CASE PRESENTATION

A 47-year-old man enters the emergency room with squeezing midchest pain that began 1 hour ago. He also has had profuse sweating and severe nausea with two episodes of emesis. There is no positional component and no change with deep inspiration. Other history is positive for hypertension and heavy tobacco use. On exam, he is diaphoretic and appears to be in severe distress. Heart rate is 109 beats/min and blood pressure is 174/90. There are no obvious murmurs or rubs. Lung fields are clear. An electrocardiogram (ECG) done on arrival is shown in Figure 1.

1. Which of these laboratory values is most likely to be elevated at the time of presentation in the above patient?

A. Troponin I
B. Creatinine kinase
C. Both of the above
D. Neither of the above

2. Which of the following would be appropriate in the period immediately after presentation?

A. Aspirin
B. Beta-blockers
C. Morphine
D. Epinephrine
E. A, B, and C

3. Which of the following are contraindications to administration of intravenous thrombolytic therapy?

A. Major surgery or trauma 6 weeks ago
B. Intracerebral neoplasm
C. Suspected aortic dissection
D. History of a cerebrovascular accident
E. All of the above

4. Which of the following occurs first in the development of myocardial infarction?

A. Platelet adhesion and activation
B. Activation of factor VII
C. Conversion of fibrinogen to fibrin
D. Activation of plasmin
E. Release of antithrombin III

5. The diagnosis of acute myocardial infarction and decision to use thrombolytic therapy should be based on which of the following clinical tools?

A. Electrocardiogram
B. Physical exam
C. History
D. Chest x-ray
E. A, B, and C

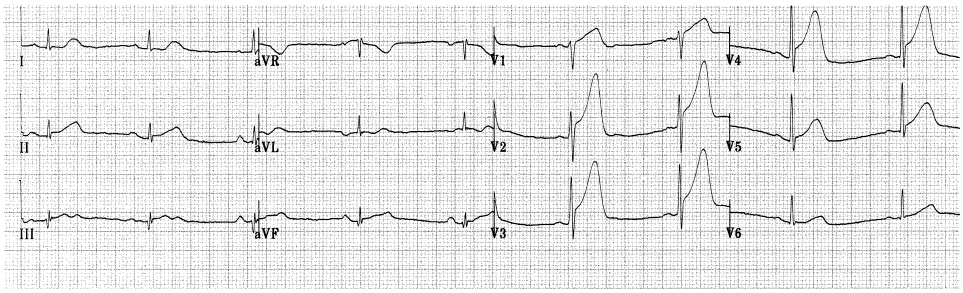
CASE DISCUSSION

Pathophysiology of MI • The patient is having an acute anterior myocardial infarction (MI). The usual initiating events are the spontaneous rupture of the thin fibrous cap that overlies coronary artery plaque, exposure of underlying collagen, and activation of platelets. Other elements of the coagulation cascade follow.

The decision to use thrombolytic therapy • The physical exam plays a role in the decision to use thrombolytic therapy primarily to exclude recent trauma (a bump on the head may be a contraindication). History and the electrocardiogram (ECG) showing ST segment elevation establish the diagnosis, and these are the only diagnostic tests needed to apply thrombolytic therapy. Blood tests and a chest x-ray unnecessarily delay therapy. You would wait for an x-ray if the history suggested aortic dissection rather than MI, but in that case you would also want a more definitive test (computed tomography [CT] scan or transesophageal echo). Cardiac enzymes including creatinine kinase and troponin do not become abnormal until 3 to 5 hours after the onset of MI.

Establishing prognosis at the onset of MI • The physical exam does help establish prognosis, as rales or pulmonary edema indicate large, high-risk MI. Other indicators of poor prognosis are age above 70, previous history of MI, atrial fibrillation, anterior infarction, hypotension, sinus tachycardia, female gender, and diabetes mellitus. Long-term prognosis is related to left ventricular function and the amount of residual myocardium that is ischemic and at risk for future injury.

Initial treatment of MI • In the emergency room, treat the patient with aspirin, morphine, and oxygen. You may try nitroglycerin for the patient with recent onset chest pain. If you are not going to use thrombolytic therapy, intravenous beta-blockade has been found to improve survival with acute MI with ST segment elevation. The other alternative to coronary thrombolysis is immediate angioplasty.



• ***Figure 1:*** *Used with permission from Taylor GJ. 150 Practice ECG's: Interpretation and Review, 2nd ed. Malden, Mass.: Blackwell Science, Inc., 2002: 60.*

Answers • 1-D 2-E 3-E 4-A 5-E

CASE PRESENTATION

A 65-year-old woman is diagnosed with a carcinoma of the cecum.

