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Emergency LSCS in A Patient with Rheumatic Heart Disease and Severe Mitral Stenosis and PAH (NYHA III)

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Abstract: ***The incidence of rheumatic mitral stenosis has grossly decreased in India. Still, among heart diseases complicating pregnancy, rheumatic mitral stenosis occupies a greater segment. The unique physiological changes in pregnancy and the pathological impact of mitral stenosis over pregnancy and labour are discussed in detail. A multidisciplinary approach in the diagnosis and management reduces the mortality and morbidity during peripartum. The anasesthesia management used in a case of an emergency LSCS in a patient with severe MS is discussed at length in this article.***

Keywords: LSCS, mitral stenosis, rheumatic heart disease, severe, PAH

1. Introduction

A pregnant patient primi gravida at 32.3 weeks of gestation by scan and 31.5 weeks by date with rheumatic heart disease with severe mitral stenosis and pulmonary hypertension, which was diagnosed at the seventh month of pregnancy, was posted for emergency LSCS. The intraoperative management is discussed.

2. Prevalence of MS in Pregnancy

Heart disease occurs during pregnancy in 0.4% to 4.1% of patients and is a leading non-obstetric cause of maternal mortality ranging from 0.4% 1% among patients of class I and II to 5-15 % among in class III and IV NYHA functional classification.[1]

3. Case Report

- A 30 year old, primigravida at 32.3 weeks of gestation by scan, weighing 54kg presented with active labour pains and complained of dyspnoea on exertion and dry cough, which she developed at the 7th month of gestation. At the time of her routine antenatal check up, she presented with mid-diastolic murmur with loud S1 at the apical area. She was investigated thoroughly and confirmed to have mitral stenosis. Her ECG showed bilateral atrial enlargement with right bundle branch block pattern with right ventricular hypertrophy with intra ventricular conduction defect. Echocardiography was also done which showed severely stenosed mitral valve (0.9 cm^2), peak/mean pressure gradient 16/14-mm of Hg, mild PHT with LVEF of 60% and intact IAS and IVS.
- The patient was on Tab. Metoprolol XL 25 mg 1 tab. OD , Tab. Ecosprin/Asprin 75mg 1 tab. OD, with Inj. Penidura 12 lac units every 21 days.
- After one month of this treatment regimen, she was taken for LSCS due to foetal distress. On preanaesthetic examination on the operation table, her pulse was 86/min, regular in rate & rhythm with no apex pulse deficit, blood pressure of 138/90 mm Hg with no signs of failure. Auscultation revealed mid diastolic murmur grade 4/6 with loud S1 , opening snap at the apical area, loud P2 at pulmonary area and clear breath sounds without any crepitations was appreciated. Her obstetric examination revealed 32.3 weeks size uterus with LOA and FHS was 160/min. There was no hepatomegaly. Her routine investigations were within normal limits and ECG findings were same as before. However portable Echocardiography showed increased difference in peak/mean pressure gradient from 16/11 mm Hg to 30/24 mm Hg, otherwise all other parameters were same as before.
- After taking informed written high risk consent in a language they understood best, she was taken up for LSCS. Patient was nil by mouth for 8 hours prior to surgery. Left lateral tilt was given. Before induction she was given Inj. Ranitidine 50mg IV, Inj. Metoclopramide 10mg. IV as aspiration prophylaxis with Inj. Cefotaxime 1gm IV. A 14F Ryle's tube was passed & thorough suction was done. Thereafter patient was premedicated with Inj. Midazolam 1mg IV slowly after dilution and

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preoxygenated with 100% oxygen for 3 mins. Patient was induced with Inj. Etomidate 20mg IV + Inj. Propofol 60mg IV. Inj. Atracurium 30 mg IV was used as muscle relaxant. Inj. Lignocaine IV preparation 60mg was injected intravenously to prophylactically attenuate any response to laryngoscopy and intubation. After 3 mins of preoxygenation DVL was done, vocal cords seen, 7.5 ET tube inserted between vocal cords under vision. Special care was taken to be as gentle as possible at the time of laryngoscopy and intubation to avoid any tachycardia or hypertension. Pt was maintained on sevoflurane +nitrous oxide+ oxygen at 4lts/min.

