

Perimortem caesarean section; successful neonatal outcome after preterm delivery: a case report

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Abstract

Perimortem caesarean section presents a unique opportunity to successfully resuscitate a pregnant woman who has suffered cardio-vascular collapse, and potentially save the fetus as well. Outcomes for cardio-pulmonary resuscitation have been reported to improve with 'emptying of the uterus', by increasing the maternal venous return and cardiac output. The case presented is of a 40 year old multiparous woman at 30 weeks gestation admitted with systemic vasculitis, bilateral deep venous thrombosis of the lower limbs, with gangrene of the distal phalanx of the index finger on the right, and thrombocytopenia. She suffered acute cardio-pulmonary arrest and a perimortem caesarean delivery was done after 27 minutes of cardiopulmonary resuscitation. A live female infant was delivered and admitted to the new born unit. She was subsequently discharged with no neurological sequelae. This case highlights how decisive action for a perimortem caesarean delivery can result in good neonatal outcomes, even after exceeding the 4 minute rule.

Key words: Perimortem caesarean section, Cardiopulmonary arrest, Maternal resuscitation

Introduction

The term Perimortem Caesarean Section (PMCS) is used to denote caesarean delivery concurrent with maternal cardiopulmonary resuscitation. It is based on the understanding that the gravid uterus makes for ineffective cardiac compressions, and impedes venous return thus compromising cardiac output. These effects are more pronounced in the third trimester. It is recommended that the caesarean delivery is carried out after 4 minutes of maternal collapse, if there's no return of spontaneous circulation with correctly performed Cardiopulmonary Resuscitation (CPR) (1). The fate of the mother and the baby are intricately inter-twined, therefore the sooner the fetus is delivered the higher the chances of neonatal survival.

Case report

We present a case of a 40 year old multiparous woman admitted at 28 weeks gestation. She was on management for systemic vasculitis, with bilateral deep venous thrombosis of the lower limbs, gangrene of the distal phalanx of the index finger on the right, and thrombocytopenia with platelets $60 \times 10^9/L$. She was on treatment with low molecular weight heparin, prednisolone, junior aspirin and analgesics. She also received ante-natal corticosteroids. After 2 weeks, the gangrenous area on the right index finger was well demarcated and she was scheduled for disarticulation of the gangrenous phalanx. While preparing for the

procedure, she collapsed suddenly in the ante natal ward and was found to be unresponsive. Central pulses were not discernible and blood pressure was not recordable. Cardiac compressions and use of an Ambu-bag to ventilate the patient was commenced immediately by the ward team. A team of anaesthesiologists was called, and arrived within two minutes to assist with the resuscitation. Adrenaline (1mg) was given 4 times and 10mls of 10% calcium gluconate was also given. The obstetrician was subsequently informed and arrived after seven minutes. Intermittent auscultation of the fetal heart was done with a pinnard fetoscope and initially was not appreciated. After 25 minutes of resuscitation, the fetal heart was appreciated faintly, with a bradycardia estimated at 50 beats per minute. Decision for caesarean delivery was made, and the delivery done immediately on site. A scalpel was used to access the abdomen through a midline incision. A live female infant was delivered, 1300g, with an Apgar score of 6 and 7 at the first and fifth minute respectively. She was promptly taken to the new born unit. Maternal resuscitation was deemed unsuccessful after 40 minutes with no return of spontaneous circulation. Cause of death was not established as the family declined to have a clinical autopsy done. The baby was nursed in the new born unit for 38 days. In that time, she received two full courses of antibiotics for neonatal sepsis. She also underwent phototherapy for 3 days due to jaundice. She was discharged to family members with a weight of 1940 grams.

Discussion

From 20 weeks gestation, aortocaval compression reduces venous return and therefore cardiac output by 30-40% (1). This significantly reduces the efficacy of cardiac compressions, even with Left Uterine Displacement (LUD). Furthermore, cardiac compressions achieve around 30% of normal cardiac output, in non-gravid women. This is reduced to 10% in gravid women. Cardiopulmonary Resuscitation (CPR) is therefore less likely to be effective in a woman who is ≥ 20 weeks pregnant. Timely delivery of the fetus and placenta reduces oxygen consumption and relieves this compression, thereby increasing venous return and improving the efficacy of CPR. In addition, altered maternal physiology in pregnancy results in accelerated development of hypoxia and acidosis that is detrimental to the fetus, in the event of cardiopulmonary arrest. Thus PMCS completed within 5 minutes of maternal cardiac arrest in keeping with the '4 minute rule' has been shown to have the best neonatal outcomes. It also allows for cerebral oxygenation, preventing maternal neurological damage, as 6 minutes is the time for onset of neurological injury after cessation of cerebral blood flow (2). It is recommended that the PMCS be performed wherever resuscitation is taking place, as movement to theater may compromise CPR efforts (1).

It has been demonstrated that many practitioners are not familiar with basic resuscitative interventions for a parturient, due to the infrequent nature of maternal collapse (3). This may result in slow and sometimes incorrect decision making. The presence of senior staff with appropriate experience is therefore necessary as early as possible in the resuscitative efforts (1). The use of pre-defined 'codes' to activate a team response for obstetric-gynaecological resuscitation, as well as PMCS is recommended. It has been shown to be more effective in concentrating specialist manpower and resources to the collapsed parturients location more quickly, than contacting team members individually, thereby reducing time to resuscitation (4).

Neonatal survival has been documented in neonates delivered up to 45 minutes after commencement of CPR, with no neurological sequelae

and noted to be growing well at 6 months (5). Fetal survival is influenced by maternal health status prior to collapse, effectiveness of CPR, and time from cardiopulmonary arrest to delivery (6). In this case, delivery was achieved within 27 minutes of commencement of CPR.

This case emphasizes the value of PCMS not only for maternal resuscitation, but also for fetal salvage. The decision for PCMS should not be abandoned even after the lapse of the recommended 4 minutes, if there's a chance of fetal survival.

Conclusion

All clinicians attending to gravid women should be skilled in resuscitation measures specific to parturients including LUD and correctly performed CPR. PMCS should be completed within 5 minutes to improve both maternal and neonatal survival chances.

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