

Perioperative Management of the Patient with Coronary Artery Disease

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Preoperative assessment

In 1996 the American College of Cardiology and American Heart Association (ACC/AHA) published guidelines for perioperative cardiovascular evaluation for noncardiac surgery,¹ and these have been recently updated.² These guidelines present an organized approach to the surgical patient with known or suspected cardiac disease, based on the presence of “clinical predictors” (history, underlying medical conditions), functional capacity, and surgical risk. The interaction of these factors determines the need for noninvasive testing, possibly leading to coronary angiography and revascularization in a small percentage of patients. Revascularization may not provide the intended benefit; the risks of coronary surgery add morbidity and cost to that of the planned surgery,³ angioplasty may be associated with adverse outcomes in some populations,⁴ and angioplasty/stent placement may result in acute mortality if surgery follows in less than a month.⁵

Preoperative management

Preoperative “optimization” of medical status is always a desirable goal. There are now good data from two randomized clinical trials demonstrating a reduction in adverse cardiac outcomes with the use of perioperative beta blockade. In the study by Mangano and Wallace,^{6,7} patients received acute perioperative beta blockade with atenolol; in the study by Poldermans and Boersma^{8,9} patients received oral bisoprolol for some weeks perioperatively. In the latter study the decrease in cardiac events with beta blockade was striking. Perioperative treatment with alpha-2 agonists may reduce the incidence of myocardial ischemia.^{10,11} No other medications, including intravenous nitroglycerin, have been shown to consistently reduce the incidence of ischemia and/or adverse cardiac outcomes.

Intraoperative Monitoring

London et al¹² demonstrated the V5 lead of the ECG is the single most sensitive lead for detecting perioperative ischemia, with about 75% the sensitivity of all 12 leads. While the V4 lead was almost as good in this study, a more recent publication by Landesberg et al¹³ suggests V4 is the most sensitive. Both studies indicate 2 or 3 precordial leads will detect more than 90% of ischemia available from all 12 leads, but most operating room monitors will not support multiple precordial lead monitoring. The ECG with ST segment trending of at least 2 leads should be considered a standard monitor for all patients with coronary artery disease.

Whether or not patients with coronary disease should be monitored with pulmonary artery catheters (PACs) or transesophageal echocardiography (TEE) is controversial. While both of these techniques can detect ischemia, comparative studies have failed to demonstrate that either technique provides a benefit over 2 lead ECG monitoring.^{14,15} Guidelines for the perioperative use of PACs published by the American Society of Anesthesiologists,¹⁶ and for perioperative use of TEE published by the Society of Cardiovascular Anesthesiologists¹⁷ do not recommend use of these technologies for routine monitoring in patients with CAD. They should be considered when there is a diagnostic or treatment question that can be answered or guided by the additional information, or where there is a known history of cardiac dysfunction such as congestive heart failure in a patient undergoing major surgery.

Anesthetic technique

Beyond the adherence to fundamental principles of maintaining coronary perfusion pressure and avoiding increases in myocardial oxygen demand, there is no scientific basis for recommending any particular anesthetic agent or technique in the patient with CAD. That having been said, there is now considerable laboratory evidence and emerging clinical evidence that volatile anesthetic agents may have cardioprotective properties. Seven original articles on this topic appeared in the July 2002 *Anesthesiology*, with editorial comment summarizing this exciting possibility.¹⁸

A recently published meta-analysis of 141 trials evaluating intraoperative neuraxial blockade suggested significant reductions in mortality and complications with spinal or epidural anesthesia,¹⁹ however a large randomized trial of perioperative epidural blockade in major surgery failed to confirm these findings.²⁰ In this latter study there was a clear benefit in terms of pain control and a reduction in respiratory failure. The authors suggested “many high risk patients undergoing major intra-abdominal surgery will receive substantial benefit from combined general and epidural anesthesia intraoperatively with continuing postoperative epidural analgesia,” although there were no cardiac benefits documented in this study of 915 patients.

While more than 50% of intraoperative ECG- detected ischemic episodes do not appear to be related to hemodynamic changes, there is an association between tachycardia and ischemia both intra and postoperatively.^{21,22} Avoidance of major changes in coronary perfusion pressure and heart rate should be a priority in these patients. Preoperative anemia and perioperative hypothermia have been associated with adverse cardiac outcomes.^{23,24}

Postoperative management

The risk of perioperative myocardial infarction continues into the first postoperative week; continuation of beta blockade into this period is probably essential for the protective effects documented above. Continuation of ECG or other monitoring into the postoperative period has not been evaluated in a prospective trial. As many ischemic episodes are associated with tachycardia, these may be related to the sympathetic

stimulation that occurs with pain. Beta adrenergic blockade cannot substitute for adequate analgesic techniques.

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