultrasonography in detecting clinically significant abdominal injury in pregnant patients following blunt trauma.²⁵ Four of five surgically confirmed injuries were identified on prior ultrasound examination, including placental, spleen, and liver injuries. Another imaging modality that may be indicated during evaluation of a trauma patient during pregnancy is computed tomography (CT), which generally exposes the fetus to ~ 3.5 rad.¹⁴ Although a CT scan is indicated in cases where its benefits to the mother outweigh its associated fetal risks, proper counseling, when possible, remains warranted. Finally, open peritoneal lavage may be necessary if an intraperitoneal hemorrhage is suspected on the basis of abdominal signs or symptoms suggestive of intraperitoneal bleeding, altered sensorium, unexplained shock, major thoracic injuries, and multiple major orthopedic injuries.^{14,26} Open peritoneal lavage, usually periumbilical, with sharp dissection and opening of the anterior abdominal peritoneum under direct vision is the preferred technique in pregnancy as this is less likely to injure the uterus or other organs compared with blind needle insertion.¹⁴ It is important to emphasize that, if intraperitoneal bleeding is clinically evident, a lavage is not indicated. Evaluation of blunt abdominal trauma is summarized in Fig. 1.

Blunt abdominal trauma is associated with several poor pregnancy outcomes. Intraperitoneal hemorrhage can result from trauma to the gravid abdomen. The most common cause of this form of hemorrhage is splenic rupture, which occurs earlier in pregnancy compared with

the nonpregnant state.²² It has been reported that up to 25% of pregnant patients show evidence of a hemodynamically significant splenic or hepatic injury after severe blunt trauma.²⁷ Another form of bleeding that usually occurs at a later stage of pregnancy is retroperitoneal hemorrhage, often secondary to rupture of the pelvic venous plexus.²² Intrauterine fetal demise is a known complication of abdominal trauma. It occurs primarily in the setting of abruptio placentae or other types of placental injury, although it has been reported in the setting of direct fetal injury, uterine rupture, maternal shock, or death.¹⁴ Several trauma studies demonstrate that at least 50% of fetal losses with known etiology were the result of abruptio placentae.^{4,28-30} In one report of severe car crashes involving pregnant women, maternal loss of life was the most frequent cause of fetal death.³⁰ Placental abruption is believed to be unpredictable on the basis of severity of maternal injury or placental position.^{19,22,31} Several mechanisms of placental abruption secondary to trauma have been proposed.¹⁴ The discrepancy in tissue properties between the elastic myometrium and the relatively inelastic placenta can result in shearing at the tissue interface. Because fluid is not compressible, intrusion of the elastic uterine wall will result in displacement of amniotic fluid and distention of the other parts of the uterus. In addition to intrauterine fetal demise, another serious fetal sequela that has been associated with blunt abdominal trauma is direct fetal injury with skull fracture, which is a rare event that complicates less than 1% of all pregnancies affected by trauma.¹⁴ This generally occurs in the context of significant trauma at a later gestational age, although case reports have described fractures following relatively minor trauma.³²

Preterm contractions or labor can manifest in a pregnant patient following abdominal trauma. If preterm labor is suspected, medical management includes the use of antibiotics, antenatal corticosteroids, and tocolytic agents. Antibiotics are recommended if the Group B Streptococcus culture status of the patient is unknown, which is not an uncommon occurrence in this setting. Antenatal corticosteroids should be administered if preterm labor or other risk factors for preterm delivery between 24 and 34 weeks of gestation are identified. A typical course of corticosteroids consists of either two doses of betamethasone or four doses of dexamethasone administered intramuscularly. Tocolysis is not contraindicated on the basis of trauma alone. Several agents are commonly utilized for that purpose, including magnesium sulfate, calcium channel blockers, nonsteroidal anti-inflammatory drugs, and β -mimetic agonists. The latter should generally be avoided in severe cases of trauma where a concealed hemorrhage is suspected because clinical deterioration can be masked by tachycardia, a common side effect of β -mimetic agonists. Another consideration in trauma patients with prolonged immobilization is the use of