1. Of the following, which would be the most likely presenting symptom in this patient?
   A. Small-bowel obstruction
   B. Large-bowel obstruction
   C. Constipation
   D. Anemia
   E. Diarrhea
2. A surgical resection is planned. Preoperative bowel preparation:
   A. Is unnecessary unless there is evidence of obstruction
   B. Is unnecessary for cancers in the right side of the colon
   C. Should be carried out with polyethylene glycol electrolyte solution only
   D. Should include three doses of IV erythromycin
   E. Requires the use of orally administered antibiotic agents
3. The operative procedure of choice is:
   A. Right hemicolectomy with primary ileocolic anastomosis
   B. Right hemicolectomy with end ileostomy and closure of the distal colonic segment
   C. Right hemicolectomy with end ileostomy and mucous fistula formation
   D. Placement of a cecostomy tube
   E. Subtotal colectomy with primary ileorectal anastomosis
4. The pathologic specimen shows a tumor that has invaded through the bowel wall but not into adjacent organs. Three nodes of 14 identified are positive for tumor. There is no evidence of distant metastases. The correct staging for this tumor is:
   A. T1 N2 M1
   B. T2 N1 M0
   C. T3 N2 M1
   D. T3 N1 M0
   E. T4 N0 M0

CASE DISCUSSION

Presentation of colon cancer • Although it is not always the case, carcinomas of the right colon tend to present with occult blood loss and anemia, whereas carcinomas of the left colon are more likely to present with obstruction than those on the right side.

Preoperative bowel preparation • Before elective resection of any of these lesions, a preoperative bowel preparation should be performed to reduce the bacterial count in the colon to lower the risk of postoperative infection. This includes both a mechanical cleansing, most commonly with a polyethylene glycol electrolyte solution, and oral administration of antibiotics that are not absorbed from the GI tract.

Surgical treatment of colon cancer • In all colon cancer procedures, the aim of the surgery is to remove the tumor with a margin of uninvolved tissue as well as to remove the lymph nodes draining that area of the colon. There is no advantage in removing the entire colon for a lesion localized in one area. In this case, a right hemicolectomy with primary anastomosis would be the appropriate operation. Primary anastomosis should be avoided in emergent procedures in which an adequate preoperative bowel preparation cannot be performed. In elective resections, however, primary anastomosis is preferred to avoid the complications associated with a subsequent procedure to close the colostomy.

Tumor staging • You may argue that this is more detailed information than you will need for the National Board exam (and it will probably not appear on the test); we review it for sake of completeness. The newer TNM classification for colon cancer has replaced the older Duke classification system because it is more precise.

The *T* in this scheme refers to the depth of tumor invasion, in this case T3. The *N* indicates the extent of lymph node involvement, in this case N1 (between one and three nodes involved). The *M* indicates the presence or absence of distant metastases. Because there are no known distant metastatic lesions, this would be an M0 tumor.

TABLE 1 • The TNM Staging System

T Levels	
T0	No evidence of primary tumor
TIS	Carcinoma in situ
T1	Tumor invades into submucosa
T2	Tumor invades into muscularis propria
T3	Tumor invades into subserosa or nonperitonealized pericolic or perirectal tissues
T4	Tumor invades through visceral peritoneum or into adjacent organs or structures
N Levels	
N0	No lymph node involvement
N1	One to three pericolic or perirectal lymph nodes involved
N2	Four or more pericolic or perirectal lymph nodes involved
N3	Metastases to lymph nodes along named vascular trunks
M Levels	
M0	No distant metastases
M1	Distant metastases present

Answers • 1-D 2-E 3-A 4-D

CASE PRESENTATION

A 25-year-old woman presents to your office after palpating a small mass upon self-breast examination. She states this has never been present before and is quite concerned. A paternal aunt was diagnosed with infiltrating ductal carcinoma three years ago. She reports occasional tenderness of bilateral breasts, with tenderness worse at time of menses. She denies nipple discharge. She denies recent trauma to the chest or breasts. Upon physical examination, the breasts are symmetrical without dimpling or skin changes. No lymphadenopathy is identified. A 1 cm by 1 cm slightly tender, mobile, well-circumscribed mass is palpated in the right upper outer quadrant. The left breast is without significant findings.

