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CASE REPORT

Successful Caesarean Delivery in Severe Peripartum Cardiomyopathy Using Low-Dose Intrathecal Bupivacaine–Fentanyl Technique: Case Report

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ABSTRACT

Peripartum cardiomyopathy (PPCM) is a rare but potentially life-threatening cause of heart failure occurring toward the end of pregnancy or in the early postpartum period. Anaesthetic management of parturients with PPCM poses significant challenges due to markedly reduced cardiac reserve and risk of acute decompensation during delivery. We report the successful anaesthetic management of a parturient with previous lower segment caesarean section and peripartum cardiomyopathy with severe systolic dysfunction (Ejection Fraction 30%) and global hypokinesia who underwent repeat caesarean delivery under low-dose spinal anaesthesia using hyperbaric bupivacaine 7.5 mg and fentanyl 25 mcg. Careful titration of neuraxial blockade allowed haemodynamic stability and favourable maternal and neonatal outcomes.

Keywords: Peripartum cardiomyopathy, low-dose spinal anaesthesia, caesarean section, severe systolic dysfunction, obstetric anaesthesia

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INTRODUCTION

Peripartum cardiomyopathy is an uncommon form of dilated cardiomyopathy characterized by the development of heart failure toward the end of pregnancy or within five months postpartum in the absence of identifiable cardiac disease.[1] It is associated with significant maternal morbidity and mortality, particularly in patients with severely reduced left ventricular ejection fraction. The physiological changes of pregnancy, along with abrupt haemodynamic shifts during caesarean delivery, can precipitate acute cardiac decompensation.[2]

The choice of anaesthesia in such patients remains challenging. General anaesthesia carries risks of myocardial depression from inhalational agents, haemodynamic instability associated with laryngoscopy, adverse effects of positive pressure ventilation on preload, and the inherent risk of difficult airway in the obstetric population. Conventional spinal anaesthesia, although commonly used, may result in sudden sympathetic blockade and profound hypotension. Low-dose spinal anaesthesia has emerged as a safer alternative, providing gradual onset of block with better haemodynamic control. We describe the successful use of this technique in a patient with PPCM and severe left ventricular dysfunction undergoing repeat caesarean section.

CASE REPORT

A 34-year-old gravida 2 para 1 woman at 38 weeks of gestation was admitted for elective repeat caesarean section. She weighed 68 kg with a body mass index of 27.3 kg/m². She had a history of a previous lower segment caesarean section five years earlier. During the current pregnancy, she developed symptoms of breathlessness on minimal exertion and orthopnoea.

Cardiology evaluation revealed peripartum cardiomyopathy. Transthoracic echocardiography showed left ventricular Ejection Fraction of 30% (by Simpson's biplane method), severe systolic dysfunction, global hypokinesia, mild functional mitral regurgitation (Figure 1).

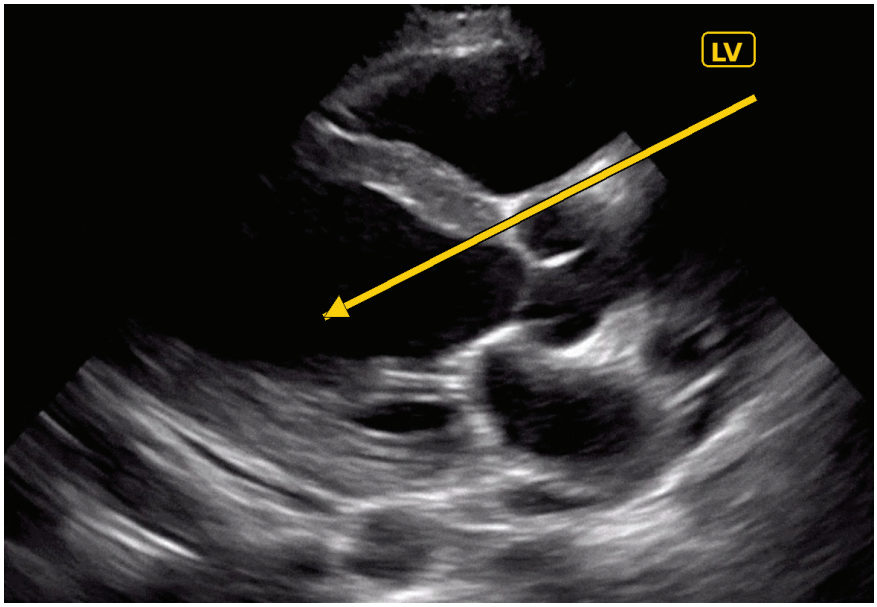


Figure 1: Transthoracic echocardiography (parasternal long-axis view) demonstrating a dilated left ventricle.

The patient was classified as NYHA (New-York Heart Association) class III. She was receiving beta-blockers and diuretics under cardiology supervision. After multidisciplinary discussion involving obstetrics, cardiology, and anaesthesiology, elective caesarean delivery was planned.

Pre-operative Assessment

The patient was haemodynamically stable with a heart rate of 92 beats/min and blood pressure of 110/70 mmHg. Oxygen saturation was 98% on room air. Airway examination revealed a Mallampati Class II airway, adequate mouth opening with an inter-incisor distance of 4 cm, a thyromental distance of 7 cm, full range of neck mobility, and intact dentition. Routine laboratory investigations were within acceptable limits.

Given the severe left ventricular dysfunction, the primary anaesthetic goals were to avoid myocardial depression, prevent sudden decrease in systemic vascular resistance, maintain preload without fluid overload, and avoid tachycardia and hypotension.

