

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

The patient is a 67 year old woman with headache and increasing hand clumsiness.

Which of the following headaches typically does NOT require imaging?

- (a) thunderclap headache
- (b) “worst” or “first” headache
- (c) headache accompanied by focal neurologic signs
- (d) headache with auras
- (e) headache with altered mental status

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

The patient is a 67 year old woman with headache and increasing hand clumsiness.

Which of the following headaches typically does NOT require imaging?

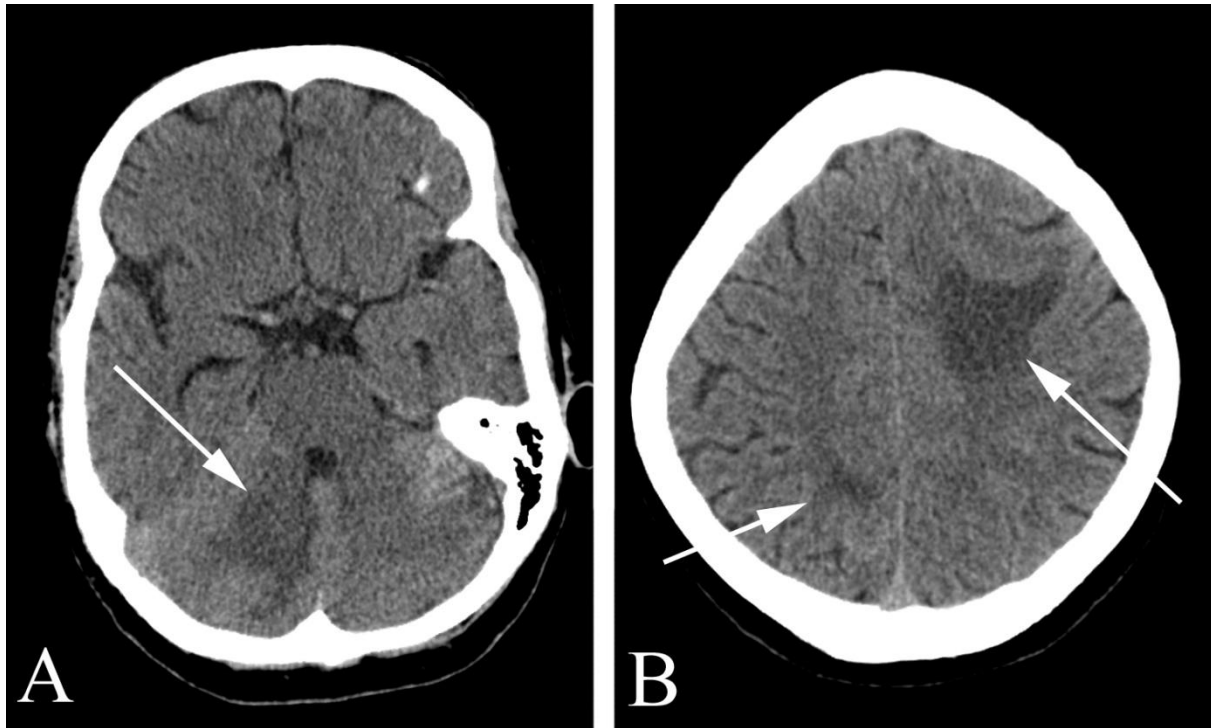
- (a) thunderclap headache
- (b) “worst” or “first” headache
- (c) headache accompanied by focal neurologic signs
- (d) headache with auras
- (e) headache with altered mental status

Answer: (d), headache with auras. Headache with auras describes migraine headache, and, particularly if meeting the other criteria of migraine headache, patients with headache associated with auras do not need imaging.

Thunderclap headache (a), “worst” or “first” headache (b), headache accompanied by focal neurologic signs (c), and headache with altered mental status (e) are all descriptions of headaches with danger signs that require imaging to exclude such entities as intracranial tumor or hemorrhage.