1. After performing the history and physical, the most likely diagnosis is:
   A. Fibrocyst
   B. Fibroadenoma
   C. Infiltrating ductal carcinoma
   D. Fat necrosis
   E. None of the above

2. You decide to proceed with needle aspiration of the mass. You would expect to see:
   A. Blood
   B. Nothing retrieved with aspiration
   C. Straw-colored fluid
   D. All of the above
   E. None of the above

3. After aspiration you would expect this mass to be:
   A. Approximately the same size
   B. Collapsed/resolved
   C. Half of its original size
   D. Doubled in size
   E. None of the above

4. The next step in the management of this patient is:
   A. Referral to a breast surgeon
   B. Mammogram
   C. Clinical breast exam in 1 to 2 months
   D. All of the above
   E. None of the above

CASE DISCUSSION

History and physical findings associated with a fibrocyst • The most likely diagnosis is fibrocyst. A well-circumscribed, mobile, tender mass at time of menses is consistent with a fibrocyst. Fibrocysts or fibrocystic changes of the breast are usually found in reproductive-aged women, commonly ages 20 to 50. The etiology is thought to be an exaggerated response of breast tissue to cyclic hormonal changes. Breast discharge may be seen in individuals with fibrocysts. History may reveal increased caffeine consumption, but this is disputed by some authorities. The diagnosis of fibrocysts should be regarded as benign. Fibroadenomas are nontender, rubbery, solid, benign masses. Fibroadenomas are characteristically found in adolescents and women in their 20s, but may be found at any age. Growth of fibroadenomas can be rapid. Rapid growth usually leads to palpation and resultant biopsy. Invasive carcinoma is a possibility but would be unusual in someone of this age group. Characteristics associated with breast cancer include nipple inversion, skin changes known as *peau d'orange*, lymphadenopathy, and bloody nipple discharge. A malignant mass is often irregular in borders and adherent to the chest wall. Fat necrosis would be unlikely, because this is a result of trauma to the breast. Fat necrosis may present as a tender, irregular mass with skin retraction. Because of the similar characteristics of fat necrosis and carcinoma, excisional biopsy is warranted.

Needle aspiration • Diagnosis of a fibrocyst can be made by simple needle aspiration. The typical finding of a fibrocyst aspiration is straw-colored fluid. If no fluid is retrieved a solid mass is assumed. Because a solid mass may be a fibroadenoma or a more worrisome finding such as carcinoma, additional testing with core biopsy or excisional biopsy is needed. Aspiration of blood from a breast mass is suggestive of carcinoma. Biopsy is needed if carcinoma is suspected. This is typically performed by a surgical oncologist.

Resolution of a breast mass • Aspiration of a breast mass can be diagnostic. If a breast mass with straw-colored fluid resolves or disappears after aspiration, the diagnosis of fibrocyst may be made. One would not expect the size to increase or stay the same. If the mass does not completely resolve, another diagnostic test is ordered. Ultrasound of the breast is helpful because it reveals if a structure is cystic or solid.

Additional testing • If straw-colored fluid is retrieved upon aspiration as well as resolution of cyst, one can feel confident with the diagnosis of fibrocyst. No further diagnostic tests such as mammogram or excisional biopsy are warranted. The patient should continue self-examination of breasts and be made aware that fibrocysts often recur. A clinical exam by a physician should be repeated after one or two menstrual cycles. If no fluid is retrieved and there is the suspicion of a solid mass, other options are available. Ultrasound of the breast may be performed to identify a cystic or solid mass. If a cystic mass is visualized, needle aspiration under ultrasound guidance is performed. If the mass is solid in appearance, the decision may be to proceed with mammography or a biopsy for pathological diagnosis.

Answers • 1-A 2-C 3-B 4-C

CASE PRESENTATION

An 18-month-old boy is brought in to the emergency department at midnight with the chief complaint of "severe cough." The father notes that the cough developed after several days of runny nose, low-grade fever, and decreased eating. The father noticed that the boy has been eating less and he thinks that his child's throat may be sore. The cough has been getting worse each night for the past several nights. Tonight his cough was much worse but surprisingly improved on the ride into the emergency department. The patient's immunizations are up to date. On physical exam, the patient is noted to have inspiratory stridor that becomes worse when upset and a loud "barky" cough. He is tachypneic and in mild respiratory distress.

