A 42 year old man presents to the emergency room with chest pain, which is worse when he is on his left side. He has been having chills. The patient has a 25 pack/year smoking history. His blood pressure is 140/86, his pulse 78, his respiratory rate 18, and his temperature 98.9 F. His O₂ saturation is 98% on room air. His white blood cell count is 11,600. A chest radiograph was obtained:

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

(a) left side down decubitus plain film examination  
(b) ultrasound of the chest  
(c) computed tomography of the chest  
(d) magnetic resonance imaging of the chest
RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

Which of the following imaging studies is the best next step in the evaluation of this patient?
(a) left side down decubitus plain film examination
(b) ultrasound of the chest
(c) computed tomography of the chest
(d) magnetic resonance imaging of the chest

43 year old man with chest pain and fever. A&B. PA (A) and lateral (B) chest radiograph shows
abnormal, focal increased density in the left upper lobe (arrows).

Answer: (c), computed tomography of the chest, is the correct response. The chest radiograph shows
a triangular-shaped density in the left chest. While the patient’s fever and elevated white count favor
pneumonia, pulmonary embolism with associated pulmonary infarction should also be considered. In
addition, given the history of smoking, a lung tumor with associated pneumonia needs to be considered.

A left-side down decubitus plain film might be helpful in cases where a left pleural effusion or a right
pneumothorax was suspected on a supine radiograph, but not in this case, and (b) is incorrect.
Ultrasound of the chest is helpful to evaluate the location and extent of a pleural effusion but the
ultrasound beam would be blocked by the surrounding lung in this case, and (b) is incorrect. Magnetic
resonance of the chest is rarely performed and is not the standard next step in evaluation of an abnormal
chest radiograph, and (d) is incorrect.

For additional quiz cases and information, please visit www.symptombasedradiology.com
The patient underwent further imaging:

![Images A and B]

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?

For additional quiz cases and information, please visit [www.symptombasedradiology.com](http://www.symptombasedradiology.com)
For additional quiz cases and information, please visit www.symptombasedradiology.com
PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

Sputum cultures were negative for bacteria, fungus, and tuberculosis. The patient was treated with antibiotics. He felt considerably better with resolution of his chest pain and cough. A repeat chest radiograph documented clearing of the consolidation seen on the initial study, compatible with cleared pneumonia. The patient’s initial chest pain was presumably from inflammation of lung tissue and the adjacent pleura along the anterior chest wall.

42 year old man with chest pain and fever. A. PA chest radiograph shows abnormal, focal increased density in the left upper lobe (arrows) compatible with consolidation from pneumonia. B. PA chest radiograph obtained after treatment with antibiotics (and clearing of the patient’s symptoms) documents resolution of the focal consolidation, compatible with cleared pneumonia.

For additional quiz cases and information, please visit www.symptombasedradiology.com
SUMMARY

**Presenting symptom:** The patient initially presented with chest pain. He also had cough and fever, compatible with pneumonia, but the presence of chest pain was worrisome for possible pulmonary embolism, and the history of cigarette smoking raised concern for pulmonary tumor.

**Imaging work-up:** In ambulatory patients with acute chest pain, the initial imaging procedure is a plain film of the chest (and not, for example, magnetic resonance imaging, computed tomography, or ultrasound). In those cases when the plain film demonstrates an abnormality that needs further characterization, the next step in imaging is usually a CT scan, as was done in this case.

**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 clinical features of cough and fever favored pneumonia in this case, but the presence of chest pain and the radiographic appearance was somewhat worrisome given the patient’s smoking history. CT showed a combination of consolidation and apparent minimal cavitation within the consolidated lung compatible with pneumonia, and the patient was treated accordingly with relatively prompt resolution of symptoms. Documented clearing of pulmonary opacity (on the follow-up chest radiograph) and resolved symptoms after treatment with antibiotics allow a presumptive diagnosis of pneumonia even without positive cultures.

**Take-home message:** When imaging is performed in ambulatory patients with chest pain, the initial study should be an upright, two-view chest radiograph. If an abnormality is detected that requires further imaging characterization, CT is almost always the best next step. If there is a strong suspicion of pulmonary embolism, the regardless of the chest radiograph results, chest CT should probably be performed.

Note the similarity of this case to RQW058, Acute Cough II. Chest pain and cough often accompany each other.

**FURTHER READING**

Meisel JL. Diagnostic approach to chest pain in adults. UpToDate, accessed 10/2/09.


Thompson BT, Hales CA. Overview of acute pulmonary embolism. UpToDate, accessed 10/2/09.

For additional quiz cases and information, please visit [www.symptombasedradiology.com](http://www.symptombasedradiology.com)