Case Report

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ANAESTHETIC MANAGEMENT OF A PARTURIENT WITH EISENMENGER'S SYNDROME POSTED FOR EMERGENCY CAESAREAN SECTION

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ABSTRACT

Physiological changes in pregnancy is poorly tolerated in patients with Eisenmenger syndrome (ES) thus increasing the maternal mortality to 30-50%. We describe the management of a 34 years old primigravida with Eisenmenger's syndrome with pre eclampsia who was posted for emergency caesarean section.

Key Words: Anaesthesia, Caesarean section, Eisenmenger's syndrome

INTRODUCTION

Pregnancy causes dramatic physiological changes in various organ system in the human body. Increased circulatory burden of pregnancy can unmask previously unrecognized heart conditions and worsen these condition to a lethal situation. A comprehensive understanding of the cardiovascular adaptation during pregnancy and early postpartum period is essential for appropriate management of pregnant patient with cardiovascular disorders.

Patients with irreversible pulmonary vascular obstructive disease, secondary to an intracardiac shunt (Eisenmengers syndrome)[1]are known to be at particularly high risk when undergoing Non cardiac surgery[2]. This risk of Non cardiac surgery may relate to **1)** the extent of the surgical procedure, **2)** severity of pulmonary hypertension, **3)** severity of tricuspid regurgitation and right ventricular dysfunction, and **4)**additional acquired cardiac and systemic disease. These patients are very vulnerable to alteration in hemodynamics induced by anaesthetics or surgery. This includes a minor fall in systolic blood pressure that can increase right-to-left shunting and possibly potentiate cardiovascular collapses such as ischemic heart disease, and renal dysfunction.

The principle of any anaesthetic technique chosen is to maintain systemic vascular resistance (SVR), avoiding its fall or increase in pulmonary vascular resistance (PVR).

CASE REPORT

A 34 years old elderly unbooked primigravida [Wt.- 59kg, Ht-161cm] who had conceived after four years following infertility treatment at 29 weeks and 2days gestation was scheduled for emergency Caesarean section with the indication being Preterm breech, Pregnancy induced hypertension with absent diastolic flow. She is not a known case of Congenital heart disease, or Rheumatic heart disease, but currently presented with NYHA Class 4 breathlessness, central cyanosis with a blood pressure of 180/100mmHg.

On further examination her Heart Rate was 118 beats per minute, O2 saturation was 87% in room air, 90% with O2 of 6L/min using Hudson Mask and Respiratory rate was 38 breaths per minute. Bilateral pedal edema was also present with pan digital clubbing. Systemic examination revealed bilateral creptations with normal vesicular breath sounds; S1, S2 heart sounds with a pan systolic murmur of grade- 3. On

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analysis of blood: ABG in Room air showed pH- 7.411,pO2- 52.0mmHg , pCO2- 30.8mmHg, HCO3- 19mmol/l, SaO2- 86.5%; Hb- 17.9g/dl, PCV-59.1%, Platelet count-65000/ mm3, TC- 10900; PT- 13.5s (13.0), INR 1.05, ApTT- 35.9s (30.0).

Chest X-ray showed dilated Right pulmonary artery and Cardio- thoracic ratio was 55% with periphery pruning. Bedside Echocardiography showed perimembranous VSD of 14mm, bi directional shunt, IAS intact, with severe PAH (RVSP-70) and EF- 58%.

After obtaining informed written consent. She was shifted to OT with O2 at 6l/min with Hudson mask after receiving anti aspiration prophylaxis. General anaesthesia was planned. Monitors such as ECG, pulse oximetry, NIBP were connected. Preinduction two wide bore venous access was secured. Internal jugular vein was cannulated using Seldingers technique and left radial artery was cannulated for beat to beat BP monitoring before induction to look for if any, hemodynamic embarrassment during induction. She was induced using Etomidate intravenously. Even though rapid sequence induction is what is suggested in pregnant patients for GA, we opted for titrated dose of the induction agent to avoid further compromise in her hemodynamics. Oxygen and air mixture (70-30%) along with Sevoflurane was used for maintenance. Muscle relaxation was achieved by Vecuronium. Oxygen saturation intra operatively was between 78%- 90%.

The goal was to maintain a CVP of 5-6 cm of water. LSCS was done and a boy baby weighing 960gms with 7/10 and 9/10 Apgar at 0 and 5 mins was extracted. Post extraction of baby, 10 units of Oxytocin was given as a slow IV infusion. The blood pressure of the patient fell following the delivery of the baby, thus injection Noradrenaline at 0.02-0.08µg per kg per minute was started intravenously for maintenance of SVR. Following completion of LSCS, she developed PPH for which a balloon tamponade was done using Foleys catheter. One bag of packed red blood cells were transfused after control of the bleeding. She was shifted to the intensive care unit and was electively ventilated. Injection Noradrenaline was tapered and stopped in immediate postoperative period.

IBP, Spo2, ECG, ABG were continuously monitored. On the second post-operative day she was extubated following a satisfactory ABG and improved chest signs. She comfortably maintained a saturation of 88-90% on 5L/min O2 Hudson mask with a respiratory rate of 20-25 breaths per minute. Mother and baby were stable and well on discharge after one week.

