

**Chest Radiology
In-Training Test Questions
for Diagnostic Radiology Residents**



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Sponsored by:

Commission on Education

Committee on Residency Training in Diagnostic Radiology

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1. Regarding thoracic manifestations of scleroderma (progressive systemic sclerosis), which of the following is true?
- A. When present, fibrosis tends to be present within the upper lobes.
 - B. Esophageal involvement is less frequently seen than cardiac involvement.
 - C. The primary pattern of fibrosis is a usual interstitial pneumonitis (UIP) pattern.
 - D. **Scleroderma is associated with an increased incidence of lung cancer.**

Rationale:

- A. False- Scleroderma-related fibrosis tends to be basilar.
- B. False- Cardiac involvement is seen in about 40% of patients with scleroderma but esophageal involvement is twice as common (80%).
- C. False- The primary pattern of fibrosis seen with scleroderma is a non-specific interstitial pneumonitis pattern which outnumbers the UIP pattern by 4:1.
- D. True- There is an increased risk of cancer by a factor of 2-6. Usually these cancers are adenocarcinomas.

Reference:

Kim EA, Lee KS, Johkoh T, Kim TS, Suh GY, Kwon OJ, Han J. **Interstitial lung diseases associated with collagen vascular diseases: radiology and histopathology** Radiographics 2002 Oct;22 Spec No:S151-65

Owens GR and Follansbee WP **Cardiopulmonary manifestations of systemic sclerosis** Chest 1987;91:118-127

2. The best diagnosis is:
- A. **Left Hydropneumothorax**
 - B. Left lower lobe mass
 - C. Chest wall abscess
 - D. right mastectomy

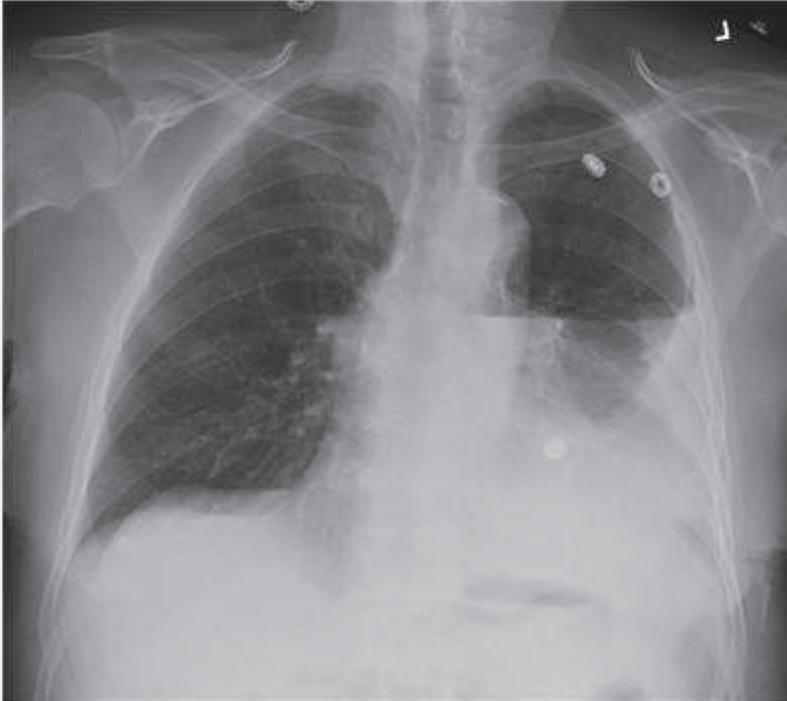


Figure 12.A Text: PA chest x-ray

Rationale:

- A. Air fluid level implies gas and liquid.
- B. Although an underlying mass could be present, the diagnosis cannot be made on the basis of this exam.
- C. The abnormality is in the pleural space, not the chest wall.
- D. Although mastectomy is a cause of relative lucency at the ipsilateral lung base, it would not explain the other findings.