- At birth the APGAR score of the baby was 8 which soon increased to 10. Birth weight of baby was 2.4kg. After delivery of the baby Inj. Fentanyl 100mcgs IV was given for analgesia.
- Oxytocin drip was started to assist the uterine contraction. Inj. Methargin was omitted. She received approximately 450 ml of crystalloid intraoperatively. She remained haemodynamically stable throughout surgery. Urine output was good throughout the surgery. At the end of surgery reversal of neuromuscular blockade was achieved with Inj. Neostigmine 2.5mg and Inj. Glycopyrrolate 0.2mg. Inj Lignocaine IV preparation 60mg was given before. On achieving adequate respiration and good airway reflexes, a smooth extubation was carried out. Postoperatively head up position was maintained and oxygen supplementation was done with venturi mask and she was closely monitored for an additional 30 minutes in the O.T. itself. As her haemodynamics remained stable, she was shifted to the Surgical ICU where oxygen was supplemented with Hudson mask and headup position was given. Same monitoring was continued. We requested the Obstetrician to continue the same treatment which she had received in the preoperative period. Her subsequent course in the hospital was uneventful and a cardiology reference was requested for further management.

4. Discussion

Mitral Stenosis is the sole predominant valvular lesion in most of the parturients. A pregnant patient with this heart disease challenges the anaesthesiologist's skills. Pregnancy and labour each physiologically imposes demands on the circulationand cardiovascular system of the patient, thus, anaesthesia may cause even more stress to an already compromised heart and cardiovascular system. Fundamental derangements produced by lesion of mitral stenosis are:

1) Obstruction to blood flow from Left Atrium to Left Ventricle
2) Increase left atrial pressure
3) Increase pulmonary capillary venous pressure

4.1 Pregnancy aggravates MS in the following ways:

- Increased Heart Rate decreases diastolic filling time through narrow ostium.
- Increased cardiac output demands that more blood than usual must flow through the orifice.
- Increased pulmonary blood volume causes the pulmonary capillary pressure to exceed the colloid osmotic pressure thereby increasing the chances of pulmonary edema.
- Autotransfusion with labour pains and after delivery of the baby can aggravate the conditions 2 and 3 as above and can convert the compensatory stage into a decompensatory stage.

4.2 Problems encountered by the anesthesiologist in the management of symptomatic patients are[5, 6]:

1) Interaction with cardiac medications such as digoxin, Ca channel blockers, diuretics, anticoagulants. The parturient with MS has an increased incidence of congestive cardiac failure, atrial fibrillation, etc. Digitalis is the most often administered drug to increase myocardial contractility and to slow the ventricular heart rate response in the patient with atrial fibrillation. In the absence of adequate pre-operative heart rate control, activation of sympathetic nervous system as during intubation of the trachea or in response to surgical stimuli may adversely increase the heart rate with subsequent decrease in the diastolic filling time and stroke volume. Digitalis toxicity is suggested by prolongation of the P-R interval and the appearance of ventricular premature beats on ECG. Diuretics are known to produce hypokalemia, which may aggravate digitalis toxicity. The presence of orthostatic hypotension may be an evidence of diuretic induced hypovolaemia. The advisability of discontinuing anti-coagulant before elective surgery still remains controversial.
2) Fluctuations in haemodynamic status during labour, delivery and in immediate post partum period may result in congestive cardiac failure and increases the chances of pulmonary oedema. This is mainly because of autotransfusion by the contracted uterus. So post partum period deserves special attention with fluid restriction, diuresis and early ambulation, which can reduce complications and enhance recovery.
3) Considerations for two lives- Mother and Child On examining the patient on operation table, we decided our anaesthetic goals as follows:

- To relieve anxiety we gave Inj midzolam, a short acting benzodiazepine. As there is high chances of sub acute bacterial endocarditis, we gave higher antibiotic like Inj. Cefotaxime.
- In our patient as the pulse rate was only 72 min/1, no pharmacological agent was used to decrease the pulse rate but care was taken to provide smooth induction and intubation.
- Considering the delayed gastric emptying time in pregnancy, we decided to follow the aspiration prophylaxis protocol.
- Minimizing increase in central blood volume by judicious use of fluids and giving head up position.
- Avoiding increase in pulmonary artery pressure by avoiding hypoxia, hypoventilation, hypercarbia, lighter plane of anaesthesia, etc. Regarding choice of anaesthesia technique: No single technique is exclusively indicated or contraindicated. The primary concern is to avoid and/or treat specific pathophysiologic changes that exacerbate the

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disease process. Epidural anaesthesia is the choice in the patient with moderate stenosis while in the patient with severe stenosis general anaesthesia is beneficial. [9]

Choosing an epidural anaesthesia in such type of patients demand careful titration of local anaesthetic drugs with cautiously treated hypotension with fluid infusion to establish normal filling pressures. Drop in systemic vascular resistance and blood pressure should be managed with phenylephrine hydrochloride. Ephedrine will increase the heart rate thus not useful in severe mitral stenosis. A single spinal bolus is not indicated for a fear of hypotension as severe decrease in systemic vascular resistance will reflexly increase the heart rate and lower the left ventricular filling.

