

Case Report:

Anaesthetic management of a patient with dilated cardiomyopathy posted for non-cardiac surgery

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ABSTRACT

Dilated cardiomyopathy (DCM) is characterized by impaired ventricular contractility and causes concern in anaesthetic management as it may sometimes predispose to malignant arrhythmias. A 77-year-old woman diagnosed to have irreducible umbilical hernia, was posted for emergency laparotomy and hernia repair. On examination, she belonged to American Society of Anesthesiologists (ASA) physical status grade III with a functional status of 4 metabolic equivalents (METs). She was also suffering from DCM with severe left ventricular (LV) dysfunction (LV ejection fraction 25%). This patient was successfully managed by administering general anaesthesia with ProSeal laryngeal mask airway. We report the detailed anaesthetic management of this patient who underwent emergency laparotomy and hernia repair.

Key words: *Cardiomyopathy Dilated, LMA Pro-Seal, Emergency Treatment*

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INTRODUCTION

Dilated cardiomyopathy (DCM) is a primary myocardial disease of varied etiological causes.¹ It is characterized by left ventricular or biventricular dilatation and impaired ventricular contractility.² The term “DCM” is generally used to designate an idiopathic process, in the absence of long-standing hypertension, toxin exposure, or chronic alcoholism (secondary dilated cardiomyopathy). Congestive heart failure with global left ventricular dysfunction, mimicking dilated cardiomyopathy, may also occur in patients with coronary ischaemia and valvular heart disease. Right ventricular dilatation and dysfunction may be present but are not necessary for the diagnosis. This condition is among the most common causes of heart failure. The incidence of dilated cardiomyopathy discovered at autopsy is estimated to be 4.5 cases per 100,000 population per year,

whereas the clinical incidence is 2.45 cases per 100,000 population per year.³ Malignant arrhythmias are the most common cause of death in DCM.¹ Anaesthetic management of these patients is quite challenging, because of the associated global ventricular dysfunction and predisposition of these patients to malignant arrhythmias perioperatively, both of which are aggravated by the myocardial depressant effect of anaesthetic drugs as well as surgical stress. The anaesthesiologist should have the knowledge of its pathophysiology, clinical features, diagnostic evaluation and the treatment modalities. We report successful anaesthetic management of a patient with DCM posted for emergency laparotomy and mesh repair of irreducible umbilical hernia.

CASE REPORT

A 77-year-old woman was diagnosed to have obstructed umbilical hernia and was posted for

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emergency laparotomy and mesh repair. On examination, she belonged to American Society of Anesthesiologists (ASA) physical status grade III⁴ with a functional status of 4 metabolic equivalents (METs). She was suffering with dilated cardiomyopathy and left ventricular dysfunction since 2008. There was no past history of hypertension (HTN), diabetes mellitus (DM) and ischaemic heart disease (IHD). She had sustained left-sided embolic stroke in 2011 from which she recovered uneventfully. She was receiving medical management with oral digoxin, torsemide, carvedilol, aspirin and clopidogrel. She was in a fasting state for the past 24 hours and was receiving maintenance intravenous fluids.

The 12 lead electrocardiogram (ECG) revealed, normal sinus rhythm (rate 91 beats per minute), occasional premature ventricular complexes (PVCs) were seen; left ventricular hypertrophy was evident. Echocardiography demonstrated global hypokinesia of left ventricle, poor systolic function with left ventricular ejection fraction (LVEF) of 25%; moderate aortic regurgitation was also present. Chest radiograph (postero-anterior view) revealed cardiomegaly; lung fields were normal. Considering preoperative high-risk stratification and the possibility of perioperative malignant arrhythmias, left ventricular failure and its consequences, patient was considered for emergency surgery under general anaesthesia after obtaining a “high-risk” informed consent.

After shifting to preoperative holding room she was given 40 µg of fentanyl intravenously under local anesthesia, using a 20 gauge radial arterial cannula, a 7F, 15 cm triple lumen central venous catheter was inserted into right internal jugular vein for intensive haemodynamic monitoring. In the operating room, after thorough suctioning, nasogastric tube (18F size) was removed. The following parameters

