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Anaesthesia for a Patient with Severe Pulmonary Hypertension Coming for Cesarean Section: A Case Report

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Abstract: Pulmonary hypertension(PH) creates a significant challenge for the anesthesiologist, placing patients in high risk category. PH is a major reason for elevated perioperative morbidity and mortality, even in non cardiac surgical procedures. Stress, pain, ventilation, surgical related inflammation, can further increase pressure within pulmonary arteries and cause right heart failure. The major concern with PH is the development of right heart failure. These patients will be on various drugs. Either epidural or general anesthesia(GA) can be used, regional anesthesia is considered better. In GA, induction should be carried out slowly and doses should be titrated to avoid fall in systemic blood pressure. GA is preferred in later stages of PH or in severe cases, along with regional anaesthesia. The main advantage of GA is safe oxygenation and uncomplicated airway management, also inhalants for selective pulmonary vasodilatation can be administered easily. Here we report a case of severe primary PH, coming for caesarian section, managed under GA.
Keywords: Pulmonary hypertension, Cesarean section, Anaesthesia.

INTRODUCTION

The mortality for primary pulmonary artery hypertension (PAH) complicating pregnancy is very high, and the only long-term 'cure' is a heart-lung transplant [1]. The mean Pulmonary artery pressure (PAP) greater than 25 mm Hg or peak systolic PAP greater than 40 mmHg is interpreted as Pulmonary Hypertension. The disease is severe when mean PAP exceeds 45 mm Hg or peak systolic PAP exceeds 60 mm Hg [2]. Initial symptoms are nonspecific and PAH is diagnosed in late pregnancy. In the presence of PAH, a physiological increase in blood volume which occurs in pregnancy, causes volume overload in right heart, and problems of hemodynamic compensation occurs which can have serious consequences such as cerebrovascular accidents, thromboembolic events. Anaesthetic management of such patients remains a challenge. We report a case of severe PAH who underwent elective LSCS under general Anesthesia.

CASE REPORT

A 23year old primigravida, presented with increasing dyspnea at 37 weeks of pregnancy. She was diagnosed to have Pulmonary artery hypertension with Tricuspid regurgitation at 5th month of pregnancy. On examination she had a heart rate of 114 beats/min, Blood pressure of 130/80mmHg. On auscultation, she had loud P2 and a grade 4 systolic murmur of Tricuspid Regurgitation. ECG showed Sinus tachycardia, right axis deviation, right ventricular hypertrophy. Chest radiograph showed cardiomegaly. Echocardiogram showed EF 78%, dilated right sided chambers, signs of severe PAH with secondary TR, systolic pulmonary artery pressure (PAP) of 120mm Hg. Patient was started on Tab Nicardia retard 5 mg BD, Tab Spironolactone 25mg + Furosemide 10mg OD, from 5th month. Complete blood count and Serum electrolytes were normal. General Anaesthesia was planned for the patient. The anesthetic procedure was explained to the patient and written informed consent obtained. The patient was premedicated with tablet ranitidine 150 mg orally the night before and 2 hours prior to surgery.

In the operating room, a 18G iv cannula was secured over right forearm. Monitoring of noninvasive blood pressure (NIBP), heart rate, electrocardiography & pulse oximetry was done. Inj glycopyrrolate 0.2 mg and Inj Metaclopromide 10mg IV were given, patient preoxygenated and with application of cricoid pressure, patient was induced with Inj thiopentone 250 mg and paralysed with scholine 100 mg. To avoid pressor response from laryngoscopy and tracheal intubation, lidocaine 1.5mg/kg was administered. Patient was intubated with 7 mm ETT, cuff inflated and fixed after bilateral equal air entry was confirmed and cricoid pressure released. Patient was ventilated with Oxygen

