

Perioperative Complications of Cardiac Surgery and Postoperative Care



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KEYWORDS

- Cardiac complications • Vasoplegia • Pulmonary complications
- Gastrointestinal complications • Acute kidney injury • Hematologic complications
- Infections • Neurological problems

KEY POINTS

- Caring for the postoperative cardiac surgical patient is challenging because of the number and severity of potential complications.
- By definition, the patient presents postoperatively with some degree of cardiac dysfunction, and the procedure itself may cause (at least transiently) further deterioration.
- Diagnostic, therapeutic and preventative measures are discussed.

CARDIAC COMPLICATIONS

Surgical and Physiologic Complications

Cardiac complications of open heart surgery can be divided into 2 distinct categories, surgical and physiologic. Mechanical complications are addressed by surgical intervention, whereas physiologic complications may be attributed to changes in preload, afterload, heart rate, and the inotropic or lusitropic state of the heart. Dysrhythmias are not uncommon after cardiac surgery, and have direct effects on myocardial performance. The use of cardiopulmonary bypass (CPB) is also associated with its own set of complications.

Proper monitoring is essential in the intensive care unit (ICU) to determine the etiology of changes in cardiac performance. Continuous telemetry, a central venous and/or pulmonary artery catheter, and direct arterial blood pressure monitoring are frequently used for both intraoperative and postoperative monitoring. These

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monitoring devices, along with the selective use of bedside echocardiography (particularly transesophageal echocardiography [TEE]), enable the critical care clinician to determine the cause of and appropriate response to most hemodynamic disturbances. The use of intraoperative TEE has had a significant impact on surgical decision making during cardiac surgery. One large case series of more than 12,000 patients found that intraoperative use of TEE altered the surgical plan in more than 9% of patients, particularly in those undergoing combined coronary artery bypass grafting (CABG) and valve procedures.¹ Both the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists recommend the use of intraoperative TEE in all open heart and thoracic aortic procedures in the adult population.²

Mechanical complications may be detected by echocardiography or with hemodynamic monitoring. Spasm or acute occlusion of a coronary graft can lead to acute myocardial ischemia and decrements in myocardial contractility. After the surgical placement of a prosthetic valve, perivalvular leak may lead to hemodynamic compromise and hemolysis. Failure of any surgical repair of a valvular defect must also be ruled out.

Myocardial dysfunction after cardiac surgery is often multifactorial, and frequently involves perioperative myocardial ischemia. Underlying coronary artery disease (CAD), hemodynamic instability, coronary artery embolization, and poor myocardial protection during cardiopulmonary bypass may all play a role in impaired myocardial contractility in the early postoperative period. Restoration of blood flow to the chronically ischemic myocardium may result in the phenomenon of myocardial ischemia reperfusion injury and further temporary compromise in myocardial contractility.³ CPB is known to initiate a systemic inflammatory response. These inflammatory mediators may lead to not only myocardial injury but also injury in multiple other organ systems.⁴

The incidence of perioperative myocardial infarction is around 3% to 15% in all patients undergoing open heart surgery.⁵ Several factors are known contributors to myocardial injury, as outlined in **Box 1**.

Owing to their underlying disease, patients undergoing CABG are at particularly high risk for the development of myocardial ischemia. A multitude of factors are known to trigger myocardial ischemia in these patients in the immediate postoperative period (**Box 2**).⁶

Pericardial Tamponade

Acute cardiac tamponade caused by hemopericardium may occur in up to 5.8% of patients after open heart surgery,⁷ and may be suspected by acute tachycardia, rising central venous pressures, and poor response to fluid challenges. Bedside echocardiography can expeditiously provide the diagnosis and allow early operative intervention

Box 1

Causes of perioperative myocardial injury after cardiac surgery

Incomplete myocardial protection during aortic cross-clamping

Incomplete revascularization

Coronary vasospasm

Air embolism

Thrombosis of a graft or native vessel

Atheromatous emboli from a previous bypass graft or from the aorta

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