

TABLE 11-4 CLINICAL PREDICTORS OF INCREASED PERIOPERATIVE CARDIOVASCULAR RISK (MYOCARDIAL INFARCTION, CONGESTIVE HEART FAILURE, DEATH)

MAJOR

Unstable coronary syndromes
Recent myocardial infarction (e.g., >1 wk and <1 mo)
Unstable or severe angina (Canadian Cardiovascular Society angina class III or IV)
Decompensated heart failure
Significant arrhythmias
High-grade atrioventricular block
Symptomatic ventricular arrhythmias
Supraventricular arrhythmias with uncontrolled ventricular response
Severe valvular disease

INTERMEDIATE

Mild angina (Canadian Cardiovascular Society angina class I or II)
Prior myocardial infarction
Compensated or prior congestive heart failure
Diabetes mellitus

MINOR

Advanced age
Abnormal electrocardiogram (e.g., left ventricular hypertrophy, left bundle branch block)
Rhythm other than sinus
Low functional capacity (i.e., unable to climb one flight of stairs with a bag of groceries)
History of a stroke
Uncontrolled systemic hypertension

Once the clinical evaluation is complete and the type of surgery is known, the need for additional testing and treatment can be determined. If emergency surgery is contemplated, little in the way of cardiac assessment can be performed, and recommendations may be directed at perioperative medical management and surveillance. If surgery is not urgent, additional evaluation is based on the clinical assessments of the risk and type of surgery. Patients with major risk factors for cardiac complications should have surgery delayed until the cardiac condition has been treated and stabilized. Patients with intermediate predictors of cardiac risk who are scheduled for high-risk surgery should undergo noninvasive testing such as exercise or pharmacologic stress testing or echocardiography. The results of these tests will help determine future management, such as cardiac catheterization or intensification of medical therapy. Patients scheduled for low- or intermediate-risk surgery, especially those who have good exercise capacity, should proceed to surgery with appropriate medical management and postoperative surveillance. Noncardiac surgery is generally safe for patients with minor or no clinical risk factors for cardiac complications, although some patients with poor functional capacity who are scheduled for high-risk operations may benefit from additional cardiac evaluation.

DISEASE-SPECIFIC APPROACHES

Coronary Artery Disease and Myocardial Infarction

About 70% of MIs occur within the first 6 days after an operation, with the peak incidence between 24 and 72 hours. Mortality associated with noncardiac surgery has been reported to be as

TABLE 11-5 CARDIAC RISK STRATIFICATION FOR NONCARDIAC SURGICAL PROCEDURES

HIGH (REPORTED CARDIAC RISK >5%)

Emergent major operations, particularly in the older adult population
Major vascular surgery, aortic aneurysm repair
Peripheral vascular surgery
Prolonged procedures associated with large fluid shifts or blood loss or both

INTERMEDIATE (REPORTED CARDIAC RISK <5%)

Carotid endarterectomy
Head and neck
Intraperitoneal and intrathoracic
Orthopedic
Prostate

LOW (REPORTED CARDIAC RISK <1%)

Endoscopic procedures
Cataract extraction
Breast biopsy

Data from Eagle KA, Brundage BH, Chaitman BR, et al: Guidelines for perioperative cardiovascular evaluation for noncardiac surgery: report of the ACC/AHA Task Force on Practice Guidelines, *J Am Coll Cardiol* 27:910–948, 1996.

high as 30% to 40%, especially if associated with congestive heart failure or significant arrhythmias. Multiple stresses associated with surgery can provoke ischemia. Physiologic tachycardia and hypertension secondary to volume shifts, anemia, infection, and the stress of wound healing increase myocardial oxygen demand and may provoke ischemia. In addition, increased platelet reactivity during the postoperative period may increase the risk for coronary thrombosis and subsequent infarction.

Despite the high mortality rate associated with perioperative MI, few studies have examined the effects of anti-ischemic therapy to prevent this complication. Several small, uncontrolled trials have suggested that β -blockers reduce intraoperative ischemia. More recently, the use of atenolol before and after surgery was associated with a reduction in MI and cardiac death, especially during the first 6 to 12 months after surgery. Although the data are limited, the use of a perioperative β -blocker therapy should be considered for all patients with suggested or known coronary artery disease unless a specific contraindication to its use is present. The data available on the usefulness of calcium-channel blockers and nitrates are even more limited, but this approach may be appropriate for the treatment of symptomatic coronary disease in individuals who are not candidates for revascularization. Coronary angiography and revascularization should be reserved for individuals in whom this treatment would otherwise result in significant improvement in symptoms or long-term survival. In rare cases, revascularization may be indicated for high-risk patients undergoing major noncardiac surgery.

All patients with suggested or known cardiac disease should have routine ECGs the first 3 days after surgery to monitor for ischemia. If the ECG is inconclusive, measurement of troponin levels may be helpful to document an ischemic event. Treatment of an MI in this setting is similar to that for the nonsurgical patient (see [Chapter 9](#)), although the use of anticoagulants and thrombolytic agents may be contraindicated in the immediate postoperative period. Special attention should be paid to correcting abnormalities that may provoke additional ischemia (e.g., hypoxia, anemia).