and Isoflurane, and an ETCO2 of 35-40 mm Hg was maintained intraoperatively. Nitrous oxide was avoided. Right Internal Jugular Vein was cannulated and the Central Venous Pressure maintained at 10-12 cm H_2O. Right radial artery was cannulated for invasive blood pressure monitoring. Nitroglycerine(NTG) infusion was started. Neuromuscular blockade was maintained with Inj vecorunium. After delivery of baby, Oxytocin infusion was started and inj fentanyl 100 microgram, Inj Midazolam 2mg i.v were administered. Surgery was completed. Residual neuromuscular blockade was reversed with inj neostigmine 0.05 mg/kg and glycopyrrolate 0.01mg/kg. Patient was extubated awake, after thorough suctioning and shifted to ICCU. NTG drip was continued in the post operative period and tapered accordingly. Other pre-op drugs also continued. Analgesia was maintained with Inj Paracetamol 1g i.v Q 6 H. On 3rd postoperative day, Tab Nicardia was increased to 10 mg TID along with Tab Lasilactone, and Tab sildenafil 25 mg OD was started. These drugs were continued and patient recieved oxygen 6L/min through facemask. On 7th postoperative day, her condition deteriorated. She became tachypnoeic with chest showing bilateral coarse crepitations. She became more hypoxic and acidotic, and was referred to higher centre.

DISCUSSION

Pulmonary hypertension is defined by a mean pulmonary arterial pressure higher than 25 mmHg at rest. The increased blood pressure in the pulmonary vessels ultimately leads to hypertrophy and failure of the right ventricle. During pregnancy, physiologic cardiovascular and pulmonary changes worsens PH and right ventricular function. Additional hemodynamic changes occur with labor, especially during uterine contractions. Scheduled cesarean delivery is often used.

Some authors have described the use of general anesthesia(GA) with good maternal outcome, saying regional block may cause a reduction in venous return which impairs output from right ventricle [3]. There is now an increasing number of case reports highlighting the use of regional anesthesia with good outcome. Nonetheless, the dense and extended block needed to prevent pain during cesarean delivery may have significant hemodynamic consequences. Specifically, single-shot spinal anesthesia is considered contraindicated in these patients. Therefore, epidural anesthesia with increment doses is most often advocated as the best regional technique. We decided to perform GA as we felt more confident that we could maintain critical filling pressures to right ventricle and be more likely to control increases in PVR associated with intubation or surgical stimulation. The main advantage of GA is safe oxygenation and also inhalants for selective pulmonary vasodilatation can be administered easily [4].

Hemodynamic goals for Pulmonary Hypertension(PH) during anaesthesia[5]:

- Avoid elevations in Pulmonary Vascular Resistance (PVR): Prevent hypoxemia, acidosis, hypercarbia, pain, hypothermia, hypervolemia, insufficient anesthesia and analgesia. Provide supplemental oxygen at all times.
- Maintain Systemic Vascular Resistance (SVR): Decreased SVR dramatically reduces Cardiac output due to fixed PVR.
- Avoid myocardial depressants and maintain myocardial contractility.
- Maintain preload.
- Maintain sinus rhythm.

Monitoring at delivery with electrocardiography, pulse oximetry, and invasive arterial blood pressure monitoring is always advocated. The use of a pulmonary artery catheter is more debated because of the increased risk of pulmonary artery rupture and thrombosis in PH. The postpartum period is the most critical period for acute PH decompensation [6]. After placental extraction, cardiac output and systemic vascular resistances increase dramatically, and return to the previous state can take up to 6 months. Therefore, physiological changes occurring during pregnancy and also during delivery and the postpartum period are hazardous for patients with severe PH. Accordingly, pregnancy is considered to be contraindicated in women with Pulmonary Hypertension, and an effective method of contraception is recommended in women of childbearing age [7].

CONCLUSION

Primary PAH complicating pregnancy remains a fatal condition. Women with PAH are advised against pregnancy. Despite the most modern treatment efforts, the overall mortality rate of pregnant women with severe PH is 30-50%, with deaths reported to occur between 2-9 days postpartum, usually from right heart failure. Cesarean delivery during regional anesthesia with invasive monitoring seemed to be an attractive approach, but there was no evidence of actual benefit. Therefore, pregnancy should still be discouraged in these patients and therapeutic abortion should be offered, particularly when early deterioration occurs. Its Anesthetic management remains a complicated task, which requires close cooperation among Obstetricians, Anesthesiologists, Intensivists, Pulmonologists and Cardiologists.

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