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ANESTHETIC MANAGEMENT OF A PATIENT WITH DILATED CARDIOMYOPATHY WITH LOW EJECTION FRACTION FOR FRACTURE FEMUR SURGERY: A CASE REPORT.

Anaesthesiology

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ABSTRACT

Patients with congestive heart failure have a high risk of perioperative major adverse cardiac events and death. The major perioperative goal of management with low ejection fraction is maintaining hemodynamic stability. The management of a patient with dilated cardiomyopathy who undergoes non-cardiac surgery is always a challenge for us, as this situation is associated with a high mortality rate. In this report, we present the successful management of a 66-year old female with congestive heart failure & EF(ejection fraction) 23% with dilated cardiomyopathy who underwent intra-articular distal femur fracture under low-dose spinal anesthesia.

KEYWORDS

INTRODUCTION

Congestive heart failure is a major health problem, and dilated cardiomyopathy is one of its leading causes [1]. The number of patients with CHF (congestive heart failure) & DCM (dilated cardiomyopathy) coming for surgery continues to rise, and we are responsible for providing safe perioperative care for patients with low ejection fraction. The risk of perioperative mortality & morbidity in these patients is high, demonstrating the need for optimal perioperative management in these patients [3]. Maintaining forward flow, encouraging inotropy without causing or worsening ischemia, and getting patients back to their preoperative level of function following surgery are the perioperative aims in the management of these patients. Pharmacologic support, such as calcium channel blockers, phosphodiesterase inhibitors, vasopressors, and diuretics, can frequently help to achieve these objectives [2]. The key points are to avoid myocardial depression, maintain hemodynamic stability, and meet the requirements of surgery. In this report, we present perioperative management of a patient with CHF with DCM (low EF 23%) who had undergone intra-articular femur plating under low-dose spinal anesthesia with a mixture of 0.5 heavy bupivacaine + fentanyl.

Case Report:

A 66-year old female sustained an intraarticular distal femur fracture due to a fall and was scheduled for open reduction and internal fixation surgery. She was a known case of dilated cardiomyopathy, not a known case of diabetes mellitus, systemic hypertension, COPD, or bronchial asthma. She was having a productive cough for 15-20 days; a respiratory system examination showed bilateral fine crypts at the base of the lungs .She was on tablet torsemide and spironolactone(10/25 mg),tablet sildenafil 50mg OD, and tablet telmisartan 20mg OD. Tablet nitroglycerin 2.5mg, tab. atorvastatin 10mg, tab. Clopidogrel 75mg OD, tab. carvedilol 6.25mg BD On examination, the patient had dyspnea at rest and orthopnea present; her heart rate was 88/min and regular. The blood pressure was 138/86 mmHg. Preoperative 12-lead electrocardiograms showed sinus arrhythmia. Chest x-ray revealed cardiomegaly with a CT ratio of 0.7. Echocardiography showed global hypokinesia of the left ventricle, LVEF (left ventricular ejection fraction)23%,severe pulmonary hypertension, severe tricuspid regurgitation, and moderate mitral regurgitation. All the biochemical and hematological investigations were within the normal limits except for a hemoglobin level of 9 g/dl. Her room air saturation was 88 to 90%. She had anticipated difficult intubation due to a short neck and Mallampatti score of 4. Preoperatively , the cardiologist's and pulmonologist's opinions were obtained .The patient was asked to stop taking clopidogrel 75mg 5 days prior to surgery, tab. spironolactone was stopped on the day of surgery, and the rest of the medication continued as per cardiologist advice. High-risk consent was obtained in view of poor cardiovascular status (American Society of Anesthesiology status 4), and the patient was planned to receive combined spinal and epidural anesthesia (CSE).