IMAGING STUDY AND QUESTIONS

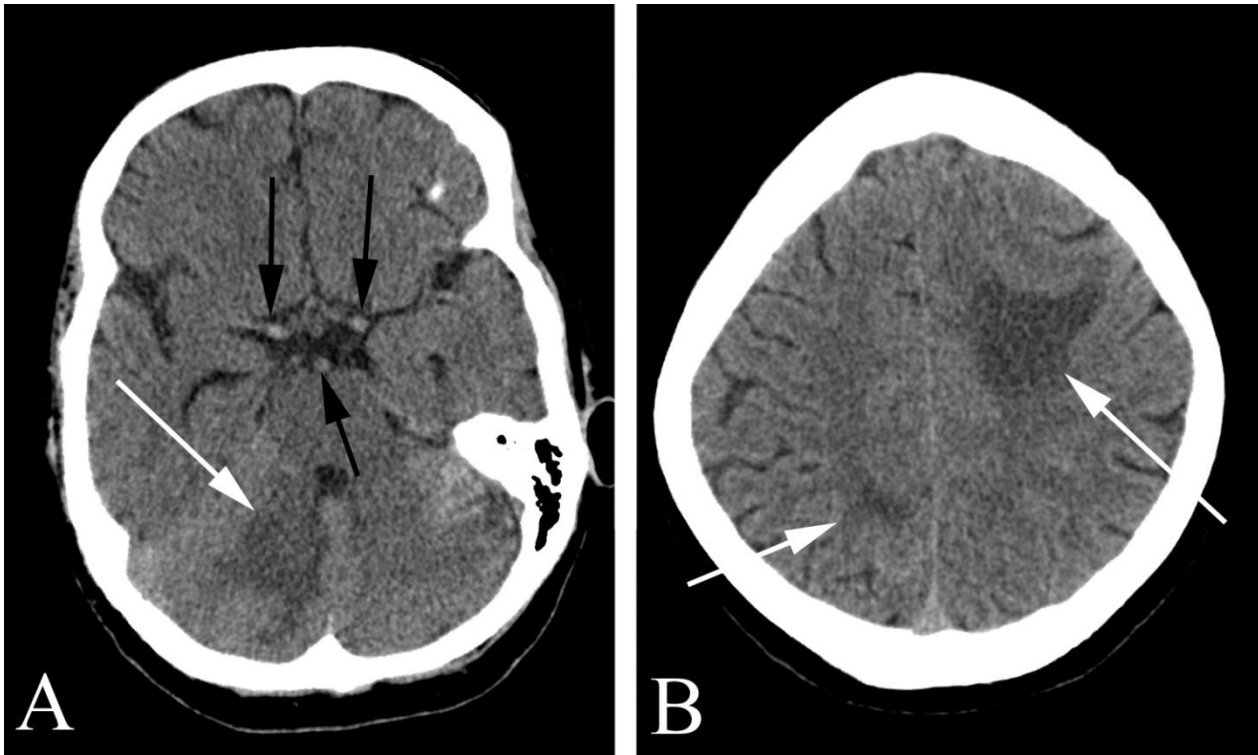
An imaging study was performed.



Imaging questions:

- 1) What type of study is shown in figures A and B?
- 2) What are the abnormalities indicated at the white arrows?
- 3) What are some possible causes of these abnormalities?

IMAGING STUDY QUESTIONS AND ANSWERS
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Imaging questions:

- 1) What type of study is shown in figures A and B? Unenhanced head CT. You can tell this is an unenhanced study by the lack of contrast in the circle of Willis vessels (black arrows).
- 2) What are the abnormalities indicated at the white arrows? There are three separate areas of decreased x-ray attenuation or “decreased density”.
- 3) What are some possible causes of these abnormalities? The imaging findings are not specific and could be seen with any cause of brain edema or inflammation including tumors, infarction, or infection. However, the imaging findings are not compatible with acute hemorrhage.

ADDITIONAL CLINICAL INFORMATION & RADIOLOGY QUESTION

In addition to the headache and increasing hand clumsiness, the patient had ongoing chest pain and a nonproductive cough. She was a smoker. She has no fever and her white blood cell count is normal.

Which of the following is the initial imaging study of choice for chest pain and cough?

