ORIGINAL RESEARCH PAPER

Anaesthesiology

CHALLENGES IN THE ANESTHETIC MANAGEMENT OF PERIPARTUM CARDIOMYOPATHY UNDERGOING EMERGENCY CESEREAN SECTION

KEY WORDS: Peripartum Cardiomyopathy, Caesarean section, general anaesthesia,

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ABSTRACT

Peripartum cardiomyopathy (PPCM) is an unusual form of dilated cardiomyopathy which manifests as acute heart failure in the last trimester of pregnancy or early postpartum period. Choice of anaesthesia is based on the urgency of lower segment caesarean section and severity of PPCM. Here we report a 31year old female G3P2L2 36weeks + 2days diagnosed as Peripartum Cardiomyopathy came with complaints of leaking per vagina was taken up for emergency caesarean section under general anaesthesia. In this case report, we discuss the anaesthetic management of a case of PPCM posted for emergency caesarean section with intra-operative event of desaturation. Anaesthetic management was directed towards optimization of desaturation, myocardial contractility, preload and after load. No adverse events or complications were observed.

INTRODUCTION

The incidence of cardiac disease in pregnancy has remained constant at 1% over several decades. Cardiomyopathies in parturient are a group of rare but fatal diseases of heart, mortality being due to arrhythmias, cardiac failure or thromboembolism. The incidence of PPCM is 1:2500-4000 in the U.S.A, 1:1000 in South Africa, 1:300 in Haiti and 1:100 in Nigeria.

Peripartum cardiomyopathy is defined as an idiopathic cardiomyopathy presenting with heart failure secondary to left ventricular systolic dysfunction towards the end of pregnancy or in the months following delivery, where no other cause of heart failure is found. It is a diagnosis of exclusion.

Case Report

A 31year old female G3P2L2 36weeks + 2days came with complaints of leaking per vagina and breathlessness and features suggestive of acute congestive cardiac failure. There was no history of pre-eclampsia or any other co-morbidities in the previous pregnancy. Physical examination revealed pallor, pedal edema, systolic murmur, heart rate of 120 beats/min with sinus rhythm, NIBP of 100/70 mmHg, respiratory rate of 22/min. She was maintaining saturation of 96-98%. Routine laboratory investigation including renal function tests and coagulation profile were within normal range, her hemoglobin was 9.2 gm% and an echocardiography showed LVEF 42% and global hypokinesia of left ventricle and diagnosed as peripartum cardiomyopathy. She was started on diuretics, Tab. IVABRAD and advised fluid restriction of 1.5litres and input output monitoring. It was planned to administer general anaesthesia to this patient in view of ongoing fetal distress; and an informed high risk consent was obtained with reservation of adequate blood products . She was shifted to operation theater (OT) with a wedge under her right hip and standard ASA monitoring were applied. After insertion of a 16 gauge iv cannula on the dorsum of right hand and a left radial arterial cannula with local infiltration, rapid sequence anaesthesia induction was carried out with slow titrating doses of Inj. fentanyl 100 microgram, Inj ethomidate 14 mg, and Inj suxamethonium 100mg. After induction of general anaesthesia with a well-positioned endotracheal tube (6.5 size ETT) checked with 5-point auscultation and Etco2 monitoring. Patient developed an episode of desaturation which was managed by checking the tube position and bag and mask ventilation with 100% FiO2, maintaining minimal PEEP, and administering 10mg Injection Furosemide, after which saturation improved up to 94%.

Simultaneous delivery of baby (Apgar 8 at 1min) slow oxytocin infusion 20units in 500ml of normal saline was started. Anesthesia was maintained with isoflurane (0.2-0.6%) with Fi02 50% with oxygen and air mixture with spo2 of 93-95%. Noradrenaline infusion was titrated according to the patients hemodynamics which was gradually tapered at the end of surgery. The patient was planned for elective ventilation and extubated after 12hours of post operative monitoring in intensive care unit. The recovery from anaesthesia was complete and uneventful. Postoperative cardiology workup was found to be within normal limits. Post operative investigations and ABG were within normal limits . She was managed with antibiotics ,LMWH, diuretics and beta blocker. She was shifted to ward after 3days and discharged from hospital two weeks later.

DISCUSSION

The criteria to diagnose PPCM includes :

Traditional Criteria :

- The development of heart failure in the last month of pregnancy or within 5 months postpartum.
- The absence of an identifiable cause of heart failure .
- The absence of recognizable heart disease prior to the last month of pregnancy.

Echocardiographic Criteria Demonstrating LV Systolic Dysfunction :

- LVEF <45%
- Fractional shortening <30%
- LV end diastolic dimension >2.7cm/m^2 body surface area.