Reference:

None

3. You are shown three CT images (Figures 3A, 3B, and 3C) of a 59-year-old man with cough and stridor. What is the MOST LIKELY diagnosis?
- A. Squamous cell papilloma
 - B. Carcinoid
 - C. **Adenoid cystic carcinoma**
 - D. Tracheobronchopathia osteochondroplastica

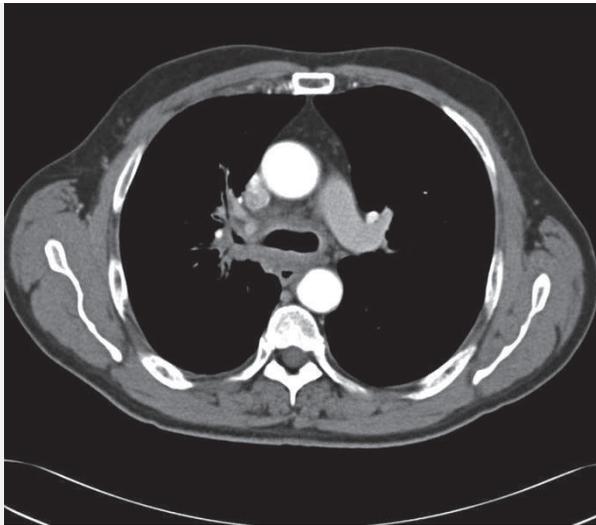


Figure 3.A

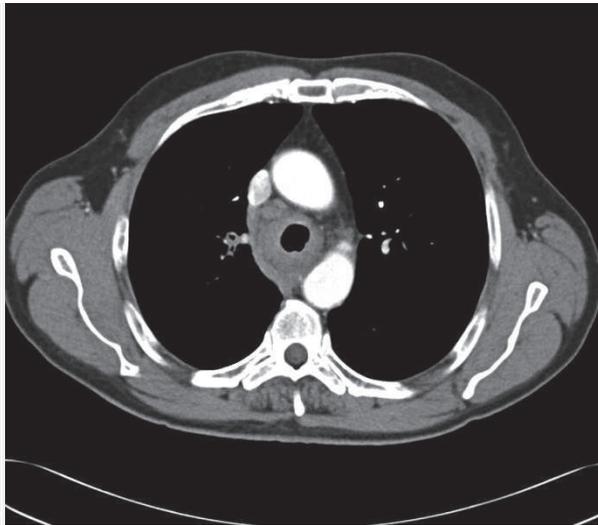


Figure 3.B

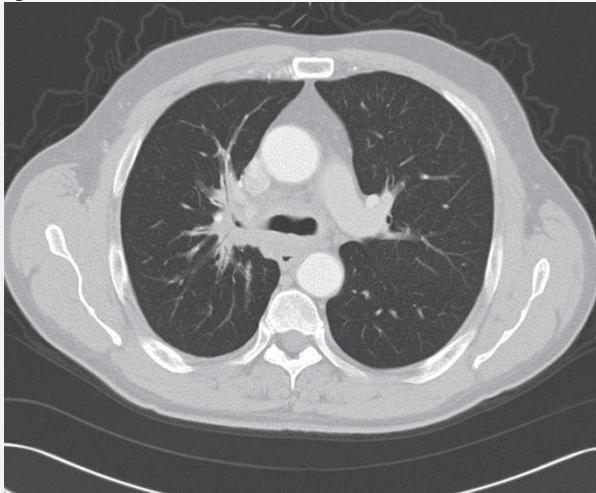


Figure 3.C

Rationale:

- A. Incorrect. The most common benign tracheal tumor, this lesion usually manifests as a smooth, well-circumscribed, soft tissue lesion measuring less than 2 cm. This would not be an appropriate choice for this irregular mass with extension along the tracheobronchial tree with lymphadenopathy.
- B. Incorrect. These also tend to be well-defined, smooth, round lesions. Carcinoid tumors arise from neuroendocrine cells and may calcify. They may enhance vigorously with intravenous contrast. The lack of enhancement and diffuse infiltration of the tracheobronchial walls make carcinoid tumor highly unlikely.