DISCUSSION

Eisenmengers syndrome is defined as the development of pulmonary hypertension in response to a left to right cardiac shunt with consequent bidirectional or reversal of shunt flow. Pregnancy is a cause of significant mortality in most published series of women with Eisenmengers syndrome. Pregnancy prevention and termination of pregnancy is preferred measure to improve survival changes in reproductive age group women.[3,4,5]

The hemodynamic changes of pregnancy are usually poorly tolerated in women with Eisenmengers syndrome. Most women with Eisenmengers syndrome are in a precariously balanced state and an important principle is to maintain that balance. The fall in peripheral vascular resistance that occurs during pregnancy can augment right to left shunting, worsening maternal hypoxemia and cyanosis.[6]

With any technique of anaesthesia, the chief consideration must be to avoid worsening of the degree of right to left shunt if already present. Thus it is imperative to maintain the SVR and prevent any decrease in it throughout the perioperative period.

Whether regional or general anaesthesia is being administered, nearly all anaesthetic medication from inhaled volatiles, to IV, to epidural, or subarachnoid- produces a decrease in SVR, as a result the right to left cardiac shunt is effectively worsened.[7]

General anaesthesia is the preferred technique among the most anaesthesiologists for Eisenmengers syndrome presenting in pregnancy. But each technique has its own Pros and cons. Positive pressure ventilation would decrease venous return and systemic blood pressure which would increase the right to left shunt. Neuriaxial Anaesthesia has been used successfully in some cases. It has an advantage of avoiding myocardial depression but at the risk of fall in SVR. The choice of anaesthesia technique should be made on considering patients unique physiology and hemodynamic status. A multidisciplinary approach is what is advocated for the management of such patients, with involvement of Obstetricians, Cardiologist, and Anesthesiologists, Intensivists.

In the above discussed case general anaesthesia was administered as the patient presented to us with cyanosis and respiratory distress. It was kept in mind throughout the procedure that even minute air bubbles can cause potentially serious effect in pulmonary microvasculature by obstruction. We used titrated dose of etomidate for induction so as to decrease the detrimental effect of GA on SVR. Nitrous oxide being a potential pulmonary vasoconstrictor was avoided in the above scenario. Both Isoflurane and Halothane are known to cause hypotension thus was avoided in this case and instead, Sevoflurane was used. Vecuronium was used for maintenance of muscle relaxation due to its cardiac stable property and absence of histamine releasing property.

The aim intra operatively was to 1) prevent hypercarbia so as to prevent acidosis and increased PVR which would worsen the shunt, 2) prevent hypoxia, 3) adequate depth of analgesia as pain can have adverse effects on PVR and SVR by increasing them, 4) Prevent Hypotension i.e., decrease in SVR , 5) well titrated volume status

Monitoring plays a Pivotal role in these patients in reducing Morbidity and mortality. Basic monitoring included Pulse oximetry, ECG, NIBP, Temperature. CVP and Intra-arterial blood pressure was also being monitored, as these would give us an idea of Right .heart filling status and SVR respectively. Due to inconsistency in achieving proper terminal position of pulmonary artery catheter, its usage is controversial. TEE even though needs expertise, is necessary in case of surgeries involving major fluid shifts.

We used Morphine to give adequate analgesia and titrated dose of noradrenaline to maintain SVR throughout the procedure. Oxytocin was given as a slow intravenous infusion after the extraction of the baby. Oxytocin as a bolus causes direct vasodilation and reduces SVR with compensatory increase in Heart rate and cardiac output.[8]

Because of the risk of pulmonary thromboembolism and paradoxical systemic embolization, heparin was given in a low dose.[9]

After successful completion of the LSCS, we decided to continue mechanical ventilation electively in her as the oxygen saturation was below 80%. All the monitors were continued to be used in post-operative period at ICU as hemodynamic instabilities are common in this period.

CONCLUSION

Eisenmengers syndrome undergoing caesarian section present many anaesthetic challenges, but an understanding of underlying physiology and the multidisciplinary approach can guide the perioperative management.

Thus, the anaesthesia technique is to be tailored in such way so as to a fall in PVR, decrease in SVR, tachycardia, hypoxia, hypercarbia and hypothermia is avoided perioperatively.

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List of Abbreviations

ES	Eisenmengers Syndrome
SVR	Systemic vascular resistance
PVR	Pulmonary vascular resistance
NYHA	New York Heart Association
ABG	Arterial Blood Gas
PT	Prothrombin Time
INR	International normalised ratio
ApTT	Activated prothrombin time
VSD	Ventricular septal defect
IAS	Inter atrial septum
PAH	Pulmonary Arterial Hypertension
OT	Operation theatre
ECG	Electrocardiogram
NIBP	Non invasive blood pressure
BP	Blood pressure
GA	General anaesthesia
CVP	Central venous pressure
LSCS	Lower section caeserian section
IV	Intravenous
PPH	Post partum haemorrhage
IBP	Invasive Blood Pressure
TEE	Trans Esophageal Echocardiogram
ICU	Intensive Care Unit

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