Cardiac Screening in the Noncardiac Surgery Patient

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KEYWORDS

• Noncardiac surgery • Coronary artery disease • Perioperative cardiac screening
• Myocardial infarction • Risk assessment • Unstable angina

KEY POINTS

- Cardiac conditions in patients undergoing noncardiac surgery confer significant risk of morbidity and mortality, which are largely preventable by implementing appropriate cardiac risk stratification prior to surgery and individually tailoring perioperative therapy to reduce risk.
- A successful surgical outcome requires a team approach and shared decision-making involving the primary care provider, cardiologist, anesthesiologist, surgeon performing the procedure, and the patient.
- With the aging population, increasing number of annual surgeries, and dynamic US health care focused toward cost-effectiveness and appropriate utilization of resources and therapies, the need for evidence-based practice to minimize perioperative surgical morbidity and mortality is of paramount importance.

INTRODUCTION

An estimated 234 million annual noncardiac surgical procedures are performed worldwide, translating to about 1 surgery for every 25 people.[1] In developed countries, the rate of perioperative death and major complications from inpatient surgery has been reported to be 0.4% to 0.8% and 3% to 16%, respectively.[2,3] Up to 42% of these are caused by cardiac complications.[4] Nearly half of the adverse events in these studies were identified as preventable. Similarly, over 50 million surgical procedures are performed annually in the Unites States.[5] The estimated perioperative cardiac complications from these surgical procedures have been reported to be 1.4% to 3.9% in pooled analyses.[6]

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The elderly population requires surgery 4 times as often as the younger population, and the proportion of the elderly population is increasing due in part to improved survival from coronary artery disease. It is estimated that the number of patients undergoing surgery will increase by 25% by 2020, and surgical complications will increase by 100%.[7] Cardiac complications represent about half of total perioperative surgical complications. Therefore, surgical safety represents a substantial global public health concern. Appropriately defining the cardiac risk of noncardiac surgery lays the foundation for successful surgical planning including accurate communication of procedural risk/benefit ratio to the patient and hence facilitating shared decision making, appropriate timing of surgery, identification of high-risk patients, and implementation of preventive medical treatment, thereby leading to positive outcome.

This article will address common cardiac conditions that require evaluation prior to noncardiac surgery, characterization of urgency and the risk associated with surgical procedures, calculation of preoperative risk assessment, indications for diagnostic testing to quantify cardiac risk, and perioperative strategies to minimize the risk of cardiac complications.

CARDIAC CONDITIONS REQUIRING EVALUATION IN PREOPERATIVE RISK ASSESSMENT

Coronary Artery Disease

Perioperative morbidity and mortality due to coronary artery disease (CAD) represent the most common complications of noncardiac surgery. CAD affects an estimated 6.2% of the US adult population, with higher prevalence in men than in women (7.6% and 5%, respectively).[8] Perioperative incidence of major adverse cardiac events (MACE) of death or myocardial infarction (MI) caused by CAD depends on the baseline risk related to prior cardiac events. Patients with chronic stable angina, previous MI, and electrocardiographic signs of ischemia suffer higher rates of perioperative MI and cardiac death.[9] Livhits and colleagues[10] reported a substantial decrease in postoperative MI rate as the length of time from MI to operation increased (0–30 days = 32.8%, 31–60 days = 18.7%, 61–90 days = 8.4%, and 91–180 days = 5.9%); the 30-day mortality rate followed a similar trend. This risk was decreased by prior coronary revascularization performed at the time of MI. Based on these data, American College of Cardiology (ACC)/American Heart Association (AHA) guidelines recommend at least a 60-day interval between an acute coronary syndrome (ACS) and elective noncardiac surgery.[11]

Heart Failure

The prevalence of heart failure (HF) in the United States is 5.7 million cases, and this number is projected to increase to over 8 million cases by 2030.[8] Patients with clinical signs and symptoms of decompensated HF or a history of HF are at significantly higher risk of perioperative complications. Widely used indices of cardiac risk incorporate HF as an independent predictor of perioperative MACE. van Diepen and colleagues[12] studied over 38,000 patients and found that the 30-day postoperative mortality rate was significantly higher in patients with nonischemic HF (9.3%), ischemic HF (9.2%), and atrial fibrillation (AF) (6.4%) than in those with CAD (2.9%), highlighting the higher risk of postoperative death in patients with active HF compared with those with stable CAD.

Preserved Versus Reduced Ejection Fraction and Symptomatic Versus Asymptomatic Heart Failure

Although symptomatic decompensated HF carries the highest perioperative risk, severely decreased (<30%) left ventricular ejection fraction (LVEF) is an independent