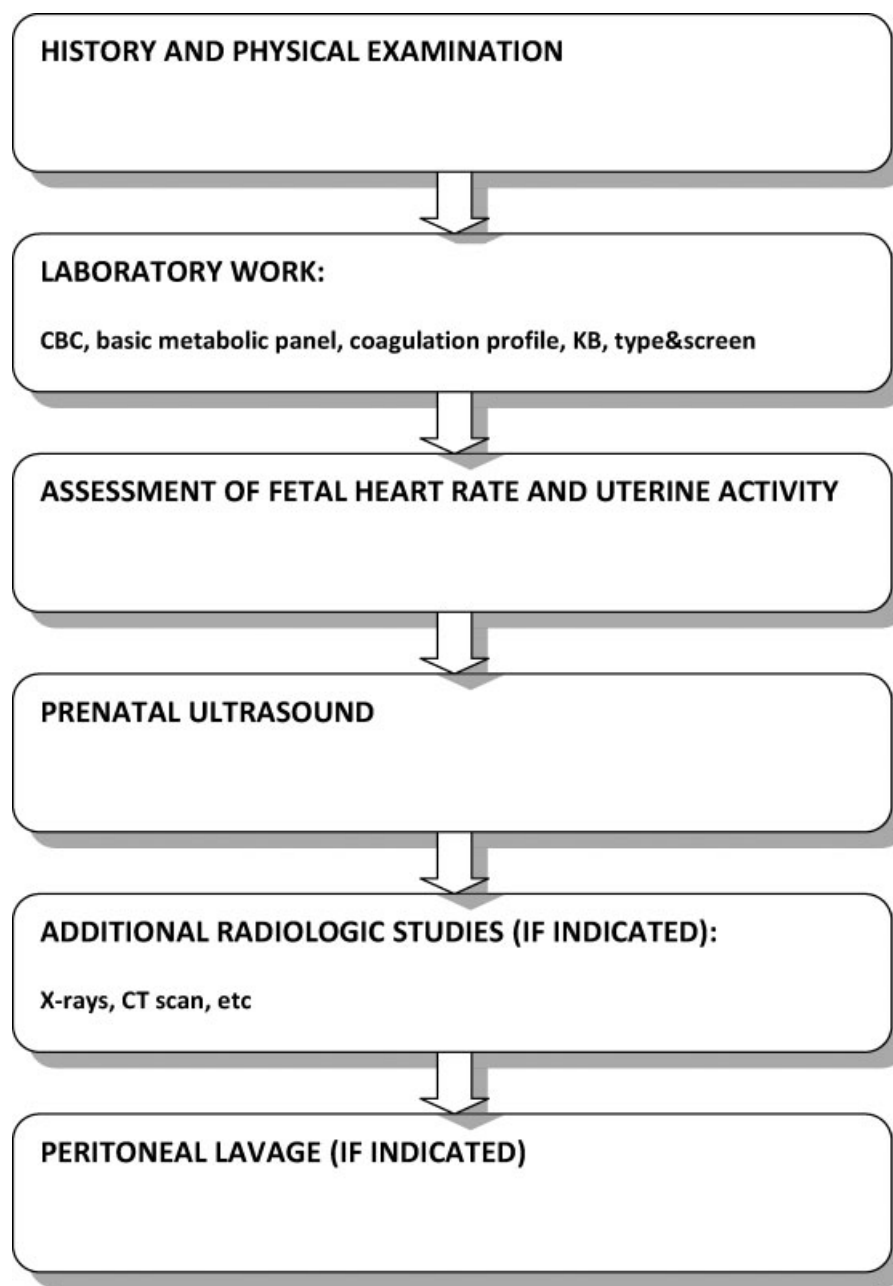


Figure 1 Evaluation of blunt abdominal trauma. CBC, complete blood count; CT, computed tomography; KB, Kleihauer-Betke test.