1) We preferred to give General Anaesthesia considering many factors like:

- Foetal distress
- Precious pregnancy
- Multivalvular disease like severe mitral stenosis with pulmonary hypertension.
- Nitrous oxide with a low concentration of volatile drug and an opioid is a good combination for intraoperative management. Although nitrous oxide can evoke pulmonary vascular constriction and increased peripheral vascular resistance it seems unlikely the magnitude of this change would justify avoiding this drug in every patient with mitral stenosis.[7]
- The muscle relaxant with minimal effect on heart rate, blood pressure and systemic vascular resistance e.g. vecuronium, atracurium are useful in the patient with mitral stenosis.
- Head up position just before delivery in anticipation of sudden increase in pre-load produced the autotranfusion of large volumes of blood into the circulation by the contracting uterus. The head high diverted much of the autotranfused blood into the lower extremities.[6]
- Opioids based general anaesthesia provide good haemodynamic stability. Fentanyl (20-50 ug/kg, total) or morphine (0.5 to 1.0 mgkg-1, total) induction will be beneficial, but can cause respiratory depression in mother as well as in fetus.[8]
- Naloxone should always be kept ready for resuscitation.

2) Considering all these factors, we induced our case with Inj.Etomidate IV and Inj. Fentanyl 100 mcgs IVafter delivery of the baby to provide analgesia. Our case was referred for balloon valvuloplasty afterwards.

5. Conclusion

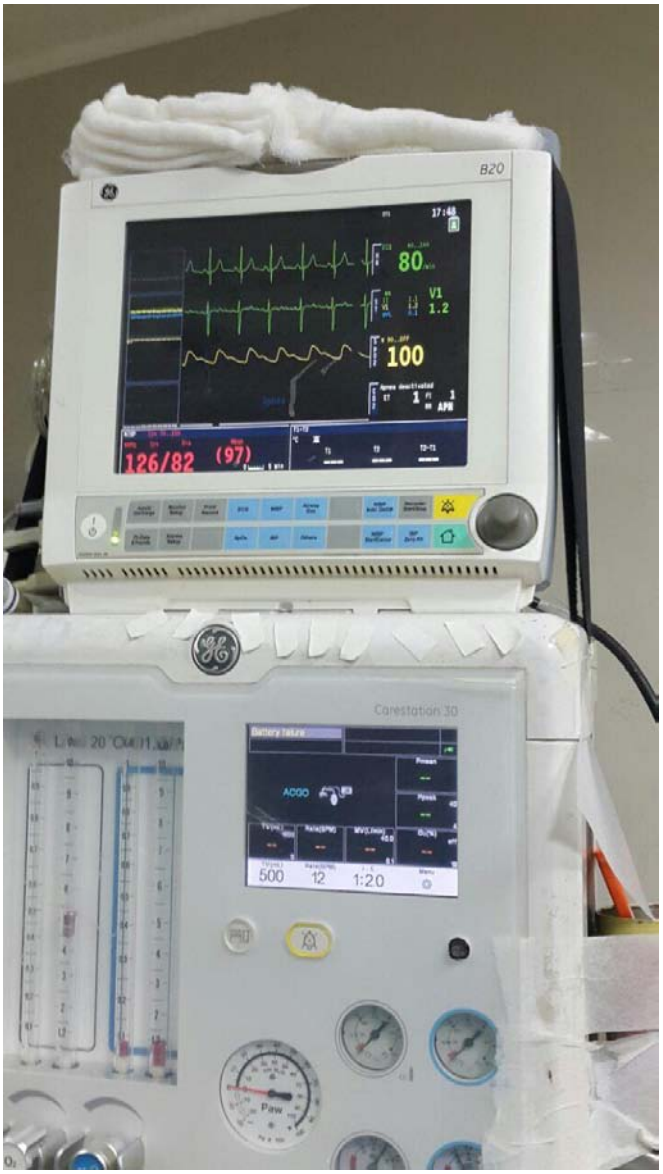
In patients with severe symtoms inspite of adequate medical therapy, mitral valve commisurotomy or balloon valvuloplasty should be recommended and can be done in second trimester successfully.[10] Thus we want to stress that an overall review of these patients is required to decide an anaesthetic technique and proper and adequate intraoperative as well as postoperative care is the key to the outcome of such cases.

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