CHAPTER 3

Cardiovascular Emergencies
Questions

3-1. Which of the following statements concerning the initial evaluation of patients presenting with acute chest pain is TRUE?

(A) The response to a "gastrointestinal cocktail" is useful in discriminating symptoms of acute myocardial ischemia from other etiologies.
(B) The pain of myocardial ischemia is always retrosternal in location and described as a sensation of heaviness or pressure.
(C) A normal electrocardiogram excludes the possibility of acute myocardial infarction in patients with acute chest pain.
(D) Resolution of chest discomfort with nitroglycerin may not be diagnostic of acute myocardial ischemia.

3-2. Which of the following statements concerning the clinical application of myocardial marker measurements is TRUE?

(A) Single-sample myocardial marker measurements are useful in excluding the diagnosis of acute myocardial infarction.
(B) Cardiac troponins remain elevated after an acute myocardial infarction for approximately 48 hours.
(C) Numerous conditions in addition to acute myocardial infarction are associated with elevated troponin levels.
(D) Abnormal cardiac troponin levels are useful in predicting patients at higher risk for adverse events regardless of CK-MB and electrocardiogram results.

3-3. Which of the following electrocardiogram patterns is most consistent with occlusion of the right coronary artery?

(A) ST-segment elevation in V_1, V_2, and V_3.
(B) R waves in V_1 and V_2 >0.04 s and R/S ratio ≥1.
(C) ST-segment elevation in I and aVL.
(D) ST-segment elevation in II, III, and aVF.

3-4. An 82-year-old female presents with 1 hour of substernal chest pressure, dyspnea, and diaphoresis. Her initial electrocardiogram is shown in Figure 3-1. No old electrocardiograms are available for comparison. Her first set of cardiac markers is negative. Which of the following is the most appropriate treatment?

(A) Admit the patient to a floor bed.
(B) Observe the patient and order serial cardiac markers.
(C) Administer thrombolytics.
(D) Cardiovert her with 50 joules.

3-5. Which of the following tachydysrhythmias, occurring shortly after the onset of acute myocardial infarction, is associated with an increased mortality?

(A) Ventricular tachycardia.
(B) Accelerated idioventricular rhythm.
(C) Atrial fibrillation.
(D) Ventricular premature beats.

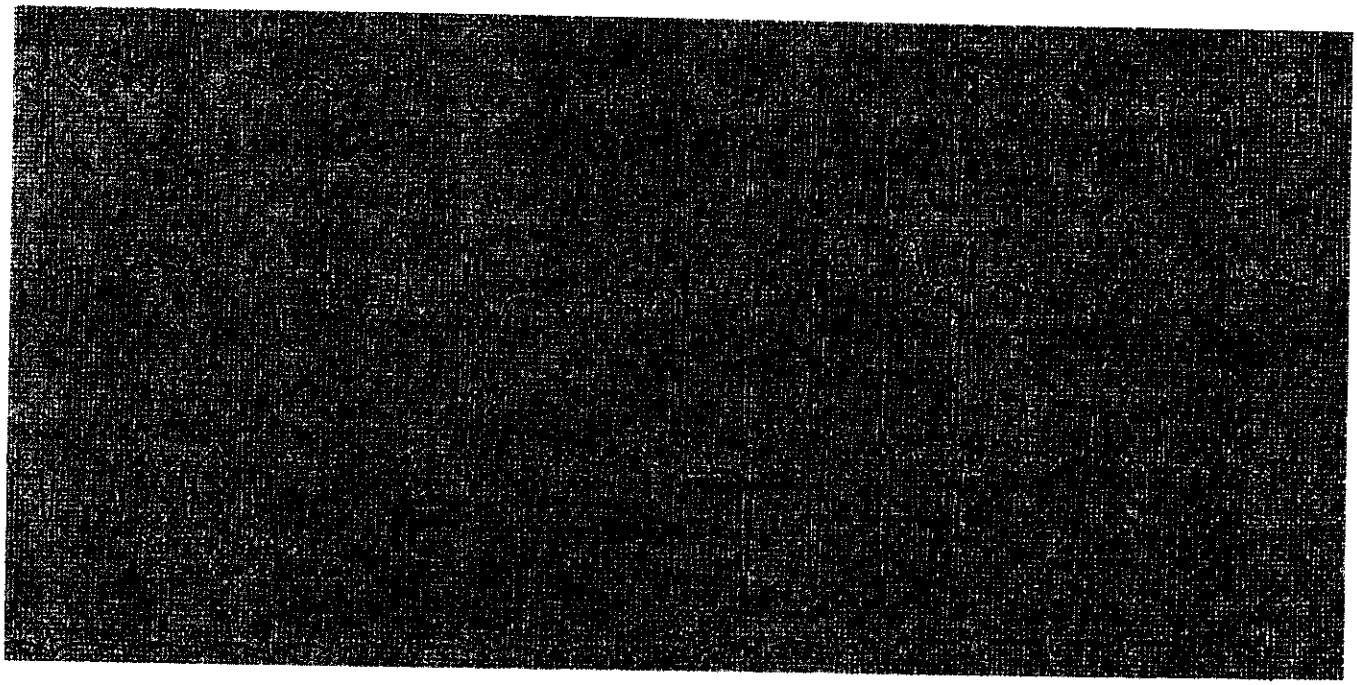

Figure 3-1.

