

CARDIAC ARREST IN LABOUR LEADING TO PERIMORTEM CAESAREAN SECTION IN A WOMAN WITH A BODY MASS INDEX >46 WITH A SUCCESSFUL OUTCOME

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ABSTRACT

A 42-year-old primigravida was admitted to the delivery suite for induction of labour at term due to gestational diabetes and pre-eclampsia. Her booking body mass index was 46 and she had known, well-controlled asthma. Active labour was established. When she was 8–9 cm dilated, she required fetal blood sampling. At the end of the procedure, the patient had a sudden cardiac arrest. High-flow oxygen at the rate of 15 litres was started with bag and mask and immediate maternal cardiopulmonary resuscitation (CPR) was commenced. After 3 minutes of CPR, a decision was made to perform a perimortem caesarean section to aid effective resuscitation. The baby was delivered swiftly. The patient began to respond and showed signs of life. The patient was transferred to theatre for suturing. The massive postpartum haemorrhage protocol was initiated. The patient was transfused with three units of packed red blood cells, three units of fresh frozen plasma, and two units of platelets. The total blood loss was about 3.5 litres. She recovered in an intensive therapy unit. After 72 hours, her clinical assessment excluded any neurological or other ongoing morbidity. Amniotic fluid embolism was suspected as the cause for cardiac arrest. As the patient made a very quick postoperative recovery, a bronchial lavage was thought to be clinically unnecessary. The baby, initially admitted to the baby unit, was also discharged on Day 3 of life with no morbidity. Both mother and baby were completely well at a 3-month postnatal follow-up visit.

Keywords: Haemorrhage, high-risk pregnancy, maternal mortality, obesity, hypertension.

INTRODUCTION

Cardiopulmonary arrest during pregnancy is rare but presents a stressful clinical scenario as inability to provide prompt and swift resuscitation can lead to mortality of both mother and the fetus. Therefore, the outcome is very much dependent on the quick and co-ordinated response from a multidisciplinary team, including adult cardiac arrest team, anaesthesiology, medicine, obstetrics, neonatology, and sometimes cardiothoracic surgery. The incidence of cardiac arrest in ongoing pregnancy has been reported from 1 in 20,000 to 1 in 50,000.¹ There can be wide variation of the aetiological factors but an awareness of both the resuscitation of the pregnant woman and of

undertaking a perimortem caesarean section within 4 minutes after cardiac arrest proves crucial for optimal fetal and maternal outcome.²⁻⁴

Recent literature reviews acknowledge that due to increasing awareness and more training through multidisciplinary obstetrics courses, and practicing skills in the obstetric units, the incidence of perimortem caesarean sections is increasing as part of resuscitation.⁵ Cardiac arrest may be related to conditions unique to pregnancy or the aggravation of pre-pregnancy existing comorbidities. The commonly reported causes of cardiac arrest in pregnancy are pulmonary embolism, haemorrhage, sepsis, peripartum cardiomyopathy, stroke, pre-eclampsia/eclampsia, anaesthesia-related

complications, amniotic fluid embolism, myocardial infarction, and/or pre-existing cardiac disease.⁶

The initial management of cardiac arrest in pregnant women is the same as that of non-pregnant women but if the uterine fundal height is at or above the umbilicus, the uterus should be displaced to the patient's left side during resuscitation to minimise aortocaval compression or the patient should be tilted to the left lateral side.⁷ It is crucial that delivery of the fetus is part of the resuscitation process.

CASE REPORT

We report a case of perimortem caesarean section delivery resulting in optimal postoperative outcomes for both mother and baby with no reported morbidities immediately or at 3-month follow-up. This 42-year-old primigravida was admitted to the delivery suite for induction of labour at term due to gestational diabetes and moderate pre-eclampsia with significant proteinuria. Her booking body mass index (BMI) was 46 and she had known, well-controlled asthma.

She was established into active labour after artificial rupture of membranes, which was later augmented by oxytocin infusion as per local protocol. During the later parts of the active phase of labour, when she was 8–9 cm dilated, her fetal cardiotocography was classified as pathological and therefore it was decided to do fetal blood sampling. At the end of the procedure, the patient started coughing and soon after the obstetric registrar who was performing the procedure noticed her developing central cyanosis. She was not responding to verbal and painful stimuli and peripheral pulses were not recordable. High-flow oxygen at the rate of 15 litres was started with bag and mask and an immediate maternal cardiopulmonary resuscitation (CPR) commenced in left lateral position. A cardiac arrest call was put out and the arrest team arrived to take over the resuscitation.