PPCM is now regarded as a distinct entity and several hypothesis have been proposed regarding its pathophysiology. A combined two-hit model including systemic angiogenic imbalance and host susceptibility is thought to be crucial in the pathophysiology .Possible factors

leading to PPCM include low selenium levels, viral infections, stress activated cytokines ,inflammation ,autoimmune reactions, pathological response to hemodynamic stress, unbalanced oxidative stress and induction of anti-angiogenic factors.

There is a decrease in myocardial contractility reducing LVEF. Initially compensation occurs with left ventricular enlargement and increase in stroke volume with an associated increase in contraction .Eventually these compensatory mechanisms fail, cardiac output decreases and left ventricular failure manifests.

Recommended therapy for PPCM :
- GOALS
- Treat hypotension
- Fluid restriction
- Dietary salt restriction

Drugs For Routine Use
- Diuretics
- Beta blockers
- Vasodilators
- Digoxin

Therapies In Selected Patients
- Aldosterone antagonists (in postpartum)
- Inotropes
- Anticoagulation
- Implantable defibrillators
- Biventricular pacing
- Cardiac transplantation

New Therapeutic Strategies:
Bromocriptine may be a novel disease specific treatment and acts by suppression of production of prolactin by dopamine receptor agonism. Levosimendan, calcium sensitizer and inodilator shown to decrease mortality in patients with decompensated heart failure.

Anesthetic Management:
Preoperative preparation must focus on improving the congestive cardiac failure. All cardiac medications continued and Serum electrolytes rechecked on day of surgery because of electrolyte abnormalities due to diuretic therapy.

Both neuraxial and general anesthesia have been safely administered for cesarean section inn patients with PPCM.

Continuous neuraxial anesthesia usually preferred as it decreases preload and afterload but not contractility. While using regional techniques , it is important to avoid marked hemodynamic changes.

The Choice Of Regional Techniques Include :
- single shot spinal anesthesia
- continuous spinal anesthesia
- an incremental epidural anesthesia
- Combined spinal epidural technique

Preloading or co-loading of intravenous fluids cannot be done as it causes fluid overload. Choice of vasopressors to treat hypotension must be chosen appropriately to avoid tachycardia.Marked hemodynamic response expected during delivery due to auto tranfusion from uterus and also due to use of oxytocic drugs. Judicious use of diuretics and vasodilators is warranted.

General anesthesia maybe needed in emergency situations or when regional anesthesia is contraindicated in anticoagulated patients. An opioid based technique (fentanyl and remifentanyl) usually provides excellent hemodynamic stability.When using opioid based technique it is important to remember neonatal respiratory depression and appropriate steps taken in terms of artificial ventilation of the neonate and naloxone administration. With Remifentanyl the short duration of action decreases the risk of transplacental passage and subsequent neonatal depression .GA facilitates the use of TEE.

Blood loss should be replaced appropriately. Thromboprophylaxis should be considered using sequential compression devices. They require adequate post operative analgesia and prolonged postoperative monitoring in ICU .

Anesthestic Goals:
- Avoid tachycardia and maintain sinus rhythm
- Avoid effects of negative inotropic agents
- Prevention of increase in afterload
- Maintain adequate preload in the presence of elevated LVEDP.

Monitoring
- Pulse oximetry
- Capnography
- ECG
- Invasive arterial blood pressure
- Central venous pressure monitoring
- Transesophageal echocardiography
- Pulmonary artery pressure monitoring
- Cardiac output monitoring

CONCLUSIONS
PPCM is a disease associated with high morbidity and mortality and can lead to maternal and fetal loss. It is vital to have a complete understanding of the pathophysiology of the disease for safe anesthetic management of these high risk parturients. Favourable maternal and fetal outcome is achieved with considering the basic hemodynamic goals while choosing the techniques and drugs to provide anesthesia to the patients with PPCM.

A multidisciplinary team with a protocolized approach will ensure safe peri-operative course of these patients.

REFERENCES:
1. Chestnut's Obstetric Anesthesia :Principles and Practice .Fourth edition.
2. Sliwa K et al. Current state of knowledge on etiology,diagnosis,management and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy.Eur J Heart Fail 2010: 12: 767-778.
3. Anaesthetic management of two cases of peripartum cardiomyopathy. Bhawna Soni,P L Gautam, Anjun Grewal,Harminder Kaur .Journal of Obstetric anesthesia and critical care (Jan 2011)
4. Turnbull D. Anesthetic management of peripartum cardiomyopathy. Minerva Anestesiol. 2021 Mar;87(3):334-340. doi: 10.23736/S0375-9393.20.14703-5. Epub 2020 Dec 10. PMID: 33300322.