

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 29 year old man presents to an outpatient clinic for elective evaluation of chest pain. He is otherwise healthy and works as a welder and fitter. Approximately one week prior to presentation while sitting in front of his computer, he experienced sharp, stabbing left chest pain that radiated to his back and was accompanied by shortness of breath. The pain is worse when he lies on his back and relieved when he leans forward. The patient has no nausea or left arm pain. The patient is a smoker (approximately one pack per day for ten years). His heart rate is 88, blood pressure 132/84, and his respiratory rate is 16. The patient is six feet, one inch tall and weighs 164 lbs. The patient has no sternal or anterior rib tenderness.

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

- (a) 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

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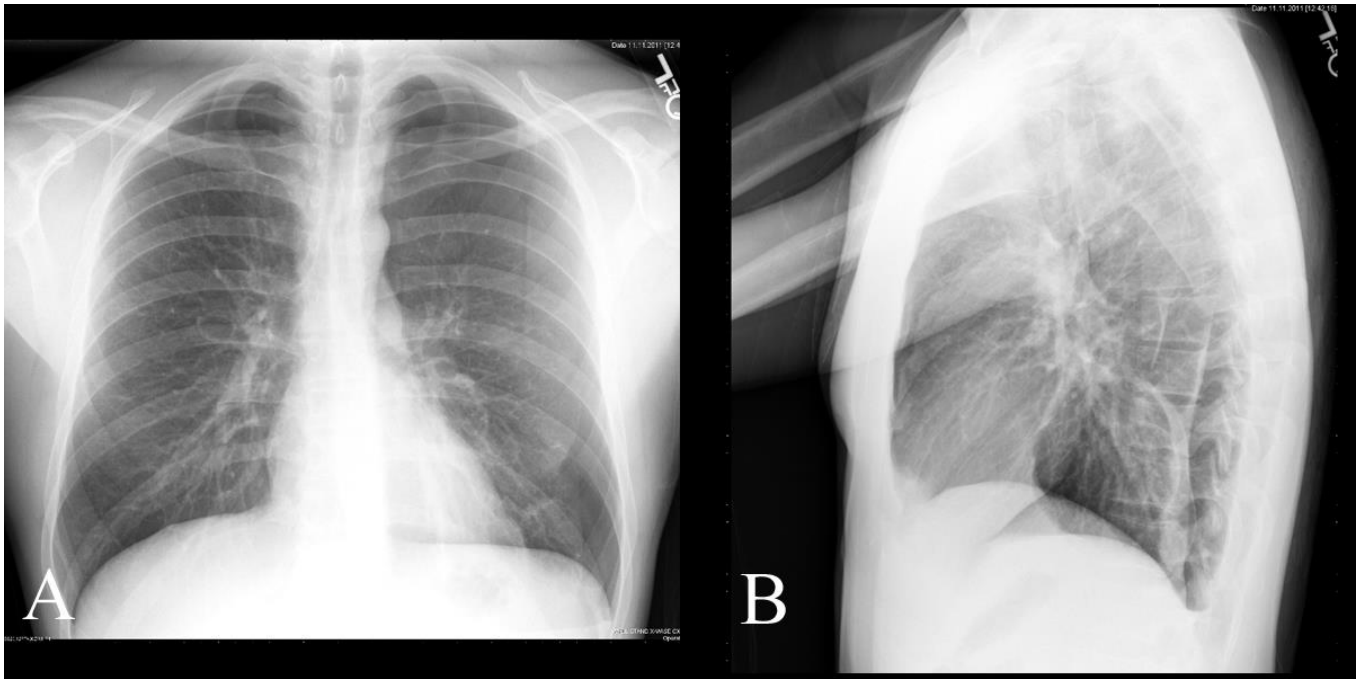
Answer: (a), two view plain film of the chest, is the correct response. The routine and accepted imaging evaluation of adult patients with acute chest pain (with or without dyspnea) includes plain films of the chest. If the patient is upright and ambulatory, it is best to send the patient to the radiology department and have the examination performed with the patient upright, the tube-film distance at 72 inches (183 cm), and standard positioning. For patients who are in marked pain or who are severely short of breath, a portable plain film of the chest may be performed. In this case, the patient was being seen in an outpatient clinic.

Ultrasound of the chest may be used to evaluate for pleural effusions but is not the initial study of choice for evaluation of dyspnea, and (b) is incorrect. Computed tomography of the chest is appropriate in some patients with dyspnea, but is typically performed after a plain film examination, and is not the best *first* imaging study done. 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.

