

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

An 86 year old woman living in a skilled nursing facility and recuperating from a broken wrist has acute mental status changes. She has a history of hypertension, coronary artery disease, and peripheral vascular disease. Which of the following is the most appropriate imaging study?

- (a) plain films of the skull
- (b) emergent unenhanced head CT performed without contrast material
- (c) magnetic resonance (MR) imaging of the brain performed on an elective basis when the schedule permits
- (d) no imaging study is necessary in this situation

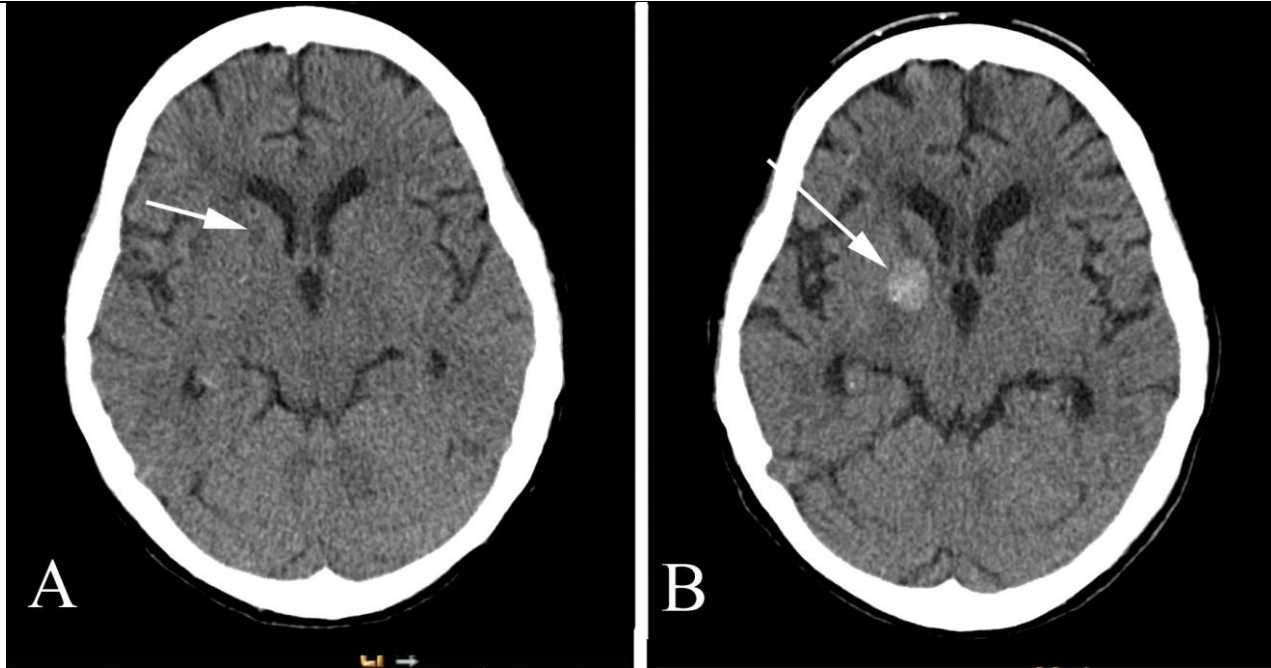
RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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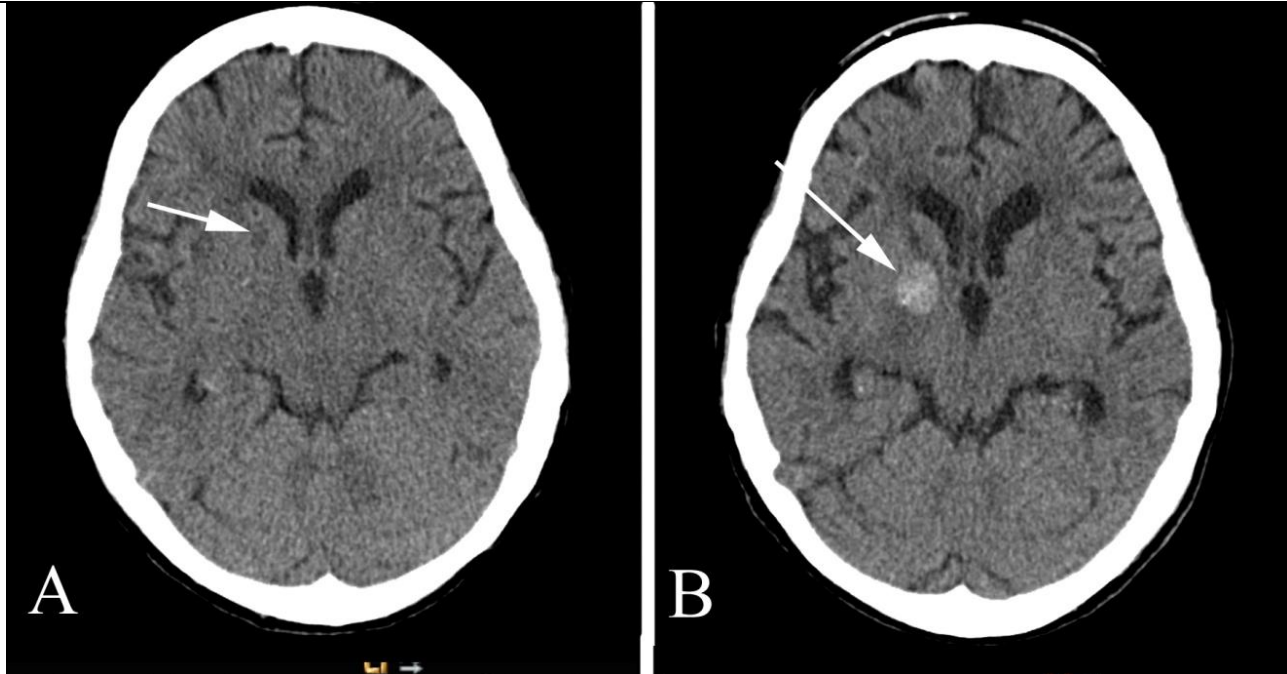
Answer: (b), emergent CT of the head performed without contrast material. The CT is performed to mainly to detect possible intracranial hemorrhage.

