

Perimortem Cesarean Section: The Importance of 4 Minutes rule

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Abstract

Maternal cardiac arrest is rare with an incidence between 1 in 20.000 and 1 in 30.000 births. During pregnancy, chest compression could not deliver sufficient cardiac output to accomplish resuscitation due to the physiological changes during pregnancy and during resuscitation. Providers have two potential patients, the mother and the fetus that strongly depend on each other. After a cesarean delivery is performed, effective CPR was seen to occur. This procedure was recommended to start within 4 minutes of maternal cardiopulmonary arrest if resuscitative efforts were unsuccessful. In reality, performing perimortem cesarean section could face many obstacles that cause delay. Here in, we present three cases of perimortem cesarean sections of sudden cardiac arrest occur at the emergency room. The outcome from these cases differed by the decision on the time cesarean section performed. Two out of three mothers survived, however, both survivors died on intensive care unit due to secondary deterioration. Two babies who were born within 5 minutes came out in good condition with no neurologic deficit.

Keywords: perimortem cesarean section, 4 minutes rule, outcome

Tindakan Bedah Caesar Perimortem: Pentingnya Aturan 4 Menit

Abstrak

Serangan jantung pada ibu hamil merupakan hal yang jarang terjadi dengan kejadian antara 1 dalam 20.000 dan 1 dalam 30.000 kelahiran. Selama kehamilan, kompresi dada tidak dapat memberikan curah jantung yang cukup untuk mencapai resusitasi optimal karena perubahan fisiologis pada kehamilan. Selama resusitasi, terdapat dua pasien potensial, yaitu ibu dan janin yang sangat tergantung satu sama lain. Setelah bedah sesar dilakukan, resusitasi jantung paru yang efektif dapat tercapai. Prosedur tersebut dianjurkan untuk dimulai dalam waktu 4 menit dari henti jantung pada ibu jika upaya resusitasi tidak berhasil. Pada kenyataannya, melakukan bedah caesar perimortem dapat dihadapkan pada banyak kendala yang menyebabkan keterlambatan tindakan. Pada laporan kasus ini terdapat tiga kasus bedah sesar perimortem yang dilakukan pada henti jantung mendadak di ruang gawat darurat. Luaran dari ketiga kasus tersebut berbeda bergantung pada keputusan waktu bedah sesar mulai dilakukan. Dua dari tiga ibu berhasil bertahan hidup, tetapi akhirnya kedua pasien meninggal di unit perawatan intensif akibat morbiditas sekunder. Dua bayi yang lahir dalam waktu 5 menit berada dalam kondisi baik tanpa defisit neurologis.

Kata kunci: operasi sesar perimortem, aturan empat menit, luaran

Introduction

Maternal cardiac arrest is rare, with an incidence between 1 in 20.000 and 1 in 30.000 births.¹⁻⁴ During resuscitation of a pregnant woman, providers have two potential patients, the mother and the fetus. Nowadays, more physicians have realized that during pregnancy, chest compressions will not deliver sufficient cardiac output to accomplish resuscitation. Under optimal condition, chest compression produces a cardiac output less than a third of normal. While in pregnancy, the compression of the great vessels by the uterus reduces cardiac output by another two thirds.⁴⁻⁷ After delivery of the fetus, releasing the aorto-caval compression, then effective CPR was seen to occur. Mothers were revived and the live of the fetus also depends on the mother cardiac output, thus, this procedure was named the perimortem cesarean section.

The term perimortem cesarean section was introduced in 1986 to describe the procedure of cesarean delivery concurrent with maternal cardiopulmonary resuscitation.⁴ The outcome of mother or fetus with cardiac arrest in pregnancy will often depend on the successful resuscitation of the first few minutes. Both resuscitation's and obstetric guideline suggest that perimortem cesarean be considered done within 4 minutes of maternal collapse if there is no return of spontaneous circulation (ROSC). Advanced cardiac life support (ACLS) also recommends that if the mother's pulse has not been restored within 4 to 5 minutes after resuscitation, perimortem cesarean section should be performed.^{5,8} Deliver the baby within 5 minutes in women beyond 24 weeks of gestation is recommended in order to facilitate maternal optimal resuscitation and establishing sufficient cardiac output. Quick delivery of the baby not only intended to prevent neurologic sequel to the baby but also to the maternal thus, 4 minutes interval theoretically benefits both mother and neonate by minimizing ischemic neurological damage in both.⁹⁻¹¹

Case Illustration

We present three cases of perimortem cesarean section due to sudden cardiac arrest at the emergency room. The outcome of these cases is differed by the decision-making on when to perform c-section after CPR occurs. Two of three mothers survive, but after wards, both died due to septic shock in ICU. Two babies who were born within 4 minutes survive in good condition with no neurologic deficit found.