General anaesthesia was specifically avoided due to the risk of myocardial depression from inhalational agents, haemodynamic instability during laryngoscopy and intubation, and the adverse effects of positive pressure ventilation on preload in a patient with severely compromised left ventricular function. Although the airway assessment was reassuring, the inherent risk of failed intubation in the obstetric population further supported the neuraxial approach.

Anaesthetic Management

Standard monitors including ECG, non-invasive blood pressure, and pulse oximetry were applied. Two wide-bore intravenous cannulas were secured. Fluid administration was restricted and guided carefully to avoid volume overload.

Crystalloid was administered at 2 mL/kg/hour. For a patient weighing 68 kg with an operative duration of 1 hour, the maintenance crystalloid volume was 136 mL. An additional 200 mL was administered to replace blood loss, giving a total intraoperative crystalloid volume of 336 mL. Fluid administration was carefully monitored to avoid volume overload.

A decision was made to perform low-dose spinal anaesthesia. Under strict asepsis, subarachnoid block was administered at the L3–L4 interspace in the sitting position using a 26G Quincke spinal needle. A total of 7.5 mg of 0.5% hyperbaric bupivacaine combined with fentanyl 25 mcg was administered intrathecally as a single carefully titrated low dose. This combination allowed for adequate sensory block with reduction in the local anaesthetic dose requirement. The block was assessed at 5-minute intervals; sensory blockade to the T6 dermatome was achieved without sudden haemodynamic changes.

Oxygen was administered via face mask throughout the procedure. Blood pressure and heart rate remained stable, with no significant hypotension or requirement for vasopressors. A live, healthy male baby was delivered with satisfactory Apgar scores. Oxytocin was administered as a slow infusion (10 units over 30 minutes) to avoid bolus-related haemodynamic instability. Estimated blood loss was approximately 600 mL.

Post-operative course

The patient was monitored in the high-dependency unit postoperatively. The

intrathecal fentanyl administered intraoperatively provided effective early post-operative analgesia for approximately 4–6 hours. Post-operative analgesia was primarily maintained with regular intravenous paracetamol 1 g every 6 hours. Non-steroidal anti-inflammatory drugs (NSAIDs) were deliberately avoided given the potential for fluid retention and worsening of cardiac function in this patient. Low-dose intravenous tramadol 50 mg was administered on two occasions as rescue analgesia for breakthrough pain not adequately controlled by paracetamol alone. In retrospect, a transversus abdominis plane (TAP) block could have been considered to further reduce opioid requirements.

Fluid balance was strictly monitored. There were no episodes of pulmonary oedema or cardiac decompensation. Both maternal and neonatal outcomes were favourable, and the patient was discharged in stable condition.

DISCUSSION

Peripartum cardiomyopathy represents a significant anaesthetic challenge due to reduced myocardial contractility and limited cardiac reserve. Sudden haemodynamic fluctuations during caesarean delivery may precipitate acute heart failure in patients with severe systolic dysfunction.

General anaesthesia was avoided in this patient for several reasons. Inhalational anaesthetic agents cause dose-dependent myocardial depression, which is particularly hazardous when the ejection fraction is as low as 30%. Laryngoscopy and intubation are associated with a sympathetic surge that can precipitate acute decompensation. Positive pressure ventilation reduces venous return and may further impair haemodynamics. Additionally, the obstetric population carries an inherently elevated risk of difficult or failed intubation. Taken together, these factors made neuraxial anaesthesia the preferred and safer option.

Conventional single-shot spinal anaesthesia, although commonly used, can result in abrupt sympathetic blockade leading to severe hypotension, which may not be tolerated in patients with poor ventricular function. Low-dose spinal anaesthesia addresses this concern by using a significantly reduced intrathecal dose, thereby allowing a more gradual onset of sympathetic blockade. The addition of intrathecal fentanyl 25 mcg provided synergistic analgesia, enabling the local anaesthetic dose of hyperbaric bupivacaine to be reduced to 7.5 mg while still achieving adequate surgical anaesthesia to T6. This opioid-sparing effect on local anaesthetic dose is a key advantage of adjuvant intrathecal opioids in high-risk cardiac patients.

Our case demonstrates that with meticulous planning, multidisciplinary coordination, and careful selection of anaesthetic technique, caesarean delivery can be safely performed even in patients with severe systolic dysfunction. The avoidance of rapid fluid loading, use of dilute oxytocin infusion rather than bolus dosing, and strict post-operative fluid management further contributed to the favourable outcome.

CONCLUSION

Low-dose spinal anaesthesia with hyperbaric bupivacaine 7.5 mg and intrathecal fentanyl 25 mcg can be a safe and effective anaesthetic technique for caesarean section in patients with peripartum cardiomyopathy and severe left ventricular dysfunction. General anaesthesia

should be avoided where possible due to the risks of myocardial depression, haemodynamic instability at intubation, and positive pressure ventilation effects on preload. Post-operative analgesia should be opioid-sparing, with paracetamol as the first-line agent and NSAIDs avoided. Individualized anaesthetic planning and vigilant perioperative monitoring are essential to ensure optimal maternal and neonatal outcomes.

AUTHORS' CONTRIBUTIONS

Concept and design: ASM, WN

Literature review: WN, ASM

Compilation of manuscript:ASM

Manuscript editing & proofreading: ASM,WN

DECLARATION OF CONFLICTS OF INTEREST

The authors declare no potential conflicts of interest relevant to this article.

DECLARATION OF PATIENT'S CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical information. Every effort has been made to ensure patient anonymity.

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