3-6. An 85-year-old female presents with acute onset of dyspnea, inspiratory rales, and holosystolic murmur. Her electrocardiogram reveals Q waves in II, III, and aVF. Approximately five days earlier, she relates, she had a "severe bout of heartburn." Cardiac enzymes are significant for a normal CK-MB but elevated troponin. What is the most likely cause of this patient's symptoms?

(A) Left ventricular free wall rupture.
(B) Pulmonary embolism.
(C) Dressler syndrome.
(D) Papillary muscle rupture.

3-7. A 50-year-old female presents with sharp, precordial chest pain of 10 minutes duration, which has now resolved. She has a history of hypertension but no other medical problems including coronary artery disease. Her electrocardiogram reveals T-wave inversion <1 mm in the inferolateral leads. Which of the following best classifies this patient's likelihood of significant coronary artery disease?

(A) Nonexistent.
(B) Low likelihood.
(C) Intermediate likelihood.
(D) High likelihood.

3-8. Which of the following therapeutic agents has been shown to unequivocally decrease mortality in the setting of acute myocardial infarction?

(A) Aspirin.
(B) Calcium channel antagonists.
(C) Magnesium.
(D) Glycoprotein IIb/IIIa inhibitors.

3-9. A 50-year-old male presents with an acute inferior wall myocardial infarction. Following the administration of aspirin and nitroglycerin, he suddenly becomes confused and diaphoretic with a blood pressure of 70/30 mmHg. Physical examination reveals jugular venous distention, clear lung fields, and no evidence of a murmur. What combination of therapeutic agents is most likely to immediately stabilize this patient?

(A) Heparin and glycoprotein IIb/IIIa inhibitors.

3-17. Which of the following is NOT part of the classic triad seen with aortic stenosis?

(A) Syncope.
(B) Widened pulse pressure.
(C) Dyspnea.
(D) Angina.

3-18. A 50-year-old male presents to the ED in pulmonary edema. The patient has no history of hypertension. He does complain of shortness of breath and chest pain. He has a new holosystolic murmur on exam. The murmur is loudest at the apex and radiates to the left axilla. The patient has a normal-sized heart on chest x-ray. His electrocardiogram is diagnostic for an acute myocardial infarction. What is the most likely cause of the murmur?

(A) Congestive heart failure.
(B) Aortic stenosis.
(C) Cardiac tamponade.
(D) Papillary muscle necrosis.

3-19. What is the most common cause of acute aortic insufficiency?

(A) Infective endocarditis.
(B) Trauma.
(C) Aortic dissection.
(D) Marfan's syndrome.

3-20. Which of the following electrocardiogram characteristics are rarely found in patients with dilated cardiomyopathy?

(A) Atrial fibrillation.
(B) Left ventricular hypertrophy.
(C) Normal electrocardiogram.
(D) Ventricular ectopy.

3-21. Which of the following findings is frequently found on the chest radiograph in patients with hypertrophic cardiomyopathy?

(A) Kerley's A lines.
(B) Pulmonary edema.
(C) Cardiomegaly.
(D) Normal.

3-22. Which of the following is NOT a characteristic of pericarditis?

(A) PR-segment depression.
(B) Fever.
(C) Exertional dyspnea.
(D) Sharp retrosternal pain worse when supine.

3-23. Which of the following is a late electrocardiogram finding in patients with pericarditis?

(A) "Knuckle sign" in aVR.
(B) PR depression.
(C) T-wave inversions.
(D) ST elevation.

3-24. Which of the following is NOT associated with cardiac tamponade?

(A) Pulsus paradoxus.
(B) Narrow pulse pressure.
(C) Electrical alternans.
(D) Left ventricular hypertrophy.

3-25. What is the most common cause of nontraumatic cardiac tamponade?

(A) Infection.
(B) Uremia.
(C) Malignancy.
(D) Idiopathy.

3-26. What is the most common symptom in patients presenting with a pulmonary embolism?

(A) Syncope.
(B) Angina.
(C) Shortness of breath.
(D) Pleuritic chest pain.

3-27. Which of the following tests is most helpful in ruling out a low-risk patient for a pulmonary embolism?

(A) Chest x-ray.
(B) D-dimer.
(C) Electrocardiogram.
(D) Pulse oximetry.

-28. Which of the following is NOT associated with an adverse short-term outcome in normotensive patients with pulmonary embolism?

