Anaesthetic Management of an Elderly Patient with Dilated Cardiomyopathy Undergoing Surgery for Fracture of Trochanter

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Abstract

The anaesthetic management of a patient with dilated cardiomyopathy (DCM) undergoing non cardiac surgery poses a challenge to the anaesthesiologist as DCM is commonly complicated by progressive congestive heart failure and malignant arrhythmias. The anaesthesiologist must have the knowledge of its haemodynamics, diagnostic evaluations and treatment modalities, more so regarding various drugs used during anaesthesia. We report a case of DCM with severe left ventricular dysfunction posted for surgery of fracture of trochanter managed successfully during anaesthesia.

Key Words: Anaesthetic management, Dilated cardiomyopathy, Non-cardiac surgery.

Introduction

Dilated cardiomyopathy (DCM) is a primary myocardial disease of unknown cause characterised by left ventricular or biventricular dilation, impaired myocardial contractility, decreased cardiac output and increased ventricular filling pressures(1). The prevalence is 920/100000. It may be ischemic or non ischemic. The ischemic type is related to atherosclerosis and ischemic heart disease. The non ischemic type may be secondary to infections, chemotherapeutic agents, alcohol abuse or during the peripartum period. Consequently, patients with this underlying condition may present at any time for anaesthesia. It is essential that anaesthesiologist understand the underlying pathology to better manage these patients. The management of a patient with DCM undergoing noncardiac surgery is always a challenge to the anaesthesiologists as DCM is most commonly complicated by CHF (congestive heart failure) and malignant arrhythmias (the most common cause of death in DCM)(1). We here present a case of dilated cardiomyopathy posted for elective surgery of fracture of trochanter.

Case Report

A 70 year old male, weighing 70kg, with fracture of trochanter was scheduled for surgery. He was diagnosed to be having dilated cardiomyopathy during preanaesthetic checkup. There was no history of drug allergies. On general physical examination, there were no signs of heart failure like raised JVP (jugular venous pressure), ankle oedema and hepatomegaly. His blood pressure was 110/70 mmHg and pulse rate was 104/minute with occasional missed beats. On systemic examination, chest was clear bilaterally and heart sounds appeared normal with a pansystolic murmur in mitral area. He was edentulous with adequate mouth opening and had normal neck and temporomandibular joint movements. Spine was normal. Chest X-ray showed cardiomegaly. ECG (electrocardiography) showed LBBB (left bundle branch block) with occasional ventricular ectopic beats. Echocardiography revealed LVEF (left ventricular ejection fraction) 35%, left ventricular hypokinesia with mild to moderate mitral regurgitation. He was put on tablet carvedilol 3.125 mg OD, isosorbide nitrate 20mg BD, lasix 20 mg OD & losartan 25 mg OD by cardiologist. Other investigations i.e. hemoglobin, bleeding time, clotting time, urine examination, blood urea, blood sugar and serum electrolytes were within normal limits.

Spinal anaesthesia was planned for the procedure. The anaesthetic procedure was explained to the patient and high risk written informed consent was obtained. He was premedicated with tablet ranitidine 150mg in the night and 2 hours before surgery. In the operating room, monitors were attached including BP (blood pressure), SpO2 (pulse oximetry) and ECG. His baseline blood pressure was 112/74mmHg, pulse 100/min with occasional missed beats and SpO2 was 99%. Intravenous line was secured with 18G cannula using ringer lactate. Heart rate, NIBP (non invasive blood pressure) and ECG were recorded throughout the procedure. After cleaning and draping, lumbar puncture was done with 23G quincke babcok needle at L3-L4 interspace. Clear CSF (cerebrospinal fluid) was obtained and 1.8 ml of 0.5% hyperbaric bupivacaine with 25 µg fentanyl was injected. Adequate sensory block was achieved upto T10.
Patient was given oxygen through medium concentration mask at the rate of 5 L/ min. After 10 minutes systolic blood pressure dropped to 70 mmHg. Injection mephentermine 6 mg iv (intravenous) was given and simultaneously infusion of dopamine was started at the rate of 10µg/kg/ minute. BP rose to 106/68 mmHg. There were frequent episodes of ventricular ectopics for which patient was administered injection xylocard 60mg iv bolus and thereafter put on xylocard infusion. Surgery lasted for 1 hour. At the end of surgery, patient was conscious, pain free and comfortable. Postoperative blood pressure was 110/72 mmHg and pulse was 96/min without any missed beats. He was observed for 4 hours in post anaesthesia care unit where he remained hemodynamically stable.

