Coronary Artery Disease: Review Questions

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QUESTIONS

Choose the single best answer for each question.

Questions 1 through 4 refer to the following case study.

A 60-year-old man with hypertension, dyslipidemia, and a 20-year history of diabetes mellitus goes to the emergency department because of a 1-month history of cough, increasing dyspnea, abdominal bloating, and orthopnea requiring him to sleep sitting up. He reports that his cough is productive of green sputum. He has had some lower extremity edema over the past week but reports no chest pain. He is in rapid atrial fibrillation, with a ventricular rate of 140 bpm. His blood pressure is 120/75 mm Hg, temperature is 38.6°C (101.5°F), and oxygen saturation is 86% on room air. He has absent breath sounds one third of the way up on the right side and rales halfway up, bilaterally. His jugular venous pressure is elevated to the angle of the jaw, and he has an enlarged liver with hepatojugular reflux.

1. Which of the following is NOT an appropriate intervention for this patient?

A) Administer a low-dose β-blocker, intravenously
B) Administer flecainide
C) Administer heparin, furosemide, and oxygen
D) Load with digoxin, intravenously
E) Perform cardioversion

2. The patient receives appropriate therapy and converts spontaneously to sinus tachycardia at a rate of 120 bpm. Electrocardiography reveals Q waves in the inferior leads, poor R wave progression in the anterior precordium, and nonspecific ST and T wave changes. Chest radiography reveals pulmonary edema with an effusion on the right side. At this time, which of the following is NOT an appropriate diagnostic evaluation?

A) Monitor serial cardiac enzyme levels to rule out myocardial infarction
B) Monitor on telemetry and follow electrolyte levels
C) Obtain sputum for Gram stain and blood cultures
D) Perform echocardiography
E) Perform stress test with nuclear imaging

3. The patient's troponin I level is elevated to 14 ng/mL, with a normal proportion of creatine kinase–MB isoenzymes. Echocardiography reveals severely decreased left ventricular (LV) function with multiple segmental wall motion abnormalities and an ejection fraction of 20%. There is dilation of the left ventricle and left atrium, moderate mitral regurgitation, and moderate tricuspid regurgitation, with an estimated pulmonary artery pressure of 70 mm Hg. The patient is placed on heparin, low-dose dopamine, and an aggressive diuretic regimen. He loses 10 kg (22 lb) during the next 48 hours and is finally able to lie flat. Which of the following is the most appropriate test to perform next?

A) Cardiac catheterization
B) Cardiac magnetic resonance imaging
C) Dobutamine echocardiography
D) Electron beam computed tomography
E) Stress test

4. The patient has severe 3-vessel coronary artery disease and is referred for bypass surgery. The surgeons are concerned about his severely decreased LV function. Which of the following tests will NOT help predict improvement in cardiac function and survival after revascularization?

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A) Dobutamine echocardiography
B) Electron beam computed tomography
C) Fluorodeoxyglucose positron emission tomography
D) Persantine sestamibi imaging
E) Rest-rest thallium

EXPLANATION OF ANSWERS

1. **(B) Administer flecainide.** The patient has fulminant congestive heart failure (CHF), the etiology of which is unknown. It is possible that he has an undiagnosed cardiomyopathy (ischemic or idiopathic) and that an infection resulted in CHF and atrial fibrillation (AF). It is also possible that the AF is causing the CHF from tachycardia. Nevertheless, the AF is deleterious. Flecainide is an effective agent to convert atrial fibrillation, but it is contraindicated in this patient, because it increases mortality in patients with coronary artery disease (CAD) and heart failure. Cardioversion might be appropriate if AF is the primary cause of the CHF. Unfortunately, the patient cannot clearly identify when the AF began, so thromboembolic complications are a concern; anticoagulation should be initiated if no contraindications exist. With a stable blood pressure, a course of diuresis with administration of oxygen and anticoagulation is reasonable, because CHF and hypoxia may be a cause of his AF. Digoxin administered intravenously, along with cautious administration of low-dose, short-acting β-blockers to achieve rate control (without exacerbating his failure) is reasonable.
2. **(E) Perform stress test with nuclear imaging.** Stress testing is contraindicated while the patient is still in significant CHF. The patient should certainly have cardiac enzymes drawn to rule out ischemic injury. Ischemic AF, although unusual, can occur. The patient, who has new CHF and multiple cardiac risk factors, is now subject to ischemic stress from a rapid rhythm and hypoxia. Given the history of a productive cough and fever in this immunocompromised patient, cultures should be drawn and empiric antibiotic coverage considered. Telemetry monitoring is certainly appropriate, because he may revert to AF again. Electrolyte monitoring with aggressive replacement of potassium and magnesium is essential to decrease the risk of ventricular dysrhythmias in a patient with CHF undergoing diuresis. Echocardiography will provide much information about the presence of structural heart disease, LV and valvular function, pulmonary pressures, and LV hemodynamics.
3. **(A) Cardiac catheterization.** Cardiac catheterization should be performed to rule out treatable and potentially reversible causes of decreased LV function. Patients with obstructive CAD and ischemic cardiomyopathies have a significant survival benefit with revascularization. Of patients with CAD evaluated for heart transplant, approximately 30% improve sufficiently and do not require transplant after revascularization. Delineation of the coronary anatomy is essential in patients with depressed LV function. Stress testing would not be appropriate because it fails to provide adequate information about the coronary anatomy; it might be helpful in evaluating functional status and risk for infarction or death in the coming year. Dobutamine echocardiography might be helpful in assessing for viable myocardium and helping to differentiate ischemic from idiopathic cardiomyopathy, but it is an indirect assessment. Magnetic resonance imaging and electron beam computed tomography are evolving tests for screening and diagnosis of CAD but would likely give abnormal results in a 60-year-old man.
4. **(B) Electron beam computed tomography.** All of the tests listed are useful in assessing for viable myocardium, except for electron beam computed tomography. Rest-rest thallium, persantine sestamibi, and dobutamine echocardiography are relatively equivalent in sensitivity (approximately 80%). Fluorodeoxyglucose positron emission tomography, which identifies ischemic myocardium by its preferential metabolism of glucose rather than free fatty acids, is thought to be slightly more sensitive and specific in identifying viable myocardium. Recommendations regarding the optimal test depend on the expertise of the individual clinician's institution. Although the surgeons may be reassured by the presence of viable myocardium, because it is associated with better survival and lower perioperative mortality, thoughtful consideration must be paid to the individual patient, because no test is 100% predictive. Recent data reveal that even in the absence of traditionally defined evidence of viability, survival may be improved by revascularization in some patients. It is also becoming clear that assessing for viability to predict improvement in LV function and assessing to predict survival may not be the same. In a diabetic patient with multivessel CAD, coronary artery bypass grafting is the optimal revascularization procedure.