(A) Left ventricular hypertrophy.
(B) New T wave inversions in V_1–V_4.
(C) New right bundle branch block.
(D) Heart rate greater than systolic pressure.

3-29. Which of the following is NOT approved for the treatment of pulmonary embolism by the U.S. Food and Drug Administration?

(A) Aspirin.
(B) Unfractionated heparin.
(C) Low-molecular-weight heparin.
(D) Thrombolytic therapy.

3-30. Which of the following statements is TRUE concerning pulse oximetry readings in the diagnosis of pulmonary embolism?

(A) A normal oxygen saturation rules out pulmonary embolism.
(B) Pulse oximetry readings play no role in the diagnosis of pulmonary embolism.
(C) Pulse oximetry readings are moderately helpful in identifying patients with a pulmonary embolism.
(D) All patients with a pulmonary embolism will have abnormal pulse oximetry readings.

3-31. What systolic blood pressure identifies a patient with a hypertensive emergency?

(A) 160 mmHg.
(B) 180 mmHg.
(C) 200 mmHg.
(D) No absolute number exists.

3-32. Which is NOT associated with transient hypertension?

(A) Anxiety.
(B) Pregnancy.
(C) Alcohol withdrawal syndromes.
(D) Cocaine.

3-33. Which of the following is NOT a finding of hypertensive retinopathy?

(A) Copper and silver wiring.
(B) Cherry red spot in macula.
(C) Cotton wool spots.
(D) Papillary disc edema.

3-34. Which of the following is the drug of choice for hypertensive encephalopathy?

(A) Sodium nitroprusside.
(B) Nifedipine.
(C) Hydralazine.
(D) Methyldopa.

3-35. Which of the following is NOT a risk factor for abdominal aortic aneurysm?

(A) Syphilis.
(B) Family history of aneurysm.
(C) Smoking.
(D) Hypertension.

3-36. What is the most common symptom of a ruptured abdominal aortic aneurysm?

(A) Hematuria.
(B) Syncope.
(C) Change in level of consciousness.
(D) Pain.

3-37. Which is NOT a clinical sign of a ruptured aortic aneurysm?

(A) Cullen's sign.
(B) Scrotal hematoma.
(C) Grey Turner's sign.
(D) Femoral pulse difference.

3-38. Which of the following is NOT typical of the pain associated with an aortic dissection?

(A) Shifting locations.
(B) Slow and gradual in onset.
(C) Tearing or ripping.
(D) Abrupt and severe.

3-39. Which of the following is the best test for an unstable patient with a possible aortic dissection?

(A) Computed tomography.
(B) Aortic angiogram.
(C) Transesophageal echocardiography.
(D) Magnetic resonance imaging.

3-40. Which of the following is NOT part of Virchow's triad of risk factors for venous thromboembolism?

(A) Venous stasis.
(B) Malignancy.
(C) Vessel wall injury.
(D) Hypercoagulable state.

3-41. Which of the following is the best test for diagnosing deep vein thrombosis (DVT)?

(A) Impedance plethysmography.
(B) Physical exam.
(C) Doppler ultrasound.
(D) Latex agglutination D-dimer.

3-42. Which of the following is NOT useful in the diagnosis of DVT?

(A) Positive ultrasound.
(B) Elevated D-dimer.
(C) High score using Well's criteria.
(D) Venography.

3-43. Which drug should be avoided in pregnancy when anticoagulation is desired?

(A) Heparin.
(B) Enoxaparin.
(C) Lepirudin.
(D) Warfarin.

3-44. What is the first of sign of an arterial occlusion?

(A) Pallor.
(B) Pulselessness.
(C) Paresthesias.
(D) Pain.

3-45. What is a common electrocardiogram finding in the post–cardiac transplant patient?

(A) Left ventricular hypertrophy.
(B) Left bundle branch block.
(C) Complete heart block.
(D) Two distinct P waves.

3-46. In the resuscitation of the cardiac transplant patient, which drug has no effect?

(A) Epinephrine.
(B) Atropine.
(C) Amiodarone.
(D) Diltiazem.

3-47. What is the main role of nuclear medicine evaluation (technetium or thallium) of the heart?

(A) To predict 1-year cardiac mortality.
(B) To determine anatomic dimensions of the heart.
(C) To evaluate myocardial perfusion.
(D) To identify coronary artery anatomy.

CHAPTER 3

Cardiovascular Emergencies

Answers, Explanations, and References

3-1. The answer is D (Chapter 49). Nitroglycerin, in addition to its utility in treating coronary ischemia, can also provide relief of symptoms caused by gastrointestinal ailments via smooth muscle relaxation. Patients with myocardial ischemia may have complete relief of their symptoms with a gastrointestinal cocktail. Unfortunately, a significant portion of patients with myocardial ischemia may not present with chest pain as their predominant symptom. A normal electrocardiogram does not rule out acute myocardial infarction. Up to 5% of patients with acute myocardial infarctions may present with this finding.