1. Of the following, which is the most likely etiologic agent for this disease process?

A. Respiratory syncytial virus
B. *Bordetella pertussis*
C. *Moraxella catarrhalis*
D. Parainfluenza virus
E. *Haemophilus influenzae* type b

2. What radiographic finding is characteristic of this disease?

A. "Thumb sign"
B. "Steeple sign"
C. Right upper lobe consolidation
D. "Boot shaped heart"
E. Atelectasis

3. Treatment may include:

A. Erythromycin
B. Dexamethasone
C. Diuretics
D. Prophylactic intubation in the emergency department
E. Vaccination

CASE DISCUSSION

Croup • The patient described has croup or laryngotracheobronchitis, a common illness in children between the ages of 3 months and 3 years, with a mean age of 18 months. The majority of cases are caused by parainfluenza viruses (types 1, 2, and 3). Other pathogens that may cause croup include influenza, respiratory syncytial virus, and *Moraxella catarrhalis*. Croup usually occurs in the winter months, generally from October to April. Croup must be distinguished from epiglottitis, an acute, life-threatening obstruction of the upper airway due to infection and edema of the epiglottis. With vaccination against *Haemophilus influenzae*, this condition is much less common but it still must be considered in children presenting with upper airway obstruction as the clinical approach is entirely different. Children with epiglottitis must be kept comfortable with no intervention to cause worsened airway obstruction while arrangements are made to secure the airway in a controlled environment, usually the operating room.

Course • Symptoms of croup are preceded by a prodrome of mild upper respiratory tract infection with rhinorrhea, cough, low-grade fever, and occasionally sore throat. The patient subsequently develops a "barky" or "seal-like" cough and stridor that typically is worse at night or with agitation and may improve in cool moist air.

Radiography • The characteristic finding in croup on anterior posterior radiographic examination of the chest and lower airway is the "steeple sign," pointed narrowing of the superior trachea due to inflammation of the subglottic area. The "thumb sign," a thickened edge of the epiglottis when seen on lateral neck radiogram, is associated with epiglottitis. The "boot shaped" heart is associated with tetralogy of Fallot.

Therapy • Most cases of croup improve with mist humidification alone. Racemic epinephrine may be necessary if the patient does not respond to mist; however, rebound symptoms may occur with worsened respiratory distress. Therefore patients given racemic epinephrine should not be sent home from the emergency room until they have been observed for at least 4 hours to assess for rebound edema. Usually patients who require a dose of racemic epinephrine and definitely those who require two or more doses are admitted to the hospital. Dexamethasone is helpful in severe cases to reduce inflammation of the airway, with improvement generally occurring about 6 hours after administration. Intubation is reserved for severe cases and should only be performed in a very controlled environment such as an operating room by anesthesiologists.

Answers • 1-D 2-B 3-B

CASE PRESENTATION

A 22-year-old male presents to the emergency room with "the worst headache of my life" beginning 4 hours ago. The pain is severe over the right parietal area, continuous, and accompanied by right pupil dilatation, right lid weakness, and difficulty moving the right eye nasally. He has no history of headaches, trauma, or significant illness. Physical exam reveals no further neurologic deficits, but the patient complains of mild neck stiffness.

1. What would you expect in subarachnoid hemorrhage?
   A. Identifiable hemorrhage on CT in 90% of cases
   B. Blood in cerebrospinal fluid (CSF) appearing in the first lumbar puncture tube, but significantly less in tube 4
   C. Lack of xanthochromia in the CSF at least 24 hours after onset of symptoms
   D. Improvement of initial symptoms, only to return 3 to 5 days later
   E. A and D

2. Risk factors or disease associations with subarachnoid hemorrhage are:
   A. Trauma and saccular aneurysms
   B. Hypotension
   C. Renal carcinoma
   D. Atrial fibrillation
   E. Hypothyroidism

3. Treatment of subarachnoid hemorrhage includes:
   A. Neurosurgical evaluation for clipping, aneurysm coil placement, or embolization
   B. Nimodipine to prevent subsequent vasospasm
   C. Control of hypertension
   D. Mannitol, hyperventilation, steroids, and shunts to reduce intracranial pressure when indicated
   E. All of the above

4. What complications can arise from SAH?
   A. Rebleeding
   B. Prolongation of QT interval and arrhythmias on EKG
   C. Seizures and focal neurologic deficits
   D. Change in mental status
   E. All of the above

