

Case Report**Perimortem caesarean section following maternal gunshot wounds**Ozlem Guneyssel¹, Onur Yesil², Tuba Cimilli Ozturk², Sebnem Eren Cevik³**Abstract**

Perimortem caesarean section is an ethically difficult decision for emergency medicine resuscitation teams. A 34-years-old woman was attacked by her husband with a gunshot. At the time arrival to the emergency room, there was no pulse, no spontaneous breath and blood pressure was unobtainable. Although extensive advanced cardiopulmonary resuscitation was performed for 7 minutes, no cardiac activity was regained. During the cardiopulmonary resuscitation efforts, an abdominal ultrasonography was performed and revealed a fetal heart rate with bradycardia. Low segment caesarean section was performed by the obstetrician in the resuscitation room and a female newborn was delivered within less than one minute of the skin incision. Decision on terminating the CPR efforts should not be made in maternal cardiac arrests older than 28 weeks' gestational age, unless the viability of the fetus had been evaluated.

KEYWORDS: Perimortem Caesarean Section, Pregnant Cardiac Arrest, Gunshot Wound, Emergency Department.

J Res Med Sci 2011; 16(8): 1089-1091

Perimortem caesarean section is an ethically difficult decision for emergency medicine resuscitation teams. The procedure covers emergency delivery during the ongoing maternal cardiopulmonary resuscitation where the mother has no sign of recovery afterwards with or without infant survival.¹

Historically, the first data about perimortem caesarean section was the Roman decree (*Lex Cesare*, or law of Caesar). The purpose of this ancient law was based on religious rituals rather than attempts for survival of either the newborn or mother. According to law of Caesar the unborn infants should be separated from their mothers' bodies after death. Some infants did survive. It was reported that several mythological and ancient historical figures had been born in this fashion, including the Greek physician Asklepios.² The first modern approach to Perimortem Caesarean deliveries was reported by Katz and colleagues in 1986.³

The previous case reports and recommendations were all about mother survival.³ We

present our perimortem caesarean case, most likely the first one in the literature which is applied directly towards the infant survival rather than the mother.

Case Report

A 34-years-old woman was attacked by her husband in November 2010 with a gunshot. The event place was approximately 3 minutes close to our hospital; Umraniye Training and Research Hospital, Istanbul, Turkey. Upon arrival cardiopulmonary arrest was noted by the ambulance team and hands-only cardiopulmonary resuscitation was started immediately at the scene and continued at emergency room. The patient had not been intubated by the ambulance team. On primary survey there were two gunshot wounds on the head and neck, and fundus height was compatible with 30 weeks of gestation. At the time arrival to the emergency room, there was no pulse, no spontaneous breath and blood pressure was unobtainable. After airway was secured, cardiac

1- Associate Professor, Department of Emergency Medicine, School of Medicine, Marmara University, Istanbul, Turkey.

2- Emergency Medicine Clinic, Umraniye Training and Research Hospital, Istanbul, Turkey.

3- Department of Emergency Medicine, Pasabahce State Hospital, Istanbul, Turkey.

Corresponding Author: Ozlem Guneyssel

E-mail: guneyssel@gmail.com

monitorization revealed asystole and cardiopulmonary resuscitation was continued. Then intravenous access was provided; adrenalin was simultaneously administered intravenously (IV) and IV fluid infusion (500 mL colloid and 1000 mL crystalloid) was started.⁴

Although extensive advanced cardiopulmonary resuscitation was performed for 7 minutes, no cardiac activity was regained. The patient was assumed dead and it was thought that she could no longer be resuscitated. In the meanwhile the obstetrician was also consulted besides the trauma team. During the cardiopulmonary resuscitation efforts an abdominal ultrasonography was performed and revealed a fetal heart rate with bradycardia. The resuscitation team leader decided to apply perimortem caesarean section. The informed consent could not be obtained because there was not any legally responsible person.

Low segment caesarean section was performed by the obstetrician in the resuscitation room and female newborn was delivered within less than one minute of the skin incision. She was born with an Apgar (Appearance, Pulse, Grimace, Activity, and Respiration) score of 0 at minute one (absence of cardiac activity). The newborn was intubated; ventilated and external chest compressions were started. After five minutes of neonatal cardiopulmonary resuscitation cardiac activity was regained and an improvement in the skin color was observed. She was subsequently transferred to the neonatal intensive care unit with an Apgar score of 3 at minute five. She is survived, still monitoring in intensive care unit and neurologic outcome is still uncertain.