3-2. The answer is D (Chapter 49). Elevated troponin levels predict those patients at risk for adverse cardiovascular events and are useful in triaging patients to the appropriate level of inpatient care. In patients presenting with acute chest pain and a nondiagnostic electrocardiogram, acute myocardial infarction cannot be definitively excluded upon presentation, and serial sampling of myocardial markers is required. Cardiac troponins are highly specific for myocardial injury. In contrast, there are numerous conditions associated with elevated CK-MB levels. Following acute myocardial infarction, troponin levels begin to elevate around 6 hours, peak at 12 hours, and remain abnormal for 7 to 10 days.

3-3. The answer is D (Chapter 50). The electrocardiogram can be used to predict the coronary vessel causing an infarct. ST-segment elevation in lead III greater than lead II is consistent with an inferior wall injury pattern secondary to right coronary artery occlusion. A true posterior wall infarction is manifested by significant R waves in V_1 and V_2. Occlusion of the left circumflex artery is heralded by ST-segment elevation in at least one lateral lead (V_5, V_6, or aVL) with an isoelectric or elevated ST-segment in lead I.

3-4. The answer is C (Chapter 50). New-onset left bundle branch block (LBBB) in the setting of symptoms suggestive of acute myocardial infarction is an indication for mechanical or pharmacologic reperfusion therapy. However, ST-segment patterns may be present that indicate acute myocardial infarction in the setting of preexisting LBBB:

- ST-segment elevation of 1 mm or greater concordant with the QRS.
- ST-segment depression of 1 mm or greater in leads V_1, V_2, or V_3.
- ST-segment elevation >5 mm and discordant with the QRS.

3-5. The answer is C (Chapter 50). Supraventricular tachycardias are associated with an increased mortality in the setting of acute myocardial infarction. These arrhythmias result in an increased myocardial oxygen demand and are associated with increased adrenergic stimulation due to depressed systolic function. An accelerated idioventricular rhythm often reflects successful reperfusion in patients receiving thrombolytic therapy. Ventricular premature

beats are the most common arrhythmia associated with acute myocardial infarction and normally do not require specific treatment. Early, transient ventricular tachycardia is not associated with an increase in mortality.

3-6. The answer is D (Chapter 50). Papillary muscle rupture, although rare, is most commonly seen following inferior myocardial infarction as the posteromedial papillary muscle receives its blood supply from a solitary source. Patients usually present with sudden onset of dyspnea, pulmonary congestion, and a new holosystolic murmur secondary to mitral valve regurgitation. Left ventricular free wall rupture is a catastrophic event with a greater than 90% mortality rate. If patients survive to presentation, their symptoms are consistent with cardiac tamponade, and bedside ultrasound can be diagnostic. Pulmonary embolism is certainly a diagnostic consideration in this patient but less likely based on the presenting signs and symptoms. Dressler syndrome usually presents 2 to 10 weeks following acute myocardial infarction. It may reflect an autoimmune-mediated phenomenon and is most commonly manifested by fever and chest pain.

3-7. The answer is B (Chapter 50). This patient has a low likelihood of significant coronary artery disease (see Table 3-1). Patients presenting to the ED with symptoms suggestive of myocardial ischemia without evidence of acute myocardial infarction require stratification based on their likelihood of significant coronary artery disease. Such individual risk stratification can help guide subsequent management and disposition.

3-8. The answer is A (Chapter 51). Aspirin is a simple yet powerful therapeutic weapon in the setting of acute myocardial infarction, resulting in a 23% reduction in mortality. Patients who have a significant allergy to aspirin should be given clopidogrel to ensure inhibition of platelet aggregation. The glycoprotein IIb/IIIa inhibitors are powerful antiplatelet agents. Unfortunately, the only clear mortality benefit from IIb/IIIa inhibitors is in those patients undergoing percutaneous coronary intervention. Calcium channel antagonists have not been shown to reduce mortality and in fact are more likely to cause harm in the setting of acute myocardial infarction. There is considerable conflicting evidence relating to the efficacy of magnesium in the setting of

TABLE 3-1. LIKELIHOOD OF SIGNIFICANT CORONARY ARTERY DISEASE IN PATIENTS WITH SYMPTOMS SUGGESTIVE OF UNSTABLE ANGINA

High Likelihood (85–99%)	Intermediate Likelihood (15–84%)	Low Likelihood (1–14%)
Any of the following features	***Absence of high-likelihood features and any of the following***	***Absence of high- or intermediate-likelihood features but may have***
History of prior AMI, sudden death, or other known history of CAD	Definite angina; males <60 or females <70 y of age	Chest pain classified as probably not angina
Definite angina: males ≥60 or females ≥70 y of age	Probable angina: males ≥60 or females ≥70 y of age	One risk factor other than diabetes
Transient hemodynamic or ECG changes during pain	Chest pain probably not angina in patients with diabetes	T-wave flattening or inversion <1 mm in leads with dominant R waves
Variant angina (pain with reversible ST-segment elevation)	Chest pain probably not angina and 2 or 3 risk factors other than diabetes	Normal ECG
ST-segment elevation or depression ≥1 mm	Extracardiac vascular disease	
Marked symmetric T-wave inversion in multiple precordial leads	ST depression 0.05–1 mm T-wave inversion ≥1 mm in leads with dominant R waves	

