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CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 25 year old man presents with sudden onset of severe shortness of breath. He is otherwise healthy and works with his father on the family farm. He was driving a tractor when the shortness of breath started, and there was no precipitating trauma or other specific event that the patient can recall. In addition to dyspnea, the patient has right-sided chest pain. His heart rate is 83, blood pressure 131/80, and his respiratory rate is 24.

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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(c) computed tomography of the chest
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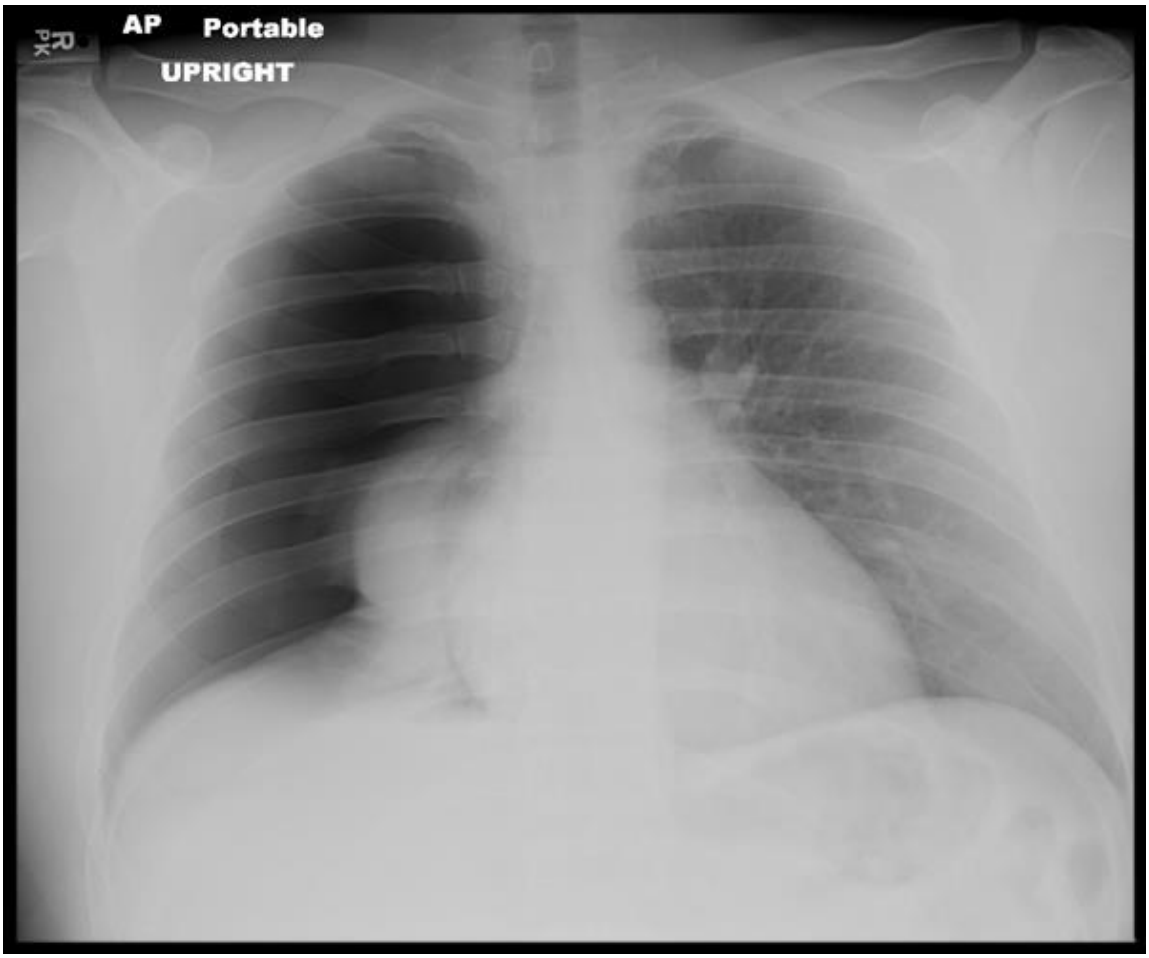
Answer: (a), two view plain film of the chest, is the correct response. The routine and accepted imaging evaluation of adult patients with acute dyspnea (with or without chest pain) includes plain films of the chest. If the patient is upright and ambulatory, it is best to send the patient to the radiology 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 severely short of breath and cannot leave the emergency room, a portable plain film of the chest is performed instead of the standard upright and lateral study performed in the radiology department.

