



Focusing on the surgical patient with cardiac problems



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CONTACT HOURS

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The author has disclosed that she has no significant financial relationship with or financial interest in any commercial companies that pertain to this educational activity.

IT'S ESTIMATED THAT 8 million Americans suffer from some form of cardiovascular disease. In this article, I'll describe how to evaluate a noncardiac surgical patient's cardiovascular risk

Learn about the latest guidelines for assessing cardiac risk and protecting your patient's heart during noncardiac surgery.

and the evidence-based recommendations for managing his preoperative care. Although the surgeon and consulting

healthcare providers will perform risk evaluations, you'll need to understand how to apply the American College of Cardiology/American Heart Association

(ACC/AHA) guidelines on perioperative cardiovascular evaluation as you care for a patient undergoing noncardiac surgery.

Meet a typical patient

Clyde Jones, 75, was admitted to your surgical unit with acute abdominal pain. A computed tomography scan of the abdomen shows a bowel obstruction, and he's scheduled for surgery in the morning.

Mr. Jones has a history of coronary artery disease (CAD) and had two bare-metal coronary artery stents placed 4 years ago. He also has hypertension and type 2 diabetes. His daily medications include aspirin, metoprolol, atorvastatin, and glyburide. A cardiology consult has been ordered to evaluate his cardiovascular risk and determine if he needs any additional testing before surgery.

Mr. Jones's preoperative evaluation will be tailored to assess his risks from urgent bowel surgery. To obtain a true picture of Mr. Jones's cardiac status, ask him these questions:

- Do you experience chest pain or discomfort at home?
- Do you take nitroglycerin at home? If yes, how often, and when did you last take it?

Conditions to treat

Active cardiac conditions, which should be treated before noncardiac surgery, include:

- acute coronary syndromes
- decompensated heart failure (New York Heart Association class IV, in which the patient has symptoms such as shortness of breath at rest)
- significant dysrhythmias including high-grade atrioventricular blocks and symptomatic ventricular dysrhythmias including poorly controlled atrial fibrillation (resting heart rate greater than 100 beats/minute), symptomatic bradycardia, and newly recognized ventricular tachycardia
- severe valvular heart diseases such as severe aortic stenosis or symptomatic mitral stenosis.

- Do you need to rest between taking a shower and getting dressed?
- Can you walk up a flight of stairs without stopping?
- Have you stopped doing any usual activities because of increased symptoms?
- Do you have swelling in your legs or ankles?
- Do you get pain in your legs when walking? If yes, does the pain go away after you rest?

These questions will help create a picture of the patient's symptoms at home. Some patients don't realize or communicate how much they've limited their activity to minimize symptoms. This can lead to an overestimation of their functional status.

During the physical assessment, be sure to take the patient's BP in both arms, assess carotid pulses, and look for jugular vein distension. Auscultate his lungs and heart and examine his extremities for edema and signs of peripheral vascular disease; patients with peripheral arterial disease may also have CAD. Listen for abdominal bruits. An accurate cardiovascular assessment may reveal

an underlying pathology. For example, a significant difference in arm BPs can indicate subclavian artery stenosis. Bruits over major arteries (including femoral and renal arteries) can indicate stenosis. The updated guidelines summarize the active cardiac conditions, such as severe valvular disease, that should be evaluated and treated before surgery. (See *Conditions to treat* for a list.)

The guidelines make the important distinction between a history of myocardial infarction (MI) or the presence of abnormal Q waves on a 12-lead ECG and an acute MI. A history of myocardial necrosis (history of MI or abnormal Q waves) is considered a clinical risk factor. An active cardiac condition, which carries greater risk, is defined as an acute MI (a documented MI 7 days or less before the examination) or a recent MI (occurring more than 7 days but less than or equal to 1 month before the examination) with evidence of important ischemic risk by clinical symptoms or noninvasive study. For example, if a patient has had a recent MI and a recent stress test doesn't show any further myocardium at risk, the patient is at low risk for another MI during and after noncardiac surgery. Although the risk is low, elective surgery may be postponed until 4 to 6 weeks after the MI.