- (a) plain films of the chest
- (b) chest computed tomography (CT)
- (c) chest magnetic resonance imaging (MR imaging)
- (d) chest ultrasound

ADDITIONAL RADIOLOGY QUESTION, ANSWER, & EXPLANATION

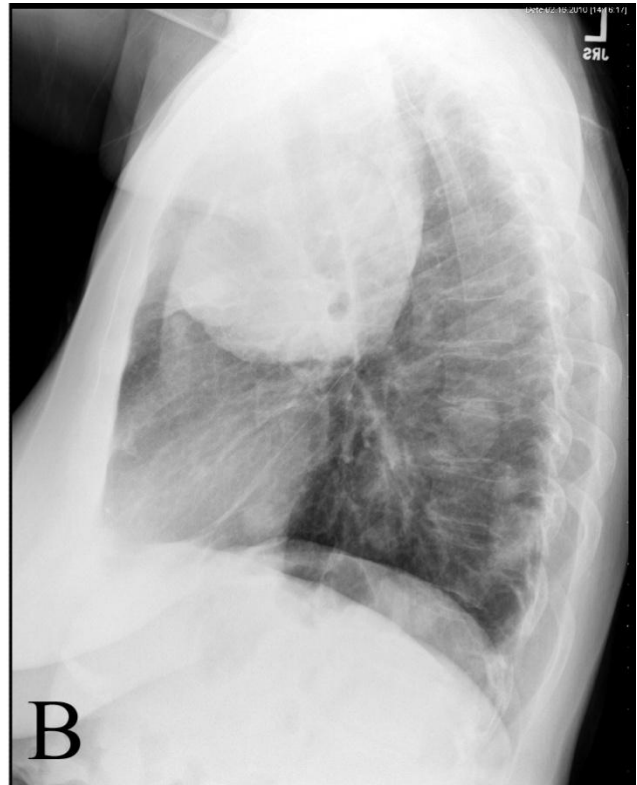
In addition to the headache and increasing hand clumsiness, the patient had ongoing chest pain and a nonproductive cough. She was a smoker. She has no fever and her white blood cell count is normal.

Which of the following is the initial imaging study of choice for chest pain and cough?

- (a) plain films of the chest
- (b) chest computed tomography (CT)
- (c) chest magnetic resonance imaging (MRI)
- (d) chest ultrasound

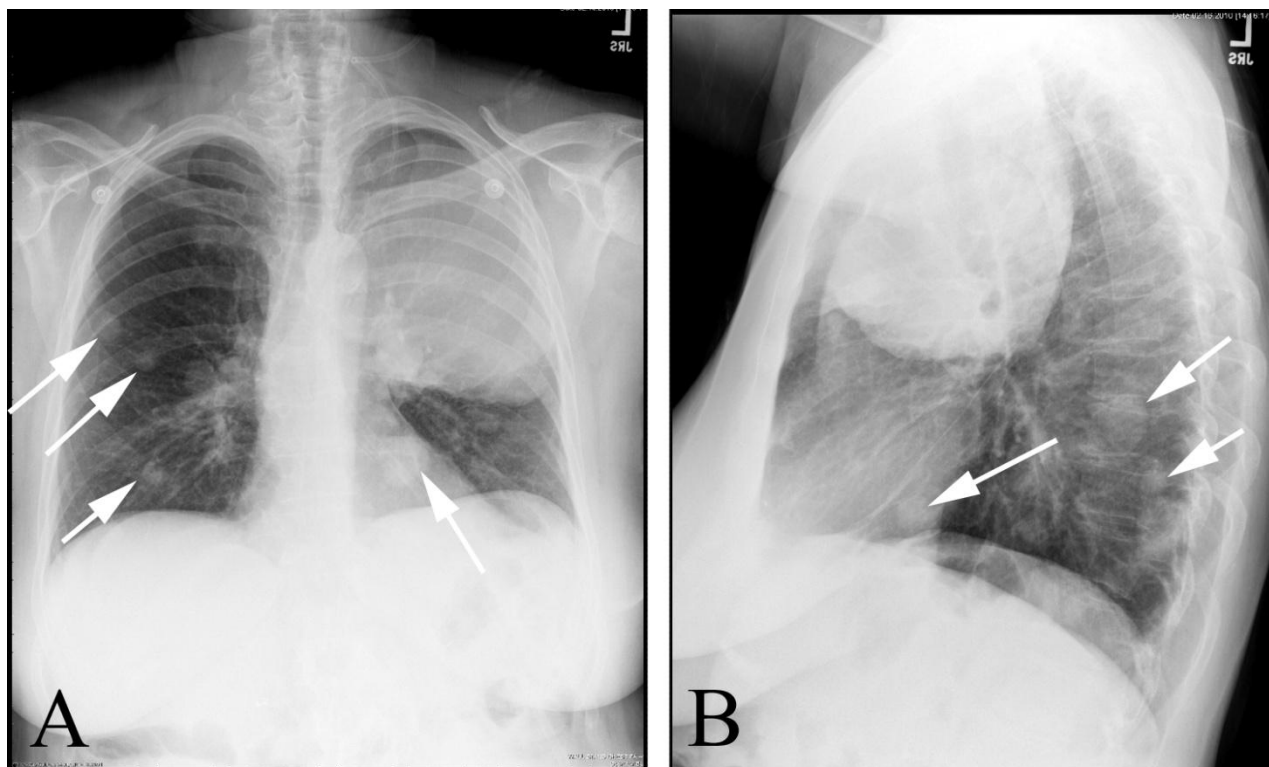
Answer: a, plain films of the chest. Plain films of the chest are the initial imaging study of choice for most chest complaints, including cough and chest pain. Even in the setting of a possible rib fracture, it makes sense to obtain a chest film (with or without rib detail studies) in order to evaluate for possible pneumothorax, hemothorax, and pulmonary contusion.

