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Case report

Resuscitative hysterotomy for maternal collapse in a triplet pregnancy

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SUMMARY

We encountered a 47-year-old woman, at 35 weeks of gestation, carrying triplets, who attended the hospital with severe pre-eclampsia and at admission had eclamptic fit followed by cardiac arrest. Cardiopulmonary resuscitation was started when she did not respond to initial measures; resuscitative hysterotomy was started on the site of collapse immediately, within 4 min postarrest, to deliver the triplets within 5 min postmaternal cardiac arrest. Timely decision of resuscitative hysterotomy done primarily to restore maternal cardiac output due to a grossly gravid uterus saved the mother and the triplets. With increasing maternal age and use of in vitro fertilisation resulting in multiple pregnancies, maternal comorbidities are more likely. These could result in maternal collapse in which case timely resorting to resuscitative hysterotomy can make survival of mother and fetu more likely.

BACKGROUND

The incidence of maternal collapse in pregnancy is 1/36 000 pregnancies.¹ It is more likely to occur in elderly primigravida, hypertensives and diabetics. Multiple pregnancies with medical comorbidities can significantly increase maternal cardiovascular load and can increase the risk of maternal collapse. Resuscitative hysterotomy (also called perimortem caesarean section) is resorted to when the unfortunate event of maternal collapse occurs especially in second and third trimester of pregnancy.

Cardiopulmonary resuscitation (CPR) in pregnant woman is difficult due to physiological changes of pregnancy and due to the overdistended uterus (even more distended in multiple pregnancy) pressing onto the inferior vena cava causing decrease in venous return to maternal heart. When the woman has not responded to initial CPR and manual displacement of uterus, immediate hysterotomy can make resuscitation more effective and prevent permanent brain hypoxia in the mother.

There is risk of surgical site infection, trauma to adjacent intra-abdominal organs and uterine atony causing significant postpartum haemorrhage. However, the benefit of immediate urgent delivery without the usual precautions can be crucial for survival of the mother. Resuscitative hysterotomy is done mainly for maternal benefit.

CASE PRESENTATION

This case study reports a 47-year-old Middle Eastern woman, married for 17 years with primary

subfertility conceived with in vitro fertilisation in India. She was pregnant with dichorionic triamniotic triplets. Her body mass index at initial visit at 10 weeks was 28 kg/m². She refused fetal reduction in her first trimester and continued as triplet pregnancy. She had irregular follow-up to our tertiary care hospital throughout the pregnancy.

At 10 weeks, she was started on low-dose aspirin to aid placentation and alpha methyl dopa for her hypertensive disorders of pregnancy. She was on low molecular weight heparin from early pregnancy. Her glucose tolerance test done at 16 weeks had abnormal fasting and 2 hour values, so she was started on diabetic diet, glucophage and then insulin to achieve glycaemic control. She had normal anomaly scan for the three babies. Her gestational weight gain was 17 kg. At 32 weeks, she received betamethasone for fetal lung maturity and was planned for elective caesarean section at 35 completed weeks of gestation, as her home glucose monitoring values and blood pressure were in control.

Two days before her scheduled caesarean, she arrived by ambulance to the emergency department (ED) at 02:00 hours with epigastric pain. She did not have headache or blurring of vision but was complaining of severe chest pain and difficulty in breathing. She was in left lateral position to help perfusion. Blood pressure on arrival was 202/127 mm Hg and before any antihypertensive and magnesium sulfate could be administered, she had an eclamptic fit for 1 min, which progressed to cardiac arrest. The patient had collapsed while being transferred to labour suite from ED on the ED bed.

The patient was made supine, manual uterine displacement and CPR started immediately. Meanwhile, code was announced so that the crash call team could be assembled. Manual uterine displacement, resuscitation and intubation continued but as the patient was not responding and remained pulseless, immediate decision to perform urgent and immediate hysterotomy on site of collapse was taken by the obstetrician present. The incision was taken at approximately 4 min postcollapse.

Resuscitative hysterotomy was performed with the small scalpel blade that was at hand to prevent wasting any time. Abdomen was opened by transverse (Joel-Cohen) incision as the obstetrician was more comfortable with it rather than vertical midline incision. Meanwhile, operative room staff was called for the instruments. On-call neonatologists were alerted to expect three preterm babies.



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Reminder of important clinical lesson

Meanwhile, the chest compressions were continued as the hysterotomy was being performed. Babies delivered one after another were handed over to the midwives and neonatologist present.

CPR continued and the mother was intubated and given two doses of epinephrine. She regained spontaneous circulation around 15 min after incision. She did not have noticeable bleeding during the procedure and we had almost finished closing the abdomen when circulation had returned and so did not require shifting to theatre. Oxytocin drip was started and uterus was contracted by the time we shifted her to intensive care unit (ICU). The babies weighing 1.9 kg, 1.98 kg and 2.1 kg each initially had low APGAR scores and recovered well in neonatal intensive care unit.

The patient was given triple antibiotics (ampicillin, gentamicin and metronidazole), started on labetalol infusion and magnesium sulfate for 24 hours postdelivery. On the second day, the patient was extubated and weaned off sedation. The patient received feeds via nasogastric tube. She needed dialysis for 3 days. She had slurred speech and difficulty walking for 10 days, but with intense chest and limb physiotherapy, she recovered.

The patient was shifted from the ICU to the postnatal ward on day 7 and her antihypertensives were gradually tapered. Prior to her discharge, she was mobilising well and able to breastfeed her babies. She went home with her babies in good condition after 18 days postarrest.