Discussion

Cardiac arrest in pregnancy is a rare event, with an estimated incidence of about 1:30,000 pregnancies.⁵

The speed of the resuscitation response is critical to the outcome of both the mother and the fetus. A case review of the data reported between 1986 and 2004, revealed only 38 additional case reports. Review of these 38 case reports revealed that the most common causes of

maternal arrests included trauma, pulmonary embolism, cardiac causes, sepsis, and eclampsia.³

It has been consistently estimated that significant trauma complicates 6 to 7% of all pregnancies. Trauma during pregnancy is associated with an increased risk of preterm labor, placental abruption, fetal maternal hemorrhage, and pregnancy loss. Most traumas during pregnancy are blunt abdominal traumas, with the common cause being motor vehicle crashes accounting for up to 70% of cases.^{6,7} Penetrating injuries are less common during pregnancy.⁷ Penetrating trauma in pregnancy is usually the result of gunshot or knife wounds. Other causes are much less frequent. Gunshot wounds are more common than knife wounds.⁸ In our patient there were gunshot wounds in the head and neck with severe blood loss. Although she had cranial trauma and intracranial bleeding but there was no uterine or placental injury.

Perimortem cesarean section is performed whether cardiopulmonary resuscitation is in progress.⁹ In cases of maternal cardiac arrest with potential fetal viability, perimortem cesarean section should be performed when resuscitative measures have failed.¹⁰ The ability to salvage a fetus under ideal circumstances (availability of all skilled personnel and a controlled setting) may range from 23 to 28 weeks' estimated gestational age. If the fetus is known to be 23 weeks' estimated gestational age and the institution's nursery has never had a newborn of this estimated gestational age survive, perimortem cesarean section is probably not indicated for the sake of the fetus, but may improve maternal circulation by increasing cardiac return. Before 23 weeks' gestational age, delivery of the fetus may not improve maternal venous return. Therefore aggressive maternal resuscitation is the only indicated intervention.⁸

Pregnant was wounded in the head and she had lost much blood. Cardiopulmonary resuscitation (CPR) was performed only to save the fetus. In spite of maternal excessive blood loss, effective cardiopulmonary resuscitation during the transfer to the hospital may be resulted in

adequate fetal perfusion. The causes for the fetal survival might probably be rapidly transferred to the hospital and effective hands only CPR during this time.

The shorter the interval between the onset of maternal cardiac arrest and the commencement of cardiopulmonary resuscitation, the more likely any surviving fetus will be neurologically intact. However, the success rate of cardiopulmonary resuscitation in pregnancy is unknown. Cardiopulmonary resuscitation should be adequate for providing a cardiac output. The difficulty in performing cardiopulmonary resuscitation in pregnant women in the third trimester is that the uterus is in the

supine position and occludes the vena cava. Conversely, the American Heart Association manual on Basic Life Support states that the patient must always be in the supine position when external chest compression is performed. Emergency cesarean section may be considered at 4 minutes after onset of maternal cardiac arrest if there is no return of spontaneous circulation.¹¹

Conclusion

Decision on terminating the CPR efforts should not be made in maternal cardiac arrests older than 28 weeks' gestational age, unless the viability of the fetus had been evaluated.

Conflict of Interests

Authors have no conflict of interests.

Authors' Contributions

OG and OY managed the patient; OG, OY and SEC have prepared the article. All authors have read and approved the content of the manuscript

References

1. Whitten M, Irvine LM. Postmortem and perimortem caesarean section: what are the indications? *J R Soc Med* 2000; 93(1): 6-9.
2. Ritter JW. Postmortem cesarean section. *JAMA* 1961; 175: 715-6.
3. Katz V, Balderston K, DeFreest M. Perimortem cesarean delivery: were our assumptions correct? *Am J Obstet Gynecol* 2005; 192(6): 1916-20.
4. Cabanas JG, Manning JE, Cairns CB. Fluid and blood resuscitation. In: Tintinalli JE, Stapczynski JS, Ma OJ, Cline DM, Cydulka RK, Meckler GD, editors. *Tintinalli's Emergency Medicine: A Comprehensive Study Guide*. 7th ed. New York: McGraw-Hill; 2011. p. 172-7.
5. Mallampalli A, Powner DJ, Gardner MO. Cardiopulmonary resuscitation and somatic support of the pregnant patient. *Crit Care Clin* 2004; 20(4): 747-61, x.
6. Scorpio RJ, Esposito TJ, Smith LG, Gens DR. Blunt trauma during pregnancy: factors affecting fetal outcome. *J Trauma* 1992; 32(2): 213-6.
7. Pearlman MD, Tintinalli JE. Evaluation and treatment of the gravida and fetus following trauma during pregnancy. *Obstet Gynecol Clin North Am* 1991; 18(2): 371-81.
8. Muench MV, Canterino JC. Trauma in pregnancy. *Obstet Gynecol Clin North Am* 2007; 34(3): 555-83, xiii.
9. Morris JA, Jr., Rosenbower TJ, Jurkovich GJ, Hoyt DB, Harviel JD, Knudson MM, et al. Infant survival after cesarean section for trauma. *Ann Surg* 1996; 223(5): 481-8.
10. Buchet AI, Basturk M, Tekbas G, Evsen MS, Saricicek V, Yucel Y, et al. Trauma management in Pregnancy. *Akademik Acil Tıp Dergisi* 2010; 9(2): 93-102.
11. Vanden Hoek TL, Morrison LJ, Shuster M, Donnino M, Sinz E, Lavonas EJ, et al. Part 12: cardiac arrest in special situations: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2010; 122(18 Suppl 3): S829-61.