



To Stay Safe Walking, Follow the Rules of the Road: Anesthesia for Cesarean Section in the Setting of Myocardial Infarction, a Case Report

Shahrokh Ebnerasouli ^{1,2}, Reza Aminnejad ^{3,4,*}, Mohammad Reza Hoseini Amini ^{3,4} and Seyedeh Maryam Zeynolabedin ^{3,4}

¹School of Medicine, Shahid Beheshti Medical University, Tehran, Iran

²Department of Anesthesiology and Critical Care, Kurdistan University of Medical Sciences, Kurdistan, Iran

³Department of Anesthesiology and Critical Care, School of Medicine, Qom University of Medical Sciences, Qom, Iran

⁴Clinical Research and Development Center (CRDC), Shahid Beheshti Hospital, Qom University of Medical Sciences, Qom, Iran

*Corresponding author: Department of Anesthesiology and Critical Care, School of Medicine, Qom University of Medical Sciences, Qom, Iran. Email: raminnejad@yahoo.com

Received 2021 May 26; Revised 2022 January 22; Accepted 2022 January 22.

Abstract

Many factors lead to myocardial infarction in a pregnant woman, resulting in the increasing prevalence of women with cardiac diseases during pregnancy. There are special considerations for anesthetic care under this condition. This report presents a 40-year-old woman admitted for emergent cesarean section due to acute myocardial infarction (AMI). Providing safe and balanced anesthesia while managing cardiac events was challenging; however, it was performed in accordance with standard anesthesiologic rules.

Keywords: Anesthesia, Cesarean, Delivery, Labor, Myocardial Infarction, Pregnancy

1. Introduction

Acute myocardial infarction (AMI) rarely occurs in pregnancy (1: 20,000); however, it accounts for a high maternal mortality rate, claiming the lives of both pregnant women and their fetuses. The severity is more in the third trimester or the peripartum period. Managing this situation is challenging for anesthesiologists and other physicians (1-3). There is a lack of data on maternal mortality rate; however, it is estimated to be about 35- 40% in the third trimester (2).

The incidence of cardiac disorders among pregnant women is increasing, followed by high mortality rates (3). Many factors cause AMI in a pregnant woman, one of which is coronary artery dissection. Although this factor is not prevalent, its mortality rate is high, and the female gender is more susceptible to such a condition (4). Cocaine abuse can also result in AMI in a pregnant woman (5). Diagnostic approaches such as angiography are useful for detecting atherosclerosis; however, coronary dissection may not be diagnosed, especially in the case of AMI before or after labor. Physiologic changes during pregnancy can lead to underdiagnosis. Managing AMI in pregnancy is similar to standard treatments for AMI in non-pregnant patients. This is while, in addition to the diagnostic or treatment approaches, the safety of the fetus must also be consid-

ered (6). We decided to report this case after obtaining informed written consent from the patient.

2. Case Presentation

The patient was a 40-year-old woman admitted for emergent cesarean section due to an acute myocardial infarction. She had two children, and this was her third gravidity. She had no remarkable medical history, and earlier parturitions were uncomplicated. We asked about previous deliveries, and we found out that both deliveries were vaginal deliveries performed in a rural obstetric facility. At the time of referral to the emergency department, she was in the 36th week of gestation and was suffering from typical chest pain. In the initial evaluations, the ST elevation MI (STEMI) with classical elevations of myocardial biomarkers was revealed, and the classic management of AMI was started. Because of the simultaneous initiation of uterine true contractions, cesarean delivery was planned for her in an emergent setting. In the preliminary examinations, she had a heart rate of about 85 bpm, blood pressure of 115/65 mmHg, and normal coagulation status and serum biochemistries. A smooth induction of anesthesia with minimal hemodynamic changes was planned. Any painful stimuli such as laryngoscopy and intubation needed to be

eliminated. Accordingly, after proper psychological preparation and the use of topical anesthesia utilizing intratracheal injection of 3 mL of 1% lidocaine solution and bilateral superior laryngeal nerve block with the same solution and 2 mL in each side, 15 mg of etomidate was injected for anesthesia induction, and 100 mg of succinylcholine was injected for rapid muscle relaxation (rapid sequence induction of anesthesia), and cricoid pressure was applied up to the time of endotracheal tube (ETT) cuff inflation, in order to reduce aspiration risk ETT with a 7 mm internal diameter was selected for this patient and lubricated to reduce pain and discomfort. For the maintenance of anesthesia, 100% O₂ was delivered via ETT, and a dial on the Isoflurane vaporizer was set at 1%. Remifentanyl infusion started following the delivery, and the infusion rate was justified according to the hemodynamic parameters to indicate the depth of anesthesia. The patient was monitored throughout the surgery, and in the post anesthesia care unit (PACU), there were non-invasive blood pressure (NIBP) monitoring and 5-lead electrocardiogram (ECG) tracings. After surgery, the patient was transferred to the cardiac care unit (CCU) for close monitoring and the completion of AMI management. Fortunately, the APGAR score of the neonate was acceptable; however, for better care, she was transferred to the neonatal intensive care unit (NICU). After three days, the mother was transferred to the general ward, and two days later, she was discharged while happily taking her daughter in her arms.

