

Successful perioperative management of cardiac arrest in pregnancy: A case of perimortem caesarean section with favourable maternal and neonatal outcomes

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ABSTRACT

Cardiac arrest in pregnancy in an otherwise uncomplicated one is a nightmare for the obstetrician and perioperative physicians. The success of resuscitative attempts depends on how quickly you diagnose the event and react. A multidisciplinary team that is well-trained in resuscitation is the key to success. There should be separate teams to take care of the mother and baby. Support of critical specialists for post-resuscitation care is also crucial. The decision to deliver the baby by caesarean section should be taken without any delay and offer the best chance for the survival of the baby and the mother. Though successful revival of both mother and child is reported in the literature, a 1-year follow-up with both surviving without any neurological deficit is rarely reported in the literature.

Key words: Cardiac arrest in pregnancy, Perimortem caesarean section, Resuscitative uterine interventions

Maternal cardiac arrest (MCA) is a rare but catastrophic event as it poses a significant risk to both mother and foetus requiring an immediate, well-coordinated approach. The incidence is around 1 in 12000–36000 in the developed world [1]. Bleeding, cardiac issues, drugs, embolism, infections, hypertensive disorders of pregnancy, or complications of anaesthesia are the common etiologies [1].

In this case report, we are reviewing a case of in-hospital MCA probably due to amniotic fluid embolism (AFE) and its successful resuscitation along with perimortem caesarean section (PMCS). Since the follow-up assessments after 1 year indicate preserved neurological function in both individuals, we thought of publishing this case report.

CASE REPORT

A 28-year-old lady, gravida 4 para 1 living 1 abortion 2 was admitted to the labour room with pain at 39 weeks of gestation. Her labour progressed spontaneously and at 4 cm cervical dilatation, artificial rupture of membranes was performed.

This was followed by an episode of generalized tonic-clonic seizures for about 1 min and then becoming unresponsive and pulseless.

The patient was rushed to the operation theatre with cardiac compressions, manual left uterine displacement, and ambu mask ventilation. Inside the theatre, she was asystolic and continued to be unresponsive. Monitors were attached (electrocardiogram [ECG] Lead 2 and V₃, pulse oximetry, non-invasive blood pressure [BP]). Cardiopulmonary resuscitation continued as per the advanced cardiac life support protocol by the anaesthesian team, while the gynecologist performed PMCS.

The abdomen and uterus were opened by the suprapubic transverse incision. A flabby male baby was delivered and immediately handed over to the neonatologist attached to the operation theatre complex. The uterus was mildly atonic and managed medically. The abdomen was closed in layers after putting in an intraperitoneal drain. A total of two doses of adrenaline (1 mg intravenous [IV] push) were given along with continuous chest compressions and endotracheal intubation was performed with a 7-sized cuffed tube. We maintained ventilation with 100% oxygen at the rate of 10/min. Return of spontaneous circulation (ROSC) was attained after 2 cycles of resuscitation as

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evidenced by ECG showing sinus tachycardia and capnography showing EtCO₂ of 22 mm of Hg.

There was significant bleeding intraoperatively up to 2.5 L due to oozing from muscle and rectus sheath. She was started on noradrenaline infusion and resuscitated with 2 L of crystalloids mainly ringer lactate and sterofundin (balanced salt solution), 2 units packed red cells, 2 units fresh frozen plasma, and 2 units platelets. Once ROSC was established, right internal jugular vein (with 7 F triple lumen) and left radial artery were cannulated under ultrasound guidance. Arterial blood gas analysis showed severe metabolic acidosis and accordingly bicarbonate was administered.

Inj Pitocin 5 units slow IV was given after the delivery of the baby and was continued as infusion. Noradrenaline infusion and crystalloids were administered via the central line to maintain a systolic BP of around 90–100 mm of Hg. At the end of the procedure, pupils were mid-dilated but reacting and oxygen saturation was stable. Once the BP was stabilized, she was given an injection of mannitol 20% 100 mL slow IV infusion over 30 min. Later after hemostasis, she was shifted to the intensive care unit (ICU) for further management. In the ICU, point of care ultrasonography was done which showed left ventricular hypertrophy, a mildly dilated right atrium, and a right ventricle with moderate tricuspid regurgitation. A thromboelastogram showed a picture of disseminated intravascular coagulation (DIC) and further blood products (4 units of fresh frozen plasma, platelets, and packed red cells were given). Other blood investigations showed a picture of multiorgan dysfunction and acute kidney injury picture. She was ventilated and received antibiotics and post-cardiac arrest care in the ICU. Echo after 24 h showed cardiac status stabilized, allowing weaning from inotropic support and mechanical ventilation. Subsequent brain computed tomography - pulmonary angiogram and magnetic resonance imaging brain with venogram on day 2 were normal. She was extubated on post-operative day 2 after neurological assessments and was supplemented with oxygen through facemask. On day 3 she was shifted to the room. Her liver and kidney function improved over the next couple of days and she was discharged on post-operative day 7.

