ANAESTHETIC MANAGEMENT OF PARTURIENT WITH PRIMARY PULMONARY HYPERTENSION POSTED FOR CAESAREAN SECTION - A Case Report

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SUMMARY

Primary Pulmonary Hypertension (PPH) is as rare, progressive, incurable and fatal disease. When it is associated with pregnancy, the mortality rises to more than 50%. We report a parturient having primary pulmonary hypertension, in active labor, requiring emergency cesarean section. Epidural anaesthesia resulted in good maternal and neonatal outcome.

Keywords: Primary pulmonary hypertension, Pregnancy, Epidural anaesthesia.

Introduction

Primary Pulmonary Hypertension is a rare, progressive and fatal disease, characterized by elevated pulmonary vascular resistance. It has female to male preponderance (1.7 to 1) with maximum incidence reported in third and fourth decade of life. Pregnancy in women with pulmonary hypertension stresses the already compromised cardiovascular system and is associated with very high peripartum mortality. Though the mode of delivery is decided by the obstetric factors, the optimal anesthetic management is either controversial or inconclusive.

We present a case of parturient in labor with primary pulmonary hypertension, who underwent delivery by cesarean section under epidural anaesthesia with good maternal and neonatal outcome.

Case report

A 28 year old, term pregnant woman lady admitted to our hospital, with history of labor pains. She also complained of shortness of breath on exertion. On detailed interrogation patient revealed that she was under the care of cardiologist, for dyspnea and swelling of feet 2 years ago and was diagnosed as primary pulmonary hypertension (PPH), in right heart failure. She was advised tab. digoxin 5 days a week along with tab. amlodipine 10 mg. OD and expecting fatal outcome, patient was advised not to conceive. But still patient did conceive and was referred to our hospital.

On examination her BP was 100/70 mmHg, pulse rate 88 beats per minutes and regular. The respiratory rate was 24 permin, NYHA class I. Chest was clear on auscultation. There was no evidence showing right heart failure. X-ray chest revealed enlarged pulmonary arteries, with right atrial and ventricular dilatation. The ECG showed sinus rhythm with right axis deviation and right atrial and ventricular hypertrophy. The echo-cardiogram with Doppler ultrasonography demonstrated tricuspid regurgitation stage I and systolic pulmonary artery pressure 48 mmHg and dilatation of right atrium and right ventricle. The LV appeared contracted. The Hb% was 9.4%, and platelet count 120000 cm. The SpO2 which was 90% increased to 94% with supplemental 4 L min⁻¹ O₂ therapy with mask.

Patient was explained about the poor outcome of delivery and informed consent was obtained.

Patient was started on tab. sildenafil 100 mg TDS and O₂ supplementation 4 L min⁻¹ with mask was continued. The BP HR, RR and SpO₂ were constantly monitored even as the obstetrician was closely monitoring the progress of labor.

Lumbar epidural analgesia was administered without any difficulty for labor analgesia in L₂-₃ inter space; with patient in left lateral decubitus position, a test dose of 3 ml of inj. lignocaine 1.5% with (15 g) adrenaline was given and later 6ml of 0.25% bupivacaine was administered.

Two hours later obstetrician observed fetal tachycardia of 160BPM and hence decided for LSCS. She was preloaded with 500 ml ringers lactate. Anaesthesia was instituted slowly with incremental doses up to 8 ml of...
with left uterine displacement was continued. The sensory block spread up to T8 level.

Except for one brief episode of systemic hypotension (80/60 mmHg), which was treated with inj. ephedrine 10 mg, the intra operative course was uneventful. The patient was given inj. syntocinon 10 units in infusion. The approximate blood loss was about 600 ml. The patient received a total of 1500 ml of crystalloids solution in OT. A male baby weighing 2.8 kg was delivered with APGAR score of 6 and 9 at 1 and 5 min. Postoperatively patient was continued on supplemental O2 4 Lmin⁻¹ through mask for next 12 hrs even as SpO₂ remained at 94-96%. Epidural postoperative analgesia was administered with inj. tramadol 75 mg and 3 ml of 0.25% Bupivacaine as and when demanded by patient, for the next 48 Hours.

The remaining part of hospital stay was uneventful. The patient received tab. nifedipine 10 mg TDS and tab. Sildenafil 50 mg TDS. On 10th day, 2 D echocardiography was done which showed reduction in size of right heart chambers but a rise in systolic PAP to 58 mmHg. So the mother and baby were discharged in good physical health. Patient was advised tab. nifedipine 20 mg TDS and tab. sildanefil 50 mg TDS.

