

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 49 year old woman presents for the third time in a month with cough. On her first visit, she had cough, fever, myalgias, headache, and fatigue. She was diagnosed with influenza and bronchitis, and treated with antibiotics. Her fever remitted and she had no chest pain or fever, but her cough persisted. She was once a smoker with a total history of approximately 15 pack-years, but she quit smoking 16 years ago. She was given a second course of antibiotics but it is now 10 days later and her cough persists. The cough is productive of yellow sputum, and the patient has some dyspnea on exertion.

Which of the following imaging studies is the best first step in the evaluation of this patient?

- (a) two view plain film of the chest
- (b) ultrasound of the chest
- (c) computed tomography of the chest
- (d) magnetic resonance imaging of the chest

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

A 49 year old woman presents for the third time in a month with cough. On her first visit, she had cough, fever, myalgias, headache, and fatigue. She was diagnosed with influenza and bronchitis, and treated with antibiotics. Her fever remitted and she had no chest pain or fever, but her cough persisted. She was once a smoker with a total history of approximately 15 pack-years, but she quit smoking 16 years ago. She was given a second course of antibiotics but it is now 10 days later and her cough persists. The cough is productive of yellow sputum, and the patient has some dyspnea on exertion.

Which of the following imaging studies is the best first step in the evaluation of this patient?

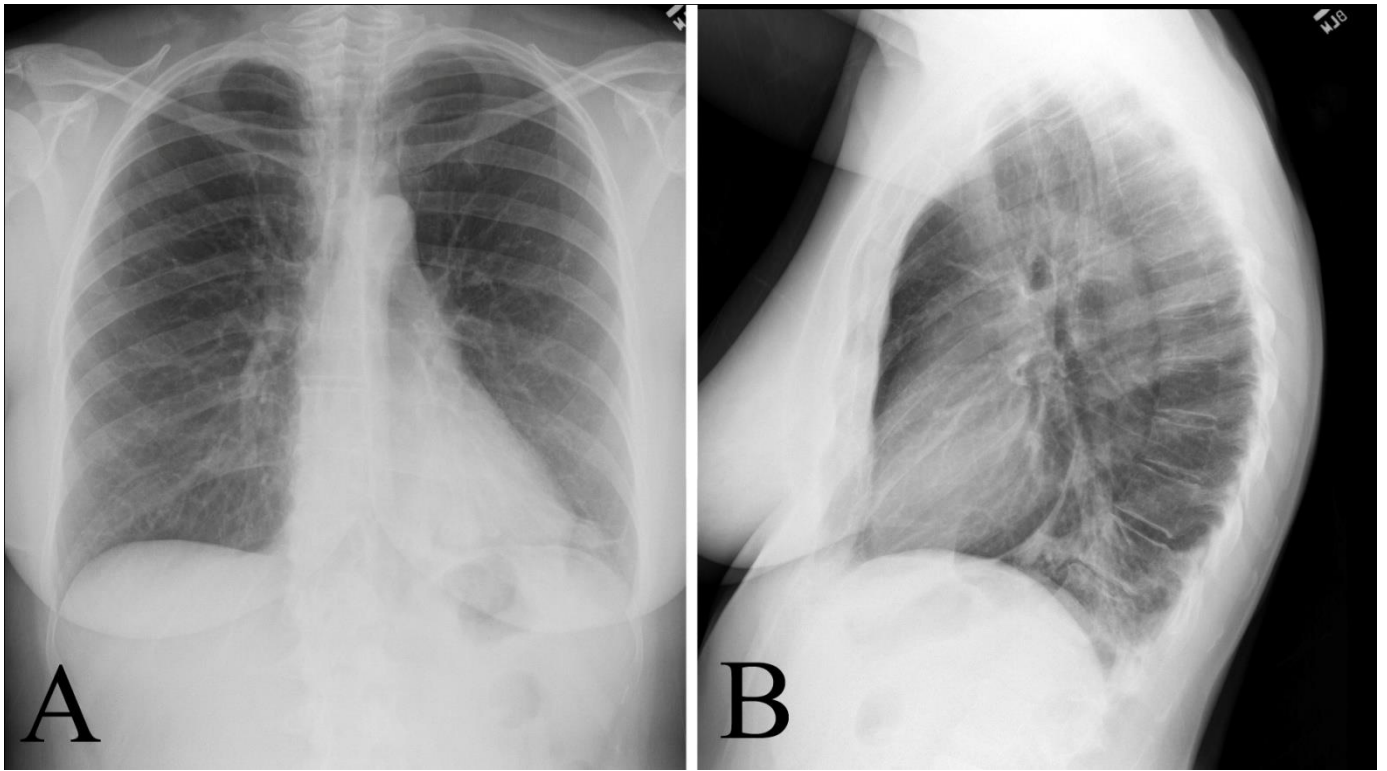
- (a) two view upright plain film of the chest obtained in the radiology department
- (b) single view portable plain film of the chest obtained in the clinic
- (c) computed tomography of the chest
- (d) magnetic resonance imaging of the chest

