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Case Report

A case of uncorrected tetralogy of Fallot with preeclampsia: An anesthetic challenge for cesarean section

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Abstract

Women with cardiovascular diseases may present for cesarean delivery. We present a case of anesthetic management for cesarean section in a patient with uncorrected tetralogy of Fallot complicated with preeclampsia. No definite guideline or information is available in the textbook or literature about the management of such a case. A 21 year primigravida was admitted in our institute with breathlessness on normal day to day life activity. Her blood pressure was 160/100 mmHg, oxygen saturation 85-86% in room air and she had ejection systolic murmur of grade three intensity along the left sternal border. Her echocardiography which was done in the first trimester revealed tetralogy of Fallot with moderate to severe right ventricular outlet obstruction with hypoplastic pulmonary artery and pulmonary valve. Proteinurea was detected on bedside urine examination. The patient was posted for emergency cesarean section due to non-reassuring fetal heart rate associated with preeclamsia. Magnesium sulfate 10 gm intramuscularly was given for seizure prophylaxis and general anesthesia was administered using etomidate as induction agent. The objective of anesthetic management mainly depends on maintaining of systemic vascular resistance and decreasing pulmonary vascular resistance. In preeclampsia systemic vascular resistance is already elevated. Thus treatment of preeclampsia may worsen cyanosis, so we avoided labetalol to reduce blood pressure. Intra-operative and post-operative periods were uneventful and baby had good apgar scores. So we can conclude that cesarean section in patient with both tetralogy of Fallot and preeclampsia can be managed successfully with general anesthesia using techniques which maintain systemic vascular resistance.

Key Words: Anesthesia; cesarean section; preeclampsia; pregnancy; tetralogy of Fallot

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Introduction

Tetralogy of Fallot (TOF) is the most common congenital cyanotic heart disease and accounts for 5% of all congenital heart diseases presenting with pregnancy.[1] The objective of anesthetic management mainly depends on maintaining of systemic vascular resistance and decreasing pulmonary vascular resistance and general anesthesia is recommended.[2,3,4] Preeclampsia is a very common multiorgan disorder of pregnancy. Previous studies on preeclamptic patients undergoing cesarean section recommends epidural anesthesia if coagulopathy is excluded.[5] The data available on the anesthetic management of cesarean section in patient with both uncorrected TOF and preeclampsia is limited. Here we present a case of uncorrected TOF complicated with preeclampsia posted for caesarean section (LSCS).

Case report

A 21 year old unbooked primigravida was admitted in the labor room of our institute with 36 weeks of gestation. She complained of breathlessness on normal day to day activity. On further enquiry it was known that she was suffering from cardiac disease since her childhood. She was not taking any medication except hematinic and calcium as prescribed by obstetrician. There was no family history of congenital heart disease and she belonged to low socioeconomic status.

On examination, the patient weighing 52 kg had clubbing, pedal edema, central cyanosis, heart rate (HR) 96/min, blood pressure (BP) 160/100 mmHg, respiratory rate (RR) 42/min. Chest auscultation revealed ejection systolic murmur of grade three intensity along the left sternal border. Fine basal crepitations were also audible.

Her hemoglobin was 13.5 gm%. Her echocardiography which was done in the first trimester revealed TOF with moderate to severe right ventricular outlet obstruction with hypoplastic pulmonary artery and pulmonary valve with no evidence of pulmonary artery hypertension. A large malaligened ventricular septal defect (VSD) with 30% overriding of relatively large aortic root was reported. Biventricular systolic function was good with 62% left ventricular ejection fraction. Proteinurea was detected on bedside urine examination. The patient was suffering from preeclampsia.

The patient was posted for emergency LSCS due to preeclampsia associated with nonreassuring fetal heart rate. Magnesium sulfate ($MgSO_4$) 10 gm (5 gm in each buttock) intramuscularly (im) was administered for seizure prophylaxis. Standard endocarditis and aspiration prophylaxis was administered.

