

Perimortem Caesarean Section

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Abstract

Maternal cardiopulmonary arrest is a very rare event whose prognosis might depend on the response to the event. We present the case of an unbooked G5P4 who had an arrest following two eclamptic fits. She had an on-site perimortem cesarean section and was delivered of a live female baby with a birth weight of 4.95 kg. She was subsequently transferred to the intensive care unit where she later died 5 days postdelivery. The baby was discharged home 4 days postdelivery with no neurological deficit. In managing such cases, multidisciplinary management must be the approach from the point of making the diagnosis to performing a resuscitative hysterotomy, as such reducing cardiac arrest delivery interval to the barest minimum.

Keywords: Cardiopulmonary arrest, eclampsia, perimortem caesarean section, resuscitative hysterotomy

INTRODUCTION

It is uncommon for a mother to suffer cardiopulmonary arrest during pregnancy, and when it occurs, it is accompanied by an increased incidence of perinatal and maternal morbidity and mortality.^[1] Its incidence is put at approximately 1 in 12,500–1 in 30,000 deliveries.^[2,3] The likelihood of survival for both the mother and or the fetus, depends largely on how quick resuscitative measures were started, which will include perimortem caesarean section (PMCS).^[3,4] The shorter the “cardiac arrest delivery interval” the higher the probability of both the mother and the fetus surviving.^[5] Yet, at that, the prognosis for the mother is poorer. As a rule, PMCS ought to start following 4 min of effective cardiopulmonary resuscitation (CPR), there is no return of spontaneous circulation. This was established by Katz *et al.* in 1986.^[4,6]

CASE REPORT

We present the case of an unbooked gravida 5 Para 3 ± 1 (3 alive) who presented with a 2-day history of severe throbbing headache and two occurrences of generalized tonic-clonic seizures. Each seizure lasted approximately 1–2 min and both resolved spontaneously. However, at presentation to the labor ward emergency unit, she was in postictal sleep. The history was given by her spouse who also presented an early ultrasound scan report with gestational age equivalent

to 41 weeks + 6 days. At presentation, her blood pressure was 160/100 mmHg, and her Glasgow Coma Scale (GCS) was 9 out of 15. Immediate resuscitative measures were commenced and intravenous access was secured. She was catheterized and about 150 ml of urine drained, blood samples were taken for various investigations, and she had a loading dose of magnesium sulfate according to the Pritchard regimen. She had intranasal oxygen. Abdominal examination showed a viable fetus with a fetal heart rate of 144 beats per minute, whereas vaginal examination revealed an unfavorable cervix with a Bishop score of 4. The management plan was to stabilize and deliver through the faster route.

However, 30 min into admission at the labor ward eclamptic room, while she was still being resuscitated and stabilized, she had a cardiopulmonary arrest. Immediately, CPR was initiated, and other personnel needed to conduct a successful CPR and PMCS were called upon. After about 4 min of active CPR, the decision was to carry out a PMCS. After being informed about

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Figure 1: The patient on endotracheal intubation

the problem and the need for a PMCS, the spouse agreed to the proposal. Informed consent was obtained from the husband for the procedure. At this time, all necessary personnel were present including the consultant anaesthetist, the perioperative nurses, and the neonatologist was on the way. She was immediately intubated to aid resuscitation [Figure 1]. The PMCS started about 4 min after the decision to carry out a PMCS, and after 1 min a viable male baby was delivered with American paediatric gross assessment record (APGAR) score, 2, 5, and 7 at 1, 5, and 10 min, respectively, with a birth weight of 4.95 kg [Figure 2].

Image 1. patient on endotracheal tube

Image 2: patient undergoing perimortem caesarean section in the eclamptic ward

The GCS of the mother improved from 3 to 9 (on endotracheal tube) after the delivery, and she had to be transferred to another city for intensive care. She had two episodes of cardiac arrest en route to the intensive care unit and died 5th-day postdelivery in the unit. The baby has discharged home 4th-day postdelivery with no neurologic deficit having recovered within hours of delivery.

