Anesthetic Management for Caesarean Section of Peripartum Cardiomyopathy: A case report

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ABSTRACT

Peripartum cardiomyopathy (PPCM) is a rare disease of unknown etiology but serious form of cardiac failure affecting women in the last month of pregnancy or during the first 5 months post-partum. Anesthetic management of such cases is a challenge due to the increased risk of various perioperative complications. We report the successful anesthetic management of emergency lower segment caesarean section in a patient with PPCM using low dose spinal anesthesia.

INTRODUCTION

Peripartum cardiomyopathy (PPCM) is a rare life-threatening clinical entity of unknown etiology. The definition includes four criteria:

1) Development of cardiac failure in the last month of pregnancy or within 5 months of delivery.
2) Absence of any identifiable cause for the cardiac failure.
3) Absence of recognizable heart disease prior to the last month of pregnancy.
4) Left ventricular systolic dysfunction demonstrated by echocardiography (ejection fraction <45%, reduced fractional shortening).

Symptoms of PPCM-fatigue, edema and dyspnea are similar to the normal spectrum of peripartum state and pregnancy co morbidities such as pregnancy induced hypertension often leading to delayed diagnosis.

Anaesthetic management for caesarean section in parturient with PPCM is a challenging task due to the increased risk of various perioperative complications. The anaesthetic management aims to maintain myocardial perfusion by avoiding arrhythmias or episodes of hypotension or tachycardia and to optimise cardiac output by maintain preload but prevent fluid overload, maintain / increase myocardial contractility, prevent increased afterload.

We report a patient with PPCM with fetal distress requiring emergency lower segment caesarean section (LSCS) that was managed with spinal anesthesia.

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A 29-year-old primi with a 36 weeks pregnancy was scheduled for an emergency LSCS. She had regular ANC visit. Since past four weeks she complained of progressively worsening fatigue, dyspnea on exertion, itching of whole body, and palpitation. A cardiology consultation was done which led to the diagnosis of PPCM. She was managed with digoxin, frusemide and amiodarone.

Her laboratory investigations showed haemoglobin of 14.0 gm%; results of serum electrolytes, renal and liver functions were within normal values. 2D echocardiography showed non dilated LV, moderate left ventricular hypokinesia, reduced contraction and ejection fraction of 40%. ECG tracing showed sinus tachycardia.

On examination her pulse was regular with 140 beats per minute, blood pressure 140/90 mmHg and respiratory rate 22 per minute. On auscultation, lungs were clear. Her airway was Mallampati grade II.

A high risk informed and written consent was obtained. Two units of blood were made available for the surgery. On arrival in the operating room intravenous access was established with an 18 G cannula and left radial artery was cannulated for measuring intra arterial blood pressure (IBP) and routine monitors (ECG, pulse oximeter and NIBP) were attached.

After taking all aseptic precautions, spinal anaesthesia was administered in sitting position with 1.6ml of 0.5% (8 mg) bupivacaine and 25μg fentanyl in L3–L4 interspace using 25 G quincke needle in a single atraumatic attempt. Patient was coloaded with 300 ml of lactated ringers’ solution. The patient was placed in supine position and a wedge inserted under the right hip to minimise aorto-caval compression. T6 sensory block was obtained after two minutes. Intravenous Phenyephneprine 50 mcg was administered after five minutes of spinal anaesthesia to correct hypotension (80/50 mmHg). Subsequently BP from 100/60 to 110/70mmHg was maintained throughout the surgery. Heart rate was maintained between 110/minute and 120/minute. Her spo2 range from 94% to 96% at room air.

After ensuring adequacy of the block up to T6dermatomal level, the surgery was performed and a male infant weighting 2.3 kg was delivered after 10 min. Inj. oxytocin 2.5 IU bolus followed by infusion at rate of 10 IU/h was commenced after clamping of the umbilical cord. The Appearance, Pulse, Grimace, Activity, and Respiration (APGAR) score was 9 and 10 at 1 and 5 min, respectively.

