Case Report

Current Opinion in Gynecology and Obstetrics

Emergency Department Cesarean Section for Placental Abruptio; Anticipation from Prehospital History with Preparation for Immediate Delivery

Sundararajan R¹, Speybroeck J², Marsee M², Shariff FS², Czarnecki D³, Clark A¹, Thompson M¹, Thomas S¹, Wadsworth S⁴, Wiarda G¹, Zackariya N¹, Shariff F¹, Al-Fadhl H¹, Fulkerson D¹ and Walsh M^{1,2,4*}

¹Beacon Emergency and Trauma Services, South Bend, IN, USA

²Indiana University School of Medicine, Notre Dame Campus, South Bend, IN, USA

³Michiana Obstetrics and Gynecology, 515 N Lafayette Blvd, South Bend, IN 46601, USA

⁴Saint Joseph Regional Medical Centre, 5215 Holy Cross Parkway, Mishawaka, IN 46545, USA

***Correspondence:** Mark Walsh, Indiana University School of Medicine South Bend Campus, Departments of Emergency Medicine and Internal Medicine, Saint Joseph Regional Medical Centre, 5215 Holy Cross Parkway, Mishawaka, IN 46545, USA; Tel: (574) 339-3268; Fax: (574) 335-1111; E-mail: markwalshmd@gmail.com

Received date: July 08, 2020; Accepted date: August 17, 2020; Published date: August 22, 2020

Abstract

Emergency department cesarean section for placental abruptio is an uncommon surgical procedure that requires anticipation in the prehospital environment as well as preemptive recognition of impending fetal demise by the emergency physician. The presence of an obstetrician ready to perform immediate cesarean section on an unstable patient with placental abruptio may be lifesaving for both the mother and the fetus. However, there are no specific guidelines for prehospital recognition of patients with placental abruptio that require emergency cesarean section. While the emergency department is not the optimum surgical theatre for an emergency cesarean section, placental abruptio often deteriorates so quickly that even a few minutes of delay can have catastrophic consequences for both mother and fetus. We describe a case of placental abruptio following moderate motor vehicular trauma in an eight month pregnant woman whose only complaint was moderate abdominal pain. The emergency physician's suspicion based on the mechanism of injury caused her to mobilize the obstetrician, who was ready to perform an emergency department cesarean section with successful delivery of the fetus. Subsequent managing of the mother's surgical incision and coagulopathy was performed in the operating room. This case highlights the importance of vigilance that prehospital providers, emergency department physicians, and obstetricians should have for a pregnant patient involved in a motor vehicle crash.

Keywords: Pregnancy, trauma, obstetrics, cesarean, delivery, emergency department, prehospital, placental abruptio, motor vehicle crash

Abbreviations: MVC: Motor Vehicle Crash; FAST: Focused Assessment of Sonography in Trauma; CTG: Cardiotocography; C-section: Cesarean Section; BP: Blood Pressure; HR: Heart Rate; RR: Respiratory Rate; mmHg: Millimeters of Mercury; Bpm: Beats per Minute; ED: Emergency Department; OR: Operating Room; G: Gravid; P: Para; EMS: Emergency Medical Services; PPV: Positive Pressure Ventilation; NICU: Neonatal Intensive Care Unit; PRBC: Packed Red Blood Cells; INR: International Normalized Ratio; PT: Prothrombin Time

Introduction

The diagnosis of placental abruption must be made early in patients who present to the emergency department (ED) [1-4]. However, in the absence of classical symptoms of significant pain, hemorrhage, and evidence of fetal distress, the diagnosis can often be delayed with catastrophic consequences for both mother and fetus [1,3-7]. This is particularly true for post-traumatic placental abruption that presents to the emergency department, where attention to distracting injuries can delay the diagnosis [8]. Not all trauma that precipitates placental abruption is significant, and even minor injuries compounded by seatbelt injury can cause placental abruption [8,9]. The earlier the diagnosis, the better the prognosis [2-4]. Even a minimal delay can result in deleterious consequences for both the fetus and mother [7,10]. Prehospital diagnosis can be made by trained first responders who pay close attention to the classic signs and symptoms of placental abruption including abdominal pain, vaginal bleeding, and maternal hypotension. There are no formal guidelines for prehospital personnel that would lead them to suggest to the command and control center in the emergency department that placental abruption has occurred. After the initial diagnosis, it is suggested that the timing for delivery of the child is important; however, there is no guideline to suggest whether the delivery should be done in the emergency department or in the operating theatre [11,12]. We present a case of placental abruption that was diagnosed based on the mechanism of injury for a woman, 8 months pregnant, who complained of moderate abdominal pain following a Motor Vehicle Crash (MVC) of only moderate severity. The emergency physician preemptively activated the trauma system and requested the presence of an obstetrician in the anticipation of an immediate cesarean section for presumed placental abruption. Upon arrival in the department, a Focused Assessment of Sonography in Trauma (FAST) revealed fetal bradycardia. The obstetrician was present in the emergency department and met the patient as she arrived. The fetus was delivered by emergency cesarean section in the emergency department. After reviewing this successful case and related literature, we suggest that protocols should be established to allow for the immediate treatment of these patients through early consideration of this diagnosis in the field and early treatment either in the emergency department or the operating theatre.

