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Case Report

Anaesthesia Section

Anaesthetic Management of Parturient with Severe Mitral Stenosis Planned for Elective Caesarean Section for Safe Confinement

MAITRI PATEL[1], SANJOT NINAVE[2], AMOL BELE[3], PALLAVI DEULKAR[4], NITIN ALASPURKAR[5]

ABSTRACT

Perioperative management of pregnant women with cardiac disease is challenging. The physiological cardiac changes that occur during late pregnancy leads to haemodynamic stress to the patient with the cardiac disease during and immediately after parturition. Pregnant women with severe valvular disease do not tolerate haemodynamic changes associated with pregnancy. The choice of anaesthesia technique either general anaesthesia or regional anaesthesia is depending on the haemodynamic goals, cardiac status of the patient, and mode of delivery. A 23-year-old female patient was planned for elective caesarean section for safe confinement. She was an operated case of Balloon Mitral Valvuloplasty (BMV). General anaesthesia was preferred due to the severity of mitral stenosis. Incorporation of epidural analgesia with general anaesthesia provided intraoperatively haemodynamic stability during laryngoscopy, intubation, and extubation. Also, postoperatively analgesia could be achieved due to epidural top-ups. Ultimately, a good perioperative outcome has been achieved due to haemodynamic stability which reduces perioperative morbidity and mortality of the patient.

Keywords: Haemodynamic changes, Perioperative care, Pregnancy

CASE REPORT

A 23-year-old G2A1 with 40 weeks of gestation was referred from a district hospital. Seven years ago, the patient had episodes of haemoptysis and was diagnosed with severe mitral stenosis with a Mitral Valve Area (MVA) of 0.7 cm^2 and moderate pulmonary hypertension. The patient underwent BMV. Post BMV echocardiography suggestive of MVA of 1.6 cm^2, mitral valve gradient of 6/4 mmHg with no mitral regurgitation. A tablet of aspirin 150 mg once a day was advised for six weeks. The patient was asymptomatic throughout her current pregnancy. The patient was referred to the preanaesthesia clinic for deciding on the perioperative plan of management.

A thorough preanaesthetic check-up was done. Her Basal Metabolic Rate (BMI) was of 17.5 kg/cm^2 and her Mallampati grade was one. The chest was bilaterally clear and the diastolic murmur was present on auscultation. Preoperative echocardiography was suggestive of severe mitral stenosis (MVA-1.3 cm^2), mild mitral and tricuspid regurgitation, left atrial enlargement, and left ventricular ejection fraction was 60%. An elective caesarean section was planned for an American Society of Anaesthesiologist (ASA) class III patient under general anaesthesia with epidural analgesia.

Informed, verbal and written consent was taken. Nil-per-oral was confirmed. Inj. cefotaxime 1 gm was given 30 minutes prior to surgical prophylaxis. Inj. pantoprazole 40 mg was also given. The patient was shifted to the operating room. Monitors were placed and baseline vitals (Heart Rate (HR)- 82/min, Blood Pressure (BP)-126/78 mmHg, and SpO_2-100%) were noted. Intravenous access was secured and ringer lactate was started. Urinary catheterisation was done. The invasive arterial was kept ready. Under all aseptic precautions, an epidural catheter of 20G was secured at L3-L4 space and fixed at 9 cm to the skin via using an 18G Tuohy's needle in the lateral decubitus position. The patient was repositioned slightly by using a left-sided wedge. Inj. Bupivacaine 0.250% of 10 mL was given through an epidural catheter in titrated doses.

Preoxygenation with 100% oxygen was done for 3-4 min. Inj. Glycopyrrolate 0.2 mg was given. Modified rapid sequence induction was performed using inj. Etomidate 22 mg and inj. succinylcholine 100 mcg. The patient was intubated with a 7.0 mm cuffed endotracheal tube. The HR was in the range of 82-90/minutes while BP was in the range of 120/78 to 128/80 mmHg during induction of general anaesthesia and intubation. Ringer lactate was given on titrated basis. After the delivery of the baby, oxytocin was started on an intravenous drip slowly at 10 units/hr. The depth of anaesthesia was maintained by oxygen and air 50:50. Inj. fentanyl 100 mcg and inj. atracurium 30 mg was given immediately after delivering the baby. Normocarbia was maintained throughout the period.

At the time of closure, inj. Bupivacaine 0.125% with inj. fentanyl 50 mcg was given for maintaining haemodynamics during and after extubation. At the end of the procedure, the patient started breathing spontaneously. The patient was reversed by using inj. glycopyrrolate 0.04 mg and inj. neostigmine 2 mg i.v. slowly. Extubation was performed without any change in haemodynamics and the patient was shifted to the cardiac care unit for observation with an epidural catheter kept in-situ. Postoperatively, inj. bupivacaine 0.125% of 10 mL with inj. fentanyl 25 mcg was given via epidural catheter every eight hourly for the first 72 hours of the postpartum. The patient was monitored for two days in the cardiac care unit and then transferred to the postnatal ward. The mother and baby were discharged from the hospital on the seventh postoperative day without any perioperative complications.

DISCUSSION

A normal pregnancy is associated with physiological cardiovascular changes that affect well-being of women with heart disease. If a pregnant patient presented with cardiac disease then the risk of

morbidity and maternal mortality is high during the perioperative period. The maternal morbidity and mortality due to cardiac disease depends on the severity of that cardiac disease. Valvular Heart Disease (VHD) in pregnant women can lead to maternal, foetal, and neonatal complications. Pregnant women with severe valvular disease do not tolerate haemodynamic changes associated with pregnancy.

