

# Graded Epidural Anaesthesia for Lower Segment Cesarean in a Parturient with Very Low Ejection Fraction

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## ABSTRACT

Dilated cardiomyopathy is characterized by left or biventricular dilatation with impaired ventricular contractility. It is associated with systolic dysfunction with decreased left ventricular ejection fraction and congestive progressive heart failure. Anaesthetic management of such condition is very challenging and requires highest level of expertise, strategy and precaution. We present such a case of dilated cardiomyopathy with a very low ejection fraction of 12% who underwent lower segment cesarean section under epidural anaesthesia with successful outcome.

## KEY WORDS

*Cesarean section, Dilated Cardiomyopathy, Epidural Anaesthesia, Very low ejection fraction*

## Citation

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## INTRODUCTION

Dilated cardiomyopathy (DCM) is characterized by dilation of one or both ventricles with impaired contractility resulting in systolic dysfunction. It manifests with reduced ejection fraction (EF) and cardiac output (CO) with patient usually presenting with features of heart failure. It is often accompanied by arrhythmias, mitral or tricuspid regurgitation, thromboembolism and even sudden cardiac death.<sup>1-3</sup> Pregnancy in patients with DCM can worsen the disease predisposing to further perioperative complications.

## CASE REPORT

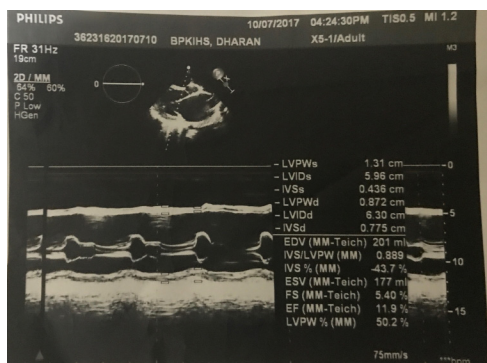
A 22-year-old G<sub>2</sub>P<sub>1</sub>L<sub>1</sub> parturient with American Society of Anaesthesiologists Physical Status (ASA PS) IV at 36 weeks period of gestation (POG) with DCM with severe mitral regurgitation (MR) with left ventricular ejection fraction (LVEF) of 12% was planned for elective lower segment cesarean (LSCS). She had past history of normal

spontaneous uneventful vaginal delivery 20 months back. In her current pregnancy she had presented earlier at 26 weeks POG with history of palpitation, shortness of breath (SOB), orthopnea, paroxysmal nocturnal dyspnea (PND) and chronic cough especially on lying supine. She was then admitted and treated with the diagnosis of DCM with severe MR. Ejection Fraction estimated at the time was 25%. After 4 days of hospital stay she was discharged and kept on regular follow up. She again presented this time at 35 weeks +4 days POG with similar complaints for 7 days. After cardiac consultation she was treated with torsemide. She also completed a course of dexamethasone for probable preterm delivery. After completion of 37 weeks she was planned for elective LSCS in view of her cardiac condition and minimal ejection fraction.

On examination her pulse was 120 beats per min, regular, non-invasive blood pressure (NIBP) was 113/71 mmHg and respiratory rate (RR) was 24 per min. Ankle edema was present. Jugular venous pulse was normal. On chest

auscultation pansystolic murmur was heard over mitral area. No added sounds including crepitations were heard.

Her laboratory investigations showed Hb-10.4 gm/dL, TLC-8400 cell/mm<sup>3</sup>; PT/INR-15 s/1.16; platelet – 1,00,000/mm<sup>3</sup>; electrolytes, renal and liver function tests were within normal limits. ECG showed p mitrale with sinus tachycardia. Echocardiography showed dilated left atrium and ventricle, global hypokinesia of left ventricle, LVEF=12%, severe MR with no clot or vegetation (fig. 1).



**Figure 1.** Echocardiogram of the patient showing different parameters. Left Ventricular Posterior Wall thickness in systole (LVPWs); Left Ventricular Internal Dimension in systole (LVIDs); Interventricular Septal thickness in systole (IVSs); Left Ventricular Posterior Wall thickness in diastole (LVPWd); Interventricular Septal thickness in diastole (IVSd); End Diastolic Volume (EDV); End Systolic volume (ESV); Fractional Shortening (FS); Ejection Fraction (EF).

Informed and written consent was obtained for elevated risk. On arrival in the operation theatre routine monitors were attached which included ECG, pulse oximeter (SpO<sub>2</sub>) and NIBP. Epidural anaesthesia (EA) with 0.75% ropivacaine was planned as there was no need for immediate surgery. Under all aseptic precautions and under local anaesthesia arterial line, epidural and CVP catheter were inserted at left radial artery, L1 and L2 interspace and right internal jugular vein respectively. Epidural test dose with 2% lidocaine and adrenaline (1:200000) was given. Invasive blood pressure and CVP were monitored. CVP was maintained around 8 cm of H<sub>2</sub>O. Noradrenaline and dopamine infusion were kept ready for infusion. Inj. 0.75% ropivacaine 6 mL was administered via the epidural catheter. T8 sensory block was obtained after 12 min. Then 3 mL top up of 0.75% ropivacaine was repeated. The surgery (LSCS) was started after achieving sensory block level of T6. Surgery lasted for one hour. Patient remained haemodynamically stable except for two episodes of hypotension which was treated with inj. mephentermine 6 mg twice. A female baby weighing 2.9 kg was delivered with APGAR score of 10 and 10 at 1 and 5 minutes respectively. Patient received a total of 700 mL of Ringers lactate. Patient developed hypotension in the recovery period after one hour. Total urine output was 30 mL only and CVP measured at that time showed 6 cm of H<sub>2</sub>O. Fluid resuscitation with 800 mL of RL was done. Noradrenaline was simultaneously started and later tapered once the BP was optimized. Patient was