Abbreviations: AMI = acute myocardial infarction; CAD = coronary artery disease; ECG = electrocardiogram.
Source: Braunwald E, Mark DB, Jones RH, et al: *Unstable Angina: Diagnosis and Management.* Clinical Practice Guideline No. 10 (amended). AHCPR Publication No. 94-0602. Rockville, MD, Agency for Health Care Policy and Research and the National Health, Lung and Blood Institute, Public Health Service, U.S. Department of Health and Human Services, 1994.

acute myocardial infarction and thus it should not be considered a routine agent in the treatment of such patients.

3-9. **The answer is D** (Chapter 51). This patient is suffering from a right ventricular infarction that complicates approximately one-third of all inferior wall myocardial infarcts. The mainstay of treatment is preload augmentation and inotropic support using aggressive normal saline boluses followed by initiation of dobutamine. Another key aspect of managing these patients is the preservation of atrioventricular synchrony. Atrial-augmented filling of the ventricle is vital in maintaining adequate cardiac output in the setting of ventricular systolic dysfunction as it may contribute up to 35% of the stroke volume. Synchronized cardioversion may be required to preserve this "atrial kick" in the setting of atrial tachydysrhythmias. Heparin, glycoprotein IIb/IIIa inhibitors, and clopidogrel may play a role in this patient's reperfusion strategy but are not as useful in the immediate stabilization phase. Streptokinase is less desirable to percutaneous coronary intervention in the setting of cardiogenic shock. Magnesium's only clear indication is in the setting of polymorphic ventricular tachycardia secondary to prolongation of the QT interval. Angiotensin converting enzyme inhibitors play a role in reducing left ventricular dysfunction and dilatation but are not necessarily initiated in the ED.

3-10. **The answer is B** (Chapter 51). The increased mortality in acute myocardial infarction patients with atrioventricular block is not directly caused by the conduction disturbance itself. Instead, the mortality in these patients is due to the extensive myocardial damage required to affect the intrinsic conduction system. Prophylactic temporary pacing is still indicated to prevent sudden hypotension and worsening ischemia in the setting of certain conduction disturbances, high-grade atrioventricular blocks, and symptomatic sinus bradycardia unresponsive to atropine. Dobutamine and isoproterenol may increase myocardial work load and oxygen demand and thus are less attractive options. Atropine is indicated for symptomatic sinus bradycardia, Mobitz I second-degree atrioventricular block, and third-degree heart block.

3-11. **The answer is D** (Chapter 52). The classic presentation of aortic stenosis is one of chest pain, dyspnea, and exertional syncope. This diagnosis should be entertained in all elderly patients presenting with syncope. Subclavian steal syndrome, certainly a consideration in this patient, occurs as a result of proximal subclavian stenosis and resultant "shunting" of blood away from the ipsilateral vertebral artery. Such patients are unlikely to experience chest discomfort or dyspnea. Although less common, patients with pulmonary embolism may present with syncope as a part of their symptom complex due to profound (but transient) right ventricular outflow obstruction. Brugada syndrome is a syndrome manifested by syncope due to polymorphic ventricular tachycardia. Such patients have a unique electrocardiogram that reveals ST-segment elevation in leads V_1–V_3 associated with a right bundle branch block pattern (see Figure 3-2). Patients with this disorder are at high risk for sudden cardiac death and require treatment with an automatic implantable cardioverter defibrillator (AICD).

3-12. **The answer is C** (Chapter 52). The patient with unexplained syncope despite an initial ED evaluation (up to 50% of such patients) requires risk stratification based on clinical and electrocardiographic characteristics. Depending on the risk of near-term events, patients may either be admitted for evaluation and further cardiac monitoring or discharged with the intent of further outpatient evaluation. Significant predictors of sudden cardiac death or significant dysrhythmia within one year of a syncopal event are abnormal electrocardiogram (excluding nonspecific ST-T changes), age >45