3. Discussion

In the case of AMI in pregnant women, delivery should be postponed two to three weeks to recover the cardiac system from infarction. The clinical conditions of the mother and fetus determine the delivery approach. Vaginal delivery is a painful process and may lead to myocardial ischemia; however, a cesarean section has no such shortcoming. In contrast, vaginal labor has some advantages as fewer anesthesia- and surgery-related risks such as hemodynamic changes and infection are reported. In vaginal labor, blood loss is less, thereby posing little risk for insufficient heart perfusion. Left lateral decubitus improves cardiac preload and cardiac output, providing sufficient placental perfusion. Delivery with instruments can reduce the second stage of labor and prevent straining and pressure on the heart. Applying a gentle push on the lower abdomen is acceptable in patients with more than 40 percent ejection fraction. Oxytocin can cause coronary spasms and should not be used. Some drugs such as trinitroglycerin, beta-adrenergic blocking agents, or blockers of calcium channels may be used to prevent myocardial ischemia. Provided that all factors aggravating the cardiac situation

and increasing cardiac function are optimized, vaginal delivery is preferred for the AMI patients, and cesarean section must be performed only in patients with unstable hemodynamics (7).

Frassanito presented a case report of a 36-year-old woman with AMI in the 25th week of pregnancy. Delivery with cesarean section was performed in the 35th week. Surgery was performed under general anesthesia. Sevoflurane and remifentanyl were used for the maintenance of anesthesia. The patient was monitored with electrocardiogram, saturation oximetry, invasive blood pressure with the arterial line, cardiac output measurement by lithium dilution, and bispectral index (1). In the present study, little facilities were available for the cardiac monitoring and anesthetic management of our case, and the clinical setting was an emergency center. Accordingly, we could not use the cardiac output measurement devices.

Moore et al. experienced the same scenario three weeks following an ischemic heart insult (4). The initiation of uterus contractions in our case made us perform a cesarean section immediately after the initiation of AMI management. Accordingly, it was not possible to conduct further investigations.

In an elective setting, patient preparation and proper planning can promote outcome and decrease risks. Epidural anesthesia with the least hemodynamic perturbations can be performed safely after the transient suspension of anticoagulants, which is necessary to manage AMI (8). Alternatively, spinal anesthesia with a low dose of bupivacaine and a minimal dose of intrathecal opioid can provide a stable hemodynamic condition for this purpose (9-11). In the present study, the emergent situation did not let us stop blood diluent medications and perform the neuraxial block. However, careful hemodynamic monitoring can help anesthesia providers stay safe walking in daily routine practice.

3.1. Conclusions

In the case of AMI in pregnant women, delivery should be postponed two to three weeks to recover the cardiac system from infarction. However, in emergencies such as the initiation of the uterus, it is inevitable to have true contractions optimizing the clinical setting and implementing all available facilities to reduce risks for both mother and fetus.

Footnotes

Authors' Contribution: S. E. managed the perioperative situation, including spinal anesthesia. R. A. was the main consultant in performing the procedure and writing the manuscript. M. H. and S. M. Z. wrote the primary

manuscript. All authors equally contributed to preparing the final revision of the article.

Conflict of Interests: There was no conflict of interest.

Funding/Support: There was no funding/support.

Informed Consent: Informed written consent was obtained from the patient and her husband.

References

- Frassanito L, Vagnoni S, Zanfini BA, Catarci S, Maggiore S, Draisci G. General anesthesia for caesarean delivery in a pregnant woman affected by acute myocardial infarction. *Eur Rev Med Pharmacol Sci.* 2012;**16**(8):1123–6. [PubMed: 22913165].
- Aglio LS, Johnson MD. Anaesthetic management of myocardial infarction in a parturient. *Br J Anaesth.* 1990;**65**(2):258–61. doi: 10.1093/bja/65.2.258. [PubMed: 2121201].
- Hink E, Luitjes SH, Bolte AC. PP150. Pregnancy outcome in women with heart disease in a single tertiary care center. *Pregnancy Hypertens.* 2012;**2**(3):320. doi: 10.1016/j.preghy.2012.04.261. [PubMed: 26105471].
- Moore AD, Hill J. Myocardial infarction and pregnancy: A case report. *AANA.* 2012;**80**(1):32–6.
- Liu SS, Forrester RM, Murphy GS, Chen K, Glassenberg R. Anaesthetic management of a parturient with myocardial infarction related to cocaine use. *Can J Anaesth.* 1992;**39**(8):858–61. doi: 10.1007/BF03008297. [PubMed: 1363222].
- Roth A, Elkayam U. Acute myocardial infarction associated with pregnancy. *Ann Intern Med.* 1996;**125**(9):751–62. doi: 10.7326/0003-4819-125-9-199611010-00009. [PubMed: 8929010].
- Poh CL, Lee CH. Acute myocardial infarction in pregnant women. *Ann Acad Med Singap.* 2010;**39**(3):247–53. [PubMed: 20372762].
- Duarte FP, O'Neill P, Centeno MJ, Ribeiro I, Moreira J. Myocardial infarction in the 31st week of pregnancy—case report. *Rev Bras Anesthesiol.* 2011;**61**(2):225–31. doi: 10.1016/S0034-7094(11)70027-7. [PubMed: 21474030].
- Mousavi SM, Aminnejad R. The effect of addition of intrathecal sufentanil to hyperbaric bupivacaine in cesarean section—a prospective randomized study. *Anaesth Pain Intensive Care.* 2019;**23**(1).
- Mohajerani SA, Moosavi SM, Aminnejad R. Spinal Anesthesia for Cesarean Delivery of a Pulmonary Arterial Hypertension Parturient; A Case Report. *Annals of Anesthesiology and Critical Care.* 2018;**3**(1). doi: 10.5812/aacc.64516.
- Salimi A, Nejad RA, Safari F, Mohajaerani SA, Naghade RJ, Motlaghi K. Reduction in labor pain by intrathecal midazolam as an adjunct to sufentanil. *Korean J Anesthesiol.* 2014;**66**(3):204–9. doi: 10.4097/kjae.2014.66.3.204. [PubMed: 24729842]. [PubMed Central: PMC3983416].