Discussion

The diagnostic criteria used in the NIH registry for PPH include a mean pulmonary artery pressure of more than 25 mmHg at rest or more than 30 mmHg with exercise, and exclusion of left sided cardiac valvular disease, myocardial disease, congenital heart disease and any clinically important respiratory connective tissue or chronic thromboembolic disease.²

The enhanced activity of thromboxane or diminished activity of prostacyclin or impaired synthesis of nitric oxide has also been associated with PPH. But whether these are the cause or the result of the disease is unclear.²

The hormonal changes associated with pregnancy allow large amount of fluid to accumulate in the interstitial space. Following delivery, this fluid is suddenly shifted to maternal circulation, increasing preload significantly and further increasing pulmonary hypertension. This lethal risk is highest during first 10 days of post partum period.³

In healthy pregnant woman PVR is 34% less than in non pregnant states, as the prostacyclin production is increased five fold. The withdrawal of this pulmonary vasodilator effect of prostacyclin in immediate post partum period may account for majority of deaths.¹

The anaesthetic management of pregnant patient with PPH remains controversial. However the goals of anaesthetic management include:

- Avoiding further increase in PVR
- Avoiding marked decrease in venous return
- Avoid marked reduction in SVR
- Avoid myocardial depression

Both the inhalational induction and narcotic based induction are recommended. But the disadvantage includes slow induction, neonatal depression, maternal myocardial depression, effects of positive pressure ventilation among others.

Nitrous oxide may increase PVR in preexisting PH patients. Ketamine, by releasing catecholamines, can increase PVR.⁴ The other IV or inhalation anaesthetics, neuromuscular blockers and antagonists have little effects on PVR.⁵ The use of PA catheters has not reduced the mortality in parturients. The difficulty in insertion of PA catheter, due to low CO, large RV, precipitation of arrhythmias and difficulty in obtaining accurate measurements due to elevated PVR, lead to its questionable usefulness.⁶

Echocardiography can be very useful monitor in these patients as it also provides information regarding contractility, EF, wall motion abnormalities, biventricular interaction etc.¹

If preload and after load are well maintained, regional or peripheral blocks are ideal. The single biggest predictor of outcome in patients with pulmonary hypertension is presence of RV failure.

Sildenafil a new investigational drug is used in combination with inhaled NO, decrease the pulmonary artery pressure. It has the advantage of oral medication and can be taken chronically.

Hare et al observed a mortality rate of 50% for vaginal delivery and approaching 100% for caesarean section in patients with PPH.⁷

Smedstad and colleagues,⁶ reported 8 cases of PH with pregnancy. One of these cases was primary PH and was successfully managed with epidural anesthesia. Kiss et al who observed that, of the 11 cases reported in literature since 1956, maternal death resulted in 7 patients and two could survive with intensive management.

The 18 reported cases observed by Khan and inj. lignocaine 2% (140 mg). The supine position Bhatt,¹ there were 10 deaths following anaesthesia for LSCS and
vaginal delivery, 5 deaths occurred within 48 hrs. following LSCS (3 epidural and 2 GA) and 5 other deaths occurring following vaginal delivery under epidural anesthesia, during 4 weeks peripartum period. The autopsy in these patients revealed no significant information.

Satoh et al.\(^8\) indicate that technique of anaesthesia for LSCS in patients with PPH, depends on severity of disease in individual cases. The successful use of ECMO for a patient with low CO and NYHA IV was reported for termination of pregnancy in patient with PPH.

The aerosolized PGI\(_2\) and its synthetic analog iloprost, are easy to administer, do not affect SVR and reduce PAP, when compared to inhaled NO and IV PGI\(_2\), though its experiences in parturient is limited.\(^9\)

Successful use of oral nifedipine to lower PAP during LSCS under epidural anesthesia was reported by Khan and Bhatt\(^1\) and other ulmonary vasodilators such as IV epoprostenol 2-20 mgkg\(^{-1}\)min\(^{-1}\),\(^10\) Inj. adenosine 50-200 kg\(^{-1}\)min\(^{-1}\) IV is are also used for management of PH, but reports of their use during LSCS are not available. Some researches advocate the use of cardiac glycosides, when calcium blockers are used, for countering the negative isotropic effects of calcium channel blockers.\(^2\) The use of oral sildenafil has shown promising results, especially in children with congenital heart diseases, the results of its use in parturients are yet to be evaluated. Though controversial, we chose epidural anaesthesia as we considered it as a safe alternative to general anaesthesia. The stress of laryngoscopy and intubation and the problems of IPPV (increased SVR) are avoided. Lignocaine with adrenaline is used as test dose only as it can cause fall in SVR. The post operative analgesic can provide a stable cardiovascular situation.

**Conclusion**

The PPH can worsen during labor and delivery resulting in high maternal mortality. Although no conclusions can be drawn from this single case report it is demonstrated that in selected cases, caesarean section can be performed under epidural anesthesia. The usefulness of oral sildenafil needs to be studied in parturients. The peripartum management of patients with PPH is best conducted by a multidisciplinary approach using expertise of anaesthesiology, obstetrics and cardiologists to provide better results:

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**References**


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**CORRIGENDUM**

Refer :"Handy formula for calculation of infusion rate of any drug.” Indian J. Anaesth 2005;49(1) : 16. The general formula, the volume of dilation is ‘P’ ml in the text it has been wrongly printed as ‘X’ ml. The readers are requested to read volume of dilution as ‘X’ in place of ‘P’ wherever it has appeared. The error is regretted.

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