Note the similarity of this case and RQW061, a 25 year old man with acute onset of shortness of breath.

IMAGING STUDY AND QUESTIONS

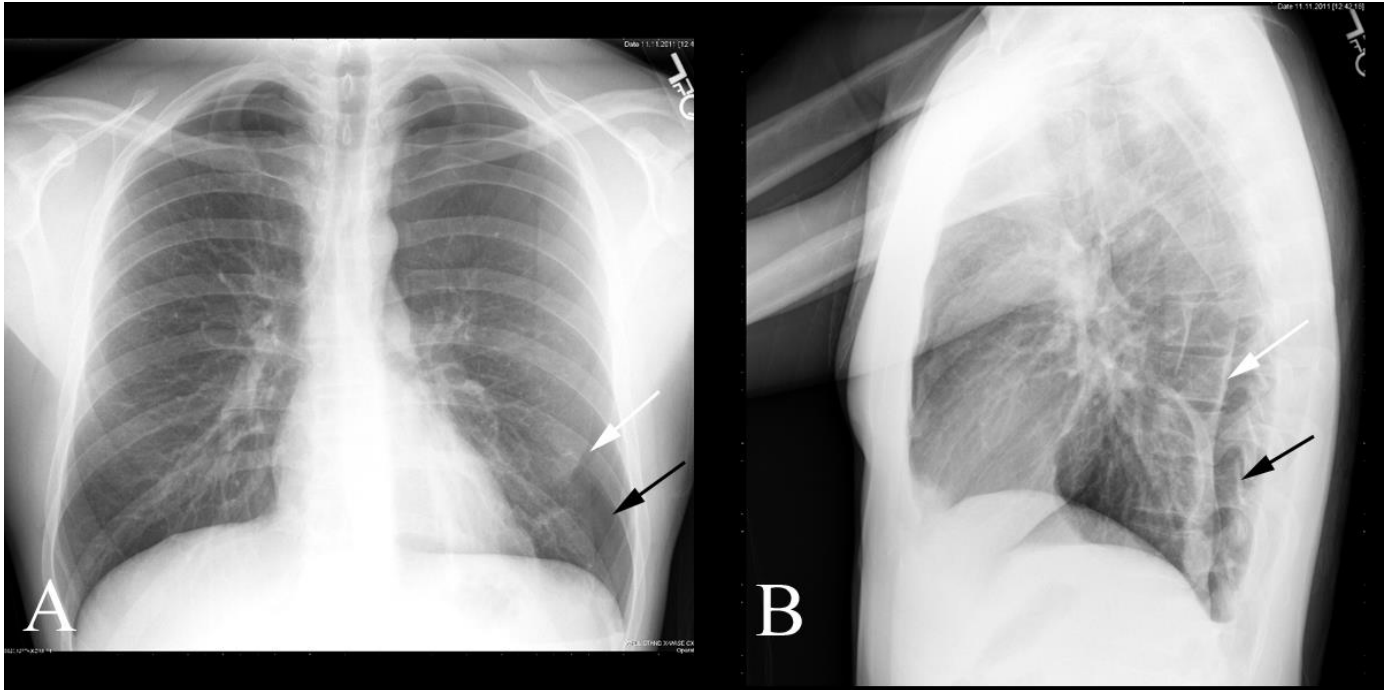
The patient underwent imaging:



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

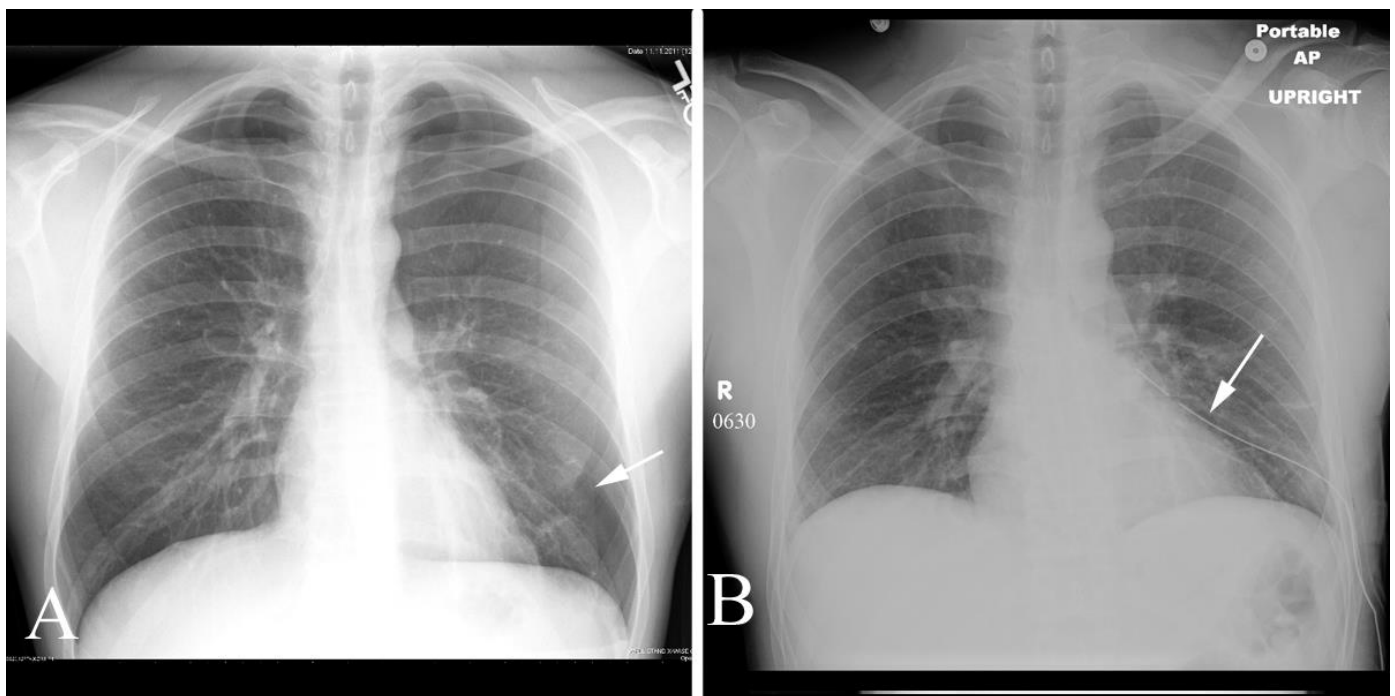


Imaging questions:

- 1) What type of study is shown? Posterior to anterior (PA) (panel A) and lateral (panel B) plain films of the chest.
- 2) Are there any abnormalities? Yes. There is a left pneumothorax, with a pleural stripe (white arrow) seen at the margin of the partially collapsed lung, with increased lucency between the pleural stripe and ribs (black arrow) on the left side.
- 3) What is the most likely diagnosis? Pneumothorax.
- 4) What is the next step in management? Patient oxygen and surgical evaluation for possible placement of a left chest tube.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

Surgical consultation was obtained and on the basis of the patient's ongoing pain, shortness of breath, and the size of the pneumothorax, a chest tube was placed. The patient's partially collapsed left lung rapidly re-expanded. His shortness of breath relented. The patient was counseled to stop smoking. The patient had no recurrence of spontaneous pneumothorax over the ensuing several months.



29 year old man with a spontaneous pneumothorax treated with a chest tube. A. Initial PA chest radiograph shows a left pneumothorax with the pleural stripe displaced away from the inner aspect of the ribs (arrow). B. Follow-up AP portable chest radiograph following chest tube placement (arrow) shows re-expansion of the left lung.

SUMMARY

Presenting symptom: The patient presented to a clinic with chest pain of nearly a week's duration, along with some shortness of breath. This constellation of symptoms in a young patient suggests spontaneous pneumothorax, although other processes (for example, pulmonary embolism and rib fracture) may have similar features.

Imaging work-up: In young patients with severe chest pain and shortness of breath, an emergent chest radiograph should be obtained.

Establishing the diagnosis: When the lung is partially collapsed and there is an obvious pleural stripe separated from the inner aspect of the rib with an intervening lucent area (as in this case), the plain film is diagnostic. If the plain film is equivocal, a CT may be performed for confirmation of a pneumothorax.

Take-home message: Patients with sudden onset of chest pain and dyspnea should be evaluated with an emergent chest radiograph.

FURTHER READING

Stern EJ. Pneumothorax. Chapter in Gurney JW, Winer-Muram HT, Stern EJ et al, *Diagnostic Imaging: Chest*. Amirsys, Salt Lake City, Utah, 2006.

Renfrew, DL. Imaging of chest pain. Chapter 11 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.