Neonate when delivered was limp and apneic, requiring positive pressure ventilation and intubation. Apgar scores were 1, 4, 6, and 7 at 1, 5, 10, and 20 min, respectively. Neonate was extubated to high flow nasal cannula and to the room in 12 h of life. One-year follow-up of the mother and child showed no evidence of any neurological deficit.

DISCUSSION

This case reports a favourable outcome following MCA and shows the importance of proper resuscitation, the performance of PMCS, and the importance of a multidisciplinary team involvement.

Amniotic fluid embolism (AFE) also known as anaphylactoid syndrome of pregnancy is a rare but fatal condition characterized by sudden cardiorespiratory collapse during labor or within

30 min after delivery of the placenta [2]. Diagnosis of AFE is mostly clinical and it must be suspected in any pregnant or immediate postpartum woman who suffers sudden cardiovascular collapse, seizures, severe respiratory difficulty, or hypoxia, particularly if such events are followed by a coagulopathy that cannot be otherwise explained [3].

The Society for Maternal and Foetal Medicine does not recommend the use of any specific diagnostic laboratory test to either confirm or refute the diagnosis of AFE [3]. Initial resuscitation after a cardiac arrest does not require a specific diagnosis of AFE as the management involves providing basic life support and advanced cardiac life support, regardless of the exact etiology. The proposed pathology may be summarised as in Fig. 1.

PMCD should be thought of in the event of MCA at term and should begin at least 4 min to effect delivery at 5 min when the uterus is above the umbilicus or gestational age >23 weeks after failed resuscitative efforts [3]. Ideally, PMCD should be performed at the site of arrest in the hospital. This time interval minimizes the risks of neurological damage, which begins to develop after 4–6 min of anoxic cardiac arrest if there is no ROSC [4]. PMCD was later renamed as resuscitative hysterotomy and recently as resuscitative uterine interventions by the Association of Obstetric Anaesthesiologists of India [4]. The shorter the arrest delivery interval, the higher the survival of the baby and mother.

Hypoxemia develops rapidly in pregnant women therefore, rapid, high-quality, and effective airway and breathing interventions are essential. Endotracheal intubation should be performed by an experienced laryngoscopist only, preferably with a smaller-sized tube endotracheal tube (6.0–7.0 mm inner diameter). No more than 2 laryngoscopy attempts should be made and supraglottic airway placement is the preferred rescue strategy for failed intubation [5]. Except during laryngoscopy, there shouldn't be any interruptions (<10 s) in chest compressions (performed at the rate of 100/min with at least 2 inches in depth with manual left uterine tilt) [4]. Foetal assessment should not be performed during resuscitation. The foetal monitors attached should be removed as soon as possible to facilitate PMCD without delay or hindrance [4].

Severe hemorrhage due to DIC may require simultaneous medical and surgical approaches. Administration of blood products with packed red blood cells, fresh-frozen plasma, and platelets at a ratio of 1:1:1 (hemostatic resuscitation) is essential. Uterine atony is common with AFE and should be managed aggressively. The use of uterotonics, such as oxytocin, ergot derivatives, and prostaglandins is appropriate when indicated [3]. Post-surgery aggressive intensive care management is crucial to stabilize possible multiorgan dysfunction and treat post-resuscitation brain oriented therapy. A separate neonatal resuscitation team with a qualified neonatologist can take over neonatal resuscitation soon after the delivery of the baby. As the neurological status and activity of the newborn improved within 30 min of neonatal intensive care admission, therapeutic hypothermia was deferred as cooling criteria were not met [6,7].