C: Correct. Adenoid cystic tumors represent the most common salivary gland tumor of the trachea. These lesions tend to grow slowly and spread submucosally. Formerly known as cylindromas because of their tendency to create castes of the tracheal tree, adenoid cystic carcinomas have been reclassified so as not to be confused with benign disease. Treatment is surgical resection which can be challenging because of this tumor's tendency to spread perineurally and escape radiologic detection.

D. Incorrect. Though the imaging might suggest an inflammatory or infectious tracheal process because of the long-segment of airway involvement, tracheobronchopathia osteochondroplastica (TOP) would not be a likely diagnosis here. The lack of calcification and preferential involvement of the posterior membrane would not allow for TOP to be the preferred diagnosis.

Reference:

SH, Lee KS, Chung MJ, Jeong YJ, Kim GY, Kwon OJ Adenoid cystic carcinoma of the airways: helical CT and histopathologic correlation. *AJR Am J Roentgenol* 2004;183:277-81
McCarthy MJ, Rosado-de-Christenson ML. Tumors of the trachea. *J Thorac Imaging* 1995;10:180-198
Spizarny DL, Shepard JA, McLoud TC, Grillo HC, Dedrick CG. CT of adenoid cystic carcinoma of the trachea. *AJR Am J Roentgenol* 1986;146:1129- 1132

4. Concerning cystic fibrosis, which one is TRUE?
- A. Bronchiectasis is more severe in the lower lobes.
 - B. **Sodium and chloride levels are elevated in the sweat.**
 - C. It is heritable by dominant transmission.
 - D. The lung volumes are small.

Rationale:

- A. Incorrect. Bronchiectasis-- identified as parallel lines or as ring shadows larger than the accompanying pulmonary artery -- usually is widespread on radiographs but tends to affect mainly the upper lobes.
- B. Correct. True statement. The Sweat Test is one of the ways that diagnosis of Cystic fibrosis is made.
- C. Incorrect. Cystic fibrosis is a relatively common hereditary disorder of recessive transmission. The disease is the most common lethal genetically transmitted disease among whites with an estimated incidence in this group of 1 per 2,000 to 3,000 live births.
- D. Incorrect. Hyperinflation is seen in about 80% of adult patients and tends to involve mainly the lower lobes.

Reference:

Muller NL, Fraser RS, Colman NC, Pare PD. Diseases of the Airways. In Radiologic Diagnosis of Diseases of the Chest. Eds. Muller NL, Fraser RS, Colman NC, Pare PD. W.B. Saunders Company, Philadelphia. 2001. p. 452-520, (p 493-494)

5. Concerning solitary pulmonary nodules, which one is TRUE?

- A. Considered benign if stable for 1 year
- B. Defined as a lesion that measures less than 2 cm
- C. Metastasis is the most common cause
- D. **Presence of fat is indicative of benign etiology**

Rationale:

- A. Incorrect
- B. Incorrect
- C. Incorrect
- D. Correct. Solitary pulmonary nodule is defined as a well circumscribed round or oval lesion measuring less than 3 cm in diameter. About half of the lesion are proven to be benign, about 40% are proven to be primary lung carcinoma and only about 10% are proven to be metastasis. A number of criteria have been described to help differentiate benign from malignant nodules. However, none have proven to be of very specific except presence of fat is suggestive of a benign lesion. Also, benign lesions have a doubling time of less than 1 month or greater than 16 months. Thus, nodules that are stable for over a 2 year period are considered benign.

Reference:

Collins J, Stern EJ. Solitary and Multiple nodules. In: Collins J, Stern EJ, eds. Chest Radiology: The Essentials. Philadelphia, Lippincott Williams and Wilkins, 1999; 91-105.