Chest computed tomography (CT) may be used in further evaluation for suspected pulmonary embolism if the chest plain film is negative, or to further evaluate an abnormality seen on the plain film, but is not the initial imaging study of choice, so (b) is incorrect. Chest magnetic resonance imaging (MRI) is occasionally used as a trouble-shooting study when evaluating apical lung tumors or some cardiac conditions, but is not the initial imaging study of choice, so (c) is incorrect. Chest ultrasound is usually used when searching for the ideal location to tap a known or suspected pleural effusion, but chest ultrasound is not the initial imaging study of choice for chest pain or cough, so (d) is incorrect.

ADDITIONAL IMAGING STUDIES AND QUESTIONS

Imaging questions:

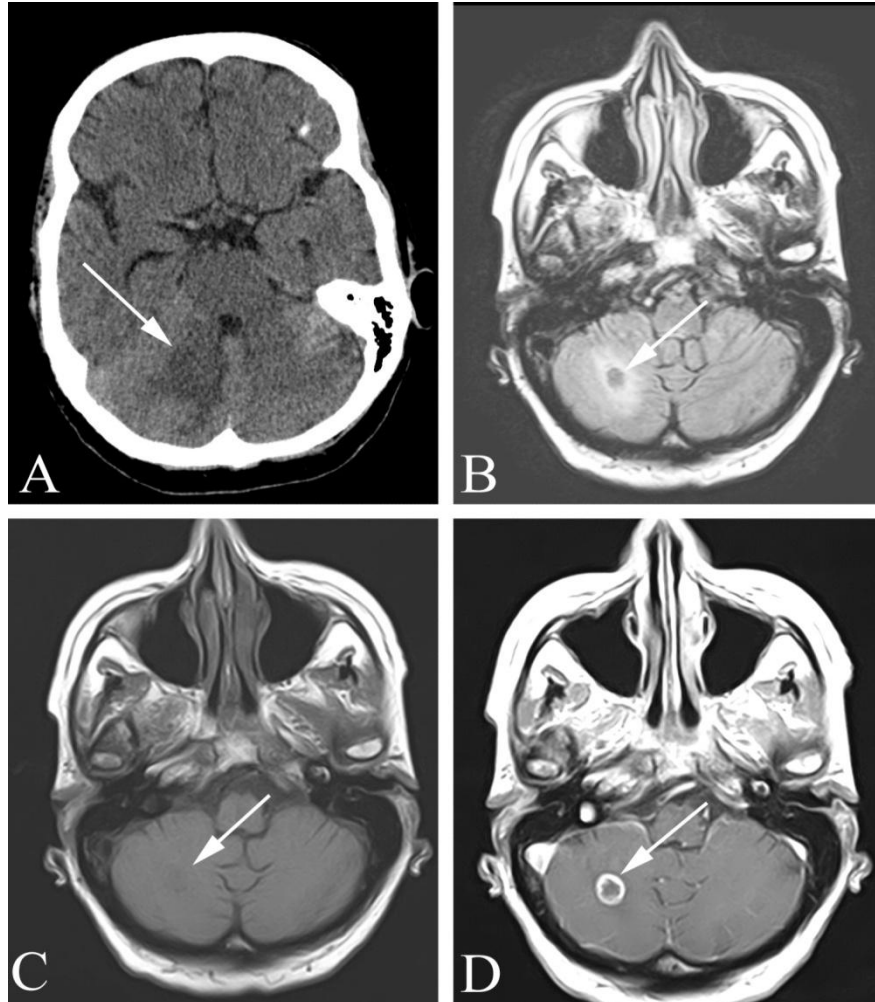
- 1) What type of study is shown in figures A and B?
- 2) What is/are the abnormal finding(s)?
- 3) What is the likely cause?
- 4) What is the next step in patient management?

