

Anesthetic Management for Caesarean Section in a Case of Dilated Cardiomyopathy: A Case Report

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ABSTRACT

The perioperative anesthetic management of a pregnant female with dilated cardiomyopathy (DCM) undergoing elective caesarean section delivery poses a challenge for anesthesiologists either due to pre-existing or risk of precipitating congestive heart failure. Pregnancy in patients with pre-existing DCM can flare up the condition. The anesthesiologist must have thorough knowledge of DCM pathophysiology, clinical features, diagnostic evaluations, and the anesthetic modalities and various drug interactions during anesthesia. This case report describes the successful anesthetic management of a parturient with dilated cardiomyopathy undergoing elective cesarean section under intrathecal plus epidural anesthesia.

Keywords: Congestive heart failure, Dilated Cardiomyopathy, Elective Caesarean section, Epidural anesthesia.

INTRODUCTION

Dilated cardiomyopathy is a primary disorder of heart muscle characterized by left ventricular (LV) or biventricular dilatation and impaired global ventricular contractility. Initially, the ventricle dilates to increase the force of contraction and stroke volume (Frank-Starling relationship); however, these compensatory mechanisms gradually fail, progressive ventricular failure ensues and cardiac output (CO) decreases. During pregnancy, parturients with DCM have a higher incidence of cardiac events than the non-pregnant patient.^[1] There is an increased risk of malignant arrhythmia, thromboembolism, and even sudden death as various anesthetic drugs can worsen this condition.^[2] The present study describes the successful anesthetic management of a parturient with DCM and a low LV ejection fraction of 32%, wherein the child was delivered via cesarean section using a spinal plus graded epidural anesthesia technique. A multidisciplinary group includes Anesthesiologist, cardiologist, gynecologist, pediatrician dealt with this case for a good result.

CASE REPORT

A registered case of 24-year-old primigravida with 37 weeks gestation, was posted for elective lower segment caesarean section in view of cardiac disease, under combined spinal epidural anesthesia.

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She was a known case of dilated cardiomyopathy since 2 years, and having symptoms dyspnea on doing less than normal activity (New York Heart Association class III). She was admitted in hospital 2 years ago for appendicectomy with mild features suggestive of congestive heart failure (CHF). On further workup she was diagnosed with DCM. Her symptoms were well controlled on treatment with oral carvedilol 3.125mg, digoxin 0.25 mg, once a day. Her past history did not reveal any alcohol abuse, viral infection or the use of β -adrenergic agonists.

On the pre-anesthetic examination, her heart rate was 74/min and regular. The systolic and diastolic blood pressures (BP) were 120 mmHg and 84 mmHg respectively. The respiratory rate was 18/min. Jugular venous pressure was normal and no hepatomegaly was observed. She also had bilateral pitting pedal edema. Cardiovascular examination revealed the presence of parasternal heave and systolic thrill along with ejection, systolic murmur on auscultation. There were no rhonchi or rales found on auscultation of lung areas. Her airway was Mallampati grade II.

Pre-operative 12 lead electrocardiograph (ECG) suggestive of left ventricular hypertrophy. Echocardiography reports demonstrated global hypokinesia of LV, poor systolic function, EF of 32%, mild mitral regurgitation, and LV end-diastolic dilatation. Her laboratory investigations showed hemoglobin of 11.8 gm% and results of serum electrolytes, renal function, and Liver function within normal limit and International normalized ratio 1.2. Her Thyroid function test within normal limits. The diagnosis of DCM was confirmed by a cardiology review and the patient was continued on ongoing medications with the addition of Tab

Torsemide 10 mg OD. A 6.6% risk of cardiac complications perioperatively informed and written consent was obtained because of cardiac disease and poor EF.^[3] Regional (epidural + spinal) anesthesia technique and the reason for its selection was explained to the patient and her co-operation requested.

On arrival in the operating room, intravenous access was established with an 18 G cannula. ECG, pulse oximetry, non-invasive BP, SpO₂ were attached for continuous monitoring. Her BP was 120/72 mmHg. Pulse 88/min, SpO₂ 98%. After ensuring all aseptic precautions, a central venous cannula was inserted in the right internal jugular vein and central venous pressure was monitored. The arterial line was placed in the left radial artery for invasive blood pressure monitoring. An epidural catheter was inserted cephalad at L2-L3 interspaces via an 18G Tuohy needle in sitting position. The catheter was fixed at 9 cm at the skin. Correct placement was confirmed by injecting 1.5% lignocaine without adrenaline 3 ml. In the L3-L4 interspace, 25G Quincke needle was inserted for the administration of 25mg fentanyl intrathecally. The patient was placed in a supine position and wedge inserted under the right hip to minimize aortocaval compression. Later, 0.75% Ropivacaine 10 ml was injected epidurally in 10 minutes slowly. The sensory level up to T6 was achieved. Oxygen was given via a venti mask at the rate of 4 L/min. After 10 min of epidural analgesia, BP dropped to 86/60 mmHg. This was treated with an intermittent bolus of phenylephrine in doses of 50-100µg. Then, her BP was maintained at 100-130 mmHg systolic and 60-90 mmHg diastolic throughout the surgery. Female baby 2.6 kg was delivered, after 10 min. Injection oxytocin 2.5 IU bolus followed by infusion at a rate of 10 IU/h was commenced after clamping of the umbilical cord. The APGAR score was 9 and 10 at 1 and 5 min, respectively. The patient was hemodynamically stable throughout the surgery. Central venous pressure was maintained between 8 cm and 12 cm H₂ O. To prevent fluid overload, 200 ml of gelofusine was administered after 500 ml of ringer lactate. The surgery lasted for 45 min. The estimated blood loss was 700 ml.

