and lasts ~10 min. The duration of diffusion hypoxia has to be shorter than SGE, as a limited amount of N₂O is washed out with a high concentration gradient between blood and alveolar space, especially when ventilation is with an open circuit. Interestingly, high concentration gradient between blood and alveolar space, *E-mail: hessana@g-email.de

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Anaesthetic management of high-risk cardiac patients undergoing thoracic surgery with the support of intra-aortic balloon pump

Editor—We read with interest the case report by Marcucci and colleagues¹ and the accompanying editorial by Newby and Nimmo² some months ago. Patients with severe coronary artery disease scheduled for urgent major surgery are a particular challenge for anaesthetists. Those with a severe pattern of coronary artery disease such as a critical left main stem stenosis or severe three-vessel disease have a poor prognosis and coronary artery bypass surgery should be considered as it has been shown to significantly improve prognosis. However, the delay can be undesirable because of the risk of tumour progression or surgery may not be suitable in some patients. We wish to report the perioperative management of two such high risk cardiac patients requiring lobectomy for lung carcinoma.

Case 1, a 62-yr-old, 64 kg man was to undergo thoracotomy and left upper lobectomy for lung carcinoma. He gave a history of angina and coronary angiogram showed extensive three-vessel disease with right coronary artery totally occluded, left anterior descending artery 80% stenosed and a small left circumflex artery. Left ventricular ejection fraction was 25%. Given the diffuse nature of the disease, the patient was not felt to be suitable for coronary artery bypass surgery. Balanced anaesthesia was planned and intra-aortic balloon pump (IABP) was used for perioperative myocardial support. IABP was inserted via the femoral artery with local anaesthesia. Thoracotomy and left upper lobectomy was performed under one-lung anaesthesia. There was transient ST depression on the electrocardiogram shortly after induction of anaesthesia which resolved spontaneously. Throughout the remainder of the case the blood pressure, heart rate and ECG remained within normal limits. Total blood loss was estimated to be 200 ml. Intercostal nerves block was performed by surgeon with plain bupivacaine 0.5%, midazolam 2 mg, and thiopentone 75 mg and rocuronium 50 mg. Maintenance of anaesthesia was with oxygen and air, sevoflurane 1–2%, morphine and atracurium. Thoracotomy and left upper lobectomy was performed under one-lung anaesthesia. There was transient ST depression on the electrocardiogram shortly after induction of anaesthesia which resolved spontaneously. Throughout the remainder of the case the blood pressure, heart rate and ECG remained within normal limits. Total blood loss was estimated to be 200 ml. Intercostal nerves block was performed by surgeon with plain bupivacaine 0.5%, 20 ml and diclofenac 50 mg was given rectally at the end of surgery. Postoperative pain relief was continued with patient-controlled analgesia with morphine. IABP was removed on the second postoperative day. Serial ECG and cardiac enzymes were normal. The patient was discharged from the hospital on postoperative day 10.

Case 2, a 70-yr-old, 75 kg man scheduled for thoracotomy and right upper lobectomy. He gave a history of hypercholesterolaemia, hypertension and a previous myocardial infarction. Coronary angiography showed extensive three-vessel disease: left main stem and left circumflex arteries were 50% stenosed, left anterior descending and right coronary artery were totally occluded. Echocardiography showed akinesis in the apex, hypokinetic antero-septal, mild diastolic dysfunction and a normal ejection fraction. Balanced anaesthetic management was planned and IABP was inserted preoperatively. Anaesthesia was induced with fentanyl 300 μg, midazolam 2 mg, and propofol 40 mg and rocuronium 60 mg. Anaesthesia was maintained as in the previous case. Surgery was uneventful with blood loss estimated to be 250 ml. Intercostal nerves block was performed by surgeon with plain bupivacaine 0.5%, 20 ml. The patient was extubated at the end of surgery, diclofenac...
complications. Perioperative and long-term use is recommended in all patients presenting with the classical contraindications as obstructive pulmonary disease, has further been shown to be beneficial in patients presenting complications in high-risk patients have been proven, and their benefits of the latter in preventing perioperative cardiac stress response. Although IABP is very efficacious in reducing myocardial oxygen demand and increasing coronary perfusion pressure, it does not prevent tachycardia and does not modulate the neuroendocrine stress response caused by surgery. Withdrawal of the IABP support in the postoperative period puts the patient at risk of an imbalance between oxygen delivery and oxygen demand if the myocardium is not otherwise protected.

Anaesthesia was maintained with sevoflurane in both cases. This strategy will doubtlessly have contributed to cardiac protection by preconditioning of the myocardium against ischaemia, a well-established property of this volatile anaesthetic.

Finally, as the authors state, IABP is an invasive procedure with non-negligible complications that often requires anticoagulant therapy. In selected cases it can be a valuable adjunct to a global strategy of myocardial protection, but β-receptor antagonism and myocardial preconditioning should form the basis of the perioperative care given to a patient at risk of myocardial ischaemia.

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