

Perioperative Anesthetic Management of a Case of Severe Dilated Cardiomyopathy Undergoing Elective Lower Segment Cesarean Section Under Epidural Anaesthesia

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Abstract

The perioperative anesthetic management of a pregnant patient with dilated cardiomyopathy (DCM) undergoing caesarean section poses a challenge for anesthesiologist either due to pre-existing or a risk of precipitating congestive heart failure. Pregnancy in patients with pre-existing DCM can flare up the disease and can be fatal. Anesthetic management of these patients is quite challenging. The anesthesiologist must have the knowledge of its 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 DCM undergoing cesarean section under epidural anesthesia.

Keywords: Dilated cardiomyopathy, Elective caesarean section, Epidural anesthesia

INTRODUCTION

Dilated cardiomyopathy (DCM) is characterized by dilatation and impaired systolic function of one or both ventricles. Each year, this disorder affects approximately 5-8 people per 100,000.¹ DCM is defined by the presence of: (a) Fractional myocardial shortening <25% and/or left ventricular ejection fraction (LVEF) <45%; and (b) LV end diastolic diameter >117% excluding any known cause of myocardial disease.² DCM is the most common type of non-ischemic cardiomyopathy, the third most common cause of heart failure, and the most common indication for cardiac transplantation. Malignant arrhythmias are the most common cause of death in DCM.¹ Approximately, 50% of cases of non-ischemic DCM are idiopathic. Here, we report a case of DCM with low EF posted for elective cesarean section under epidural anesthesia.

CASE REPORT

A booked case of 27-year-old primi gravid with 37 weeks gestation, was posted for elective lower segment caesarean section in view of cardiac disease, under epidural anesthesia. She was a known case of DCM since 6 years. She gave a history of hospital admission 2 years ago with features suggestive of congestive heart failure (CHF). Her symptoms were well controlled on treatment with oral frusemide 40 mg, digoxin 0.25 mg, and syp potchlor. Her past history did not reveal any viral infection, alcohol abuse or the use of b-adrenergic agonists.

On the pre-anesthetic examination, her heart rate was 92/min and regular. The systolic and diastolic blood pressures (BP) were 138 mmHg and 88 mmHg respectively. The respiratory rate was 18/min. Parasternal heave and

systolic thrill were present. On chest auscultation ejection, systolic murmur was heard. There were no ronchi or rales. Jugular venous pressure was not raised, and there was no hepatomegaly. She also had bilateral pitting pedal edema.

Pre-operative 12 lead electrocardiograph (ECG) showed left bundle branch block and poor progression of R wave in leads V1-V5. Echocardiography reports demonstrated global hypokinesia of LV, poor systolic function, EF of 29%, mitral regurgitation and LV end diastolic dilatation. Her investigations showed total cholesterol 12,100, polymorphs 80%, lymphocytes 18%, hemoglobin 10.2%, random blood sugar 104 mg/dl, sodium 141 meq/L, potassium 4 meq/L, urea 40 mg/dl, creatinine 1 mg/dl and platelets 160,000 with international normalized ratio 1.

A high-risk informed and written consent was obtained in view of cardiac disease and poor EF. Regional (epidural) anesthesia technique and the reason for its selection was explained to the patient and his co-operation requested. On arrival in the operating room, intravenous access was established with an 18 G cannula and lactated ringer solution administered at the rate of 1.5 ml/kg/h. ECG, pulse oximetry, non-invasive BP, SpO₂ were attached for continuous monitoring. Her BP was 134/90 mmHg. Pulse 93/min, SpO₂ 98%. After taking all aseptic and antiseptic precautions, central venous cannulation was done into right internal jugular vein central venous pressure was monitored. Under strict aseptic precautions an epidural catheter was inserted at L3-L4 interspaces in sitting position. Catheter was fixed at 10 cm. Correct placement was confirmed by injecting 1.5% lignocaine with adrenaline 3 ml as a test dose. Later, 0.5% levobupivacaine 6 ml was injected epidurally. After 5 min, another 6 ml of the drug was administered epidurally. Sensory level up to T7 was achieved. Oxygen was given via venti mask at the rate of 4 L/min. After 10 min of epidural analgesia, BP was dropped to 80/60 mmHg. This was treated with intermittent bolus of ephedrine in doses of 2.5-5 mg. Her BP Then, her BP was maintained at 100-130 mmHg systolic and 60-90 mmHg diastolic throughout the surgery. Male baby 2.6 kg was delivered, after 10 min. Injection oxytocin 2.5 IU bolus followed by infusion at 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 9 cm H₂O. To prevent fluid overload, 500 ml of hetastarch was administered after 500 ml of ringer. Surgery lasted for 50 min. Post-operative course was uneventful, and she was shifted to post-operative recovery room for continuous monitoring.