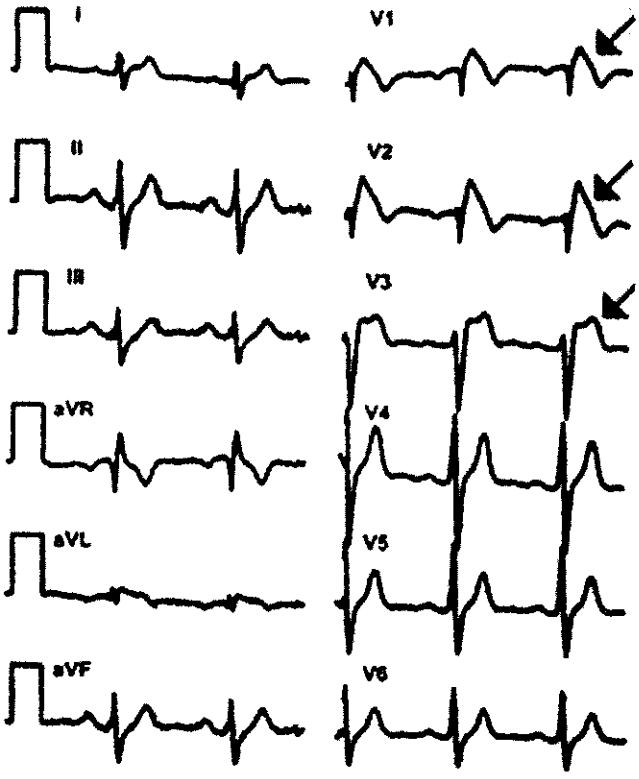

Figure 3-2.

years, history of ventricular dysrhythmia, and history of congestive heart failure. Patients with confirmed reflex-mediated syncope do not have increased risk of cardiovascular morbidity or mortality. Patients with atrial fibrillation are at increased risk for cerebrovascular complications but not sudden cardiac death.

3-13. **The answer is C** (Chapter 53). Although loop diuretics are indicated for acute pulmonary edema and decompensated heart failure, these agents are not used alone in the chronic management of congestive heart failure due to a lack of mortality benefit. Beta adrenergic blockers and angiotensin converting enzyme inhibitors decrease mortality in patients with symptomatic left ventricular dysfunction. Spironolactone is useful in New York Heart Association Class III and IV heart failure patients with continued symptoms despite the use of other agents.

3-14. **The answer is A** (Chapter 53). Heart failure has a substantial impact in both human and economic terms. It is the leading cause of hospitalization in patients over 65 years of age. Heart failure patients who present with a first episode of pulmonary edema have 1-year mortality rates of 50%. B-type natriuretic peptide levels have significant utility in the acute and chronic management of patients with congestive heart failure. The use of calcium channel blockers should be avoided in the heart failure patient due to their negative effects on inotropic function. Despite their increased risk for malignant dysrhythmias, prophylactic antiarrhythmic therapy is contraindicated in heart failure patients as it appears to increase mortality.

3-15. **The answer is B** (Chapter 53). Ischemic heart disease is the most common cause of systolic dysfunction in patients in developed nations. Chronic hypertension is more often associated with heart failure due to diastolic dysfunction. Less common in occurrence, acute congestive heart failure resulting from myocarditis and thyrotoxicosis is usually reversible with treatment of the underlying disease process.

3-16. **The answer is D** (Chapter 54). Mitral valve stenosis leads to progressive dilatation of the left atrium. This finding on the electrocardiogram classically is the notched or biphasic P wave as the distended atrium conducts the P wave. Another finding in mitral stenosis may be right axis deviation. Left ventricular hypertrophy usually does not occur as the left ventricle characteristically does not have the increased pressures from mitral stenosis. Sinus bradycardia is not typically seen in mitral valvular disease. In fact, quite often the patient develops a tachycardic rhythm, namely, atrial fibrillation.

3-17. **The answer is B** (Chapter 54). Clinically, aortic stenosis has a narrow pulse pressure. Aortic insufficiency, on the other hand, causes a widened pulse pressure. This is

sometimes manifested by a "water hammer pulse" or head bobbing. As aortic stenosis progresses, dyspnea is the first symptom, followed by paroxysmal nocturnal dyspnea, exertional syncope, and angina.

3-18. **The answer is D** (Chapter 54). Mitral regurgitation from papillary necrosis would produce a holosystolic murmur loudest at the apex. Aortic stenosis produces a loud systolic murmur but is loudest at the second right intercostals space and radiating to the carotids. Congestive heart failure does not cause a murmur but rather an extra heart sound from fluid overload. Cardiac tamponade can cause muffled heart tones and could cause shortness of breath and chest pain but does not cause a murmur.

3-19. **The answer is A** (Chapter 54). Infective endocarditis causes most cases of acute aortic insufficiency. Other common acute causes are trauma and aortic dissection. Marfan's syndrome, syphilis, calcific degeneration, congenital bicuspid valves, and rheumatic heart disease are examples of chronic causes of aortic insufficiency.

