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Anesthetic Management of a Parturient with Dilated Cardiomyopathy Posted for Emergency Caeserean Section Using Epidural Volume Extension Technique: A Case Report

Dr. Kiran B R[1], Dr. Syeda Shaista Naz[2]

[1]Associate Professor, S S Institute of Medical Sciences and Research Centre, Davangere, Karnataka, India

[2]Consultant Anesthetist, Jindal Sanjeevani Multispeciality Hospital, Toranagallu, Ballari, Karnataka, India

Abstract: ***Peripartum cardiomyopathy (PPCM) is a rare condition that affects women in late pregnancy and in post-partum period. It is characterized ventricular dilatation and impaired contractility. This leads to systolic dysfunction with decreased ejection fraction and progressive congestive cardiac failure. The major anesthetic concern in managing these patients is to optimize cardiac output and maintain myocardial perfusion with stable intraoperative hemodynamics. We present a case of parturient that was posted for emergency caesarean section and managed successfully by the Epidural Volume Extension (EVE) – Saline technique.***

Keywords: Epidural anaesthesia, dilated cardiomyopathy, caesarean section

1. Introduction

Peripartum cardiomyopathy affects the women in late pregnancy and in post-partum period. It is characterized by left ventricular or biventricular dilatation and impaired contractility leading to systolic dysfunction of heart with decreased ejection fraction and progressive congestive cardiac failure. The major anesthetic concern while managing these patients is to optimize cardiac output and maintain myocardial perfusion while maintaining stable intraoperative hemodynamics. We present a case of parturient posted for emergency cesarean section managed successfully with Epidural Volume Extension –saline technique.

2. Case Report

A 28 year old unbooked case of G2A1L0 of 34 week gestation presented with cough and breathlessness of two days duration. Her pulse rate was 140/min and regular, blood pressure 160/110mmHg, respiratory rate was 26/min. She also had bilateral pitting pedal edema .On auscultation bilateral crepitations were noted. No murmurs were heard. Laboratory investigations revealed haemoglobin of 9.5g/dl, total count of 15000/cmm. Renal parameters, Liver function tests, serum electrolytes and coagulation parameters were normal. Uric acid and LDH were mildly elevated. ABG showed hypoxia with respiratory alkalosis and metabolic acidosis. ECG showed sinus tachycardia with LVH and inverted T waves in lateral leads. Echocardiography revealed global hypokinesia of left ventricle with an ejection fraction of 36%, dilated left atrium and left ventricle. NST revealed fetal distress. Emergency LSCS was planned in view of fetal distress. A high risk informed and written consent was obtained.

On arrival to the OT, patient was connected to ECG - monitoring lead 2 and lead V5, NIBP, pulse oximeter. Under aseptic precautions triple lumen central venous line and radial intra arterial line were secured. Baseline line vitals read a heart rate of 108/min, IBP of 156/106 mmHg, CVP of 12mmHg, SpO2 of 95 % on room air. Inj.Frusemide 40 mg stat was given and inj.Dobutamine 5 mcg/kg/min was started.

Patient was put in left lateral position and under aseptic precautions. A modified combined spinal epidural anesthesia with Epidural volume extension technique was performed. At L2-L3 space epidural catheter was inserted. Later using 27 G whitacre needle spinal tap was done at L3-L4 space and 1 ml of 0.5% Bupivacaine heavy was injected intrathecally. Patient was made to lie supine with a wedge below the right hip to minimise the aortacaval compression .Level of anesthesia was T12 after 5 minutes of spinal anesthesia following which 5 ml of normal saline was injected through epidural catheter. Dermatomal level of anesthesia was T10, T8, T6 after 3, 5, 10 minutes of epidural saline administration.

Hemodynamics were stable throughout the surgery. IBP varied between 105/58 to 123/70 mmHg, heart rate between 90 to 102 beats per minute and CVP of 5 to 8 mmHg and Spo2 of 100% on O2 through face mask at 6 litres/minute. Surgical procedure was uneventful and a live, active and healthy baby was delivered. Inj. Oxytocin 2.5 IU bolus followed by infusion at rate of 10 IU/h was commenced after clamping of the umbilical cord. Patient was shifted to ICU for monitoring in the postoperative period.

3. Discussion

Peripartum cardiomyopathy is a primary disorder of heart muscle affecting women in late pregnancy and in the postpartum period. PPCM is a diagnosis of exclusion. Parturients with congenital or acquired heart disease can present with similar symptoms in late pregnancy or during

labour.

