



BMH Med. J. 2026;13(1):25-28. **Case Report**

A Delicate Balance; Anaesthetic Approach to HOCM with Low Ejection Fraction

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Abstract

Hypertrophic Obstructive Cardiomyopathy (HOCM) with reduced ejection fraction presents significant anesthetic challenges due to the risk of dynamic LVOT obstruction, arrhythmias, and haemodynamic instability. We report the anaesthetic management of a patient with HOCM and low ejection fraction undergoing laparoscopic cholecystectomy. Emphasis was placed on maintaining preload, avoiding tachycardia, preserving afterload, and blunting sympathetic responses. Invasive monitoring, gentle induction, controlled pneumoperitoneum, and precise intraoperative haemodynamic management enabled a stable perioperative course. This case highlights the importance of individualized anaesthetic strategies in safely managing high-risk cardiac patients undergoing minimally invasive surgery.

Keywords: Hypertrophic obstructive cardiomyopathy; Dynamic LVOT obstruction; Perioperative haemodynamics; High-risk cardiac patient.

Introduction

Hypertrophic obstructive cardiomyopathy (HOCM) is a genetically mediated myocardial disorder characterized by asymmetric left ventricular hypertrophy, diastolic dysfunction, and dynamic left ventricular outflow tract (LVOT) obstruction. It remains a major cause of heart failure, malignant arrhythmias, and sudden cardiac death, with ongoing advances in disease understanding and management influencing contemporary cardiovascular practice [1]. Perioperative assessment of right ventricular (RV) function has gained importance, as RV dysfunction significantly impacts haemodynamic stability and postoperative outcomes [2].

Anaesthetic management of HOCM requires meticulous control of haemodynamics to prevent worsening of dynamic LVOT obstruction. Key goals include maintaining adequate preload, avoiding tachycardia, preventing sudden reductions in systemic vascular resistance, and blunting myocardial contractility [3,4]. Although pulmonary hypertension and atrial fibrillation are known to adversely influence perioperative outcomes in HCM [5-7], our patient had no clinical or echocardiographic evidence of either condition, allowing focused management of dynamic LVOT obstruction.

From an anesthetic perspective, minimizing LVOT obstruction throughout the peri operative period is essential. Beta-blockers such as esmolol have been effectively used to control heart rate and reduce intraventricular gradients [8]. This case highlights the anaesthetic challenges and perioperative strategies in a patient with HOCM and reduced ejection fraction undergoing laparoscopic cholecystectomy, aiming to contribute practical insights for managing similar high-risk patients [9].

Case Description

An elderly, obese female (70 kg, BMI around 31 kg/sq m), presented with biliary colic for three days, right upper quadrant abdominal pain, rebound tenderness, and leukocytosis suggestive of acute cholecystitis. The emergency nature of the surgery further heightened the anaesthetic risk, as suboptimal preoperative stabilization and elevated systemic stress responses can exacerbate dynamic LVOT obstruction and hemodynamic instability. These clinical features demanded prompt surgical intervention while simultaneously requiring meticulous anesthetic planning to maintain cardiovascular stability in a patient with limited cardiac reserve.

Her medical history was significant for well-controlled hypertension on Telmisartan 40 mg once daily and type 2 diabetes mellitus managed with oral hypoglycemic agents. She had a history of coronary artery disease with an anterior wall myocardial infarction about a decade back, treated with percutaneous coronary intervention. Additionally, she had experienced a left cerebellar infarct couple of year back, which was treated with thrombolysis and left her with no residual neurological deficits. She also had a past history of upper gastrointestinal bleeding secondary to peptic ulcer disease, which was managed conservatively.

Her current medications included Metoprolol 50 mg once daily, Telmisartan 40 mg once daily, Atorvastatin 20 mg at bedtime, and Clopidogrel 75 mg once daily, which was withheld five days prior to surgery. Oral hypoglycemic agents were withheld on the morning of surgery and repeated fasting blood sugar and serum electrolytes on the day of surgery.