CASE DISCUSSION

Clinical features and diagnostic evaluation of subarachnoid hemorrhage (SAH) • "The worst headache of my life" of acute onset is a neurosurgical emergency until proven otherwise by a normal CT, lumbar puncture, and physical exam. Cerebrospinal fluid findings frequently include elevated opening pressure and grossly bloody fluid with 100,000 to 1 million plus red blood cells. The amount of blood in the CSF does not significantly decrease as CSF tubes are collected as may be seen with a traumatic LP. Xanthochromia, or yellow pigmentation of the supernatant of centrifuged CSF, is indicative of RBC breakdown from hemorrhage. A subsequent chemical meningitis causes localized nuchal rigidity and irritation. A "sentinel bleed," heralded by an unusual or severe headache, may occur with temporary improvement, only to be followed by subsequent rebleeding and clinical deterioration. Third nerve palsy, presenting with ipsilateral pupil dilatation, ptosis, and restricted extraocular eye movements, may be a presenting feature of posterior communicating artery aneurysms. Once SAH has been diagnosed, the vascular cause of bleeding can best be determined with cerebral angiography, which is used to guide surgical therapy.

Causes of subarachnoid hemorrhage • Subarachnoid hemorrhage, most commonly caused by trauma, ruptured berry aneurysm, or arteriovenous malformation rupture, is associated with hypertension, polycystic kidney disease, and cocaine/amphetamine use. Atrial fibrillation is more commonly associated with embolic stroke.

Complications of subarachnoid hemorrhage • Neurologic complications include cerebral vasospasm leading to ischemic brain injury, seizures, hydrocephalus, and mental status changes. Systemic complications include EKG changes, arrhythmias, neurogenic pulmonary edema, hyponatremia, and chemical meningitis due to irritation of the meninges by blood in the subarachnoid space.

Treatment of subarachnoid hemorrhage • Treatment of subarachnoid hemorrhage is neurosurgical in most cases, utilizing microneurosurgical techniques. The less-invasive techniques of arterial embolization, coil placement into the aneurysm via catheter, and/or stereotactic radiosurgery of arteriovenous malformations are being used more frequently in situations not amenable to traditional open surgical techniques. In order to minimize complications, interventions for treating seizures, controlling blood pressure and vasospasm, and reducing increased intracranial pressure should be implemented.

Answers • 1-E 2-A 3-E 4-E

CASE PRESENTATION

Maria is a 23-year-old woman who presented to a clinic with palpitations, fainting, diarrhea, stomach cramps, and a fear that she might be dying. In taking a history, the examiner learns that she was attacked by a dog and hospitalized when she was 12. Since that time she has avoided all places where dogs might attack her. Maria initially feared all large dogs but has recently begun experiencing frequent periods of palpitations, chest pain, dizziness, and a fear that she is dying or having a heart attack. These symptoms reportedly come out of the blue and do not last long. After testing, there appears to be no organic cause for these physical symptoms. She has been able to maintain all daily activities but is doing so with discomfort and fears the physical symptoms might return at any time.

1. Which Axis I disorder is the most likely diagnosis?

A. Panic disorder with agoraphobia
B. Specific phobia
C. Panic disorder without agoraphobia
D. Generalized anxiety disorder
E. Delusional disorder

2. If Maria were to develop anxiety about being in places or situations from which escape might be difficult or embarrassing and avoided all public places, which Axis I diagnosis would be most likely?

A. Panic disorder with agoraphobia
B. Specific phobia
C. Panic disorder without agoraphobia
D. Generalized anxiety disorder
E. Delusional disorder

3. If these episodes occurred only in the specific, predictable circumstances they would be called:

A. Phobia responses
B. Situationally cued
C. Predispositionally cued
D. Specifically cued
E. Environmental responses

4. If when Maria was younger she feared only dogs and attempted to avoid them at all costs, what Axis I disorder would be the most likely diagnosis?

A. Panic disorders with agoraphobia
B. Specific phobia
C. Panic disorder without agoraphobia
D. Generalized anxiety disorder
E. Delusional disorder

CASE DISCUSSION

Axis I disorder • The current presentation of this patient is most consistent with panic disorder without agoraphobia. The physical symptoms of palpitations, fainting, diarrhea, stomach cramps, and a fear that she might be dying are typical of panic attacks. Additionally, the symptoms are coming out of the blue, not only in response to the presence of dogs, and they do not last long. The fear that she might have another panic attack has caused marked distress.

Avoiding public places • If the patient developed anxiety about being in situations from which escape might be difficult and began to avoid such places, this would meet the definition of agoraphobia in addition to the panic attacks.

Specific circumstances • When the attacks are cued by specific, predictable circumstances they are considered to be "situationally cued," because it is the situation that triggers the attacks.