were monitored: 2 lead ECG (LII and V5), invasive blood pressure (IBP), central venous pressure (CVP), oxygen saturation by pulse oximetry (SPO₂), end-tidal carbon dioxide (ETCO₂), body temperature and urine output. One bolus dose of xylocaine 1.5 mg/kg was given intravenously to treat the PVCs. Anaesthesia was induced with etomidate 0.2 mg/kg, fentanyl 2 µg/kg and the patient was paralysed with 0.1 mg/kg vecuronium. A size 3 Pro-Seal laryngeal mask airway (LMA) was inserted and secured after proper positioning. Anaesthesia was maintained with oxygen, air, isoflurane up to 1.5%, top-up dose of vecuronium 1 mg and intermittent positive pressure ventilation. Monitoring of CVP and other vital signs was used to optimize the preload. CVP was maintained between 12- 14 cm H₂O. We started dopamine infusion 5 µg/kg/min to avoid sudden fall in blood pressure due to anaesthetic drugs and it was tapered slowly at the end of surgery. Surgeons found omentum as hernial content which was reduced and defect was closed with the help of mesh. Procedure lasted for 90 minutes. Blood loss was about 200 mL. Intraoperatively 800 mL of normal saline and 500 mL of colloid were infused; urine output was 140 mL at one-and-half hours. At the end of surgery, residual neuromuscular blockade was reversed and LMA Pro-Seal was removed after return of protective airway reflexes and patient had good spontaneous respirations. Patient had stable haemodynamics throughout the procedure. Patient was shifted to surgical recovery room and all the intraoperative monitoring was continued post-operatively. Intravenous morphine 0.5 mg/hr infusion was started for post-operative pain relief. All her preoperative medications including aspirin and clopidogrel were continued as per the recommended scheduled dosing and timing. Patient was shifted from the recovery room on third post-operative day. Further course was uneventful.

DISCUSSION

Dilated cardiomyopathy is characterized by progressive cardiac dilatation and results in impaired ventricular function. It has a prevalence of 36 per 100,000 population.¹ A large number of cases are idiopathic but within these there is a familial association. Anaesthetic management of patients with cardiomyopathy with reduced systolic function is challenging and may be associated with high mortality.⁵ The goals of anaesthetic management are: (i) avoiding myocardial depression by carefully titrating the anaesthetic drugs; (ii) maintaining normovolaemia; (iii) avoiding overdose of drugs during induction as the circulation time is slow; (iv) avoiding increase in ventricular afterload and (v) avoiding sudden hypotension where regional anaesthesia is the choice.

Two key factors exist in the management of patients with cardiomyopathies. These include: (i) to improve systolic function; and (ii) to prevent sudden death due to ventricular arrhythmias. To improve systolic function, patients 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. The preoperative preparation of these patients must be meticulous as they have minimal or no cardiac reserve. Preoperatively patients tend to be dehydrated as they would have been on diuretics leading to hypotension during anaesthesia. However, excessive 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 low. These electrolytes should be measured preoperatively and corrected as necessary. We have monitored serum electrolyte levels and ensured that these

were within normal limits. Oxygen carrying capacity should be adequate which is determined by cardiac output and haemoglobin.

After pre-operative evaluation our patient was posted for emergency laparotomy and hernia repair. A preoperative ultrasonography has confirmed that the omentum was the hernial content. The crucial period during which one can expect more fluctuations in haemodynamics is during anaesthesia induction. There were two choices of anaesthetic technique, general anaesthesia and regional anaesthesia. We had two options with us to secure the airway and administering general anaesthesia in this patient. One option was endotracheal intubation (ETI) and the other LMA ProSeal. We opted for LMA ProSeal because, for ETI, patient needs more depth of anaesthesia to avoid pressor response to laryngoscopy and ETI,⁶⁻⁸ and the other reason is that patient did not have a risk of gastric aspiration as evidenced by ultrasound examination of the hernial content. Compared to ETI, insertion of LMA ProSeal⁶⁻⁸ requires lighter plane of anaesthesia and also we could avoid pressor response to laryngoscopy and ETI which is particularly important in patients with compromised LV function as in our patient. We used muscle relaxants for insertion of LMA Pro-Seal and to facilitate the intermittent positive pressure ventilation (IPPV), which is more beneficial than spontaneous respirations during laparotomy to facilitate the surgery. Oxygen carrying capacity should be adequate which is determined by cardiac output and haemoglobin. To improve cardiac output, inotropes may be required.⁹ The small dose of dopamine used in this case was to support the circulation if hypotension occurred in light of the cardiac compromised status of the patient. Dopamine has positive inotropic, chronotropic and vasoconstrictive effects making it an ideal agent to negate the adverse cardiovascular effects of

anaesthetics.¹⁰ We were prepared for the possible perioperative complications associated with surgical bleed and fluid shift like hypotension and malignant arrhythmias.

Regional anaesthesia may be an alternative to general anesthesia in selected patients with DCM. We avoided regional anesthesia (spinal or epidural anaesthesia), because our patient was on antiplatelet medication and her LV function was poor. Further sudden fall in blood pressure associated with regional anesthesia was not desirable in our patient. Hence, we have not opted for regional anesthesia.

To conclude, a supra glottic airway device like LMA Pro-Seal can be used as an alternative to ETI in high risk cardiac disease patients undergoing surgical procedures for providing general anaesthesia with IPPV especially in patients who are not suitable for regional anaesthesia technique and also for those who had no risk for aspiration of gastric contents.

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