6. Which one is MOST likely to cause hoarseness?

- A. Anterior mediastinal mass
- B. **Aorto-pulmonary window mass**
- C. Right hilar mass
- D. Subcarinal mass

Rationale:

- A. Incorrect
- B. Correct. It is situated between the aortic arch and the left pulmonary artery. The space contains mediastinal fat, ductus ligament, nodes and the left recurrent laryngeal nerve. Thus, mass in this location can involve the left recurrent laryngeal nerve resulting in vocal cord abnormalities, including hoarseness.
- C. Incorrect
- D. Incorrect

Reference:

Muller, N.L., Fraser, R.S., Colman, N.C., and Pare', P.D. Radiologic Diagnosis of Diseases of the Chest. W.B. Saunders, Co., Philadelphia, PA 2001

7. You are shown three axial images from a CT scan of the chest of a 65 year old woman (Figures 3 A-C). What is the MOST LIKELY diagnosis?
- A. Relapsing polychondritis
 - B. Tracheomalacia
 - C. **Post-intubation stricture**
 - D. Saber-sheath trachea



Figure 3.A

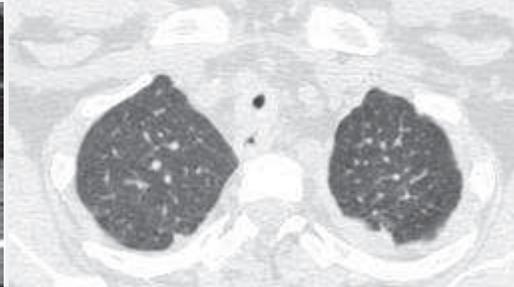


Figure 3.B



Figure 3.C

Rationale:

- A. Incorrect. Relapsing polychondritis is a rare autoimmune syndrome characterized by recurrent episodes of cartilaginous inflammation. This leads to destruction of the cartilaginous rings of the trachea resulting in thickening of the trachea. The posterior membrane is spared as it doesn't contain cartilage. This helps distinguish from other causes, such as in this case of post-intubation stricture.
- B. Incorrect
- C. Correct. Post-intubation stricture results when the high pressure of an endotracheal tube balloon results in tracheal mucosal necrosis. This eventually leads to scarring and stenosis, which typically occurs just below the thoracic inlet portion of the trachea.
- D. Incorrect

Reference:

Muller, N.L., Fraser, R.S., Colman, N.C., and Pare', P.D. Radiologic Diagnosis of Diseases of the Chest. W.B. Saunders, Co., Philadelphia, PA 2001

8. You are shown two axial images from a CT scan of the Chest of an 80-year old-man (Figure 4A and 4B). Which of the following drugs is MOST LIKELY responsible for the radiographic finding?
- A. Bleomycin
 - B. Penicillamine
 - C. **Amiodarone**
 - D. Nitrofurantoin

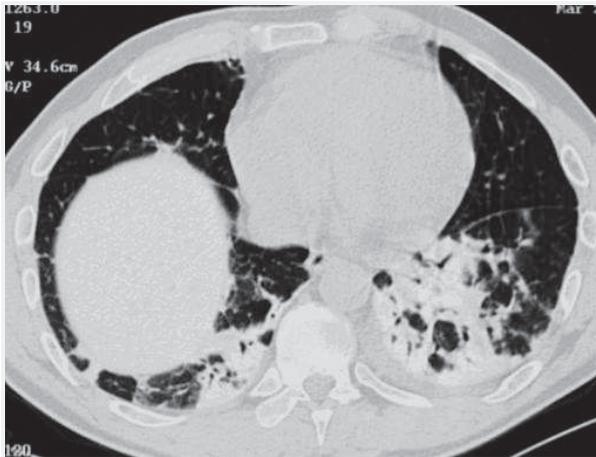


Figure 4.A

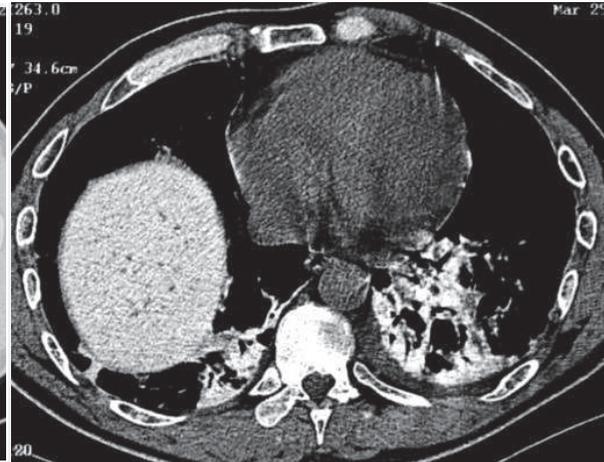


Figure 4.B

Rationale:

- A. Incorrect.
- B. Incorrect
- C. Correct. Amiodarone is a triiodinated compound used in the treatment of cardiac arrhythmias. Pulmonary toxicity occurs in 5-10 % of the patients. The risk is increased if the daily maintenance dose is greater than 400 mg and if the patient is elderly. Combination of high attenuation abnormalities in the lung and liver on CT scan are characteristics radiographic features of amiodarone toxicity.
- D. Incorrect

Reference:

Muller, N.L., Fraser, R.S., Colman, N.C., and Pare', P.D. Radiologic Diagnosis of Diseases of the Chest. W.B. Saunders, Co., Philadelphia, PA 2001 Webb, WR, Muller, NL, Naidich DP. High Resolution CT of the lung. Lippincott-Raven Publishers, Philadelphia, PA 1996

9. Regarding pulmonary mycetoma, which one of the following is TRUE?
- A. Patients are usually immunocompromised.
 - B. Cavity results from severe central cystic bronchiectasis.
 - C. **They are most often seen in the upper lobes.**
 - D. Hemoptysis results from angioinvasion by the fungal elements.

Rationale:

- A. Incorrect. Actually, patients with mycetomas are usually immunocompetent. These fungal elements colonize a cavity from other diseases (emphysema, sarcoid, tuberculosis, etc).
- B. Incorrect. Central bronchiectasis is associated with aspergillus but with allergic bronchopulmonary aspergillosis (ABPA) not with mycetomas. The cavities are usually from an underlying chronic lung disease.
- C. Correct. Aspergillomas are usually seen in the upper lobes probably related to the common sites of the large cavities in the most commonly associated conditions (sarcoid, tuberculosis, emphysema).
- D. Incorrect. The hemoptysis results from the fragile bronchial circulation which feeds the cavity wall. These bronchials may need to be embolized and in certain situations, may precipitate lobectomy.

Reference:

Franquet T, Muller NL, Gimenez A, Guembe P, de La Torre J, Bague S. Spectrum of pulmonary aspergillosis: histologic, clinical, and radiologic findings. *Radiographics*. 2001;21:825-37. Hennebicque AS, Nunes H, Brillet PY, Moulahi H, Valeyre D, Brauner MW. CT findings in severe thoracic sarcoidosis. *Eur Radiol*. 2005;15:23-30. Epub 2004 Sep 24.

10. Which of the following structures is a core or centrilobular component of the secondary pulmonary lobule?
- A. Pulmonary vein
 - B. Septum
 - C. **Bronchiole**
 - D. Lymphatic

Rationale:

- A. Incorrect. The pulmonary vein is located in the peripheral portion of the secondary lobule within the interlobular septum.
- B. Incorrect. The interlobular septum is a band of fibrous tissue, which surrounds the periphery of the secondary lobule.
- C. Correct. The bronchiole forms the center of the lobule with its accompanying pulmonary artery.
- D. Incorrect. The lymphatic vessel is also located with the vein in the interlobular septum.

Reference:

Heitzman ER, Maharian B, Berger I, et al. The secondary pulmonary lobule: A practical concept for interpretation of radiographs. *Radiology* 1969; 93:508-513 Webb WR, Stein MG, Finkbeiner WE, et al: Normal and diseased isolated lungs: High resolution CT. *Radiology* 1988; 166:81-87 Bergin C, Roqgli V, Coblenz C, et al. The secondary pulmonary lobule: Normal and abnormal CT appearances. *AJR* 1988; 151:21-25