Fear of dogs • Earlier, Maria only feared the presence of dogs, which suggests a specific phobia, animal type. It is only when the fear comes out of the blue and not only in response to dogs that the diagnosis of panic disorder can be considered.

Answers • 1-C 2-A 3-B 4-B

CASE PRESENTATION

A 78-year-old man with a history of stage IIIB non–small cell lung cancer reports a 3-hour history of acute shortness of breath and pleuritic chest pain on the right. On exam, the patient is afebrile, pulse rate is 120/min, respiratory rate is 30/min, blood pressure is 140/80, and O_2 saturation is 89% on room air. Chest exam reveals decrease in tactile fremitus, dullness to percussion, and absent breath sounds at right posterior lung base. Electrocardiogram (ECG) reveals sinus tachycardia. Ventilation/perfusion scan result is read as high-probability.

1. The most frequent inherited predisposition to hypercoagulability is which of the following?

A. Protein C deficiency
B. Antithrombin III deficiency
C. Protein S deficiency
D. Factor V Leiden mutation
E. Antiphospholipid antibodies

2. Which of the following is a common consequence of pulmonary embolism (PE)?

A. Increased alveolar-arterial (Aa) gradient (PAO_2-PaO_2)
B. Ventilation of unperfused lung
C. Pulmonary hypertension
D. Bronchoconstriction
E. All of the above

3. True statements regarding the diagnosis of PE include which of the following?

A. Pretest probability is crucial in test ordering.
B. VQ scanning is the "gold standard" for diagnosis.
C. A low-probability VQ scan finding essentially rules out PE.
D. The most common ECG finding in PE is an S wave in lead I and a Q wave in lead III.
E. All of the above

4. Thrombolytic therapy in the setting of a PE is indicated for which of the following?

A. Pleuritic chest pain
B. Heparin-induced thrombocytopenia
C. Systemic hypotension
D. Tachycardia
E. None of the above

CASE DISCUSSION

Risk factors for pulmonary embolism • The patient has a pulmonary embolism (PE). His risk factor for PE is malignancy. Other risk factors for precipitating a thromboembolism include immobilization; surgery, especially orthopedic procedures involving the lower extremity; use of oral contraceptives; pregnancy; and indwelling central catheters. For younger patients without risk factors who have PE or deep vein thrombosis (DVT), one should consider an inherited hypercoagulable state. The most common inherited hypercoagulability is activated protein C resistance of factor V Leiden. Other inherited hypercoagulable states include deficiency in protein C, protein S, or antithrombin III; prothrombin mutations; and disorders of plasminogen.

Physiologic consequences in PE • Hypoxemia and a widened Aa gradient are classic findings in PE. Lung that is not perfused continues to ventilate, causing mismatches (discussed later). Pulmonary hypertension, right ventricular failure, and hypotension occur with massive PE. Bronchospasm can be appreciated as well.

Diagnostic testing • The typical chest x-ray finding in a patient with PE is normal. However, abnormalities such as focal oligemia (Westermark's sign) or a peripheral wedge-shaped infiltrate (Hampton's hump) can suggest the diagnosis of PE in a dyspneic patient. The most common ECG finding is sinus tachycardia, though one can see the S_1Q_3 suggestive of right axis deviation. V/Q scanning remains the principal imaging modality for diagnosing a PE. This test can reveal defects in lung perfusion coupled with preserved ventilation as one observes with PE. A normal lung scan result virtually excludes a PE, and a high-probability finding rules in a PE. It is important to note that a low- or intermediate-probability scan finding requires further diagnostic testing if the clinical suspicion is high enough. Pulmonary angiography currently is the definitive test to establish the diagnosis of PE. However, one may seek evidence of a DVT in the lower extremity by ultrasound before pulmonary angiography. Computed tomography (CT) pulmonary angiography is emerging as an effective alternative imaging technique as well, and studies are ongoing.

Treatment • The treatment of PE with DVT consists of anticoagulation. Heparin, low-molecular-weight heparins, and warfarin are all FDA approved for this role. The duration of therapy for PE is 1 year (indefinite with persistent risk factor, proximal DVT for 6 months, and calf-vein thrombosis for 3 months). Those patients who are at high risk for anticoagulation, have active bleeding, or have recurrent thromboembolism despite adequate anticoagulation are candidates for inferior vena caval filters. Finally, tissue-type plasminogen activator (tPA) has been FDA approved for a subset of patients with massive PE and either severe right ventricle (RV) hypokinesis or systemic hypotension.

Answers • 1-D 2-E 3-A 4-C