the appropriate prophylaxis against deep venous thrombosis. Options include graduated compression stocking, pneumatic compression device, unfractionated heparin, and/or low-molecular-weight heparin. Finally, adequate intravenous access is generally warranted in cases of abdominal trauma. In the event of cardiac arrest, cardiopulmonary resuscitation (CPR) should be pursued immediately, although this is often more challenging in pregnant patients, particularly those at advanced stages of pregnancy. Certain modifications are warranted in the setting of pregnancy. Left lateral tilt that can be achieved by placing a wedge under the right flank and hip, which in turn displaces the uterus to

the left side, alleviates compression of the great vessels, and optimizes CPR.³³

Uterine rupture, which has been traditionally linked to abdominal trauma, represents one of the most life-threatening emergencies in obstetrics. Uterine rupture refers to the presence of a defect in the gravid uterine wall, although its extent can be variable. Such an injury may result in serosal hemorrhage or abrasions; avulsion of the uterine vasculature with hemorrhage; complete disruption of the myometrial wall with extrusion of the fetus, placenta, or umbilical cord into the abdominal cavity; or complete uterine avulsion.¹⁴ Approximately 75% of cases of uterine rupture involve the uterine

fundus. Clinical presentation can vary from subtle findings (e.g., uterine tenderness, nonreassuring fetal heart rate patterns) to a rapid onset of maternal hypovolemic shock. Typical signs of peritoneal irritation on physical examination, such as distention, rebound tenderness, guarding, and rigidity, can be identified but are not always evident. Although the majority of cases of uterine rupture following trauma involve the uterine fundus, rare injuries such as a corneal myometrial defect following blunt external trauma had been reported by Dandawate and colleagues.³⁴ In this case, a pregnant patient at 23 weeks of gestation was involved in a motor vehicle accident, resulting in right-sided abdominal trauma. She remained asymptomatic and was noted to have a large right cornual myometrial defect at the time of cesarean delivery at 36 weeks. It was described that placental tissue had herniated through a 5- to 6-cm outpouching lined solely by serosa. The authors attributed this defect to the abdominal trauma that occurred at the time of the motor vehicle accident.

The incidence of uterine rupture varies in the literature, although a review of 19 peer-reviewed publications reporting an incidence for uterine rupture has yielded an overall rupture rate of 1 in 1514 pregnancies (0.07%).³⁵ Uterine rupture is among the four most common clinical causes of medical litigation in obstetrics and gynecology in the developed world, although this is postulated to be driven by poor outcomes rather than by malpractice.³⁶ Numerous risk factors have been linked to uterine rupture, including prior cesarean delivery, uterine surgery, congenital uterine malformations, agents utilized for induction of labor and termination of pregnancy, and trauma.³⁷ Uterine rupture secondary to trauma can occur at any gestational age. Harrison and colleagues reported a case of uterine rupture with fetal demise following a motor vehicle accident at 22 weeks. In this case, an obstetric ultrasound performed shortly after the accident revealed an empty uterus after the fetus had been extruded in the maternal abdominal cavity without evidence of a fetal cardiac activity.³⁸ Uterine rupture has been associated with abdominal trauma in pregnancy, particularly cases that involve direct abdominal impact associated with substantial force.^{39,40} This complication is associated with substantial maternal and fetal mortality rates that can reach 10 and 100%, respectively.^{29,41} Once the stability of a pregnant patient after trauma has been established, a comprehensive workup, including sonographic examination, is warranted. It is important to note that the diagnosis of uterine rupture can be made using ultrasonography, which allows examination of the uterine integrity, although definitive diagnosis requires a laparotomy.

Plauche and colleagues reported a series of 23 cases of major or catastrophic uterine rupture. This was defined as complete separation of the uterine wall, with or without expulsion of the fetus, endangering the life of the

mother and/or the fetus.⁴² In this series, uterine rupture occurred in the setting of a prior cesarean delivery in 14 (61%) cases. Trauma was associated with two of the remaining 9 (39%) cases of previously intact uteri. In a large retrospective cohort study by El-Kady and colleagues that included ~5 million deliveries in California between 1991 and 1999, the association between trauma and various maternal and fetal outcomes was examined.⁷ In this study, 10,316 pregnancies (0.2%) involved different forms of injury, most commonly fractures, dislocations, sprains, and strains followed by superficial injuries, contusions, and crushing injuries. The authors subdivided patients into a group that delivered during the trauma hospitalization and another that did not. In the former group, falls were the most common causes of injury, and in the latter, injury occurred in the context of a motor vehicle accident. Subjects delivering at the time of trauma hospitalization had more serious adverse outcomes compared with nontrauma controls, including a marked increase in uterine rupture with an odds ratio of 43. A subsequent study involving the same cohort evaluated the maternal and neonatal outcomes specifically in women hospitalized for assault during pregnancy.⁴³ The incidence of uterine rupture in this population reached 0.71% with an odds ratio of 46 compared with women with no history of assault.