3-20. **The answer is C** (Chapter 55). Patients with dilated cardiomyopathy almost always have a very abnormal electrocardiogram. As the cardiac function declines and the chambers enlarge, atrial fibrillation and ventricular ectopy are quite common. The most common finding, however, is left ventricular hypertrophy and left atrial enlargement. Q waves and poor R-wave progression across the precordium are also common findings.

3-21. **The answer is D** (Chapter 55). Patients with hypertrophic cardiomyopathy frequently have no abnormality seen on chest x-ray. Evidence of pulmonary vascular congestion or edema is highly unusual, as is cardiomegaly. The asymmetrical hypertrophy of the septum classically produces symptoms of dyspnea with exertion, but it has more to do with an abrupt elevation in the left ventricular filling pressures in the hypertrophic heart.

3-22. **The answer is C** (Chapter 55). Patients with pericarditis tend to not have exertional dyspnea. If they have any dyspnea, it is due to increased pericardial irritation with inspiration. Low-grade fevers and pain when supine are classic findings. Dysphagia is caused by local irritation of the esophagus by the inflamed posterior pericardium.

3-23. **The answer is C** (Chapter 55). Initially (Stage 1), patients have the classic findings of diffuse ST elevation, PR depression, and a "knuckle sign" in the PR segment of aVR. In Stage 2, the ST segment returns to baseline and the T-wave amplitude decreases. T-wave inversions are classically a late finding (Stage 3) in the electrocardiograms of patients with pericarditis. Stage 4 is the resolution of the repolarization abnormalities.

3-24. **The answer is D** (Chapter 55). Patients with cardiac tamponade usually do not have underlying heart disease. The most common causes are malignancy and pericarditis. In fact, the electrocardiogram classically has very low voltage. Electrical alternans (beat-to-beat amplitude variation) is seen in about 20% of cases. Pulsus paradoxus and a narrow pulse pressure are commonly seen in tamponade.

3-25. **The answer is C** (Chapter 55). Metastatic malignancy accounts for 40% of nontraumatic tamponade. Acute idiopathy accounts for 15%; bacterial and tubercular infections account for 10%. Uremia also accounts for 10% of nontraumatic pericardial tamponade.

3-26. **The answer is C** (Chapter 56). Shortness of breath is the most common symptom of a pulmonary embolism, occurring in approximately 90% of patients with the diagnosis. Chest pain is the second most common presenting symptom. Syncope is an uncom-

mon finding but one that perhaps carries a more serious prognostic value as syncope is a sign that the cardiopulmonary system is severely compromised.

3-27. **The answer is B** (Chapter 56). A normal D-dimer suggests that the patient does not have an active thrombosis. In a low-risk patient, a negative D-dimer can effectively rule out a pulmonary embolism. A normal chest radiograph and normal electrocardiogram occur quite frequently and are not reassuring.

3-28. **The answer is C** (Chapter 56). Factors associated with an adverse short-term outcome in normotensive patients include syncope or seizure with respiratory distress at presentation, age >70, presence of congestive heart failure, chronic obstructive pulmonary disease, prior pulmonary embolism, >50% pulmonary vascular occlusion, T-wave inversions in V_1–V_4 or new incomplete right bundle branch block, heart rate/systolic pressure ratio >1.0, room air pulse oximetry <94%, and increased troponin levels.

3-29. **The answer is A** (Chapter 56). Aspirin has not been approved by the FDA for treatment of pulmonary embolism. However, other drugs that inhibit thrombin or accelerate fibrinolysis have been approved. While thrombolytic therapy of pulmonary embolism has been approved, there is little data supporting a survival benefit.

3-30. **The answer is C** (Chapter 56). A normal pulse oximetry reading and even a normal PaO_2 is not helpful in excluding the diagnosis of pulmonary embolism. Up to 25% of patients without underlying lung disease will have a PaO_2 >80 mmHg. Many diseases in the differential diagnosis of pulmonary embolism can produce hypoxia. A normal pulse oximetry reading does not eliminate the possibility of pulmonary embolism.

3-31. **The answer is D** (Chapter 57). A hypertensive emergency is not defined by any absolute blood pressure measurement but rather by a relative increase from the patient's baseline pressure and the evidence of end organ damage (encephalopathy, LV failure with pulmonary edema, renal compromise, etc.).

3-32. **The answer is B** (Chapter 57). Pregnancy tends to lower blood pressure. The other choices (cocaine, anxiety, alcohol withdrawal) all elevate blood pressure transiently. The blood pressure will eventually return to baseline once the underlying condition is reversed or treated.

3-33. **The answer is B** (Chapter 57). The finding known as the cherry red spot is found in central retinal vein occlusion, not in hypertensive retinopathy. The central macula has a separate blood supply and so appears to be a focal area of redness in the middle of a pale macula (from the central artery occlusion). Copper and silver wiring are early (Stage II) retinopathy findings. Cotton wool spots represent focal ischemia of Stage III retinopathy. Papillary disc edema is found in malignant hypertension and is Stage IV of hypertensive retinopathy.

