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CASE REPORT

A Case of Hypertrophic Obstructive Cardiomyopathy Posted for Laparoscopic Cholecystectomy

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ABSTRACT

Hypertrophic obstructive cardiomyopathy (HOCM) is an autosomal dominant inherited condition in which the interventricular septum undergoes asymmetrical hypertrophy, obstructing the left ventricular outflow tract during ventricular systole.[1] The disease can present at any time during lifetime, with patients complaining of dyspnea of various grades depending on the severity of obstruction.

Laparoscopic cholecystectomy is one of the most commonly performed elective surgical procedures. Patients with gallstone disease get immense benefit from the procedure in terms of relief of signs and symptoms, as well as possible complications of prolonged disease.

Patients with HOCM, whose signs and symptoms are well controlled on regular medication, can undergo laparoscopic/open cholecystectomy safely with appropriate anaesthetic and surgical management, and they should not be denied the benefits of undergoing laparoscopic cholecystectomy due to their cardiac condition.

Keywords: Cardiomyopathy, dyspnea, laparoscopic cholecystectomy

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INTRODUCTION

Hypertrophic obstructive cardiomyopathy is a condition where asymmetric hypertrophy of the interventricular septum and systolic anterior motion of the mitral valve leaflet lead to dynamic obstruction of the left ventricular outflow tract. Patients with this condition can present with various grades of symptoms, from being asymptomatic to sudden cardiac death.[2] These patients might be posted for elective surgical procedures, and lack of knowledge about the pathophysiology of the condition and improper intraoperative management can lead to grave consequences. Laparoscopic cholecystectomy is one of the most commonly performed elective surgical procedures, but it can present with challenges in HOCM patients. Here, we present a case of HOCM, who was posted for laparoscopic cholecystectomy and underwent the surgery without any complications.

CASE PRESENTATION

A 56-year-old female presented to the OPD with complaints of severe intermittent abdominal pain since last month. On clinical and radiological examination, the patient was diagnosed with gallstone disease. The patient reported that she was diagnosed with hypertrophic obstructive cardiomyopathy, which she learned when she went to a hospital 9 years ago due to dyspnea on exertion. She has been on beta blockers since then, and the symptoms have improved following the initiation of drug therapy. ECG showed QRS fragmentation in leads II, III, and aVF. An ejection systolic murmur was heard at the left parasternal region. 2DE showed asymmetrical septal hypertrophy, LVH, Grade 3 Systolic anterior motion of the mitral valve leaflet, mild AR, and an ejection fraction of 60%. Other investigations were within normal limits. The patient was planned for laparoscopic cholecystectomy.

On the day before surgery, the patient was asked to continue beta-blocker therapy and advised to maintain adequate hydration by allowing water orally up to 2 hours before the surgery. On the day of surgery, the patient was taken inside the operating room. Standard ASA monitors were attached (ECG, pulse oximetry, non-invasive blood pressure monitoring, temperature probe). Two wide-bore cannulas were secured. Preloading was done with 500 mL of ringer's lactate. The patient was adequately pre-oxygenated, and induction of anesthesia was achieved with injection of fentanyl 100 mcg IV and titrated doses of etomidate, till loss of response to verbal commands. Vecuronium 7 mg IV was administered for muscle relaxation. Preservative-free lignocaine 60 mg IV was given ninety seconds before laryngoscopy to avoid tachycardia, as it can increase left ventricular outflow tract obstruction. Gentle laryngoscopy was done, and the patient was intubated with a 7.5 mm PVC, cuffed endotracheal tube. An arterial line was secured with a 20G IV cannula for beat-to-beat blood pressure monitoring. Laparoscopic ports were inserted; the surgeon was advised to avoid rapid insufflation of the abdomen and keep the flow rate of insufflating gas and the abdominal pressure as low as possible. The surgery proceeded, and the surgeons found it difficult to continue the procedure through laparoscopy due to the presence of adhesions and less space to work in, so they decided to go for open cholecystectomy. Fentanyl 50 mcg IV was given before incision, and once the procedure was over, local infiltration of the wound was done with local anesthetic agents. The haemodynamics were stable throughout the procedure. Inhalational agents were switched off once the surgery was over. When

adequate respiratory efforts were present, the patient was given neostigmine 0.05 mg/kg and glycopyrrolate 20 mcg/kg IV. Esmolol 10 mg IV was given twice in a titrated manner to avoid extubation response. The patient was extubated once she was generating adequate tidal volume and having adequate muscle power. She was observed in HDU for the next 24 hours, where she was stable throughout. Adequate hydration was maintained during this period.