Airway assessment revealed adequate mouth opening, Mallampati class II, and a thyromental distance greater than 6.5 cm. Although neck extension was restricted due to cervical spondylotic changes, there were no loose teeth or airway deformities. Anticipating a moderately difficult airway, airway adjuncts including a bougie, video laryngoscope, and laryngeal mask airway were kept ready.

During preoperative evaluation, ECG showed bifascicular block, Q waves in the inferior leads, and sinus tachycardia. Echocardiography revealed an ejection fraction of 48%, asymmetric septal hypertrophy consistent with HOCM, regional wall motion abnormalities involving the anterior wall, and mild left ventricular systolic dysfunction. Chest X-ray demonstrated cardiomegaly, and routine laboratory investigations were within normal limits.

Premedication consisted of intravenous Midazolam 1 mg IV, Metoclopramide 10 mg IV, and Dexamethasone 8 mg IV given half an hour before taking up the patient to operation theatre. Standard ASA monitors, including 5-lead ECG, non-invasive blood pressure, pulse oximetry, capnography, and temperature monitoring, were applied. The patient was preoxygenated with 100% oxygen for three minutes to build an adequate oxygen reserve and reduce the risk of desaturation during induction. Following preoxygenation, a radial arterial cannulation was secured under aseptic precautions on the left.

Anaesthesia was induced using Etomidate 0.3 mg/kg to maintain cardiovascular stability along with Fentanyl 2 microgram/kg for analgesia. To blunt sympathetic responses, Esmolol 10 mg and Labetalol 10 mg were administered in titrated doses. Muscle relaxation was achieved with Cisatracurium. Gentle laryngoscopy and intubation were performed, following which a central venous line was secured for fluid and haemodynamic monitoring. Anaesthesia was maintained with

an oxygen-air-sevoflurane mixture, and controlled ventilation ensured normocapnia. Nitroglycerin infusion was initiated to prevent myocardial ischemia and titrated to maintain a mean arterial pressure between 70-80 mmHg. Fluids were administered cautiously to maintain normovolemia without compromising preload. Pneumoperitoneum pressure during laparoscopy was kept below 12 mmHg. Heart rate was maintained between 65-75 beats per minute, and no arrhythmias or ischemic events occurred intraoperatively.

Towards the end of the procedure, the nitroglycerin infusion was gradually tapered. After confirming adequate spontaneous ventilation and complete neuromuscular recovery, extubation was performed once the patient regained full motor response. To attenuate sympathetic stimulation during extubation, Lignocaine 1.5 mg/kg IV was administered 90 seconds prior. A smooth extubation was achieved with a stable haemodynamics.

Postoperatively, the patient was transferred to the Intensive Care Unit for close monitoring. Analgesia was administered as intravenous paracetamol at a dosage of one gram every eight hours, complemented by an intravenous Fentanyl infusion at a rate of 25 micrograms per hour. Beta-blocker therapy was sustained, and other home medications were reinstated on the first postoperative day. Her postoperative course remained unremarkable, and she was discharged in stable condition on postoperative day four.

Discussion

This case underscores the paramount significance of assiduous perioperative management in patients afflicted with HOCM and diminished ejection fraction undergoing laparoscopic surgery. The inherently dynamic nature of LVOT obstruction necessitates meticulous control of hemodynamic variables, particularly during intervals of heightened physiological stress such as induction, pneumoperitoneum, and emergence.

The successful outcome in this patient can be attributed to the use of invasive hemodynamic monitoring, cautious titration of anesthetic agents, maintenance of adequate preload, and avoidance of sympathetic surges. Low-pressure pneumoperitoneum and controlled ventilation helped minimize adverse changes in venous return and afterload, thereby preventing exacerbation of LVOT obstruction.

Conclusion

This case reinforces that safe anesthesia in patients with HOCM and reduced ejection fraction is possible when management is guided by established physiologic principles, vigilant monitoring, and individualized anesthetic planning. Careful perioperative planning, invasive monitoring, and haemodynamic stability are key to achieving safe and successful outcomes.

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