Answer: (a), two view plain film of the chest, is the correct response. The routine and accepted imaging evaluation of adult patients with acute cough (generally defined as less than three week) includes plain films of the chest. All adult patients with cough and other clinical features of community acquired pneumonia do not require radiographic evaluation, and this patient did not have imaging performed until her third visit with the physician. If the patient is upright and ambulatory, it is best to send the patient to the radiology department and have the examination performed with the patient upright, the tube-film distance at 72 inches (183 cm), and standard positioning. Standard positioning includes one view with the patient's chest against the film (or X-ray detector, when computed or digital radiography is performed), called a "PA" for "posterior-anterior" (for the direction in which the X-ray beam travels) and another view with the patient's left side against the film (or X-ray detector), called a "left lateral" (or simply a "lateral) view. Both views are taken in full inspiration. Portable plain films of the chest are valuable when the patient is too ill to come to the radiology department, but are generally inferior in most ways to two-view upright chest studies in the evaluation of patients with chest complaints.

Ultrasound of the chest may be used to evaluate for pleural effusions but is not the initial study of choice for evaluation of acute cough, and (b) is incorrect. Computed tomography of the chest is appropriate in some patients with cough, but is rarely or never performed before a plain film examination. An exception might be made to this rule for a patient who was direly ill, which this patient was not. Therefore, (c) is incorrect. Magnetic resonance of the chest is rarely performed and is not the initial study of choice for patients with cough, and (d) is incorrect.

IMAGING STUDY AND QUESTIONS

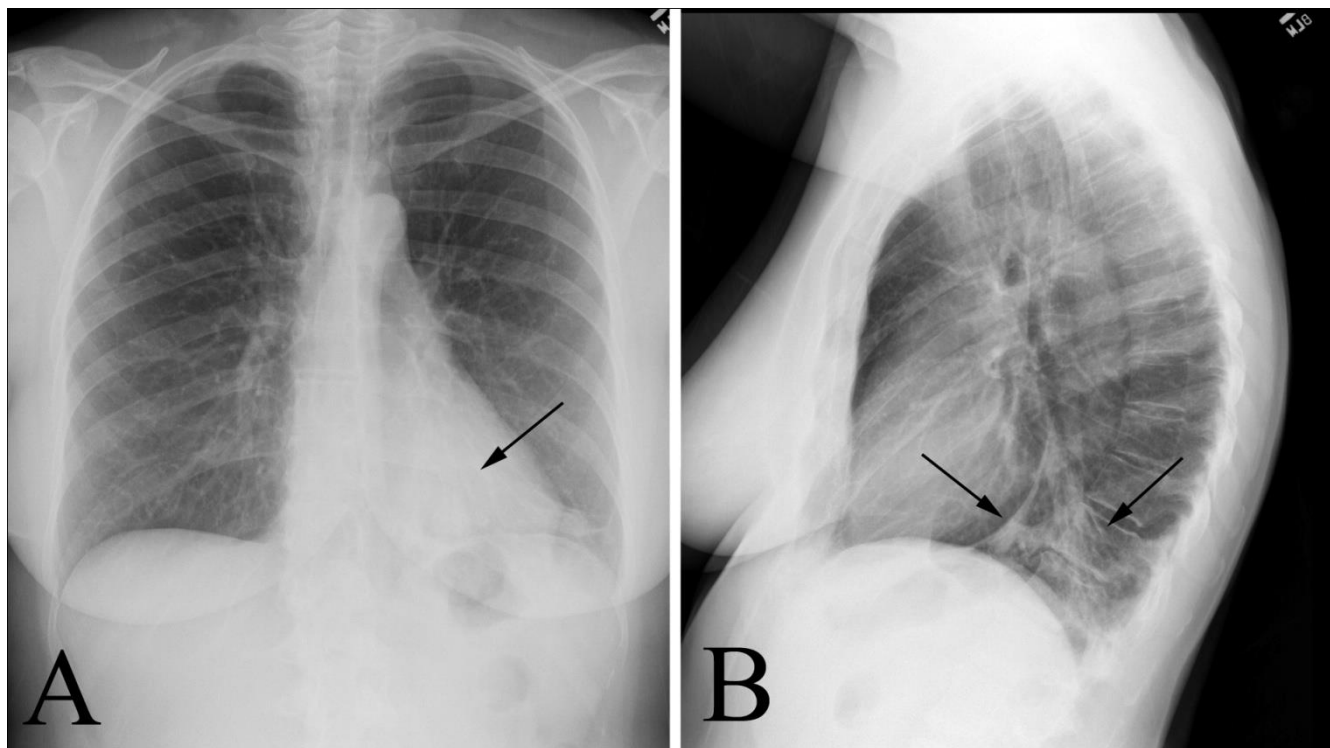
The patient underwent imaging:



Imaging questions:

- 1) What type of study is shown?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWERS

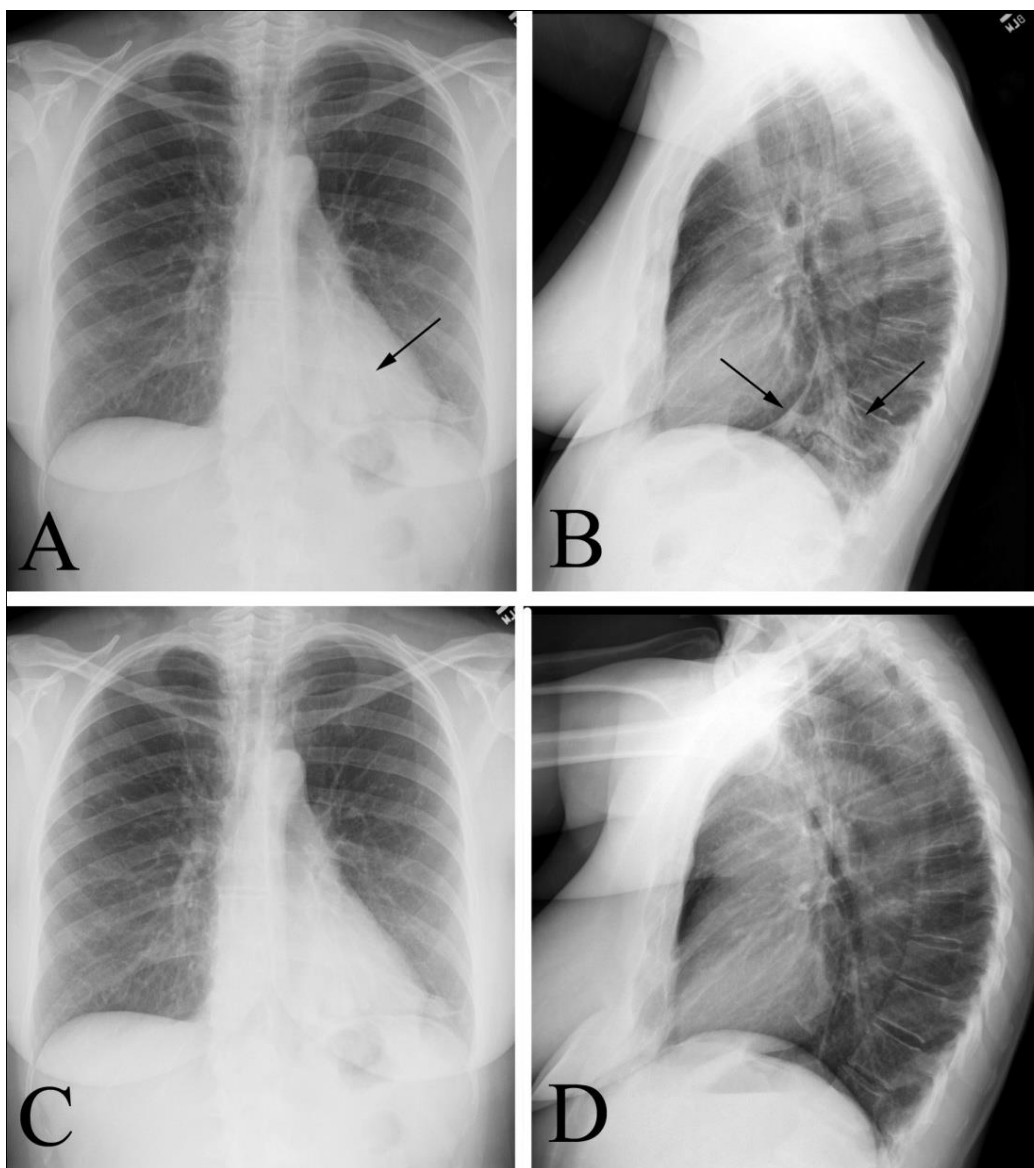


Imaging questions:

- 1) What type of study is shown? Standard two-view PA and lateral chest X-ray.
- 2) Are there any abnormalities? Yes. There is abnormal density in the left posterior base, which makes the bottom vertebrae appear abnormally dense (arrows).
- 3) What is the most likely diagnosis? While the findings are not tissue specific, the imaging findings are compatible with consolidation from pneumonia, particularly considering the patient's history.
- 4) What is the next step in management? Treatment for community pneumonia, with a different antibiotic than has been used so far, with a follow-up examination to document clearing of pneumonia.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The patient was treated a different antibiotic. A follow-up chest exam done four weeks later (see below) showed clearing of the lungs, essentially excluding any underlying neoplasm as the cause of the pneumonia.



49 year old woman with clearing pneumonia. A&B. Initial PA and lateral chest radiograph shows abnormal increased density in the left lower lobe (arrows). B&C. Follow-up PA and lateral chest radiograph shows a normal chest radiograph, documenting clearing of the pneumonia.

SUMMARY

Presenting symptom: The patient initially presented with typical features of a clinically acquired pneumonia, namely cough, fever, myalgia, headache, and fatigue. *Whether, when, and how* to treat such patients without antibiotics (assuming a viral infection) and with antibiotics (assuming a bacterial infection) is a subject of ongoing controversy and beyond the scope of this quiz.