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 rarely or never performed before a plain film examination. 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

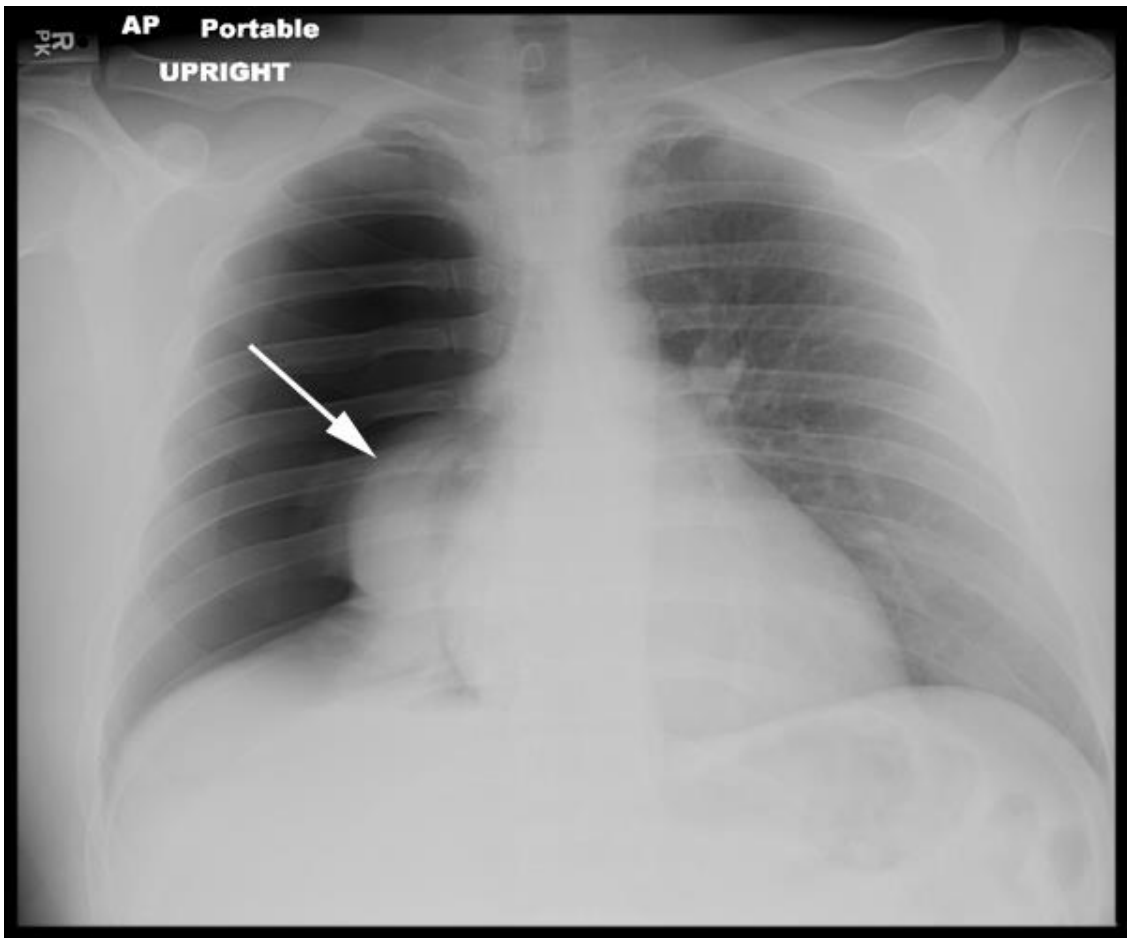
The patient underwent imaging:



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

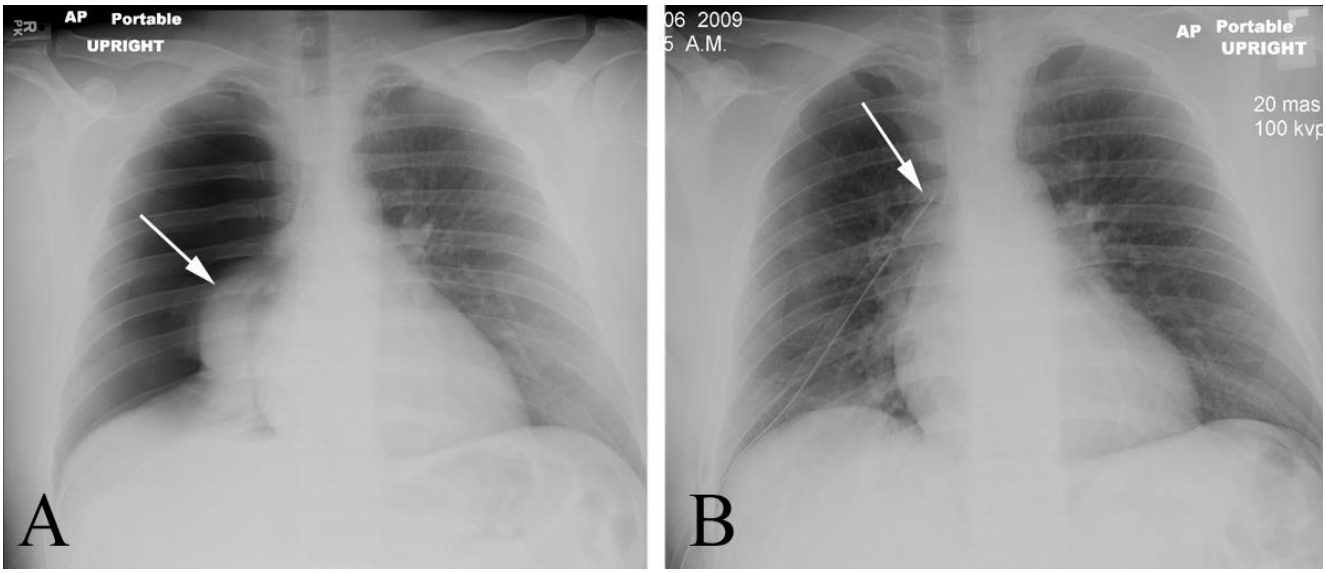


Imaging questions:

1) What type of study is shown? A portable upright plain film of the chest.
2) Are there any abnormalities? Yes. There is a large right pneumothorax, with complete collapse of the right lung (arrow), which leaves the right chest cavity abnormally lucent (black) compared to the left side.
3) What is the most likely diagnosis? Pneumothorax.
4) What is the next step in management? Patient oxygen and immediate placement of a right chest tube.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

A chest tube was placed and the patients collapsed right lung rapidly re-expanded. His shortness of breath relented. The patient had no recurrence of spontaneous pneumothorax over the ensuing three years.



25 year old man with a spontaneous pneumothorax treated with a chest tube. A. Initial antero-posterior (AP) portable chest radiograph shows abnormal a collapsed right lung (arrow). B. Follow-up AP portable chest radiograph following chest tube placement (arrow) shows re-expansion of the right lung.

SUMMARY

Presenting symptom: The patient initially presented with severe shortness of breath. He also had severe chest pain. This constellation of symptoms in a young patient is highly characteristic of spontaneous pneumothorax, although other processes (pulmonary embolism, 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 collapsed and the amount of free air in the pleural space is large (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 dyspnea and chest pain 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. 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.