

## Very Low Dose Bupivacaine for Cesarean Section in a Case of Peripartum Cardiomyopathy

Ankit Sharma\*, Ashim Banerjee, Hazel Talwar, Neha Bhardwaj

Department of Anesthesiology and Critical Care, University College of Medical Sciences and Guru Teg Bahadur Hospital, New Delhi, India

\*Corresponding author: Dr Ankit Sharma, Department of Anesthesiology and Critical Care, University College of Medical Sciences and Guru Teg Bahadur Hospital, New Delhi, India, Tel: +91-9711301366; E-mail: [ankitmamc@gmail.com](mailto:ankitmamc@gmail.com)

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### Abstract

Peripartum Cardiomyopathy is a disease of unknown etiology which affects pregnant females during late pregnancy or early post-partum period. The clinical presentation of these patients is similar to that of patients with dilated cardiomyopathy. Management of such cases poses an anesthetic challenge in view of the increased risk of various perioperative complications due to the disease pathology as well as the anesthesia technique. We report the successful anesthetic management of lower segment Cesarean Section in a patient with peripartum cardiomyopathy with cardiac ejection fraction 25% using very low dose bupivacaine (4 mg) with fentanyl (20 mcg) in subarachnoid block.

**Keywords:** Peripartum Cardiomyopathy; Spinal anesthesia; Bupivacaine

### Introduction

Peripartum Cardiomyopathy (PPCM) is a rare, idiopathic disorder of pregnancy defined as development of cardiac failure in the peripartum period (the period from one month prior to delivery/termination of pregnancy till 5 months of delivery), without any identifiable cause for the cardiac failure or any recognizable heart disease prior to presentation. The diagnosis is based on exclusion and confirmed with echocardiographic findings of left ventricular systolic dysfunction (ejection fraction <45%, reduced fractional shortening) [1].

PPCM usually presents with fatigue, edema, dyspnea and cough which may be confused as a part of normal spectrum of peripartum state and comorbidities like toxemia of pregnancy, leading to delay in diagnosis [2]. Cesarean Section for a patient with PPCM poses serious anesthetic challenge to prevent further hemodynamic embarrassment and worsening of cardiovascular status while providing adequate analgesia for surgery [3].

We present a case of peripartum cardiomyopathy managed under spinal anesthesia using very low dose bupivacaine and fentanyl.

### Case Report

A 25-year old primigravida with a 28 weeks pregnancy presented to emergency department with complaints of fatigue and dyspnea for past 4 days. Patient's past history and menstrual history was unremarkable. ECG showed sinus rhythm with a rate of 110/min with no other significant abnormality. 2D echocardiography showed mild to moderate MR, moderate TR, gross Left Ventricular (LV) dilatation with global LV hypokinesia, severe LV systolic dysfunction with ejection fraction 25-30% with moderate pulmonary artery hypertension. A cardiology consultation was taken and a diagnosis of

peripartum cardiomyopathy was made and the patient was started on enalapril, furosemide, digoxin, and metoprolol.

Blood investigations revealed Hb 12.2 gm%, TLC 12, 100/mm<sup>3</sup>, platelet count 2.27 lakh /mm<sup>3</sup>, INR 0.91 with renal function and liver function tests within normal limits. Arterial blood gas analysis revealed pH 7.4, pCO<sub>2</sub> 22 mmHg, pO<sub>2</sub> 169.9 mmHg (on oxygen by facemask), bicarbonate 14.0 mEq/L. On pre-operative assessment, the patient was sitting upright receiving oxygen by facemask but had tachypnea with respiratory rate 22 breaths/minute and frequent bouts of cough. On auscultation, bilateral basal crepitations were heard. The patient's baseline blood pressure (BP) and heart rate were 138/90 mmHg and 96/minute, respectively. Airway examination was unremarkable.

Intra operative monitoring included continuous ECG, non-invasive blood pressure (NIBP), blood oxygen saturation (SpO<sub>2</sub>). A wide bore peripheral venous cannula was secured in left upper limb. Epidural anesthesia was planned in order to avoid sudden hemodynamic variations associated with subarachnoid block. About 100 ml of lactated Ringer's solution was infused before epidural catheter insertion. Due to frequent coughing and movement and lack of patient cooperation required for epidural anesthesia, catheter insertion procedure was abandoned.