Discussion

Anaesthetic management of patients with cardiomyopathy with reduced systolic function is challenging and may be associated with high mortality(2). Two key factors exist in the management of patients with cardiomyopathies: one is to improve systolic function and the other is to prevent sudden death due to ventricular arrhythmias. To improve systolic function, patient should initially be managed medically with administration of diuretics, beta-blockers, angiotensin converting enzyme inhibitors or angiotensin receptor blockers. Our patient was being managed with these drugs. Biventricular pacing, cardioplasty or cardiac transplant may also be required to improve cardiac function(3). Biventricular pacing and cardioplasty is beneficial for patients with severe cardiomyopathy in moderate to severe congestive heart failure with EF. The preoperative preparation of these patients must be meticulous as they have minimal or no cardiac reserves. Preoperatively patients tend to be dehydrated as they have been diuresed leading to hypotension during anaesthesia. But still preoperative hydration is not desirable as it may lead to congestive heart failure. As patients may develop ventricular arrhythmias in the perioperative period, antiarrhythmic medications should be continued. Arrhythmias occur commonly when potassium or magnesium levels are decreased. These electrolytes should be measured preoperatively and corrected as necessary. Oxygen carrying capacity should be adequate which is determined by cardiac output and haemoglobin. Therefore, Hb should be maintained at a higher level and 13-14gm/100ml has been recommended. To improve cardiac output, inotropes may be required(4). The goals of anaesthetic management are

1. Myocardial depression should be avoided.
2. Normovolemia should be maintained.
3. Avoid overdose of drugs during induction as the circulation time is slow.
4. Ventricular afterload should be avoided.
5. Avoid sudden hypotension when regional anaesthesia is the choice.

We used spinal anaesthesia as GA (general anaesthesia) carries a high risk because these patients may develop CHF or arrhythmias during intraoperative period(5). Also spinal anaesthesia has certain other advantages. It reduces bleeding, postoperative respiratory problems, deep vein thrombosis, CNS (central nervous system) complications, facilitates early ambulation, minimizes requirement of postoperative analgesia. In addition, spinal anaesthesia does not require instrumentation of the airway and patients maintain their airway and pulmonary function. Maintenance of consciousness during surgery permits prompt recognition of acute dangers in cerebral function or the onset of angina pectoris. Hyperbaric bupivacaine was used in less amount (1.8ml) in our case as time of onset is decreased and spread is more extensive with hyperbaric bupivacaine for spinal anaesthesia in elderly(6). Fentanyl was used as narcotics have minimal depressing effect on cardiac function. Intraoperative 500 ml of HES (hydroxyl ethyl starch) and 1000 ml of ringer lactate were given. Fall in blood pressure was corrected with injection mephentermine and infusion of dopamine. Over hydration may not be desirable as it may lead to congestive heart failure. Fluid management is critical. Therefore a vasopressor to mitigate against the vasodilating effect of the anaesthetics is a rational approach as we used mephentermine and dopamine in our case.

Epidural anaesthesia produces changes in the preload and afterload that mimic pharmacological goals in the treatment of this disease(7). It is recommended that fluid therapy and pharmacological management be guided by the use of pulmonary artery catheterisation and the determination of cardiac filling pressures(8). Patient can also manifest life threatening ventricular arrhythmias. Anaesthesiologists should be prepared to use xylocard, amiodarone or defibrillation to treat arrhythmia. In addition to the basic monitoring (blood pressure, pulse oximetry, ECG and end tidal CO2), direct arterial blood pressure monitoring may be more beneficial to identify abrupt hemodynamic changes(9). Dopamine has positive inotropic, chronotropic and vasoconstrictive effects making it an ideal agent to negate the adverse cardiovascular effects of anaesthetics(10).
Another method of anaesthesia in these patients is with the help of nerve blocks. Nerve blocks could be a rational approach as they have minimal hemodynamic abrasion.

Indications of general anaesthesia in these patients with dilated cardiomyopathy is when higher block is required or spinal anaesthesia is contraindicated. Anaesthetics not only depress central nervous system function but also cardiac function. They tend to depress the myocardium, slow the heart rate and dilate the blood vessels. Anaesthetic management needs to be customized for those with left ventricular ejection fraction (LVEF) below 45%. Therefore, selecting the type and dose of anaesthetics with minimal vasodilatation and myocardial depressing effect is prudent. Drugs like ketamine, etomidate and narcotics have minimal depressing effect on cardiac function and are used frequently. Conventional anaesthetics like propofol, thiopentone sodium or isoflurane in recommended doses depress cardiac function(4). Skeletal muscle paralysis is provided by non depolarising muscle relaxants that lack significant cardiovascular effects.

To conclude, the most important factors for management of these high risk patients include a thorough preoperative assessment, optimizing the cardiac status, proper anaesthetic plans, intraoperative and postoperative monitoring and prompt diagnosis and management of complications.

References

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