ADDITIONAL IMAGING STUDIES QUESTIONS & ANSWERS**Imaging questions:**

- 1) What type of study is shown in figures A and B? Two view (PA or posterior-anterior and lateral) chest plain film examination.
- 2) What is/are the abnormal finding(s)? There is a large opacity in the left upper lobe, with multiple smaller, variably sized lesions scattered throughout the remainder of the chest (white arrows).
- 3) What is the likely cause? The most likely cause of the abnormality is metastatic disease. While septic emboli could have a similar appearance, the lack of fever and elevated WBC argue against this possibility.
- 4) What is the next step in patient management? Referral for appropriate biopsy for diagnosis.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The patient was referred to an oncologist following a lung biopsy which demonstrated non small cell lung carcinoma. A brain MR (shown below) better demonstrated multiple, “rim enhancing” brain metastases. The patient was treated with chemotherapy and radiation therapy, but died approximately 6 months after presentation.



Metastatic lung cancer in a 67 year old woman with headache and hand clumsiness. A. Unenhanced head CT shows low density in the right cerebellar hemisphere (arrow). B. Axial FLAIR brain MR shows a central focus of decreased signal intensity with surrounding increased signal (arrow) (tumor surrounded by “vasogenic edema”). C. Axial unenhanced T1 weighted brain MR image shows subtle low signal intensity at the location of the tumor (arrow). D. Axial post-contrast enhanced T1 weighted brain MR shows intense contrast enhancement along the margin of the tumor (arrow) (“rim enhancement”).

SUMMARY

Presenting symptom: The International Headache Society (www.i-h-s.org) uses the term “primary headache” to describe tension type, migraine type, and cluster type headaches, and the term “secondary headache” to describe headaches secondary to another disorder (e.g., intracranial mass or hemorrhage). Criteria for diagnosis of primary headaches are nicely covered on the IHS’s web site, and basically involve classification of the headache by descriptors such as unilateral versus bilateral, throbbing versus non-throbbing, intensity, aggravation by activity, and ancillary features. Warning signs of secondary headache include “worst or first” headaches, “thunderclap” (sudden onset, overwhelming) headaches, and headaches accompanied by neurologic symptoms (when these symptoms are not typical of migraine auras).

Imaging work-up: Generally, tension type headaches and migraine headaches do not require imaging. Cluster headache, although a primary headache, generally does require imaging (typically done with brain MR without and with contrast) because it is generally not possible on clinical grounds to distinguish true cluster headaches from secondary headaches arising from intracranial aneurysms, meningiomas, and pituitary tumors (see Flavier et al). Secondary headaches, which may have accompanying features such as accompanying neurologic abnormalities, fever, sudden onset and extreme severity, usually do require work up. Depending on the clinical circumstances, either head CT (if faster imaging or when MR is contraindicated) or brain MR (for more complete analysis) is performed.

Establishing the diagnosis: The ultimate diagnosis, in this case, rested on obtaining diagnostic tissue from the lung and then making the assumption that the multiple characteristic brain lesions represented metastatic disease.

Take-home message: Imaging is not necessary for tension type and migraine type primary headaches, but is necessary for cluster type primary headaches and secondary headaches. Distinguishing primary from secondary headaches is usually possible on clinical grounds.

FURTHER READING

Flavier I, Van VVliet JA, Roon KI et al. Trigeminal autonomic cephalgias due to structural lesions: a review of 31 cases. *Arch Neurol* 2007;64:25-31.

Clinical policy: critical issues in the evaluation and management of patients presenting to the emergency department with acute headache. *Ann Emerg Med* 2002;39:108-122.

Renfrew, DL. Headache. Chapter 3 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.