The postoperative course was uneventful, and she was shifted to the post-operative recovery room for continuous monitoring. Post-operatively BP was 128/86 mmHg and the pulse rate was 88 beats/min. The patient had no complaints of chest pain, sweating, or difficulty in breathing. The postoperative analgesia was provided with 0.2% ropivacaine plus 50 µg of fentanyl through the epidural catheter, which was removed 48 h later. Post-operatively cardiologist done echocardiography, EF was 32%, and he advised her tablet enalapril 5 mg OD, tablet aspirin 150 mg OD, tablet carvedilol 3.125 mg BD after surgery. She was discharged on the 10th day.

DISCUSSION

In patients with DCM, left and/or right ventricular systolic pump function is diminished, resulting in progressive cardiac enlargement, a process known as remodeling, and often, but not invariably, producing symptoms of congestive heart failure. Although no cause is clear in many cases, DCM is probably the ultimate results of myocardial damage produced by a plethora of metabolic, toxic, or infectious agents. Mural thrombi may be present, especially in the LV apex. Perioperative issues in such patients include precipitation of congestive heart failure, arrhythmias, and systemic embolism from pre-existing mural thrombi. The poor predictors in this patient were an ejection fraction of less than 32% on echocardiography, LV end-diastolic dilation, and global hypokinetic LV. High-risk consent should take in such cases. Another poor prognostic factor associated with DCM is non-sustained ventricular tachycardia.^[4]

Anesthetic management goals in such patients incorporate maintaining perfusion, normovolemia, prevention of a rise in afterload, and avoidance of drug-induced myocardial depression. Invasive blood pressure monitoring was applied in the above case for the early detection and treatment of hypotension. Central venous pressure monitoring assists in optimal fluid therapy. Transesophageal echocardiography, continuous flow monitoring,^[5] bispectral index,^[6] and pulmonary artery catheterization are some of the other modalities of monitoring, that are found useful in patients with DCM under General anesthesia. The neuraxial blockade and various pharmacological agents like dobutamine, amrinone, milrinone, and levosimendan are useful in patients with DCM successfully to reduce afterload.^[7]

We did not consider general anesthesia as a high risk of arrhythmias, and the obstetric patient will require rapid sequence induction to prevent aspiration of gastric contents. The rapid administration of anesthetic induction agents may cause detrimental hypotension and the responses of sedative drugs or induction agents may be slow due to the slow circulation time which may usually be interpreted as a need for the additional drug in a healthy patient.^[8] Opioids with benzodiazepines or nitrous oxide cause severe cardiovascular depression. The use of high doses of opioids may necessitate postoperative ventilation for both mother and infant.

In addition to avoiding the stress of laryngoscopy and intubation, the vasodilatation produced by regional anesthesia is beneficial with isolated left ventricular dysfunction.^[9] A combined Spinal Epidural Block was planned in the present study because, in conjunction with reducing the afterload, it provides predictable and good postoperative analgesia.^[10] Low dose fentanyl was used in the subarachnoid block to reach the analgesia rapid and

gives advantages of providing analgesia and sedation without a significant reduction in systemic vascular resistance.^[11] An epidural catheter was placed to provide gradual and controlled induction with minimal variation in hemodynamic parameters and can gradually increase the level or duration of the block if required so as not to cause sudden hypotension. Phenylephrine helped in treating subarachnoid block related hypotension, by restoring peripheral resistance. It avoids the myocardial depressant effects of many inhalational and intravenous anesthetic agents, bypasses issues with slow circulation time, and also avoids increases in ventricular afterload. However, hypotension from epidural local anesthetic-induced sympathetic nerve block is still problematic in a patient with severely low ejection fraction.

CONCLUSION

In conclusion, a pregnant patient of DCM poses many risks but precise planning, judicious use of pharmacological agents, suitable monitoring, and tailored anesthetic technique according to the patient's general condition and surgical requirement can result in a positive outcome. This case was managed successfully under combined spinal-epidural anesthesia without any complications, with proper perioperative precautions. Spinal anesthesia is not recommended as it can precipitate sudden and rapid reductions in systemic vascular resistance and thereby preload. General anesthesia has its disadvantages of obnoxious stimulations. We conclude that combined spinal-epidural anesthesia appears to be the technique of choice for a patient with DCM.

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