A patient with hypertrophic obstructive cardiomyopathy presenting for total knee replacement

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A 72-year-old woman with a history of hypertrophic obstructive cardiomyopathy (HOCM) was listed for a left total knee replacement (TKR). She had had an uneventful general anaesthetic (GA) for a knee arthroscopy 4 years earlier but had been refused TKR because she was a high anaesthetic risk. She now presented with pain that was keeping her awake at night and was keen for surgery, being fully aware of the attendant risks. She had a strong family history of HOCM and had had one episode of self-terminating fast atrial fibrillation. Her current medication was aspirin 75 mg, amiodarone 100 mg twice daily and atenolol 25 mg once daily.

HOCM's main pathophysiology is ventricular outflow obstruction, so the anaesthetic technique should avoid reduction of afterload and therefore cardiac output (CO). The options were:

1. GA
2. Spinal blockade
3. Epidural
4. Regional block with sedation or GA.

Option 1 was discounted because of the potential for large blood pressure swings and accompanying tachycardia that would worsen obstruction, and the inadequacy of perioperative analgesia. Option 2 was excluded because of the possible catastrophic drop in CO that lowering blood pressure could cause, despite fluid preloading and the use of prophylactic pressor agents (best avoided unless absolutely necessary). Option 3 was a possibility with judicious build-up of epidural block but was decided against for the same reasons as spinal block. Option 4 was chosen: combined sciatic and femoral nerve blocks with a GA, including a remifentanil infusion.

After insertion of a 16 gauge venous and 20 gauge radial artery cannulae both a femoral and sciatic nerve block (anterior approach) were performed with a nerve stimulator under midazolam sedation (1 mg). Bupivacaine 0.5% 25 ml with adrenaline 1 in 200 000 was used in each block.

Induction was performed in theatre using etomidate 10 mg (because of its relative lack of cardiac depressant properties) and a size 3 laryngeal mask airway (LMA) was inserted.

Nitrous oxide in oxygen 50:50 with sevoflurane was used (end tidal sevoflurane 0.8%). She initially received assisted ventilation and then breathed spontaneously. A remifentanil infusion was started 10 minutes before incision and continued throughout the procedure. A total of 300 μg of remifentanil was used (50 μg/ml infusion). She remained cardiovascularly stable throughout, including during cement insertion. There were no episodes of hypotension or tachycardia. A tourniquet was not used and the blood loss was 950 ml. Two units of packed cells were transfused interoperatively and a subsequent unit in the high dependency unit where she made a full and uneventful recovery.

DISCUSSION

HOCM has a prevalence of between 1 in 1000 and 1 in 5000. It is usually familial, being autosomal dominant with a high degree of penetrance.

There is hypertrophy of one or both ventricles as well as the interventricular septum. Left ventricular (LV) hypertrophy is usually asymmetrical, involving the free wall and the anterior/posterior septum more commonly. Right ventricular (RV) hypertrophy occurs in 30% of patients and is usually symmetrical.

Symptoms include dyspnoea, angina, syncope, palpitations, cardiac failure, systemic emboli and sudden death. Physical signs (often subtle) include a jerky carotid pulse, forceful LV cardiac impulse, prominent 'a' wave in the jugular venous waveform as a result of reduced RV compliance, a loud 4th heart sound if in sinus rhythm and a palpable atrial beat reflecting forceful atrial systole.

The most prominent sign is an ejection systolic murmur. This is increased by factors that decrease venous return or afterload, and decreased by manoeuvres that increase afterload or venous return. Invasive monitoring will reveal raised LV end-diastolic pressure, mean left atrial pressure and pulmonary capillary wedge pressure.

Anaesthesia for a patient with HOCM requires avoidance of increasing myocardial contractility, tachycardia and dysrhythmias, hypovolaemia and increased airway pressure, and lowering of systemic vascular resistance.

This case incorporates the above principles. Use of peripheral nerve blocks along with a remifentanil infusion allowed good control of perioperative pain and cardiovascular stability while use of an LMA, breathing spontaneously, avoided the pressor response of laryngoscopy and the reduction in CO associated with intermittent positive pressure ventilation. HM

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