Case Report 1

We were called from general ER due to sudden apnea of the patient after spontaneous water broke. Patient came to general ER with dyspnea, on G1 35 weeks gestational age, patient have history of fever and cough since 3 days before admission. She came with respiratory rate 35x/min, heart rate 130x/min, blood pressure and temperature was normal, no signs of labor. There were crackles at both lung fields. Patient was diagnosed as suspected community acquired pneumonia and given beta-2 agonist inhalation. Ten minutes afterwards patient got restless, then had spontaneous water broke followed by loss of consciousness and apnea with undetected pulse. Resuscitation was then performed in left lateral tilt position. At that time the fetal heart rate was reaching 70–80 pulses per minute. Due to the mother and fetal hypoxia condition the team decided to do perimortem cesarean section. Unfortunately, due to no cesarean equipment available at ER, no space in fully occupied ER, long consideration from the family's patient giving the consent, the c-section then performed almost 40 minutes after resuscitation. By the time of incision, the resuscitation still occurs and the fetal heart rate reaching 60bpm. Five minutes after incision, born baby girl 2100gram A/S 1/0. Cesarean was continued with B-lynch procedure due to atonic uterine contraction. Out of prediction, after the baby was born, spontaneous sinus rhythm revealed, SpO2 increase from 85% before c-section to 93%, with weak pulse. Patient then transferred to the ICU and was only survive 3 hours care at the ICU. Patient fall into sepsis and died due to multi organ dysfunction failure.

Case Report 2

An average 9 months gravid woman on her first pregnancy referred to ER due to dyspnea, which was felt from 5 hours before admission. She had to sleep with piles of cushion to comfort her breath and had cough since 1 week ago. She came with respiratory rate was 24x/minutes, pulse 122bpm, BP 160/100mmHg and protein stick +2. She looks pale and both extremities were cold with the capillary refill time more than 3". The fetal heart rate was 132x/min. We assessed this patient as threatened respiratory failure due to acute lung edema on G1 term pregnancy singleton live head presentation, severe preeclampsia, not in labor and we plan to do emergency cesarean section. Under preparation for c-section, patient had seizure

and fall in to apnea with no pulse. The blue code team was called, cardio pulmonary resuscitation immediately started by the anesthesiologist team in left lateral position. At that time the fetal heart rate was 109bpm. After 4 minutes resuscitation patient still cannot reach ROSC, we decided to do cesarean section immediately at place. Born baby boy 3200gram with AS 6/8, directly handled by the pediatric team. After brief cesarean surgery, the resuscitation continued about 15 minutes, pulse detected at the monitor, patient came to ROSC and sent to ICU for further management. After one hour at the ICU, the patient had vaginal bleeding, decided to insert condom catheter, but within three hours later, profuse vaginal bleeding continued with signs of hypovolemic shock, uterine atonic was found and end up with subtotal hysterectomy. One day after, patient fell in to septic shock with multi organ failure, found *Klebsiella pneumonia* from sputum culture. The baby was taken home in good condition.

Case Report 3

Mrs. 41 years old came to ER due to dyspnea with high blood pressure reaching 200/110mmHg. Patient was diagnosed as G4P3 37 weeks of gestation with severe preeclampsia, acute lung edema. After given magnesium sulfate, the patient got severe dyspnea and out of consciousness. Resuscitation directly performed, after 4 minutes unresponsive, the obstetrician team and anesthesiologist performed cesarean section on site. Baby boy 3400gram was born with A/S 3/5 given neonatal resuscitation support and surgery continues with B-lynch. Five minutes after the baby was born mother blood pressure detected 60mmHg on palpation, with weak pulse pressure. Patient transferred to ICU; 40 minutes at the ICU the blood pressure came in normal 130/100mmHg, with the heart rate was 120x/min. Patient fall into severe sepsis and septic shock, manage to survive only 6 days care in ICU. The baby is in good condition with the family.

Discussion

Perimortem cesarean section is a work of team procedure. The emergency team; consist of obstetrician, pediatrics, and anesthesiologist, all work together to save both lives. The resuscitation team leader should hold the exact decision-making for the need of performing emergency cesarean delivery protocol as soon as a pregnant woman develops cardiac arrest. With all fetuses firstly were

in good condition, providers then have two potential patients to be rescued, the mother and the fetus. The precise time for resuscitation is essential in the outcome of maternal and fetal survival.

On the first case, after no pulse detected CPR directly performed but the decision to continue with perimortem cesarean section was hesitate. Those obstacles regarding consent from the family, equipment, team, and space occupied to perform surgery. All cause of delay can be preventable if emergency team had prepared the possibility to performed emergency cesarean section since the pregnant patient came in critically ill condition. Thus informed consent from the first place was very important.

On the other hand, the next two cases was successfully performed perimortem cesarean section within 4 minutes. Both babies were born in good condition and directly handled by a pediatric team. The mother soon got ROSC after the baby was born, the surgery finished fast and patient directly move to ICU. It was like everything was already in perfect condition but eventually we still have to face the patient's secondary deterioration. Heavy vaginal bleeding due to post partum hemorrhage became a heavy second hit for the patient and both of the patient falls into a sepsis condition and died afterwards.

The case with no B-lynch applied, severe post partum hemorrhage happens one hour after C-section. No literature found that recommends performing B-lynch or hysterectomy as a routine procedure after performing perimortem c-section. Nevertheless, when we decided to do perimortem c-section we have to consider that severe hypoxia of the tissue will weaken uterine contraction that could cause atonic and finally endangered the patient.

Conclusion

Maternal cardiac arrest is the most complicated arrest scenario. There are two patients, the mother and the fetus. Multiple teams are required to collaborate in order to achieve the best possible outcome. How much time elapsed from the initiation of resuscitation, evaluation on the effectiveness of resuscitation, and speed decision-making to perform perimortem cesarean section, will affect the outcome of mother, fetus and long-term outcome of the baby. Learn from these cases, deals with the risk of hemorrhage post partum due to secondary atonia, thus applying catheter condom, B-lynch until possibility of hysterectomy should be

put in consideration after performing perimortem cesarean section. Not to mention adequate antibiotic and well management in dealing with sepsis condition.

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