then shifted to ICU for hemodynamic monitoring. Post-operative analgesia was provided with inj. morphine 1.5 mg diluted in 6 ml NS via epidural catheter 12 hourly. O<sub>2</sub> was administered via nasal prongs in the ICU. Diuretics and digoxin were started after cardiac consultation the following day. She was shifted to the post-natal Ward after 2 days from the ICU when she was haemodynamically stable and required no O<sub>2</sub> supplementation. Echocardiography on the 6<sup>th</sup> postoperative day showed no remarkable improvement. She was discharged from the postnatal Ward and was kept on regular follow up.

## DISCUSSION

The incidence of DCM is 5-8 per 100000 general populations with a prevalence of 36 per 100000.<sup>1</sup> Usually patients are asymptomatic with cardiomegaly and present later in the course with heart failure after which the mortality is high. A physiological change during pregnancy is characterized by increase in CO with reduction in systemic vascular resistance and blood pressure. This change can often lead to decompensated heart failure in such patients. The patient usually presents clinically with palpitation, cough, SOB, orthopnea, PND, ankle edema and chest pain. Apart from chest pain, our patient had all of them.

We could not label this case as peripartum cardiomyopathy (PPCM) even with the inclusive definition put forward by Heart Failure Association of the European Society of Cardiology Working Group on PPCM 2010 because of the clinical presentation and diagnosis of the patient at second trimester of pregnancy.<sup>4</sup> Of note, all forms of DCM including the PPCM have similar medical and anaesthetic management.

Anaesthetic management of cesarean section with DCM with such minimal EF is challenging. The anaesthetic goals include avoiding myocardial depression, maintenance of normovolemia, prevention of increase in after load and sudden hypotension. Both general anaesthesia (GA) and different forms of regional anaesthesia (RA) such as epidural, continuous spinal, combined spinal and epidural (CSE) and infiltration anaesthesia have been described.<sup>5-13</sup> However, the optimal anaesthetic technique is still debated with both forms having their own pros and cons.

Our patient had DCM with LVEF of approximately 12%. We are not aware of any cases with such a low LVEF that have been managed with favourable outcome. General anaesthesia (GA) is preferred for urgent cesarean delivery where fetal or maternal life is in jeopardy. Its cons would include use of drugs such as sedatives, opioids and inhalational agents that would further cause myocardial depression. Other important aspect would be to induce rapid sequence intubation which would be very challenging. Patient would always run the risk of aspiration or airway difficulty. Blunting endotracheal response would also have

its own complications. Since beta blockers and inhalational agent would not be ideal in such cases, use of high dose opioids to blunt endotracheal response would require postoperative ventilatory support for the mother and neonate as well. Though successful outcome of anaesthetic management has been reported in a parturient with an LVEF of 10% under GA with etomidate and remifentanyl, there are multiple reports with disastrous complications like cardiac arrests immediately after induction.<sup>14-16</sup> Deterioration of cardiac function from EF of 20% to 9% requiring ventilator support and even cardiac transplantation in the mother has been reported.<sup>17</sup> Use of naloxone to reverse the respiratory depression of remifentanyl in the neonate as well as the need for ventilator support for the mother in the immediate postoperative period has also been reported.<sup>18</sup>

RA is logically preferred in the absence of anticoagulation and non-emergency status. Modest decrease in systemic vascular resistance improves cardiac output which is beneficial in such patients.<sup>19</sup> One of the adverse effects of central neuraxial blockade is sudden hypotension which could be lethal even leading to cardiac arrest.<sup>20</sup> Epidural Anaesthesia especially graded gives us the flexibility to titrate sensory and motor block as required avoiding any

sudden fall in blood pressure. The slower onset of action also provides time for the patient body to compensate as well as time for intervention. Several successful outcomes of EA or CSE anaesthesia in LSCS in cardiomyopathy have been reported.<sup>5,6,10-12</sup> Pirlet et al. performed RA with low dose spinal and epidural for elective LSCS with EF of approximately 20%.<sup>11</sup> In their case low dose spinal even with 1 ml of 0.5% heavy bupivacaine produced significant hypotension with intraoperative tachycardia for which ephedrine infusion had to be started. With this event in mind we preferred graded EA for the above mentioned advantage. We chose 0.75% ropivacaine with its comparable duration of action, earlier recovery from motor blockade and lesser cardiac and neurotoxicity compared to bupivacaine.<sup>21</sup> Our patient during the entire duration of surgery had no significant intraoperative events including pain or discomfort except for two episodes of hypotension treated with bolus doses of inj. mephenteramine 6 mg twice.

Graded epidural anaesthesia with 0.75% ropivacaine may be a suitable anaesthetic technique in patients with dilated cardiomyopathy with a very low ejection fraction for elective lower segment cesarean section.

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