INVESTIGATIONS

After the resuscitation, stabilisation and shifting to intensive care unit, she was evaluated for all causes of cardiac arrest. All relevant investigations were done. The following were observed: blood group A positive, WBC 9500/uL, haemoglobin 117 g/L, platelets 301 000/uL, glucose, random 127 mg/dL, creatinine 0.4 mg/dL, sodium 133 mmol/L, potassium 4.5 mmol/L, bicarbonate (HCO₃) 22.5 mmol/L, bilirubin 0.4 mg/dL, alkaline phosphatase 43 U/L, ALT 22 U/L, AST 22 U/L, total protein 6.6 g/dL, albumin 2.8 g/dL, globulin 3.8 g/dL, uric acid 2.5 mg/dL. During her stay in ICU, chest X-ray, ECG and ECHO were done to evaluate any underlying cardiac or pulmonary conditions, they were normal. CT scan done showed no significant intracranial abnormality.

Advanced maternal age, hypertensive on medications and generalised tonic clonic convulsion at presentation were supportive of eclampsia. Eclampsia as the cause of maternal collapse is usually obvious in the inpatient setting. Epilepsy seems unlikely as she had no previous history. However, epilepsy should always be considered in cases of maternal collapse associated with seizure activity.² The acute onset of dyspnoea, signs of pulmonary congestion and severe coagulopathy were absent which rule out the amniotic fluid embolism, air embolism, stroke and pulmonary embolism. There was also no history or signs of trauma, fall or abuse.

OUTCOME AND FOLLOW-UP

There was debriefing of the case with the patient, family members and team. The patient and her husband were given psychological support prior to discharge. The case was presented in the department risk management meeting to create awareness and understanding of patient safety, engage clinicians in training and education and emphasise team work. We are doing simulation of similar scenarios on a regular basis with obstetric staff and midwives after this event.

The patient was advised to come back for evaluation of blood sugar at 6 weeks and MRI brain which she did not do. When

contacted on phone, 7 months post the urgent resuscitative hysterotomy, the patient and the three babies are doing well with no long-term complications.

DISCUSSION

Guidelines for management of cardiac arrest in pregnancy clearly state that decision to deliver the baby should be taken if there is no response to correctly performed CPR and proper manual displacement of uterus. Resuscitative hysterotomy to assist maternal resuscitation is required when the uterus is palpable above the umbilicus; this is after 20 weeks of gestation in a singleton pregnancy and as early as 16 weeks in multiple pregnancy.

When it is clear that the woman has not responded to initial CPR (usually one cycle or immediately if non-survivable trauma), steps should be taken to empty the uterus. The longer one waits, the greater the degree of hypoxia, and the hysterotomy needs to be performed as soon as possible. It was previously advised to start within 4 min of the collapse to prevent irreversible maternal brain hypoxia.^{3 4} After return of spontaneous circulation swift transfer to theatre for sterile surgical repair with good operative lighting can be done.

We present a case where the doctors were able to follow the guideline in resuscitation of the pregnant woman and were fortunate to resuscitate and deliver the triplets in proper time. Rapid assessment and initiation of appropriate resuscitative measures greatly improved the prognosis of the patient and babies.

The effective management of obstetric emergencies depends on the skill and support of multidisciplinary team of obstetrician, anaesthesiologist, neonatologist, intensivist and trained nursing staff. Survival of the mother and her three babies was due to effective team work and apt decision of urgent resuscitative hysterotomy in proper time. Any delay in the decision would have increased the chances of morbidity and mortality of them all.

Maternal cardiac arrest is a rare event. Perimortem caesarean or resuscitative hysterotomy for singleton pregnancy itself is very rarely reported, with less than 250 cases reviewed until 2004.⁵ Very, very few cases of perimortem caesarean for multiple pregnancy were found in literature. Even more unusual would be for it to be performed for a triplet pregnancy with survival of all four.

Older mothers may have medical comorbidities which need to be identified before pregnancy. Assisted reproductive technologies should be used judiciously as sometimes they can put the patient in very critical condition. Proper patient selection prior to assisted reproduction is necessary. Only single embryo should be transferred as iatrogenic multiple pregnancy can further deteriorate maternal cardiovascular status and can result in maternal collapse.

More and more drills to orient the emergency staff when dealing with pregnant women for the resuscitative hysterotomy are needed so doctors can take this important decision with confidence.^{6 7} The term resuscitative hysterotomy is preferred to

Patient's perspective

'On the night, when I came to the emergency with the chest discomfort and breathlessness, I knew there was something seriously wrong. I lost consciousness and I don't remember anything after that. I woke up 2 days later and felt relieved when I was told that my two boys and girl are fine and well.'

Learning points

- ▶ In case of maternal collapse, when uterus is palpable above the umbilicus, decision for resuscitative hysterotomy should be taken as soon as feasible to prevent maternal mortality.
- ▶ Resuscitative hysterotomy should be performed on the site of collapse and no time should be wasted to arrange for instruments or shift to theatre.
- ▶ Multidisciplinary team, supportive nursing staff, intensive care treatment, neonatal intensive care and intense physiotherapy work hand in hand to help patient recover fully.
- ▶ Debriefing of the events to the patient, family and the team involved is essential.
- ▶ Mock resuscitation and obstetric emergency drills should be done on a regular basis.

perimortem caesarean as the benefit for the resuscitation of the mother is paramount.⁸

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