After 3 minutes of CPR, a decision was made to perform a perimortem caesarean section in the labour ward delivery room without anaesthetic to achieve effective resuscitation. The baby was delivered swiftly and handed over to the paediatric team. The CPR continued during this time and the patient started to respond and showed signs of life. Therefore, after intubation on the labour ward, the patient was transferred to theatre for suturing of the uterus and abdomen. It was found that the

uterus had sustained extensions to the uterine incisions laterally during the delivery of the baby, contributing to the developing haemorrhage, which were repaired surgically. There was no involvement of the uterine arteries or ureters. The massive postpartum haemorrhage protocol was initiated. However, after observing sub-optimal response to medical management of post-partum haemorrhage, a B-Lynch uterine suture was applied, which controlled the bleeding. The patient was transfused with three units of packed red blood cells, three units of fresh frozen plasma, and two units of platelets. The total blood loss was estimated at about 3.5 litres.

She was transferred to an intensive therapy unit postoperatively and made a good recovery. She was able to be moved back to the normal postoperative care maternity ward after 72 hours. Her clinical assessment excluded any neurological or other ongoing morbidity.

Amniotic fluid embolism was suspected as the cause for the arrest. There was a plan to perform bronchial lavage to confirm the diagnosis, but the patient made a very quick postoperative recovery, so this was thought to be clinically unnecessary. The baby was initially admitted to the special care baby unit, but was discharged on Day 3 of life with no obvious morbidity. Both mother and baby were seen at a postnatal debriefing visit at the local hospital and both remained completely well at 3 months following the event.

DISCUSSION

Cardiac arrest during pregnancy carries a very high maternal and fetal mortality rate, due to the fact that after mid-trimester the gravid uterus in a supine position causes aortocaval compression. It can therefore limit the venous return to the heart, resulting in reduced cardiac output.

It is recommended that CPR be performed in left lateral tilt position in pregnant women. Pregnancy-associated changes, including tissue oedema and breast enlargement, mean cardiac output achieved via chest compressions is poor when compared with the non-pregnant population. Therefore, emptying the uterus and the resultant significant improvement in cardiac output can contribute to optimal outcome.

Perimortem caesarean section deliveries were recommended by Katz et al.⁸ in 1986. Considering the incidence in pregnant women of high BMI,

medical comorbidities, and a relatively older age, performing a perimortem caesarean section is not an easy undertaking. It should be done within the first 4 minutes of starting CPR to maximise chances of positive outcome. Recent reviews of cardiac arrest management reveal that the timing of this procedure is the most important determinant of maternal survival. Delay can cause irreversible hypoxic injury to brain. A review of the past century's cases and a review of fetal physiology suggest that to obtain optimum maternal and fetal survival, caesarean delivery should be initiated within 4 minutes of maternal cardiac arrest.^{2,3}

In regards to practical considerations, this is one of the more high-risk, unusual, and frightening situations on the delivery suite for an obstetrician and relevant staff. Surprisingly, this is not a part of the mandatory training in obstetrics and gynaecology. Moreover, the complications in this particular case of morbidly high BMI, a nearly fully dilated cervix, and deeply impacted fetal head made it an extremely difficult task to deliver the baby in the right time frame.

The latest data from MBRRACE-UK² suggests that there were eight maternal deaths between 2010 and 2012 in the UK from amniotic fluid embolism which might have been avoided if a perimortem caesarean section was undertaken within 4 minutes of initiation of CPR. Perimortem caesarean section is rarely performed within the recommended time frame leading to adverse outcomes.⁹

Recently, the need for an awareness of the timing in which a perimortem caesarean section needs to be performed has been highlighted through practical and emergency drill courses. The authors had such a refresher course a few weeks before the incident and it gave them the confidence to perform such a procedure without hesitation. We recommend that for all staff, including the emergency departments providing care for obstetric patients, perimortem caesarean section skills should be incorporated into their regular training to achieve effective resuscitation and a successful outcome in such cases.⁸ Lastly, it should be noted that legal liability from the operation is minimal.

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