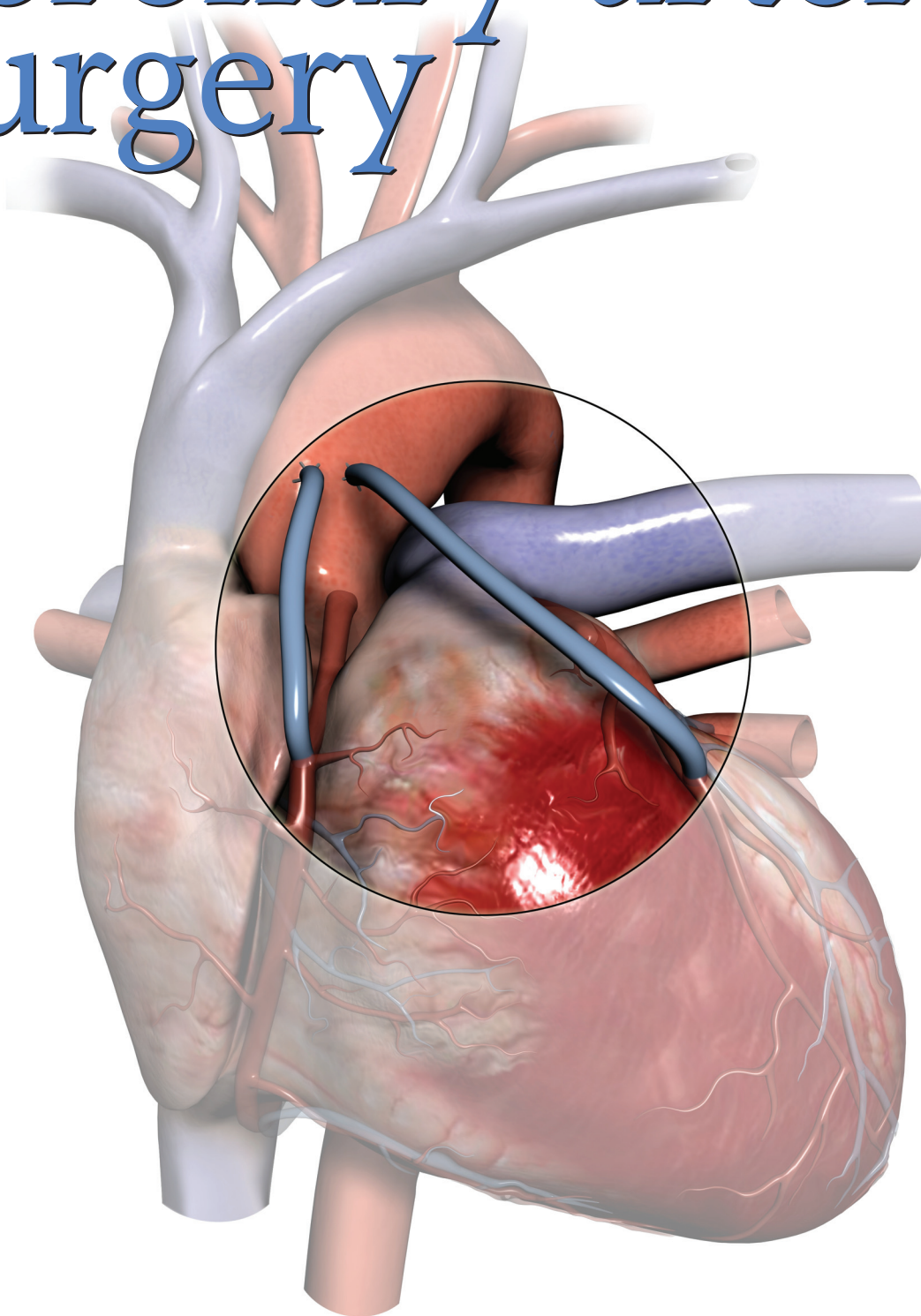


Caring for a patient after coronary artery surgery





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bypass graft

Follow this system-by-system approach to keep your patient stable and steering clear of complications.

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Every year, some 427,000 patients in the United States have coronary artery bypass graft (CABG) surgery.¹ Whether the surgery is done with the patient on or off the cardiopulmonary bypass (CPB) machine (see *"On pump or off?"*), the postoperative nursing care is the same. In this article, we'll outline your role in patient care by body system.

Safeguarding cardiac function

Twenty-four to 48 hours after surgery, your patient will be transferred from the intensive care unit (ICU) to the cardiac surgical unit and placed on continuous telemetry monitoring. Your top priority is to keep him hemodynamically stable so his vital organs are adequately perfused. Check his vital signs according to your facility's protocol and assess for signs and symptoms of adequate cardiac output. Investigate even subtle signs of trouble, such as tachycardia and cool extremities. Other signs of reduced cardiac output include diminished peripheral pulses, changes in mentation, decreased urine output, and hypotension.