Mr. Jones doesn't have an active cardiac condition, but he has two clinical risk factors, including a history of ischemic cardiac disease and diabetes. The cardiologist will carefully evaluate Mr. Jones for evidence of current myocardial ischemia by questioning him about his symptoms, including shortness of breath, chest pain or anginal equivalent, and fatigue. He'll ask if Mr. Jones has had a cardiac evaluation with a stress test; obtaining that result and having it available in the medical record will

facilitate his workup. The cardiologist also will review Mr. Jones's preoperative 12-lead ECG.

After focusing on the cardiovascular system the next steps are to examine each of the other systems to see if the patient has any conditions that would increase the risks of anesthesia or complicate cardiac management during and after surgery.

Diabetes is the most common metabolic disease that can complicate surgery. A patient with diabetes may have occult CAD.

Tight glycemic control is important in the perioperative period. Although a recommended blood glucose range isn't clear, the level should be kept below 200 mg/dL, and clinicians should seek to balance glycemic control while avoiding serious hypoglycemic episodes. Some patients without diabetes and patients with type 2 diabetes who don't normally use insulin may need insulin in the immediate postoperative period.

Taking a stepwise approach

The cardiologist will use the step-by-step approach recommended by the guidelines to evaluate the patient's risk. Let's follow Mr. Jones:

- *Determining the urgency of the surgery.* Mr. Jones's bowel surgery is considered urgent. The cardiologist may give specific recommendations for patient management in the OR and postoperative period. Elective procedures such as knee or hip replacement, on the other hand, may be delayed or postponed if further cardiac evaluation or intervention is recommended.

- *Evaluating the patient for active cardiac conditions.* Mr. Jones underwent coronary artery stent placement 4 years ago and has had subsequent negative stress tests. He's never had an MI, and he doesn't have chest pain or anginal equivalent with activity. He's not aware of having

palpitations, and he has never experienced syncope or near syncope.

He's not aware of having any problems with his heart valves, and he has no cardiac murmurs or an implanted pacemaker or cardioverter defibrillator, so he can move to the next step. If Mr. Jones had an active cardiac condition, it would be evaluated and treated preoperatively unless he needed emergency surgery.

- *Evaluating the risk of the surgery.* Surgical procedures are classified as low risk, intermediate risk, or vascular procedures. If the surgery is low risk (less than 1% combined morbidity and mortality), it's probably safe to proceed even in very sick patients. (See *Cardiac risks in noncardiac surgery.*) Additional cardiac testing would rarely change patient management.

- *Evaluating the patient's functional capacity.* This can be evaluated objectively with a stress test or subjectively by asking the patient a set of questions designed to estimate functional capacity. For example: Can he walk up two flights of stairs without stopping? Can he walk more than four blocks without signs and symptoms such as shortness of breath or chest pain? If he has a good functional capacity and is asymptomatic, no further intervention is recommended. Mr. Jones walks 5 miles on a treadmill daily at a speed of 3.5 mph without symptoms.

- *Evaluating clinical risk factors if the patient has symptoms or has poor or unknown functional capacity.* Clinical risk factors include a history of ischemic heart disease, history of heart failure, and history of cerebrovascular disease, diabetes, or renal insufficiency. If the patient doesn't have any clinical risk factors, the surgery can proceed. If he has one or two clinical risk factors, the surgery can proceed with heart rate control with beta blockade; additional testing should

be considered only if the results could change patient management.

If the patient has three or more clinical risk factors, consider the cardiac risk associated with the planned surgery. If additional tests won't change the plan of care, they shouldn't be considered.

Mr. Jones is asymptomatic but has diabetes and a history of ischemic heart disease, so the guidelines recommend obtaining a resting 12-lead ECG. Obtain a blood glucose level every 6 hours or with meals once he returns to eating.

Mr. Jones is at intermediate risk for developing problems during and after surgery. Because he has CAD, the cardiologist will address the following questions: How much myocardium is at risk? How much stress can his heart take before becoming ischemic? What's his ejection fraction? Is he on the optimal cardiac medication regimen?

Mr. Jones is already on a beta-blocker. He'll receive it I.V. until he can safely take oral medications again. His diabetes will need to be closely monitored, and he'll need insulin therapy during and after surgery. The consultant may order a 12-lead ECG postoperatively to assess for ischemic changes.

