

## Case Report

# A Near Miss: Peri-mortem Caesarean Section

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## Abstract

Maternal cardiac arrests are rare but serious events where recognition and prompt initiation of resuscitation are crucial. Obesity is a common risk factor encountered in disorders of pregnancy as well as maternal cardiac arrests. Cardiac arrest algorithms should be followed with some changes to accommodate maternal and fetal health. We present a case of a 32-year-old pregnant patient who had a perimortem caesarean section due to maternal cardiac arrest.

## Introduction

Obesity is one of the most commonly occurring risk factors in obstetric practice. Maternal obesity is on the rise in both developing and developed countries [1]. Body Mass Index (BMI) is a measure of weight in relation to height. According to RCOG, being overweight or obese increases the risk of complications for maternal and fetal health [2]. According to WHO, obesity is classified as BMI being equal to or greater than 30 kg/m<sup>2</sup> [3].

Complications to the neonate include doubling the risk of congenital anomalies, macrosomia, prematurity, and neonatal death as well as increased risk of stillbirth [2,4]. Individuals with higher BMI pre-pregnancy or in early pregnancy are more likely to experience Adverse Pregnancy Outcomes (APO) [5]. APOs include hypertensive disorders of pregnancy, pre-term birth, small-for-gestational-age birth, and gestational diabetes [2,5]. All these APO subtypes are associated with higher short-term risk of maternal morbidity and mortality including maternal cardiac arrests, which affect 1 in 30000 pregnant women [6,7]. 2015 MBRRACE-UK (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK) review into maternal deaths reported that 30% of women who died were obese and 22% were overweight [4]. Obese pregnant women are also at an increased risk of undergoing a caesarean section [4,8]. Increased maternal size can make assessing fetal external monitoring, presentation, and lie more difficult to assess as well [4].

In the last trimester of pregnancy, compression of the inferior vena cava and impairment of venous return by the gravid uterus when lying supine contribute against survival. Aortocaval compression significantly reduces the efficacy of

chest compression during resuscitation and cardiac output from 20 weeks of gestation onward [6,9,10]. These difficulties may be worsened by obesity.

We will be discussing a case on peri mortem caesarean section and how prompt recognition of arrest and appropriate management led to a good outcome for both mother and baby.

## Case report

This case discussion has been written with consent from the patient.

This was a case of a 32-year-old lady, G5 P0+4 who underwent a maternal cardiac arrest at 30 weeks gestational age. Her booking BMI was 69.9. She had several risk factors for VTE (Venous Thromboembolism) comprising both pre-existing and obstetric VTE factors. Her combined RCOG VTE score was 17. Her key medical history included Gestational Diabetes Mellitus (GDM) in insulin, pre-eclampsia, high BMI, previous stroke, and asthma. Her medications included labetalol, insulin, metformin and aspirin.

Three days before the arrest occurred, she could not be positioned prone due to increased respiratory rate. She had a scan a day before the arrest where abnormal uterine dopplers were found and a plan was made for delivery via C-section

## More Information

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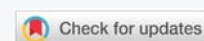
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within weeks hours. She was given  $\text{MgSO}_4$  per protocol and 3 hours before delivery. She was also given two doses of antenatal steroids due to premature delivery. Her blood pressure was labile and just about controlled with labetalol infusion.

On the day of the arrest, she moved herself from the bed to the operating table and was propped up to 45 degrees with left lateral tilt, subsequently complaining that she was unable to breathe. A SATS probe was applied but there was a very poor trace. She then became unresponsive and cyanotic. There was no palpable pulse and CPR at 30:2 was started with a cardiac arrest call put out. The baby was successfully delivered within 4 minutes of CPR initiation. APGAR scores of the baby after delivery were six at one minute, seven at five minutes, and nine at ten minutes.