DISCUSSION

This patient was a diagnosed case of hypertrophic obstructive cardiomyopathy whose symptoms were well controlled on medication. She has been taking the medication regularly and was on regular follow-up. She was diagnosed with symptomatic gallstone disease recently and was planned for laparoscopic cholecystectomy.

Patients with HOCM may be asymptomatic on or off medication, but surgical stress can precipitate the condition, which can lead to severe complications.[3] Adequate anaesthetic and surgical management is essential for these patients to undergo surgery safely.

Laparoscopic cholecystectomy, though a short-duration procedure, carries its own challenges in HOCM patients. The pneumoperitoneum created for the procedure can decrease preload, which can further precipitate LVOT obstruction. The resulting increase in afterload can be beneficial in this group of patients, but a significant increase can be detrimental.

Vasodilation caused by anaesthetic agents can further precipitate the condition. Sympathetic stimulation during laryngoscopy and extubation will decrease the diastolic time and increase contractility, causing further obstruction of the outflow tract.

In this patient, adequate hydration was maintained to preserve preload from the preoperative period. Heart rate was kept at the lower end of normal using a beta-blocker. Induction of anaesthesia was done with a cardio-stable anaesthetic agent. Laryngoscopy response was blunted using a preservative-free intravenous local anaesthetic agent. Invasive blood pressure monitoring was done to identify any haemodynamic instability early. Warm fluids were used to prevent hypothermia. Adequate intraoperative and post-operative analgesia was achieved using multimodal analgesia. Extubation response was blunted using short-acting beta blockers. Proper monitoring was done in the post-operative period, ensuring adequate hydration and analgesia.

In a nutshell, the following are the haemodynamic goals and challenges in patients with HOCM coming for laparoscopic surgeries:

- Preoperative optimization of trans-valvular gradient and heart rate: High heart rate and high trans-valvular gradient in a patient with HOCM can lead to severe decompensation. Preoperative optimization with pharmacotherapy or surgical myectomy (if indicated) is of paramount importance.
- Adequate hydration preoperatively: As HOCM leads to a fixed cardiac output state, maintaining adequate preload is important, as vasodilation caused by anaesthetic agents can further reduce preload. Pneumoperitoneum created during laparoscopic surgeries can further decrease venous return, so the flow rate and the pressure of the insufflating gas should be kept to a minimum.
- Maintaining adequate systemic vascular resistance (SVR): Reduced SVR can lead

to increased occlusion at the left ventricular outflow tract. Avoid hypotension. Use vasopressors if needed. Very high SVR should be avoided.

- Avoid tachycardia: Adequate depth of anaesthesia and analgesia should be maintained throughout. Use short-acting beta blockers during periods of increased sympathetic stimulation (eg., laryngoscopy,extubation).
- Adequate analgesia and haemodynamic monitoring postoperatively in an intensive care unit.

This shows that patients with HOCM can safely undergo short-duration elective surgeries if their symptoms are well controlled and adequate anaesthetic and surgical management is done. They should not be deferred from the benefit of undergoing surgery just because of their condition.

However, more studies with different types of surgery and different grades of the condition are needed to generalize this to other patients.

AUTHORS' CONTRIBUTIONS

Concept and design: ABA, JS

Literature review: ABA, SG, SA

Compilation of manuscript: ABA, JS, SA

Manuscript editing and proofreading: ABA, SG

DECLARATION OF CONFLICTS OF INTEREST

The authors declare no competing interests.

DECLARATION OF PATIENT'S CONSENT

Informed written consent to use data regarding the patient, procedure, and its related complications for publication purposes was obtained.

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