Case Presentation

Prehospital course

A G4P3 22 year old female was the unrestrained back seat passenger of a car involved in a head-on type MVC with medium front-end damage to the automobile. Airbags were deployed in the front seat. The patient was able to get out of the vehicle and was able to stand. She was alert and oriented complaining of minimal abdominal pain. Vital signs in the field were BP 140/85 mmHg, HR 93 bpm, RR 20 bpm, Pain 4/10 (abdominal). She reported being approximately 8 months pregnant. The patient had no prior surgical history. During transport she remained stable.

Emergency department course

Initial vital signs: BP 116/66 mmHg, HR 93 bpm, RR 25 respirations

Significant physical examination findings included that she was alert, anxious, and stating "do not let my baby die". Her abdomen was gravid, consistent with 8 months gestation, and there was mild to moderate generalized abdominal tenderness without rebound. There were no signs of bruising or ecchymosis on the abdomen. A bimanual vaginal exam revealed no bleeding, however there was slight cervical motion tenderness. Her cervical os admitted a small finger and was not dilated.

The emergency physician anticipated the diagnosis of placental abruption based on the EMS history of trauma, 8 months of pregnancy, and abdominal pain. Because of non-reassuring fetal status with fetal decelerations into the 70s on FAST exam and no resolution in the emergency room, the obstetrician was notified and met the patient with a cesarean kit and an emergent low transverse C-section was initiated in the ED. A fetal CTG was not performed. The emergency physician performed rapid sequence intubation with succinylcholine and subsequent rocuronium paralysis with propofol and fentanyl sedation.

Post emergency department course

The patient went from the ED to the OR to complete the closure. In the operating room it was noted that she had significant bleeding in the area of the right broad ligament. An underlying coagulopathy developed with thrombocytopenia and hypofibrinogenemia. This was stabilized intraoperatively with the infusion of 1 bag of 10 units of cryoprecipitate and a total of 4 units of packed red blood cells (Table 1). She was extubated after the procedure and made an uneventful recovery.

Table 1: Coagulation

Time from Admission	Hemoglobin	Platelets	PT/INR	Fibrinogen
	(g/dL)	($\times 10^3/\mu\text{L}$)	(seconds)	(mg/dL)
Admission (ED)	11.4	200	12.8/1.0	354
3 hours (post-op)	9.6	127	16.2/1.3	127
8 hours (post-op)	9.1	118	14.3/1.1	211
27 hours (post-op)	8.3	109	X	398.0 mg/dL

4 units of Packed Red Blood Cells (PRBC) given at 2 hours from admission

1 bag of 10 units of Cryoprecipitate given at 7 hours from admission

Infant course

Fetal heart rate on arrival: Was in range of 70-80 bpm

The infant was delivered via cesarean section in the ED and was resuscitated in the hallway. The initial APGAR was score 1 because the infant was limp, pale, cyanotic, apneic, and the heartbeat decreased to 60 bpm. Positive Pressure Ventilation (PPV) was attempted before successful endotracheal intubation in the ED, and eventually the infant was transferred to the NICU. It was noted that the infant's heart rate increased to above 100 bpm within a minute and a half. An umbilical venous line was placed. Temperature was 97.4°F and O_2 sat was 92% on 50% FiO_2 . At 8 minutes the child became more vigorous. Because the initial APGAR score was 1 and because the child required endotracheal intubation and mechanical ventilation, the child required a 30 day period in the NICU. The child made an uneventful recovery after admission to the NICU and was discharged at one month and two days and has met normal first year developmental milestones.