She maintained a rhythm of PEA. Intubation was attempted but was unsuccessful initially due to improper position and very large habitus. An i-gel was therefore inserted with good capnography all throughout the arrest and subsequently, she was successfully intubated with GlideScope. Venous blood gas was done, and no reversible causes were identified. Transabdominal open cardiac massage was also performed by one of the operating surgeons. The cardiac arrest team was suspicious of a pulmonary embolism as a cause of the arrest and the decision for thrombolytic therapy was considered but not given as she achieved the return of spontaneous circulation. A CVC was inserted, adrenaline infusion started, fentanyl, propofol infusion, and rocuronium were started and she was shifted to ITU.

In summary, she underwent 40 minutes of CPR. An MDT-team debrief was not able to ascertain the cause of the PEA arrest. Investigations while being intubated and when extubated showed pulmonary oedema and pleural effusion, with no evidence of pneumothorax or pulmonary embolism. The likely cause was a vasovagal collapse exacerbated by aortocaval compression and subsequent ventilation failure. The mother was left with no neurological complications. Her Glasgow Coma Score (GCS) on discharge was 15/15; upper and lower limb power, sensation, and all reflexes were intact; there was no damage to cranial nerves or to the brainstem. This case is an example of excellent teamwork, professionalism, and excellent standard of care given by the teams involved.

## Discussion

The coordinated efforts of the obstetric team, anaesthetic team, intensive care unit team, and neonatal team were crucial for improving maternal and neonatal survival. However, there were several valuable learning points from this case.

Invasive monitoring should have been considered once the patient was started on PET protocol and transfer to HDU for this purpose should have been considered. In terms of PET drug therapy, labetalol should also have been avoided due to

the risk of bronchospasm, and a bolus of magnesium sulphate should have been given as part of the PET protocol.

The early recognition of maternal collapse and early initiation of CPR improved maternal and fetal outcomes as shown in this case [11,12]. Additionally, to improve maternal and fetal outcomes, it is useful to understand the extra causes of cardiac arrests in pregnant women [12] such as amniotic fluid embolism, haemorrhage, and acute respiratory distress syndrome [6,11].

It is also important to note that lateral tilt in extreme obesity is difficult to achieve safely on a standard operating table; the patient should be placed in a supine position with manual displacement to the left of the gravid uterus, as a supine position without manual displacement of the gravid uterus will result in aortocaval compression [13-15].

In pregnant women, it is difficult to maintain a clear airway and perform intubation, and there is increased oxygen consumption and an increased likelihood of pulmonary aspiration [9]. These may make pregnant women hypoxic more readily and make ventilation more difficult [9,11]. Obstetric Anaesthetists' Association (OAA) and Difficult Airway Society (DAS) recommend high flow nasal oxygen for high BMI, PET and other predicted difficult intubation patients for general anaesthetic lower segment caesarean section (LSCS) [16].

The resuscitation council's guidelines using the ABCDE approach should be followed for a maternal collapse resuscitation situation, especially relief of aortocaval compression [6,9]. The same defibrillation energy levels, drugs, and doses should be used as in a non-pregnant woman [6,11,12]. In women over 20 weeks of gestation, if CPR is to no avail within 4 minutes or more, perimortem caesarean section (PMCS) should be achieved within 5 minutes of the collapse as per Green Top guidelines [9].

## Conclusion

We presented a case of a PMCS due to maternal cardiac arrest of a raised BMI pregnancy. During the PMCS, the patient underwent 40 minutes of CPR, intubation, and invasive monitoring, and was transferred to ITU for further care upon achievement of ROSC. The baby was successfully delivered within 4 minutes of CPR initiation and the mother was discharged neurologically intact along with her newborn.

We found that obesity can cause complications for both mother and fetus from pregnancy to delivery. Aortocaval compression should be relieved when carrying out a PMCS and difficulty in intubating should be anticipated in the case of raised BMI. Green top guidelines should be considered when caring for obese or overweight women during pregnancy, pre-conception, and a maternal collapse resuscitation situation. Stimulation training for maternal emergencies should be facilitated for clinical staff.

We hope readers will benefit from this case report and implement the necessary changes to their clinical practice.

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