Dysrhythmias, most often tachydysrhythmias, are common after CABG and usually occur on the second or third postoperative day. Atrial fibrillation (AF) occurs in 15% to 40% of patients after CABG, in 37% to 50% of patients after valve surgery, and in up to 60% of patients who've had CABG and valve surgery. A rapid ventricular response and loss of atrial kick can cause myocardial ischemia or reduce cardiac output and BP. Patients with hypokalemia and hypomagnesemia may be more prone to AF.

Factors that increase your patient's risk of AF include:

- older age
- mitral valve disease
- history of AF
- chronic obstructive pulmonary disease (COPD)
- not having received preoperative beta-blocker or angiotensin-converting enzyme inhibitor therapy or withdrawal of previous therapy.²

Preoperative or early postoperative administration of beta-blockers is considered standard therapy to reduce the risk of AF after CABG.³ Amiodarone is an alternative for patients who have contraindications to beta-blockers.

If your patient develops AF, his stroke risk is two to five times higher. The American College of Cardiology/American Heart Association provides consensus guidelines for administering anticoagulation to patients with AF lasting more than 24 hours.⁴ Because heparin is associated with increased bleeding risk, the patient may start warfarin therapy without also starting heparin. However, for high-risk patients, such as those with history of stroke or transient ischemic attack, heparin should be considered a bridging therapy to oral warfarin until the patient's international normalized ratio is therapeutic.

Ventricular dysrhythmias can occur any time after CABG surgery but are more common in the early postoperative period. Hypothermia, electrolyte disturbances (especially hypokalemia and hypomagnesemia), acidosis, manipulation of the heart, and myocardial ischemia may be factors in postoperative dysrhythmias. Bradycardias and transient heart blocks usually resolve within several hours after surgery. The patient will

come out of the operating room with epicardial pacing wires and a temporary pacemaker, which are used for atrioventricular pacing until normal conduction returns.

A pericardial effusion can result in **cardiac tamponade**, a rare but potentially lethal complication following CABG. Most cases occur in the early postoperative period, but tamponade can occur as late as 6 months postoperatively. Pericardial effusion puts pressure on the heart, prevents diastole and filling of the chambers, and reduces cardiac output. The hallmark of cardiac tamponade is the Beck triad: muffled heart sounds, distended jugular neck veins, and hypotension. Pulsus paradoxus greater than 12 mm Hg is a classic sign of tamponade. Patients may experience dyspnea, chest pain, and dizziness.

If your patient has signs and symptoms of cardiac tamponade, the physician may order a bedside echocardiogram. If it con-

firms tamponade, prepare your patient to return to the operating room for evacuation of the clot and repair of the bleeding site. But if the patient's condition deteriorates to the point that he's at risk for cardiac arrest, the physician may perform an emergency bedside reexploration sternotomy.

Pulmonary problems

Between 30% and 60% of patients have pulmonary dysfunction and hypoxemia after CABG, usually as a result of fluid volume overload, poor inspiratory effort, and atelectasis. Risk factors for pulmonary problems include a history of heart failure, COPD, smoking, or diabetes; age over 65; and endotracheal intubation. Common signs of respiratory impairment are shortness of breath and decreased oxygen saturation.

Atelectasis, a common postoperative complication, may be related to CPB, including decreased surfactant produc-

tion, or the effects of general anesthesia.

Pleural effusion, another common complication, occurs in the immediate postoperative period in 41% to 87% of patients. Effusions can result from bleeding secondary to internal mammary artery (IMA) harvesting. Small effusions (less than 500 mL) can be managed conservatively and will usually resolve spontaneously. Larger effusions may require thoracentesis, especially if they cause dyspnea or other signs and symptoms.

To reduce your patient's risk of postoperative pulmonary complications, assess breath sounds frequently, monitor his SpO₂, administer supplemental oxygen as needed, and encourage him to perform incentive spirometry every hour while he's awake. Teach him to splint his incision when coughing and moving. Be sure to provide optimal pain control so he can move freely. Assisting the patient with early, aggressive ambulation, coughing and deep breathing, and turning from side to side while in bed are simple but effective nursing interventions that help prevent postoperative pulmonary complications. Patients with copious pulmonary secretions or bronchospasm may also need chest physical therapy and nebulized bronchodilators.

Patients who need mechanical ventilation are at risk for ventilator-associated pneumonia (VAP). The Institute for Healthcare Improvement (IHI) recommends a four-pronged ventilator bundle of interventions:

- elevating the head of the bed 30 to 45 degrees except when care is being given or if contraindicated;

On pump or off?