Plain films of the skull (a) offer no significant information regarding the status of the patient's brain or vascular tree, and (a) is incorrect. MR of brain may be helpful to determine the presence of stroke and other causative lesions, but in patients with current acute, ongoing neurologic problems it is typically logistically much easier to obtain and unenhanced CT study first and to make clinical decisions on the basis of the result of the CT study. If a brain MR is obtained in a patient with acute mental status changes, it should be done urgently rather than on an elective basis when the schedule permits, and (b) is incorrect. Imaging is necessary in this situation, so (d) is incorrect.

IMAGING STUDY AND QUESTIONS

Imaging questions:

- 1) What type of study is shown in figures A and B? Note that this study was performed three months prior to the patient's acute mental status changes.
- 2) What is the abnormality indicated by the arrow in figure A?
- 3) What is the abnormality indicated by the arrow in Figure B?
- 4) What is the most likely diagnosis?
- 5) What are the next steps in management?

IMAGING STUDY QUESTIONS AND ANSWERS

Imaging questions:

- 1) What type of study is shown in figures A? Unenhanced head CT.
- 2) What is the abnormality indicated by the arrow in figure A? Focal decreased density in the right basal ganglia (specifically, the head of the caudate nucleus). This is typically secondary to prior lacunar infarction.
- 3) What is the abnormality indicated by the arrow in Figure B? Increased density in the right cerebral hemisphere, along the genu of the internal capsule. Such increased density in the setting of acute neurologic symptoms nearly always represents acute intracranial hemorrhage.
- 4) What is the most likely diagnosis? Given this patient's extensive history of vascular abnormalities elsewhere, this is, in all likelihood, a hemorrhagic infarction.
- 5) What are the next steps in management? Admission to the hospital; correction of any abnormal bleeding parameters; neurologic consultation.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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The patient was admitted to the hospital. Note that intracranial hemorrhage is one of the many contraindications for administration of fibrinolytic therapy. The patient was elderly and in poor health. A carotid ultrasound showed 70% right and <50% left ICA stenosis. While undergoing full medical evaluation in order to assess whether she could tolerate surgery, her condition deteriorated rapidly and she died.

SUMMARY

Presenting symptom: Neurologic symptoms generally need to be placed in one of several categories to plan imaging. In this case, the patient had fixed neurologic abnormality which suggested a stroke especially in light of her considerable vasculopathic history. There are, of course, multiple other causes of acute mental status changes in the elderly.

Imaging work-up: CT is typically used in the scenario for acute stroke. When hemorrhage is found (as in this case) the initial concern is to limit the extent of hemorrhage by stabilizing blood coagulation parameters, and to provide supportive care as necessary.

Establishing the diagnosis: The clinical symptoms and imaging findings in this case establish the diagnosis of hemorrhagic stroke, with highly characteristic findings on the CT study. In cases where the imaging findings are more equivocal and tumor or other processes need to be excluded, either brain MR imaging or follow-up CT study on a short term (days-weeks) may be helpful. MR shows characteristic features in hemorrhagic stroke, and strokes typically demonstrate short term (days-weeks) evolution allowing confirmation of the diagnosis.

Take-home message: Fixed neurologic deficits, particularly when compatible with stroke, require emergent workup, usually done in the emergency room or hospital setting. The initial imaging study of choice is usually an unenhanced CT study.

FURTHER READING

Caplan LR. Overview of the evaluation of stroke. UpToDate, accessed 10/10/09.

Kistler JP, Furie KL, A H. Initial evaluation and management of transient ischemic attack and minor stroke. UpToDate, accessed 10/10/09.

Renfrew, DL. Stroke, Seizure, Multiple Sclerosis, and Dementia. Chapter 4 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.