Discussion and Conclusion

Patients with placental abruption typically present with uterine contractions, fetal distress, and vaginal bleeding [1,2]. Placental abruption is caused by hemorrhage into the decidua basalis which separates the placenta from the uterus [2,13]. Commonly, vaginal bleeding follows, although a concealed hemorrhage may occur, making the diagnosis difficult. As the hematoma forms, increasing the separation of the placenta from the uterus, there is compression of the blood supply to the fetus. This can lead to weakness, and even rupture, of the myometrium with increased uterine pressure during contractions. The classification of placental abruption is: Class 0 (asymptomatic), Class 1 (mild), Class 2 (moderate), and Class 3 (severe). This classification is a function of vaginal bleeding, uterine tenderness, contractions,

maternal tachycardia, hypotension, fetal distress, and hypofibrinogenemia. Class 3 characteristics include no vaginal bleeding to heavy vaginal bleeding, painful uterine contractions, maternal shock, hypofibrinogenemia less than 150mg/dL, coagulopathy, and fetal death [2,13]. Maternal trauma secondary to motor vehicle crash is an uncommon, yet significant, risk factor for placental abruption [2,14,15]. There is little literature concerning the early diagnosis of placental abruption in vehicular trauma [9,14,15] and no primary literature concerning prehospital screening or emergency department cesarean sections other than formulaic and theoretical guidelines published in EMS manuals and general knowledge publications; without reference to specific case reports or case series [16,17].

An interesting caveat from this case is that the time of arrival in the emergency department to the time of delivery was less than 10 minutes because the emergency department physician anticipated the possibility of a placental abruption based on mild abdominal pain in a woman who was eight months pregnant involved in a trauma. Immediately after the FAST exam revealed fetal bradycardia (70-80 bpm), the obstetrician was prepared by arriving in the ED with a cesarean section tray. The emergency physician successfully performed a rapid sequence intubation, and the cesarean section was performed in the emergency department. The newborn, who was limp upon delivery, was intubated in the hallway and then transferred to the NICU. The infant was discharged one month later and has met normal first year developmental milestones upon follow-up. Immediately following delivery in the emergency department, the mother was transferred to the operating room. In the operating room, she was noted to have a hematoma in the right broad ligament that was subsequently closed. At 3 hours postpartum, she was diagnosed with a postpartum coagulopathy associated with placental abruption based on a prolonged INR, thrombocytopenia, and hypofibrinogenemia. She made an uneventful

recovery but required 4 units of PRBC and one bag of 10 units cryoprecipitate postoperatively in order to correct her coagulopathy (Table 1).

The most important lesson from this case is that the obstetrician and emergency physician shared the decision to immediately perform an emergency department cesarean section. It has been shown that even a few minutes delay in the treatment of placental abruption can have disastrous outcomes for both the mother and the newborn [7,10]. In this case, delay in delivery may have caused significant morbidity or mortality in the baby or mother. The FAST examination is traditionally used to assess the intraabdominal impact of trauma, an example being hemorrhage. In this case, however, the FAST exam went beyond its typical use by detecting an abnormal heart rate that would ordinarily have been noted on assessment by the obstetrician.

This case provides an opportunity to propose that pregnant patients involved in motor vehicle crashes be screened based on the likelihood of placental abruption. Following review and analysis of this case and the existing literature, we recommend the following guidelines below:

- Training of prehospital personnel to diagnose placental abruption based on abdominal pain, vaginal bleeding, and maternal hypotension following trauma for pregnant patients in the third trimester.
- Use of the FAST exam to assess fetal status.
- Maintenance of a high index of suspicion by the emergency physician for placental abruption.
- Proactive consultation of an obstetrician. Patients who have significant abdominal discomfort, even following minor motor vehicle crashes, such as in this case, should be greeted by not only an emergency physician but by an obstetrician and both the operating theatre as well as the emergency department prepared for an emergency cesarean section. This is advantageous because collaborative association between trauma surgeons, emergency physicians, anesthesiologists, obstetricians, and obstetrical nurses allows for the immediate delivery in the trauma bay without delay which, depending on the institution, can be significant when emergency C-section must be performed in another unit.

Declarations

Mark Walsh MD, Financial Support or Grants: Haemonetics Inc. Braintree, Massachusetts.

All other authors have no declarations to disclose.