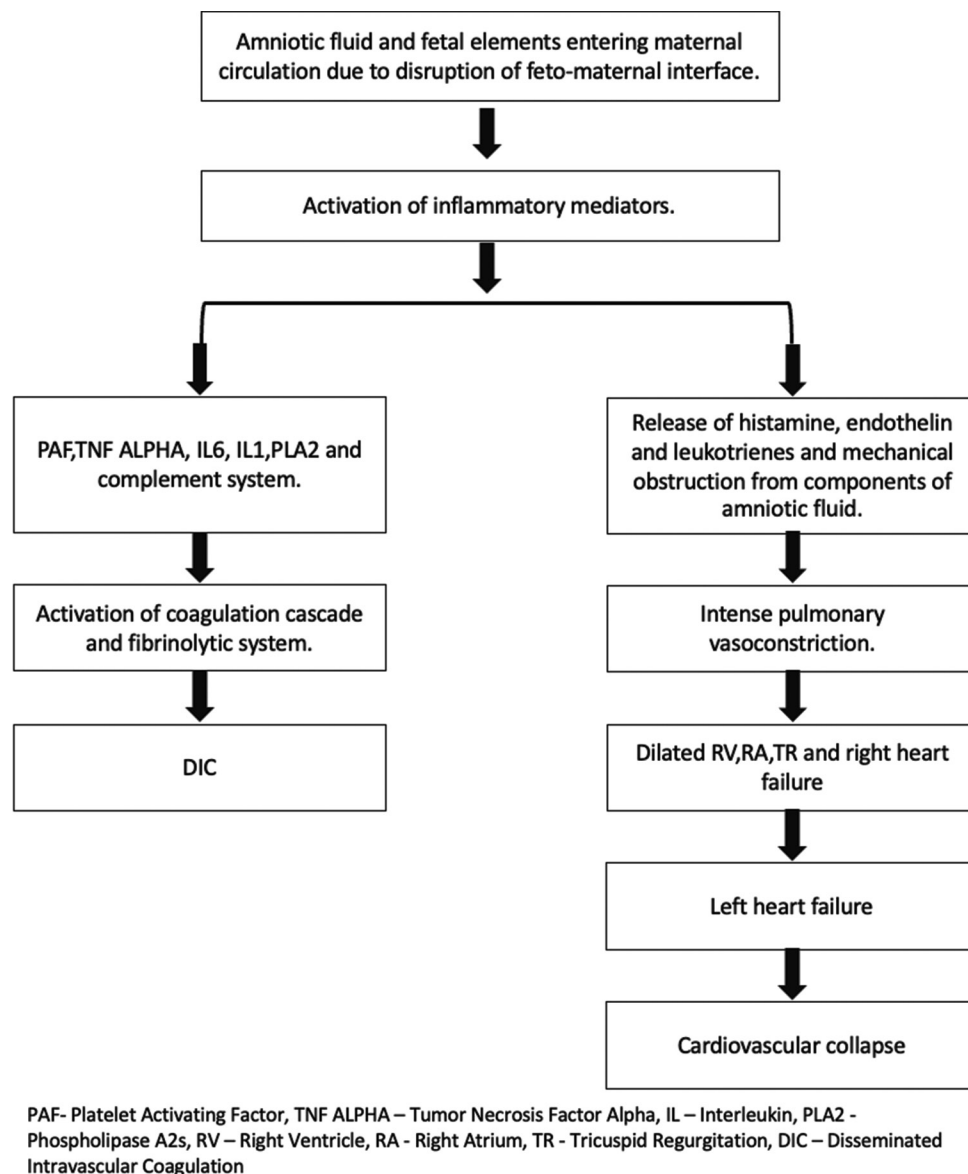


Figure 1: Proposed pathology of amniotic fluid embolism

Finally, considering the high maternal and neonatal mortality rates (83% and 58%, respectively) and the emergency nature of the situation, a well-trained team of obstetricians, anaesthesiologists, neonatologists, and nursing staff is essential to ensure the successful completion of tasks, identifying the differential diagnosis and appropriate treatment [8,9].

CONCLUSION

A multidisciplinary team approach is crucial for maternal and foetal survival during cardiac arrest in pregnancy. The success of maternal resuscitation as well as the survival of both without any neurological deficit depends upon how quickly the baby is delivered through resuscitative uterine interventions. A separate neonatology team should be there to receive the baby for neonatal resuscitation. Frequent training sessions with the help of simulation for the entire team will help to evolve the system.

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