In view of the significant impact of trauma on the pregnant woman and her fetus, preventive strategies are paramount. The protective role of seatbelts during pregnancy is supported by numerous studies.⁴⁴⁻⁴⁶ In one study by Crosby and Costiloe, a remarkable decline in maternal mortality from 33 to 5% was reported with the use of seatbelts.⁴⁵ Unfortunately, many pregnant women are reluctant to use seatbelts during the course of their pregnancy, primarily for fear of causing any harm to their fetuses.⁴⁷ Other reasons include the seatbelt causing discomfort and chafing of the legs and thighs, sliding over the abdomen, or being too tight or too short.⁴⁸ Given the vital role of a seatbelt, it is paramount to counsel patient on the significance of its use. Appropriate education has been shown to improve the use and proper placements of seatbelts during pregnancy.⁴⁷ Another alarming finding is that pregnant women often misplace the seatbelt and improperly place the lap belt over the dome of the uterus, which is associated with significant uterine and fetal injury.⁴⁹⁻⁵¹ Alternatively, there does not appear to be extraordinary force transmission to the pregnant uterus when seatbelts are properly placed.⁵⁰ The ACOG recommends safety belt use throughout pregnancy "with both the lap belt and shoulder harness in place. The lap belt portion should be placed under the pregnant woman's abdomen, over both anterior superior iliac spines and the pubic symphysis. The shoulder harness should be positioned between the breasts. There should not be excessive slack in either belt, and

both the lap and shoulder restraints should be applied as snugly as comfort will allow."¹⁴

PELVIC FRACTURES

Pelvic and acetabular fractures are rare during pregnancy, and hence limited data exist on the management of these types of injury. Diagnosis is generally made by physical examination supplemented by radiological studies. The latter have traditionally represented a source of concern for pregnant patients due to their associated radiation exposure. This issue was specifically reviewed in an ACOG committee opinion.⁵² It is emphasized that a plain X-ray generally exposes the fetus to very small amounts of radiation, particularly when shielding of the uterus is undertaken during the procedure. The estimated fetal exposure from a single view hip film is 200 millirads. This is greater than the estimated exposure from chest X-rays and abdominal films, which are 0.02 to 0.07 millirads and 100 millirads, respectively. Yet, these values are substantially lower than 5 rad, the level below which the risks of congenital anomalies, growth restriction, or abortions are not increased.

Pelvic fractures are characterized by significant morbidity and mortality rates in both the pregnant patient and her fetus as they can be associated with hypovolemic shock, particularly in the setting of intraperitoneal bleeding.¹⁴ In a recently published series of 1345 patients with pelvic and acetabular fractures treated at a major trauma center between 1987 and 2002, only 15 (1.1%) occurred in pregnant women carrying a total of 16 fetuses.⁵³ Eleven patients were conservatively managed, and four underwent surgical management. The authors reported one maternal death and four nonviable pregnancies. In an earlier review of the literature by Leggon and colleagues that combined data on 101 cases of pelvic and acetabular fractures during pregnancy, maternal and fetal mortality rates were 9% and 35%, respectively.⁵⁴ Upon further examination of the setting of these cases, the authors noted a trend toward a higher maternal mortality rate in automobile-pedestrian collisions when compared with falls. In contrast, vehicular collisions were characterized by a trend toward a higher fetal mortality rate when compared with falls. It is noteworthy that both maternal and fetal outcomes depended on the degree of injury, although the fracture class (simple versus complex) and type (acetabular versus pelvic), trimester of pregnancy, and the era of literature reviewed did not influence mortality rates. In addition to the high maternal and fetal mortality rates, these types of trauma can also be associated with bladder or urethral trauma resulting in hematuria and difficult placement of a urinary catheter.¹⁴ According to the ACOG educational bulletin, a pelvic fracture is not a definite contraindication for vaginal delivery even in the presence of a slightly displaced pelvic fracture.¹⁴ This publication

acknowledges, however, that "a severe, dislocated, or unstable fracture or a large healing callus may preclude an attempt at vaginal delivery." In the previously mentioned article by Leggon and colleagues, vaginal birth was successful in 75% of women who sustained pelvic fractures during the third trimester of their pregnancy.⁵⁴