In the operating room, standard monitors, including non-invasive blood pressure (NIBP), arterial oxygen saturation (SpO2), and five-lead electrocardiograms (ECG), were attached. Under all aseptic precautions, an arterial line (right radial) and central line (right internal jugular) were established for continuous arterial and central venous pressure monitoring. After taking all aseptic precautions, the epidural anesthesia procedure started. Due to technical difficulties, we were not able to place the epidural catheter. Hence it was decided to go with single-shot low-dose spinal anesthesia .A 25 G spinal needle was introduced at the L3-L4 interspace. Intrathecally 6mg (1.2ml of 0.5%) hyperbaric bupivacaine with fentanyl 20 mcg (total volume=1.6 ml) was administered. The patient was subsequently placed in the supine position with slight head up. A T10 sensory block to pinprick was achieved. Ringer lactate was given to maintain CVP at 6-8cm water. An oxygen face mask was attached at 5 L/min. Initial intraoperative mean arterial blood pressure was maintained above 65 mmHg with noradrenaline infusion support at 0.25 mcg/kg/min. The surgery lasted 150 minutes, and there was a blood loss of 400 mL. A total of 600 mL of normal saline and one unit of packed red blood cells were given. Patient urine output was 100 ml.The patient remained hemodynamically stable throughout the surgery. At the end of surgery, noradrenaline support was tapered and stopped. After surgery, the patient was shifted to the intensive care unit in the immediate postoperative period, and the hemodynamic monitoring was continued (ECG, arterial blood pressure, CVP). It was advised to restart clopidogrel 75mg after 6 hours of surgery.

DISCUSSION:

Heart failure (HF) is characterized as a multifaceted clinical condition marked by symptoms and signs resulting from difficulties in ventricular filling or the ejection of blood. The primary clinical signs of heart failure include shortness of breath, tiredness, and fluid accumulation. HF arises from a wide range of underlying issues, such as ischemic heart disease (i.e., ischemic cardiomyopathy), high blood pressure, valvular heart disorders, myocarditis, infiltrative diseases (for example, sarcoidosis and amyloidosis), and peripartum cardiomyopathy. Additionally, many patients may present with no clear underlying cause (i.e., idiopathic dilated cardiomyopathy) [4].

In contrast to heart failure with preserved ejection fraction (HFpEF; formerly known as diastolic heart failure), heart failure with reduced ejection fraction (HFrEF) is defined as an ejection fraction of 40% or less. As with other surgeries, the anesthetic plan should be chosen based on the patient's preferences as well as the needs of the procedure. In addition to being safe for individuals with heart failure, regional anesthetic has been demonstrated to offer advantages such as a lower risk of pneumonia and preventative analgesia for postoperative pain management. [5] These advantages need to be balanced against the risk of hypotension after a sympathectomy.

Regional anesthesia used alone or in combination with general anesthesia has the advantage of reducing preload and afterload, which can improve cardiac output. However, hypotension must be prevented to avoid myocardial hypoperfusion. Many studies showed low-dose subarachnoid block has better control over the level of blockade and hemodynamic stability. Therefore, administration of combined spinal-epidural anesthesia was our modality of choice. We gave spinal

anesthesia with a low volume of drug in the sitting position so that high levels were not achieved. We planned an epidural catheter for backup; due to technical difficulties, we were unable to place the epidural catheter and continued with spinal anesthesia. We started norepinephrine infusion intraoperatively To maintain mean arterial pressure above 65 mmHg, which could have been avoided if the epidural was done, the spinal anesthetic drug dose could have been reduced further.

In general, anesthesia, laryngoscopy, and intubation lead to excessive sympathetic activation and cause hypertension and tachycardia, which will produce a significant effect on a failing heart. [6]

Use of anesthetic gases and intravenous agents leads to hypotension. As volatile anesthetics are cardiac depressants, they must be properly titrated. Because of their impact on the δ receptor, which prevents adrenergic activation, opioids appear to be especially helpful for heart failure patients [7].

Maintenance fluid replacement with crystalloids and/or colloids (1–2 mL/kg/hr) may be the sole fluid needed for minimally or moderately invasive surgical procedures. A blood transfusion may be necessary for major procedures involving significant fluid changes and hemodynamic instability. Although restrictive transfusion techniques are usually recommended, if a patient with heart failure has ongoing blood loss, coagulopathy, or signs of reduced end-organ perfusion and their hemoglobin level drops to 8 or lower, they may be eligible for a transfusion. [5]

Reducing afterload by vasodilation can greatly reduce myocardial work. However, it is important not to compromise blood flow to circulations that have pressure-dependent autoregulation (cerebral, renal, and coronary). In particular, diastolic pressure must be maintained, as the left ventricle is perfused during diastole, and many patients with cardiac failure will also have coronary artery disease [8].

The ongoing search for medication combinations to enhance perioperative anesthesia and analgesia while minimizing side effects is driven by the rising demand for spinal anesthesia in high-risk patients with comorbidities. In addition to lowering the dose of an intrathecal LA required, the intrathecal administration of dexmedetomedine, fentanyl to bupivacaine prolonged postoperative analgesia and was not linked to hemodynamic instability [9].

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