Imaging work-up: In ambulatory patients with acute cough, *whether* and *when* to obtain an imaging study is also a subject of ongoing controversy, but *how* to image them is much less controversial: the initial step should be with plain films of the chest (and not, for example, with magnetic resonance imaging, computed tomography, or ultrasound). Further imaging may be necessary, but the initial step is always a chest plain film.

Establishing the diagnosis: While it is helpful to have a positive sputum culture to secure the diagnosis, sputum cultures are often negative, even in patients with established pneumonia. The combination of factors in this case, including the clinical feature of productive cough and the radiographic feature of lung consolidation resolving with treatment, is sufficient for an assumed diagnosis of pneumonia. Note that a follow-up radiograph should be obtained to document clearing of pneumonia in patients with risk factors for possible underlying malignancy (such as age of greater than 50 or smoking).

Take-home message: When imaging is performed, an upright, two-view chest radiograph is the initial imaging study of choice in the evaluation of ambulatory patients with acute cough.

FURTHER READING

Goroll AH and Mulley AG. "Evaluation of subacute and chronic cough" Chapter 41 in *Primary Care Medicine: Office Evaluation and Management of the Adult Patient*, 6th edition, Lippincott William & Wilkins.

Porter RS (Editor). Cough in adults. Chapter in *The Merck Manual of Patient Symptoms*, Merck & Company, Whitehouse Station, NJ 2008.

Renfrew, DL. Cough, dyspnea, and lung nodules. Chapter 10 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.

Seller RH. Cough. Chapter 9 in *Differential Diagnosis of Common Complaints*. Saunders, 2000, Philadelphia.