During "on pump" CABG surgery, a CPB machine circulates oxygenated blood while diverting most of the patient's blood from the heart and lungs. This provides a bloodless, motionless surgical field while preserving tissue perfusion to vital organs. The blocked coronary artery is bypassed using a graft from the saphenous vein or the internal mammary artery or radial artery. However, CPB puts patients at risk for various problems related to the blood being in contact with the machine, including atrial fibrillation, systemic inflammatory response syndrome, stroke, cognitive changes, renal failure, dysrhythmias, coagulopathies, and microemboli.

The older "off pump" technique, in which surgery is performed on the beating heart, reduces the adverse reactions associated with CPB and the need for RBC transfusions and positive inotropes. However, a meta-analysis found no significant differences in mortality rates, myocardial infarction, stroke, or renal dysfunction between the two types of CABG, and no consensus has been reached on which procedure is better.

Source: Keenan TD, et al. Bypassing the pump: changing practices in coronary artery surgery. *Chest*. 2005;128:363-369.

for example, because of hemodynamic instability

- providing a daily “sedation vacation” to evaluate the patient’s readiness for weaning
- taking steps to prevent venous thromboembolism (VTE)
- administering daily medication (such as a histamine₂-receptor inhibitor) to prevent peptic ulcer disease.⁵

Keeping pain under control

Besides keeping the patient comfortable, effective pain control helps maintain hemodynamic stability and prevent pulmonary complications. The typical patient will receive I.V. push opioids in the immediate postoperative period, then switch to oral forms by the second or third postoperative day as tolerated. Analgesics, positioning, distraction, and relaxation techniques also can be used to control pain.

Monitor the patient for adverse drug reactions, such as oversedation and respiratory depression. Balance his need for pain control without respiratory depression with his need to cough and deep-breathe. Individualize pain management and frequently evaluate the patient’s pain, using an appropriate pain intensity rating scale, to check the effectiveness of interventions. Also use a sedation-rating tool to monitor for sedation and respiratory depression.

Besides opioids, I.V. ketorolac, a nonsteroidal anti-inflammatory drug (NSAID), may be used with caution in patients who don’t receive adequate pain control from opioids alone. Check the patient’s renal function before administering this drug and expect to discontinue it if his serum crea-

tinine increases. Also remember that NSAIDs can increase the patient’s risk of gastrointestinal (GI) bleeding. Monitor for signs and symptoms of occult bleeding.

Another source of moderate to severe pain is chest tube removal, which usually occurs on the first or second postoperative day. Administer adequate analgesia before chest tube removal.

Staying alert for coagulation problems

Bleeding is a common complication after CABG surgery and can have many causes, including platelet dysfunction from prolonged contact with the artificial surface of the CPB machine, high doses of heparin given during surgery, and hypothermia.

A patient who’s actively bleeding and has a hematocrit less than 26% needs a transfusion of red blood cells (RBCs) to improve the blood’s oxygen-carrying capabilities and to limit myocardial ischemia or infarction.⁶ These benefits must be balanced with the risks of RBC transfusion, including acute lung injury, prolonged mechanical ventilation, infection, sepsis, and renal dysfunction. Six- to 12-month follow-up studies of patients who’d undergone cardiothoracic surgery have shown that the more packed RBCs a patient receives, the worse his postoperative functional status.⁷

Also take steps to prevent VTE, which encompasses deep vein thrombosis and pulmonary embolism. The Surgical Care Improvement Project’s guidelines, which are supported by IHI, call for prophylactic drug and mechanical therapy to prevent VTE. As ordered, use inter-

mittent pneumatic compression devices and graduated compression stockings and administer low-dose unfractionated heparin, low-molecular-weight heparin, factor Xa inhibitor (fondaparinux), or warfarin. Aspirin-only therapy isn’t recommended, and early ambulation isn’t included in the recommendations because most patients only make trips to the bathroom or take short walks down the hall—insufficient activity to prevent VTE.⁸

Renal troubles

Postoperative renal dysfunction occurs in as many as 8% of patients after CABG. Predictors of renal dysfunction include advanced age, history of moderate or severe heart failure, prior bypass surgery, type 1 diabetes, and preexisting renal disease.

A comparison of the patient’s postoperative daily weights to his preoperative weight guides the use of diuretics. Monitor his urine output, blood urea nitrogen level, and serum creatinine level to assess renal function.

Diuretics typically are given on the first postoperative day and are continued until the patient reaches his preoperative weight (usually in 5 to 7 days). Patients who needed diuretics before CABG may need to continue taking them after discharge. If the patient develops oliguria (urine output of less than 0.5 mL/kg/hour), assess his cardiac function and perfusion, vital signs, and lab results. He may need fluids or medication dose adjustments.