Most of the women who remain asymptomatic throughout their pregnancy can tolerate labour and delivery but, it is poorly tolerated by symptomatic pregnant women with cardiac disease Mitral stenosis contributes to 90% of Rheumatic heart disease in pregnancy [1]. In developing countries, due to high prevalence of rheumatic fever cardiac disease complicates 5.9% of pregnancies with high maternal mortality [1]. The anaesthesiologist plays an important role in perioperative management because these maternal deaths occur during or immediately following parturition [1].

The choice of anaesthesia technique either general anaesthesia or regional anaesthesia is depending on the haemodynamic goals, the cardiac status of the patient, and the mode of delivery. According to studies, the anaesthetic management of pregnant patients with severe mitral stenosis depends on the cardiovascular status, expertise of an anaesthesiologist, and available treatment options [2]. So, there is a need to understand the pathophysiology behind severe mitral stenosis and discuss various anaesthesia techniques to find out a perioperative anaesthetic plan for good maternal and foetal outcomes.

The cardiopulmonary changes in pregnancy during peripartum affect the well-being of women with cardiac disease. The increase in cardiac output during the peripartum period is poorly tolerated by pregnant women with severe mitral stenosis. The heart cannot handle the situations where there is an increase in metabolic demand or blood volume because of the fixed cardiac output state. A pressure gradient that forms between the left atrium and left ventricle during diastole is the key characteristic of mitral stenosis. Pulmonary congestion results from the back pressure on the pulmonary arteries. It can result in pulmonary oedema in extreme circumstances. The risk of pulmonary oedema persists for several days after delivery, irrespective of any mode of delivery due to autotransfusion [3]. So, intensive care monitoring is essential during peripartum period. The anaesthetic goals for perioperative management are to maintain normal sinus rhythm, low heart rate, adequate preload and after load, and prevention of factors that lead to pulmonary hypertension like hypoxia, hypothermia, acidosis, and hypercarbia.

The maternal outcome seems to correlate well with the New York Heart Association (NYHA) functional classification [4]. The most common maternal complication associated with VHD is heart failure and arrhythmias, while foetal complications are prematurity and intrauterine growth retardation. According to studies, the incidence of maternal cardiac complications correlates with the severity of mitral stenosis [5]. Factors like previous history of heart failure, arrhythmia, and transient ischaemic attack or stroke, a baseline NYHA class III or more or cyanosis, ejection fraction 40% or less, pulmonary hypertension and severe aortic stenosis are associated with an increase in risk of complications [6].

General anaesthesia was preferred in the index patient due to severity of mitral stenosis. To avoid haemodynamic changes during laryngoscopy and intubation, inj. bupivacaine 0.250% was given via epidural catheter. Etomidate as an induction agent of general anaesthesia is preferred because of its cardioprotective action. For maintaining haemodynamic stability before and during intubation, the short acting beta blockers and opioids can be used. Esmolol is a preferred beta blocking drug but it is associated with foetal bradycardia. Opioids can also be used for stable haemodynamics. However, in one case report, alfentanil provided haemodynamic stability and allowed for immediate postoperative extubation but caused neonatal respiratory depression [7]. So, epidural analgesia with general anaesthesia provided haemodynamic stability during laryngoscopy and intubation and the use of opioid and esmolol can be avoided which have effects on foetal outcome.

Adequate depth of anaesthesia was maintained to avoid increase in HR. Inhalation agent was avoided to prevent uterine atony. Oxytocin was given slowly to avoid decrease in Systemic Vascular Resistance (SVR) and Pulse Volume Recording (PVR) that leads to decrease in cardiac output. Ergometrine and prostaglandins analogues were avoided because it is responsible for severe hypertension and tachycardia. For maintaining haemodynamic stability during and after extubation, inj. bupivacaine and inj. fentanyl were given via epidural catheter. Postoperative analgesia was achieved with epidural top ups and the patient was pain free.

Since past two decades, regional anaesthesia in the form of epidural anaesthesia then the spinal anaesthesia proved to be safe technique in cardiac patient came for caesarean section because the total dose of epidural anaesthesia could be titrated to achieve desire sensory level without having noticeable hypotension [6].

Kirti N et al., had used lignocaine and adrenaline to achieve quick onset of epidural blockade in their case study of three patients of severe mitral stenosis [8]. Others have used bupivacaine and ropivacaine for epidural anaesthesia [9,10]. Mishra L et al., used lignocaine and adrenaline for both test dose and establishment of epidural block followed by bupivacaine and fentanyl during their case study [11].

CONCLUSION(S)

Understanding of the physiological changes of pregnancy and the pathological effects of mitral stenosis is necessary for pregnancy with mitral stenosis. The anaesthesiologist play an important role for deciding perioperative plan of management. Incorporation of small doses of epidural analgesia to general anaesthesia, avoids the abrupt changes in haemodynamic that normally occurs in pregnancy with mitral stenosis during peripartum period and also provides good anaelgesia. Ultimately, the morbidity and mortality is reduced with good perioperative maternal and neonatal outcome.

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PARTICULARS OF CONTRIBUTORS:
1. Postgraduate Resident, Department of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra, India.
2. Professor, Department of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra, India.
3. Assistant Professor, Department of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra, India.
4. Senior Resident, Department of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra, India.
5. Senior Resident, Department of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Maitri Patel,
Flat Number 9, Meghe Heights 4, Jawahar Lal Nehru Medical College,
Wardha, Maharashtra, India.
E-mail: patelmaitrii26@gmail.com

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