On arrival to operation theatre her pulse was 92/min, BP 154/96 mmHg and oxygen saturation (SpO_2) 85-86% in room air which improved to 89% with moist O2 inhalation (six liter/min via polymask). Central venous cannulation was done and central venous pressure (CVP) was measured 10 cm of water. Phenylephrine 100 mcg/ml and esmolol 10mg/ml were prepared.

General anesthesia (GA) was planned. Paracetamol 1gm intravenously (iv) and 500 ml of Ringer lactate was administered 15 min prior to induction. Rapid sequence induction was done with etomidate 15 mg and succinylcholine 50 mg after preoxygenetion with 100% O2 for five min. Trachea was intubated with cuffed endotracheal tube of seven mm inner diameter. Anesthesia was maintained with O_2 and N_2O 50:50 till the delivery of the baby followed by 67:33. After the delivery of the baby 10 units of im oxytocin, 50 mcg of iv fentanyl and 50 mg of iv tramadol was administered. Baby cried immediately after birth and uterus was well contracted. Muscle relaxation was maintained with two mg of vecuronium. Low volume ventilation with tidal volume of 350 to 400 ml was done. Rate was adjusted to keep end tidal carbon dioxide ($EtCO_2$) between 35-40 mmHg.

Blood pressure was maintained between 146/86 and 154/96 mmHg. Heart rate (HR) varied from 90 to 106/min. SpO_2 was maintained between 85% and 90%. Electrocardiogram (ECG) tracing was uneventful and CVP was maintained between 9 and 11cm of water. On completion of the surgery N_2O was discontinued and the effect of muscle relaxants was reversed with neostigmine and glycopyrrolate. Duration of surgery was 25 minutes. Intra operative blood loss was about 300 ml and 400 ml of Ringer lactate was transfused. The patient was shifted to intensive care unit (ICU) and the postoperative period was uneventful.

The patient was discharged from the hospital on 7th post operative day with a healthy baby and was advised to attend cardiothoracic surgeon in the future.

Discussion

Cesarean section in a patient with uncorrected TOF presents a challenge to anesthesiologists especially if the pregnancy is complicated with pre-eclampsia. A review of 57 pregnancies in women with uncorrected TOF showed a fetal mortality of 22% and a maternal mortality of 7%.[6]

The objective of anesthetic management mainly depends on maintaining of SVR and decreasing PVR. Regional anesthesia by neuraxial blockade usually decreases SVR so it is avoided, though there are some case reports of using graded epidural technique for anesthetic management of caesarean section in patients of TOF.[4] But as our patient had preeclampsia where decreased blood volume can cause drastic fall in BP and the platelet count was not known, we planned for GA.

Choice of induction agent is important to maintain SVR. Etomidate has maximum hemodynamic stability along with rapid induction and recovery among the intravenous anesthetic agents.[7] It causes no change in heart rate and 15% fall in SVR which was counteracted by infusion of 500 ml of RL and sympathetic stimulation caused by laryngoscopy.

Ketamine which is commonly recommended for induction of anesthesia in TOF was not used because it may cause uncontrolled increase in BP in case of preeclampsia.[8]

In preeclampsia SVR was already elevated and the shunt fraction was reduced, so labetalol was not used to reduce BP. Inhalational anesthetics were avoided because they may reduce SVR. Though N_2O have the potential to increase PVR this effect is not significant.[9] Low volume ventilation and prevention of hypoxia also contributed to maintenance of PVR.

Esmolol which is selective and short acting β_1 antagonist was kept ready to overcome any cyanotic spell due to infundibular contraction resulting from increased heart rate and contraction sue to sympathetic activity. Phenylephrine, a selective α_1 antagonist was prepared beforehand to overcome any fall in SVR.

It can be concluded that anesthetic management of caesarean section in patients of TOF and preeclampsia can be done successfully using general anesthesia because SVR is maintained with GA.

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