Risk factors for PPCM include Maternal age >30 yrs, Multiparity, Obesity, Multiple pregnancy, pregnancy associated hypertensive disorders, Essential hypertension, Tocolytic therapy with β-agonists.

In PPCM, there is a global reduction in myocardial contraction and thus left ventricular ejection fraction which manifests predominantly as ventricular systolic dysfunction. The additional stress of increasing cardiac output in parturients with DCM results in compensation through the enlargement of the left ventricle thus increasing end diastolic volume and stroke volume. As compensation fails, cardiac output falls and ensues decompensated ventricular failure.

Diagnosis of PPCM requires four criteria to be met [1]:

1) Heart failure developing towards the end of pregnancy or up to five months post-partum
2) Absence of other identifiable cause of cardiac failure
3) Absence of cardiac symptoms or disease prior to late pregnancy
4) Left ventricular dysfunction - defined as an ejection fraction less than 45% or reduced fractional shortening of less than 30%

Symptoms include dyspnoea, orthopnoea, paroxysmal nocturnal dyspnoea, palpitations, haemoptysis, cough, swollen legs and chest pain. Tachyarrhythmias can occur in PPCM. It also carries a risk of thromboembolism.

PPCM poses many challenges for the anaesthetist. Anaesthetic technique will be influenced by the urgency of delivery and physiological condition of the parturient. Both general and regional anesthesia have been described for caesarean delivery [2].

Aims of anaesthetic management are to:

- Maintain myocardial perfusion by avoiding arrhythmias and episodes of hypotension or tachycardia
- Optimize cardiac output
- Maintain preload but prevent fluid overload
- Maintain / increase myocardial contractility
- Prevent increased afterload

A titrated neuraxial anesthesia, by incremental top-up of an epidural or a combined epidural and low-dose spinal anaesthetic technique, may achieve these aims. Neuraxial anaesthesia reduces after load, promoting forward flow and may be beneficial in a situation of poor ventricular function, where no outflow tract obstruction is present [3].

General anesthesia can be used for urgent caesarean sections[4,] but the stress of larygocscopy and intubation coupled with the myocardial depressant effects of the drugs has deleterious effects on both mother and neonate. Carroll et al used Remifentanil in a patient with peripartum cardiomyopathy (PPCM) and the newborn required naloxone to reverse the respiratory depression [5]. Mc Indoe et al. described a previously asymptomatic parturient with PPCM who presented with cardiac arrest at induction of general anaesthesia for emergency caesarean section[6]. Similarly Wake et al. reported cardiac arrest during emergency caesarean section under general anaesthesia in a patient with PPCM [7].

Spinal anesthesia if given in these cases can result in an abrupt fall in blood pressure, which would have had a detrimental effect in our patient as cardiac function was already compromised. There are case reports where low dose spinal block has been successful and can be tried [8]. As the anticipated duration of caesarean section is less, these cases can be managed with low dose spinal block without any complications as there is no need to prolong the duration of block.

These patients have been managed by the CSE technique as well [9].

Blumgart *et al* [10] hypothesized that epidural injection of a local anesthetic or saline 5 min after spinal anesthesia in patients undergoing cesarean section produces significantly higher levels of analgesia compared with spinal anesthesia alone. Combined spinal epidural with the EVE technique was found to have a dose‐sparing effect, with only 55% of the bupivacaine dose required.

Tiwari et *al* [11] published first case series of five patients of PPCM with ejection fraction ranging between 40-48% who have been managed by the EVE technique, where saline has been injected in the epidural space.

Similar to the above study we managed our case with an ejection fraction of 36% with CSE -EVE technique by injecting just 5 ml of saline into epidural space following an intrathecal injection of 1cc of bupivacaine 0.5% heavy.

EVE with saline technique offers the reliability and rapidity of spinal anesthesia and the flexibility of epidural anesthesia. It also offers early sensory‐motor recovery [12] and decreases the duration of post anesthesia care unit stay. It also lowers umbilical and maternal concentration of local anesthetics, leading to better neurobehavioral outcome of newborns and increased patient satisfaction. The epidural catheter also helped provide postoperative analgesia.

Using saline instead of local anesthetic for EVE prevents the risk of total spinal anesthesia even if there is accidental migration of the epidural catheter into subarachnoid space.

4. Conclusion

EVE with saline is a novel technique which offers adequate level of surgical anesthesia with minimal hemodynamic fluctuations in parturients with decreased cardiac reserve undergoing caesarean section.

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