Post-operatively BP was 110/72 mmHg and pulse rate was 96 beats/min. Patient had no complaints of chest pain,

sweating or difficulty in breathing. The post-operative 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 and tablet alprazolam 0.25 mg after surgery. She was discharged on 10th day.

DISCUSSION

DCM is characterized by LV or biventricular dilatation and impaired ventricular contractility, which results in progressive congestive cardiac failure. Most number of cases are idiopathic. The common causes are ischemic, valve dysfunction and post viral infection. DCM can also see in association with sickle cell disease, muscular dystrophy, excess alcohol, hypothyroidism and some chemotherapy agents or during peripartum period. Clinical picture of DCM may vary from only cardiomegaly to severe CHF.³ Apart from CHF, dysrhythmias and embolism are (systemic or pulmonary) also common.⁴ Recent management include medical therapy with drugs for example vasodilator, diuretics or beta blockers and atrio-ventricular pacemakers for patients with in coordinate movements of heartchambers.⁵ It is difficult to decide the optimal time for surgery but the medical control of heart failure for >1 week is desirable.

The poor predictors in this patient were an EF of <20% on echocardiography, LV end diastolic dilation and hypokinetic LV. High-risk consent was taken due to above reasons. Other poor prognostic factor associated with DCM is non-sustained ventriculartachycardia.⁶

The goals during the management of anesthesia in patients with cardiomyopathy include

- Avoidance of drug-induced myocardial depression
- Maintenance of normovolaemia and
- Prevention of increased ventricular afterload.

The optimum anesthetic technique for patients undergoing caesarean section with dilated or other forms of congestive cardiomyopathy is controversial and both general anesthesia^{7,8} and regional anesthesia have been described.

Brown *et al.* described the use of general anesthesia because they feared catastrophic effects of reduction in systemic vascular resistance caused by epiduralblockade.⁷ Whereas Mellor and Bodenham considered that both the methods of general anesthesia and epidural anesthesia were dangerous and described the use of infiltration anesthesia supplemented with bilateral ilioinguinal nerveblock.⁹

Major centro-neuraxial blockade may actually improve myocardial performance by reducing the after load on the LV without improving contractility which may be beneficial in a situation of poor ventricular function, where no outflow tract obstruction is present.⁷ Epidural anesthesia can safely and effectively be used with carefully titrated dose of local anesthetics, and hemodynamic monitoring in parturient with DCM.¹⁰ The changes in preload and after load produced by epidural anesthesia mimic the pharmacological goals.¹¹ It is particularly advantageous in those patients with high susceptibility to aspiration of gastric contents.

We did not consider general anesthesia as 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 additional drug in a healthy patient.¹² Opioids with benzodiazepines or nitrous oxide cause severe cardiovascular depression. Use of high doses of opioids may necessitate post-operative ventilation for both mother and infant. Carefully administered regional anesthesia avoids the stress of general anesthesia.

In this case, we preferred epidural anesthesia as slowly titrated epidural anesthesia avoids the use of cardiodepressant drugs and improves myocardial performance by reducing LV afterload. The advantage of epidural anesthesia over spinal anesthesia is that it prevents sudden and rapid reductions in systemic vascular resistance and thereby preload, which might be disastrous in low cardiac output condition.

Fluid management in patients with DCM is very critical. In our case intra-operative 500 ml of ringer lactate and 500 ml of hydroxyl ethyl starch was given to prevent fluid overload. Overhydration may not be advisable as it may lead to CHF. Drop in BP was corrected with injection of ephedrine, a vasopressor which can neutralize the vasodilating effect of the anesthetics rather infusing intravenous fluids.

CONCLUSION

In conclusion, a pregnant patient of DCM poses many risks for anesthesiologist. Our patient is asymptomatic because of prior medical management this case was managed successfully under 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 and polypharmacy. We conclude that epidural anesthesia appears to be the technique of choice for a patient with DCM.

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How to cite this article: Nallam SR, Kosinapalle S, Jyothirmal I, Ratnamaiah A, Reddy KS. Perioperative Anaesthetic Management of a Case of Severe Dilated Cardiomyopathy Undergoing Elective Lower Segment Caesarean Section Under Epidural Anaesthesia. *Int J Sci Stud* 2014;2(7):225-227.

Source of Support: Nil, **Conflict of Interest:** None declared.