References

1. Mei Y, Lin Y. Clinical significance of primary symptoms in women with placental abruption. *J Matern Fetal Neonatal Med.* 2018;31(18):2446-2449. Doi: <https://doi.org/10.1080/14767058.2017.1344830>
2. Schmidt P, Skelly CL, Raines DA. Placental abruption (Abruptio placentae). In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2020. <http://www.ncbi.nlm.nih.gov/books/NBK482335/>.
3. Downes KL, Shenassa ED, Grantz KL. Neonatal outcomes associated with placental abruption. *Am J Epidemiol.* 2017;186(12):1319-1328. Doi: <https://doi.org/10.1093/aje/kwx202>
4. Downes K, Grantz K, Shenassa E. Maternal, labor, delivery, and perinatal outcomes associated with placental abruption: A systematic review. *Amer J Perinatol.* 2017;34(10):0935-0957. Doi: <https://doi.org/10.1055/s-0037-1599149>
5. Tikkanen M. Etiology, clinical manifestations, and prediction of placental abruption. *Acta Obstet Gynecol Scand.* 2010;89(6):732-740. Doi: <https://doi.org/10.3109/00016341003686081>
6. Boisramé T, Sananès N, Fritz G, et al. Abruptio placentae. Diagnosis, management and maternal-fetal prognosis: A retrospective study of 100 cases. *Gynecol Obstet Fertil.* 2014;42(2):78-83. Doi: <https://doi.org/10.1016/j.gyobfe.2013.06.012>
7. Berhan Y. Predictors of perinatal mortality associated with placenta previa and placental abruption: An experience from a low income country. *J Pregnancy.* 2014;2014:1-10. Doi: <https://doi.org/10.1155/2014/307043>
8. Jha P, Melendres G, Bijan B, et al. Trauma in pregnant women: Assessing detection of post-traumatic placental abruption on contrast-enhanced CT versus ultrasound. *Abdom Radiol.* 2017;42(4):1062-1067. Doi: <https://doi.org/10.1007/s00261-016-0970-x>
9. Aitokallio-Tallberg A, Halmesmaki E. Motor vehicle accident during the second or third trimester of pregnancy. *Acta Obstet Gynecol Scand.* 1997;76(4):313-317. Doi: <https://doi.org/10.1111/j.1600-0412.1997.tb07984.x>
10. Knab DR. Abruptio placentae. An assessment of the time and method of delivery. *Obstet Gynecol.* 1978;52(5):625-629. <https://pubmed.ncbi.nlm.nih.gov/625629/>

gov/724183/

11. Borhart J, Voss K. Precipitous labor and emergency department delivery. *Emerg Med Clin North Am.* 2019;37(2):265-276. Doi: <https://doi.org/10.1016/j.emc.2019.01.007>
12. Stallard TC, Burns B. Emergency delivery and perimortem C-section. *Emerg Med Clin North Am.* 2003;21(3):679-693. Doi: [https://doi.org/10.1016/S0733-8627\(03\)00042-7](https://doi.org/10.1016/S0733-8627(03)00042-7)
13. Casanova R, Chuang A, Goepfert A, et al. Beckmann and Ling's Obstetrics and Gynecology. Eight edition. Philadelphia: Wolters Kluwer; 2019. <https://shop.lww.com/Beckmann-and-Ling-s-Obstetrics-and-Gynecology/p/9781496353092>
14. Klinich KD, Flannagan CAC, Rupp JD, et al. Fetal outcome in motor-vehicle crashes: Effects of crash characteristics and maternal restraint. *Am J Obstet Gynecol.* 2008;198(4):450.e1-450.e9. Doi: <https://doi.org/10.1016/j.ajog.2008.02.009>
15. Klinich KD, Schneider LW, Pearlman MD, et al. Injuries to pregnant occupants in automotive crashes. In: Annual Proceedings/Association for the Advancement of Automotive Medicine. Vol 44. *Annu Proc Assoc Adv Automot Med*; 1998:37-56. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217378/>.
16. Navarro K. Prehospital management of obstetric complications, in Texas EMS Magazine. 2009:32-39. <https://www.dshs.texas.gov/emstraumasystems/JF09PrehospManageOb.pdf>
17. Limmer DD, Mistovich JJ, Krost WS. Beyond the basics: Obstetric emergencies. *Emerg Med Serv.* 2006;35(10):84-89. <https://pubmed.ncbi.nlm.nih.gov/17069344/>

Copyright: © **Sundararajan et al.** This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.