Patient received a total of 1000 ml of crystalloid and urine output was 100 ml intraoperatively. Total duration of surgery was 50 min and the patient was stable and end – operatively her pulse rate was 120/min, BP 90/60 mm Hg with sensory level of T8.

Post-operatively, the patient was monitored in the intensive care unit (ICU). Postoperative analgesia was obtained with fentanyl 50mcg per hour in infusion with inj paracetamol 1 gm 8 hrly and inj ketrolac 30mg sos for next 24 h. Cardiologist advised her tab amiodarone, tab digoxin after surgery. Patient was shifted from ICU to postoperative ward after 24 hours. She was discharged on fifth postoperative day after uneventful recovery.

DISCUSSION

This case fulfilled all the diagnostic criteria of PPCM. Treatment of PPCM is similar to other types of congestive heart failure. The mainstay of therapy is a combination of digoxin, diuretics, sodium restriction, anticoagulation and beta blockers.

PPCM poses many challenges for the anaesthetist. Anaesthetic technique will be influenced by the urgency of delivery and the physiological condition of the parturient. Women with suspected PPCM, or a past history of PPCM should be reviewed by an anaesthetist in a timely manner and an agreed plan made for labour, delivery and post-partum care.

Both general and regional anaesthesia have been used. The goals of anaesthetic management are avoidance of myocardial depression, maintaining normovolemia, avoiding overdose of drugs during induction as the circulation time is slow and to avoid sudden hypotension when regional anaesthesia is the choice.

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.\(^6\)

Subarachnoid block (spinal anesthesia) is another good option for such patients as it provides intense analgesia required for caesarean 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.\(^7\) Cut off for local anesthetic drug to be classified as low dose has been set arbitrarily at < 8mg. Very lose dose is usually referred to as a dose less than 5mg. Both low and very low dose have been regularly associated with minimal hemodynamic changes and accelerated motor recovery, since inserting an epidural anesthesia was associated with risks of improper insertion and puncture of dura.\(^8\)

We had planned spinal anaesthesia in our patient because of request made by obstetrician for quick induction in view of fetetal distress associated with pv leaking. We did not consider general anaesthesia 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\(^9\) and also to prevent aspiration of gastric contents.

Use of high doses of opioids may necessitate postoperative ventilation for both mother and infant. Carefully administered regional anesthesia avoids the stress of general anaesthesia.

There are reported cases in literature which describe the deleterious effects of general anesthesia on cardiovascular and respiratory systems of both mother and the newborn. Carroll et al. used remifentanil in a patient with peripartum cardiomyopathy (PPCM) and the newborn required naloxone to reverse the respiratory depression.\(^10\)

Mc Indoe et al. described a previously asymptomatic parturient with PPCM who presented with a cardiac arrest at induction of general anaesthesia for emergency caesarean section.\(^11\) Similarly Wake et al. reported cardiac arrest immediately after the start of surgical procedure during emergency caesarean section under general anaesthesia in a patient with PPCM.\(^12\)

Low dose of local anaesthetic in addition to opioids minimises the haemodynamic instability associated with spinal anaesthesia. Although anaesthetists are apprehensive, but there are case reports where low dose spinal block has been successful and can be tried.\(^13\) As the anticipated duration of caesarean section is less, cases can be managed with low dose spinal block without any complications as there is no need to prolong the duration of block.

Oxytocin after delivery was administered intravenously as a slow infusion to prevent sudden vasodilatation causing hypotension and tachycardia.

Post-operative period is crucial in PPCM as re absorption of third space fluid after 48 hours of LSCS may increase preload causing congestive cardiac failure. Pain management was done with fentanyl to avoid post-operative pain associated hemodynamic variations.

**CONCLUSIONS**

In developing nations, where all pregnant women don’t undergo regular antenatal checkups, high degree of clinical suspicion is important for early diagnosis and anesthetic management of PPCM thereby increasing chances of successful patient outcome. Options for anesthesia for performing caesarean 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, low dose bupivacaine with an opioid adjuvant in subarachnoid block may provide a useful option in selected case.

**REFERENCES**


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