DISCUSSION

The word caesarean section (CS) is largely believed to have been coined in 715 BC, after the decree “Lex Regis” issued by the then Roman King Numa Pompilius. Lex Regis was adapted into Lex Cesare (the law of Cesar). The decree in principle stated that no dead pregnant woman should be buried with her child, and it became taboo. Later, it became known as postmortem CS, as it was discovered that at times the fetus could still be salvaged when performed early. Lex Cesare (CS), over time, became the nomenclature for the delivery of a baby through laparotomy.^[7,8] With the advancement in medicine and development of the Basic and Advanced Life Support (BLS, ALS) in the 1980s, it was discovered that with prompt resuscitation and immediate delivery of the fetus, not only does the fetus has an increased chance of survival, the mother also does too, giving rise to the change in nomenclature to PMCS.^[3,6,9,10]



Figure 2: The patient undergoing perimortem cesarean section in the eclamptic ward

PMCS is a term that was introduced in 1986 by Katz *et al.*, and it entails the delivery of a fetus through CS while concurrently performing maternal CPR.^[4,6] PMCS aims to achieve both the mother’s and fetus’s survival to the greatest extent possible. Studies have shown that PMCS will (1) relieve the aortocaval compression by the pregnant uterus and thus improve venous return, cardiac output, and the efficiency of chest compression during CPR. (2) It will improve ventilation by removing the splinting of the diaphragm by the gravid uterus, increase maternal respiratory reserve, reduce oxygen consumption, reduce the difficulty in intubation, and risk of aspiration. (3) It will also reduce the risk of haemorrhage from hyperdynamic circulation.^[4,10,11]

Rose *et al.* in 2015, challenged the 4–5-min rule in its study and proposed a change of name from PMCS to “resuscitative hysterotomy” to reflect the current management outline. Their challenge was based on; first, the difficulty of performing a PMCS within 5 min after 4 min of effective CPR, even in the best of centers due to operational and human factors. Second, there should be concerns not only for the fetus but also for the survival of the mother, and finally, if PMCS is carried out early, it helps to improve maternal circulation, thus increasing the maternal chance of surviving. As such, plans for a resuscitative hysterotomy must be started immediately after the diagnosis is made.^[12] We used resuscitative hysterotomy protocol for this patient. As was also noted by Wu *et al.*, most of the PMCS were carried out after the 5th min and in this patient, the fetus was delivered about 8–9 min after diagnosis.^[2]

The survival rate of the mother ranges between 17% and 59%, whereas the fetal survival rate is between 61% and 80% with almost 88%–100% of surviving newborns neurologically intact.^[5,6,12,13] A 14-year nationwide study in the United States puts maternal hospital survival to discharge rate at 59%,^[13] whereas a systematic review by Einav *et al.* in 2012 stated a 54.3% of survival to hospital discharge rate.^[9]

The possible etiology of maternal cardiopulmonary arrest (MCPA) varies, and eclampsia has been stated as a common cause, as

seen in the patient discussed.^[13] Other causes of MCPA includes antepartum haemorrhage, postpartum haemorrhage, amniotic fluid embolism, sepsis, complications from anaesthesia, thromboembolism, puerperal cerebrovascular disorder, aspiration pneumonitis, pulmonary edema, acute myocardial infarction, magnesium toxicity, status asthmaticus, trauma, anaphylaxis, and aortic dissection/rupture among others.^[3,13]

The management of antepartum MCPA as at present has an outline that the Society for Obstetric Anaesthesia and Perinatology, European Resuscitation Council, and American Heart Association have documented. They have similar general principles, which include: quick estimation of gestational age using fundal height, then displacement of the gravid uterus manually (using the push or pull method)^[2,5] or tilting the table to reduce aortocaval compression. This is followed by immediate initiation of BLS resuscitation efforts with a quick changeover to advanced cardiac life support once skilled providers and resources are available. Then, assessment for the possible etiology to help in direct treatment and CS within 5 min, if initial maternal resuscitation fails.^[2,5,14-16]

A midline incision had been recommended for PMCS because of the sole purpose of speed, but studies now recommend that the surgeons should use techniques they are most comfortable with, thereby removing unnecessary delay in the delivery of the fetus, but should also consider the possible etiology before choosing the incision.^[3,5,14] This patient had the delivery of the fetus within 2 min of making the Pfannenstiel incision and as documented, the Pfannenstiel incision could be as fast as the midline incision depending on the surgeon.

In summary, the event is so uncommon that individual clinicians may not see one maternal cardiac arrest in their lifetime, making drills and practice sessions difficult. It is a health provider nightmare, and it is a race against time for the survival of both the mother and the child. At the diagnosis of cardiac arrest, a multidisciplinary approach is crucial and very important to improve outcomes. Training and retraining on management drills for MCPA will help both the mother and the fetus have better outcomes.

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Conflicts of interest

There are no conflicts of interest.

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