GI glitches

Less common, GI complications affect 1% to 2% of patients after CABG. The most common major

complications are upper GI bleeding from gastritis or peptic ulcer disease, pancreatitis, hollow viscus perforation, mesenteric ischemia, and cholecystitis.⁶ Monitor the patient's bowel sounds and notify the healthcare provider if the patient develops abdominal pain, distension, nausea, and vomiting. The patient may need diagnostic testing including an abdominal X-ray, electrolyte panel, and complete blood cell count.

Most patients have a nasogastric (NG) tube immediately after CABG surgery. The NG tube usually is removed after the patient is extubated and after his bowel sounds return. He then can be started on clear liquids and his diet advanced as tolerated.

Anorexia and nausea are common postoperative complaints and may be adverse drug reactions. Administer antiemetics if the patient is nauseated and give histamine blockers as prescribed to minimize gastric acid secretion. Treat constipation, another common postoperative problem, with stool softeners or bulk laxatives as ordered.

Fighting infection

Superficial infections and deep sternal wound infection (also called mediastinitis) occur infrequently but can have a profound effect on patient morbidity, length of stay, and cost of care. Infections usually occur within the first 2 weeks after surgery. A patient is at increased risk if he's obese, if he has diabetes or COPD, if bilateral IMA grafts were used, or if surgery was prolonged (more than 90 minutes).

Although no consensus has been reached on best practice

for postoperative wound care, best-practice guidelines recommend keeping a sterile dressing on the wound for 24 to 48 hours after surgery.⁹ Follow your facility's policy for performing incision care and changing dressings. Monitor your patient for signs and symptoms of infection, including fever, increased chest wall pain or tenderness, an unstable sternum, and purulent discharge from the wound.

Administering prophylactic antibiotics for 48 hours after cardiac surgery has been shown to minimize infection.¹⁰ The risk of deep sternal wound infections can be reduced with continuous I.V. insulin infusions to aggressively control perioperative hyperglycemia. Major infections such as mediastinitis require surgical debridement and weeks to months of I.V. antibiotic therapy. Minor wound infections can be treated with oral antibiotics and local wound care. The choice of antibiotic and duration of therapy depend on patient-risk factors and healthcare provider preference.

Heading home

As discharge approaches, your patient and his family may be anxious about how they'll manage at home, so try to ease the transition. Appropriate discharge planning should involve the patient, caregivers, nurses, physicians, and nutritionists because a team approach is the best way to treat factors that contribute to heart disease. Give the patient detailed instructions about:

- when to contact the hospital or healthcare provider. Tell the patient to seek immediate medical attention if he has chest pain,

shortness of breath not relieved by rest, a fast or irregular heartbeat, chills, fever, severe headache, numbness or tingling in his arms or legs, fainting spells, or if he coughs up bright red blood.

- what to expect and what's normal after surgery. Mood swings, diminished appetite, and difficulty sleeping are common after CABG, but usually resolve in 4 to 6 weeks.
- lifestyle changes such as stopping smoking, eating a low-fat diet, controlling BP, and losing weight. For example, patients who continue to smoke have more myocardial infarctions and reoperations.
- activity progression. For the first 6 weeks postoperatively, the patient can engage in light activities such as setting the table, folding clothes, walking, and climbing stairs. He can return to work part-time after 6 weeks and can gradually increase his activity level to normal by 3 months after surgery.
- incision care, as directed by the surgeon.
- medication education. Most patients are discharged on antiplatelet therapy, typically aspirin, which significantly reduces saphenous vein graft closure through the first year.⁴ Patients with dyslipidemia will also receive lipid-lowering therapy. Explain what the drugs are for, how to take them correctly, how to recognize signs and symptoms of adverse drug reactions, and what to report to his healthcare provider.
- cardiac rehabilitation. Unless contraindicated, all patients should receive cardiac rehabilitation after CABG. Patients who participate in cardiac rehabilita-

tion have increased physical mobility, feel in better health, and generally have a more positive outlook on life.

About 20% of patients are depressed after a major cardiac event such as CABG surgery. Reassure the patient that temporary feelings of sadness are normal and should go away within a few weeks as he gets back to normal routines and activities. Tell the patient and his family that if depression is persistent or severe and disrupts activities of daily living, he should discuss this with his healthcare provider.

A new beginning

A patient undergoing CABG has complex healthcare needs. Knowing about the multiple system changes caused by surgery will help you and the rest of the care team anticipate postoperative problems and intervene quickly and appropriately so that your

patient can have the best possible outcome. ♦

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