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Review Article

Tips in Anesthetic Techniques in Hypertrophic Cardiomyopathy

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Introduction

Hypertrophic cardiomyopathy (HCM) is a common hereditary cardiomyopathy that affects up to 1 in 200 people in the general population [1,2] Patients with HCM usually have asymmetric or isolated areas of left ventricular hypertrophy >15 mm that aren't caused by anything else. The majority of patients have left ventricular outflow tract (LVOT) blockage at rest or with provocation owing to systolic anterior motion (SAM) of the mitral valve with mitral-ventricular septal contact. In addition, SAM causes mild to moderate mitral regurgitation (MR), which is usually oriented posteriorly [3, 4].

Up to 60% of HCM patients experience cardiac issues after surgery (myocardial infarction (MI), congestive heart failure (CHF), or both) [5]. We will discuss anesthetic technique selection during noncardiac surgery for individuals with a preoperative diagnosis of HCM and provide some tips in this review.

Monitored anesthesia care

Standard American Society of Anesthesiologists (ASA) monitoring is typically sufficient for individuals with HCM undergoing minor operations needing just sedation with monitored anesthesia care (MAC) [6].

When handling HCM patients, a variety of monitoring tools should be explored. The following factors should be considered by the anesthesiologist when selecting monitoring modalities [7]:

1. The LVOTO degree

2. Does the patient have signs of heart failure;

3. The kind of operation and the possibility of major blood loss or fluid changes; and

4. Any additional diagnoses that put them at an enhanced risk of perioperative problems (i.e., diabetes mellitus, kidney failure)

Central venous pressure (CVP), continuous blood pressure monitoring using intra-arterial cannulation, and pulse plethysmographic variability (PPV) index monitoring, in addition to the regular American Society of Anesthesiologists monitoring, can also be considered [8]. CVP, like CVP/delta, isn't a good indicator of blood volume. According to two studies in both critical care and intraoperative patients, CVP is predictive of hemodynamic response to fluid difficulties (patients who are not HCM) [9, 10].

Neuraxial anesthesia –

A sympathectomy is induced by a neuraxial approach (e.g., epidural, spinal, combined spinal-epidural) with local anesthetic. If the hemodynamic aims for managing such patients are kept in mind, a neuraxial method may be employed in a patient with HCM. In a parturient with HCM, a very slowly increased epidural anesthesia or a low-dose mixed spinal-epidural combined anesthetic may be chosen for cesarean delivery [7].

General anesthesia –

Any drop in arterial pressure necessitates a rise in intravascular blood volume and postload; 1-adrenergic agents like phenylephrine and noradrenaline are the drugs of preference for this since they enhance systemic vascular resistance and reduce LVOT blockage [7].

Drugs with β-adrenergic action (isoproterenol, dopamine, adrenaline, dobutamine etc.) should also be avoided since their positive inotropic and chronotropic effects increase LVOT blockage (11). Also, vasopressors (e.g., phenylephrine or vasopressin) that enhance SVR without raising contractility or pulse (phenylephrine or vasopressin) might be used as a prevention tool [7].

Because HOCM reduces LV compliance, raising dependency on atrial contraction to ensure cardiac output, preserving sinus rhythm is very important. In situations of abrupt atrial fibrillation that destabilizes the patient, urgent cardioversion is required [7].

Sevoflurane is a mild myocardial depressant that produces a lesser decrease in systemic vascular resistance and blood pressure than isoflurane or desflurane, as well as a slight increase in heart rate or none at all. Mechanical ventilation with a high positive end-expiratory pressure and a big tidal volume is dangerous because it decreases preload and obstructs the LVOT (12). Desflurane at high dosages is avoided since it has sympathomimetic effects that might produce tachycardia and

increased contractility. While nitrous oxide is not contraindicated, it can increase pulmonary artery pressures, which may already be high in HCM patients [12].

Dexmedetomidine is beneficial because it lowers heart rate and inhibits sympathetic activation [11].

Amiodarone is an ineffective pharmacologic treatment for atrial fibrillation since it takes longer to work and its bolus causes hypotension [13, 14].

Positional procedures, such as putting the patient in a Trendelenburg position, might briefly increase preload. To minimize hemodynamically significant declines in preload during a laparoscopic surgical operation using carbon dioxide (CO2) insufflation, constant contact with the surgical team is required, especially if high insufflation pressures are used. Excessive positive end expiratory pressure (PEEP) and high tidal volumes are avoided since they might harm preload; hence, we usually keep PEEP at 5 mmHg [15].

Conclusion

When it comes to anesthesia, hypertrophic cardiomyopathy (HCM) presents a number of particular obstacles. We wanted to offer some tips on how to improve the anesthetic procedure for HCM patients undergoing non-cardiac surgery.

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