PENETRATING TRAUMA

Another rare type of injury that can occur during pregnancy is penetrating trauma, which comprises both gunshot and, to a lesser degree, stab wounds. These types of injury are characterized by a remarkable discrepancy between the maternal and fetal prognosis.^{14,55,56} Fetal demise has been reported in up to 60% of cases of penetrating trauma.⁵⁷

When intrauterine fetal demise happens in these cases, it often occurs through direct fetal injury or secondary to placental and/or cord injury.¹⁴ On the other hand, maternal outcome in these cases is generally more favorable with mortality during pregnancy being less than that witnessed in nonpregnant victims.⁵⁸ It is postulated that this decrease is a result of the anatomic changes that take place during pregnancy, namely the superior displacement of the visceral organs by the enlarging uterus. As a result, upper abdominal penetrating trauma is more likely to injure maternal bowel, and lower abdominal penetrating trauma is more likely to injure the uterus and/or fetus as the enlarged uterus tends to protect the maternal bowel from injury. It is noteworthy that stab wounds to the upper abdomen can lead to a more complex bowel injury in pregnancy as a result of the cephalad displacement of bowel by the gravid uterus.⁵⁸ In turn, the impact of gunshot wounds depends on numerous variables, including the bullet size and velocity; anatomic region of penetration; angle of entry; deflection of the bullet's trajectory by muscle, bone, or viscera; gestational age of the fetus; and the distance from which the bullet was fired.¹⁴ Unfortunately, the appearance of the entrance wound can often be misleading with more internal damage than suggested by this appearance.

In terms of management of penetrating injuries in pregnancy, complete undressing of the patient is warranted. This approach will ensure vigilant inspection of all entrance and exit wounds as those of high-velocity projectiles are often unpredictable and multiple wounds can exist concomitantly.¹⁴ Although immediate surgical exploration is the most appropriate management approach in a nonpregnant victim, this approach is not universal in pregnancy, and the decision to proceed with surgical exploration is a function of the location of injury, uterine size, and maternal and fetal vital signs.⁵⁸ In a retrospective cohort study by Awwad and colleagues that included 14 cases of high-velocity abdominal penetrating trauma during the Lebanese civil war between 1975 and 1991, the authors examined the value of selective

laparotomy.⁵⁵ In this cohort, visceral injury was evident when the entry of the missile was in the upper abdomen or back, and this was absent in cases where entry was below the uterine fundus anteriorly. Hence, in cases where trauma is in the upper abdomen, surgical exploration is generally the best approach. On the other hand, if trauma is in the lower abdomen, a more conservative approach, including observation, laparoscopy, and wound exploration, remains an option, provided a reassuring maternal/fetal status is established.^{55,58} As for stab wounds, management depends on the extent of injury. Those that do not appear to penetrate beyond the abdominal wall have been managed nonoperatively.⁵⁹ On the other hand, exploratory laparotomy is usually indicated with any evidence of peritoneal penetration, particularly if intraperitoneal hemorrhage or bowel perforation is suspected. It is noteworthy that tetanus prophylaxis is not contraindicated in pregnancy, and its indications are similar in both pregnant and nonpregnant states.¹⁴

CONCLUSION

Trauma complicates up to 7% of pregnancies and is associated with significant maternal and perinatal morbidity and mortality. Trauma in pregnancy is often classified as one of three different types: blunt abdominal trauma, pelvic fractures, and penetrating trauma. A wide array of complications has been associated with obstetric trauma, including maternal injury or death, shock, internal hemorrhage, intrauterine fetal demise, direct fetal injury, abruptio placentae, and uterine rupture. Hence, a timely and efficient evaluation is critical to ensure the well-being of the mother-fetus dyad. In addition, in view of the significant impact of trauma on the pregnant woman and her fetus, prevention of obstetric trauma is paramount. Given the strong association between motor vehicle accidents and trauma in pregnancy, the proper use of seatbelts must be advised.⁴³ Moreover, providers need to conduct timely screening for domestic violence, a problem that complicates up to 31.5% of pregnancies, with the appropriate intervention in case of identified sexual or physical abuse.^{12,60}

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