3-34. **The answer is A** (Chapter 57). Sodium nitroprusside is the drug of choice for hypertensive encephalopathy. Patients require immediate and titratable lowering of the blood pressure. Sodium nitroprusside has a rapid onset with a relatively short half-life. Intravenous nitroglycerin and labetalol have been used, but nitroprusside is still the best agent. The other choices are not well suited for the emergency setting because they are difficult to adjust quickly if the patient becomes too hypotensive. The patient's mean arterial pressure should not be lowered by more than 20–25% within the first hour.

3-35. **The answer is A** (Chapter 58). Syphilis is not a risk factor for abdominal aortic aneurysm. Classic risk factors include factors associated with atherosclerosis, such as hypertension and smoking. These factors

contribute to weakness within the aortic wall and the development of aneurysms.

3-36. **The answer is D** (Chapter 58). Pain is the most common presenting symptom, though the others listed can be part of the clinical picture. Syncope and an altered sensorium are due to blood loss and hypotension. Hematuria is often mistakenly attributed to a renal calculus.

3-37. **The answer is D** (Chapter 58). Femoral pulse difference is not seen in aortic aneurysms. It is a widely held misconception that the femoral pulses are incongruent, but the aneurysm typically does not alter the pulse. The other options are all signs of a retroperitoneal hematoma. Cullen's sign is peri-umbilical ecchymosis. Grey Turner's sign is flank ecchymosis.

3-38. **The answer is B** (Chapter 58). Pain associated with an aortic dissection is typically described as abrupt in onset and as a tearing or ripping sensation. In addition, the pain tends to migrate down the back as it travels distally down the thoracic aorta.

3-39. **The answer is C** (Chapter 59). While all of the answers have excellent sensitivity for aortic dissection, the transesophageal echocardiograph (TEE) is the test of choice for the unstable patient or the patient who requires close clinical monitoring. TEE can be performed in the ED at the patient bedside and has a sensitivity between 97% and 100%.

3-40. **The answer is B** (Chapter 59). Virchow's classic triad includes vessel wall injury, venous stasis, and hypercoagulable state. While malignancy is certainly a risk factor, it is not one of the classic factors described by Virchow.

3-41. **The answer is C** (Chapter 59). Doppler ultrasound (Duplex) has a sensitivity that approaches 97%. Physical exam is a poor predictor of DVT. Impedance plethysmography has poor sensitivity of only 80%. Not only is latex agglutination D-dimer the worst D-dimer test, but D-dimers should be used only to rule out disease, not to rule in disease. In other words, a negative D-dimer tells the clinician that DVT is unlikely.

3-42. **The answer is B** (Chapter 59). A high D-dimer is NOT helpful in diagnosing DVT. All the other tests mentioned have excellent specificity and sensitivity and can aid the diagnosis. An elevated D-dimer does not help to rule in or out the diagnosis of DVT. Only a low or normal D-dimer will help to rule out the diagnosis. A high D-dimer must be followed up with further testing.

3-43. **The answer is D** (Chapter 59). Warfarin is contraindicated in pregnancy. It is teratogenic and causes fetal bleeding. All forms of heparin are compatible with pregnancy. Since pregnant patients are at higher risk of thromboembolism, they must be placed only on heparin and not on coumadin. No form of heparin crosses the placenta, so it is safe in pregnancy. Lepirudin is a class B drug in pregnancy and can be used for anticoagulation when heparin-induced thrombocytopenia occurs.

3-44. **The answer is D** (Chapter 59). Pain is the first presenting symptom of an arterial occlusion. It may occur alone and be the only indication of a serious threat to the limb. The other P's include pallor, paresthesias, pulselessness, polar (cold), and paralysis. High clinical suspicion is required to salvage the limb at risk. As the ischemic time increases, anesthesia and paralysis portend severe injury and likely loss of the limb.

3-45. **The answer is D** (Chapter 60). The technique of cardiac transplantation preserves both the donor and recipient sinus nodes. This produces the classic finding of two electrically distinct P waves on the electrocardiogram. The atrial suture line keeps the nodes electrically isolated from one another. The donor heart should not have any other abnormalities on the electrocardiogram.

3-46. The answer is B (Chapter 60). Posttransplant patients have no sympathetic innervation. Therefore, vagally induced bradycardias do not exist in these patients, and atropine will have no clinical effect. Other drugs that act directly on the cardiac tissue will have more clinical effects.

3-47. The answer is C (Chapter 61). Nuclear medicine scanning techniques use potassium analogues to identify areas of cardiac perfusion defects. The heart is pharmacologically stressed and the potassium analogues are taken up by the cardiac muscle. Areas with less uptake of the radioactive analogue have decreased perfusion to that area. This type of test is a functional and physiologic test rather than an anatomic one.