Central neuraxial blockade was achieved using 4 mg heavy bupivacaine (0.8 ml 0.5%) and 20 mcg Fentanyl (0.4 ml) making a total drug volume of 1.2 ml. After ensuring adequacy of the block up to T6 dermatomal level, the surgery was performed. 3 IU Oxytocin, to facilitate uterine contraction, was infused slowly after delivery of the baby. A total of 700 ml of lactated Ringer's solution was administered (including the 100 ml administered before anesthesia). Intraoperatively, patient was kept supine with a wedge under right hip and received oxygen by high-FiO<sub>2</sub> facemask. Intraoperative vitals including hemodynamics and oxygen saturation remained stable throughout. The duration of surgery was 70 minutes. Patient had complete motor and sensory recovery at 90 and 100 minutes respectively. Post-operatively, the patient was monitored in the post-anesthesia care unit (PACU). The post-operative period was

uneventful. She was discharged a week later after uneventful recovery period. 2D Echo was advised after 4 weeks with follow-up with obstetrician and cardiologist.

## Discussion

Our patient fulfilled all the diagnostic criteria for PPCM. The management of PPCM is similar to dilated cardiomyopathy i.e. a combination of digoxin, diuretics, sodium restriction, anti-coagulation and beta blockers [4]. Cardiology opinion did not advise for thromboprophylaxis pre-operatively. There exist multiple schools of thoughts for safest mode of anesthesia for cesarean section in PPCM. For determining the safety and adequacy of the anesthetic technique, goals include adequate anesthesia along with avoidance of sudden variation in heart rate and blood pressure [3].

Induction of general anesthesia involves multiple challenges such as cardio depressant effects of induction drugs like thiopentone, propofol and/or inhalational agents. Using opioids for induction may cause significant respiratory distress and need for positive pressure ventilation in both mother and baby. Pregnant females are at a high risk of aspiration of gastric contents, and hence rapid sequence induction is preferred for general anesthesia which can be detrimental to hemodynamic status of a patient with compromised cardiac function like PPCM. Such challenges are avoided in regional anesthesia. The stress and associated sympathetic stimulation of laryngoscopy and intubation, as well as the cardiac and respiratory depressant actions of drugs are avoided with regional anesthesia [5].

Epidural anesthesia (alone or as part of combined spinal-epidural) seems to be a better choice for anesthesia as it allows for guarded and controlled induction with adequate maintenance of hemodynamic parameters [6]. In a few cases, lack of patient cooperation makes epidural catheter placement difficult to impossible [7].

Subarachnoid block (spinal anesthesia) is another good option for such patients as it provides intense analgesia required for cesarean section and the effects on hemodynamic parameters can be minimized by reducing the dose of local anesthetic and/or using a non-local anesthetic adjuvant [3]. Cut off for local anesthetic drug to be classified as low dose has been set arbitrarily at <8 mg. Very low dose is usually referred to as a dose less than 5 mg. Both low and very low dose have been regularly associated with minimal hemodynamic changes and accelerated motor recovery, and the former effect was of much importance to our case, since inserting an epidural anesthesia was associated with risks of improper insertion and puncture of dura [8].

Post-delivery, oxytocin was given in low dose via infusion to prevent exaggeration of hemodynamic effects of the drug like hypotension and

tachycardia. Post-operatively, patient was kept under close hemodynamic monitoring because such patients are at risk of precipitation of congestive cardiac failure due to increased preload caused by re-absorption of third space fluid after up to 48 hours of LSCS. Adequate analgesia was ensured using multimodal analgesia to prevent pain-induced sympathetic stimulation [9].

## Conclusion

For successful management of a parturient with PPCM, regular antenatal checkups, high index of suspicion, and a coordinated multi-disciplinary approach is necessary. Options for anesthesia for performing cesarean section in such patients include general anesthesia and central neuraxial blockade. Although gradual epidural anesthesia with judicious fluid is associated with the safe hemodynamic profile, very low dose bupivacaine with an opioid adjuvant in subarachnoid block may provide a useful option.

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