What test for which patient?

If the patient needs more in-depth cardiac testing, the diagnostic tests used depend on his history and type of procedure. The exercise stress test is the test of choice for most patients who can safely walk on a treadmill and who don't have preexisting left bundle-branch block or other contraindications. If the patient can't walk or perform a regular exercise stress test, he may undergo pharmacologic stress testing. Carefully assess your patient to make sure he has no contraindications to the test selected.

If noninvasive testing discovers

Cardiac risks in noncardiac surgery

The guidelines stratify surgical risk according to three levels:

Vascular (cardiac risk greater than 5%)

- Major vascular procedures such as aortic repair
- Peripheral vascular surgery

Intermediate risk (1% to 5%)

- Intraperitoneal and intrathoracic surgery
- Head and neck surgery
- Carotid endarterectomy
- Orthopedic surgery
- Prostate surgery

Low risk (less than 1%)

- Endoscopic procedures
- Superficial procedure
- Cataract surgery
- Breast surgery
- Ambulatory surgery

significant cardiac abnormalities and the surgery isn't emergent, the patient may undergo invasive testing, such as coronary arteriography, to evaluate coronary anatomy. If he has severe multivessel disease or significant left main CAD, he'll likely benefit from cardiac revascularization before undergoing elective noncardiac surgery. Clinicians should consider the patient's whole health status when making the decision for coronary artery bypass graft surgery.

The other revascularization option is percutaneous coronary intervention (PCI) with either bare-metal or drug-eluting stent placement. This option is recommended before noncardiac surgery only if the patient is a candidate for PCI whether or not he's having noncardiac surgery. After PCI, elective surgery should be delayed for 4 to 6 weeks after insertion of a bare-metal stent and 12 months after insertion of a drug-eluting stent. The patient must take aspirin and a thienopyridine after PCI to reduce the risk of

complications related to the coronary stents, but these put him at increased risk for bleeding. If the patient underwent a balloon angioplasty, elective noncardiac surgery isn't recommended for 4 weeks.

In reviewing all the recommendations, if the patient needs surgery in the next year, he should be considered for a bare-metal stent or balloon angioplasty.

Dealing with medications

Mr. Jones isn't taking a thienopyridine, but he'll restart aspirin therapy as soon as possible after surgery. Dual antiplatelet therapy with aspirin and a thienopyridine carries an increased risk of bleeding when compared with aspirin alone. The type of procedure dictates the risk of bleeding.

If the patient is on beta-blockers for angina, significant dysrhythmias, or hypertension, beta-blocker therapy should be continued I.V. until he can safely take oral medications again. The type of surgery planned determines the recommendations for beta

blockade. If the patient is scheduled for vascular surgery and was on beta-blockers preoperatively or is at high cardiac risk, or demonstrated ischemia in the preoperative workup, beta-blockers should be ordered. Beta-blockers are also indicated in patients who have more than one clinical risk factor and are undergoing intermediate-risk surgery or vascular surgery.

Mr. Jones has two clinical risk factors—history of ischemic heart disease and diabetes—so his beta-blockers will be continued through the intraoperative and postoperative phases. Mr. Jones also takes a statin; because he's having noncardiac surgery, he should resume taking this medication as soon as he's able.

A patient undergoing vascular surgery can be started on a statin preoperatively provided he has no contraindications to the medication. Statin therapy also may be considered in patients with at least one clinical risk factor who are scheduled for intermediate-risk procedures.

Patients with uncontrolled hypertension and CAD or at least one clinical risk factor may benefit from α_2 -agonists such as clonidine.

Other considerations

If the patient has an implanted pacemaker or cardioverter defibrillator, let the surgeon and anesthesiologist know so they can take appropriate safety precautions.

Mr. Jones underwent a resection of his descending colon and had an uncomplicated recovery. Once bowel function returned, he was transitioned to his preoperative oral medications. He was discharged home after 5 days with instructions to continue his cardiac and oral diabetes medications and to follow up with his cardiologist and surgeon. **LPN**

Selected references

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