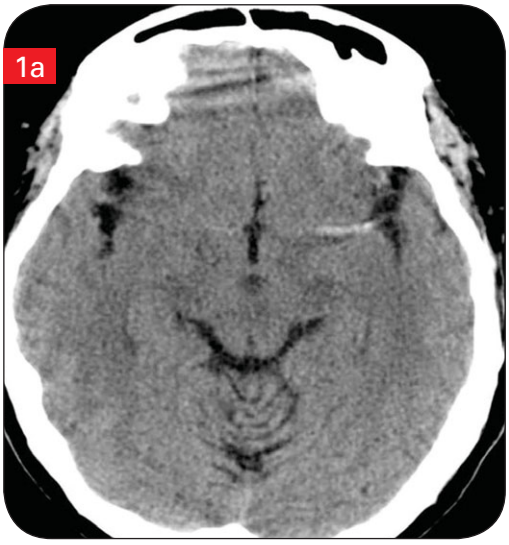
>> EMERGENCY IMAGING

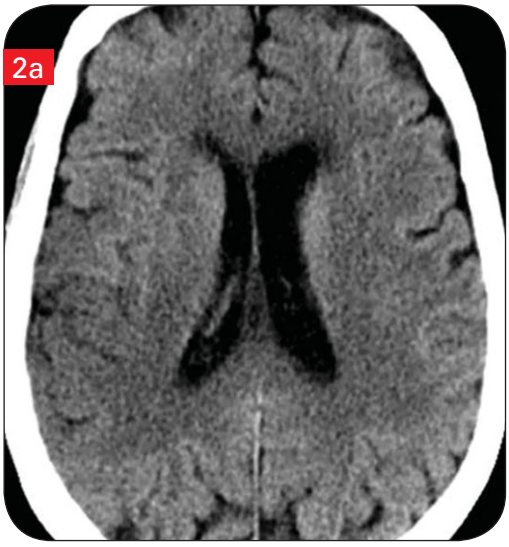
Joseph P. Comunale, MD
Keith D. Hentel, MD

PROBLEM

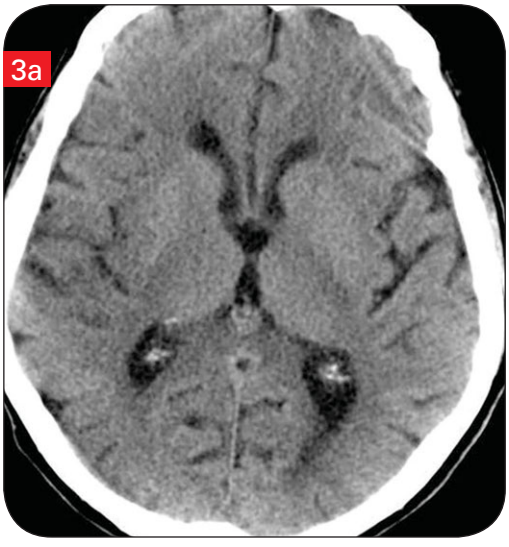
Patient 1



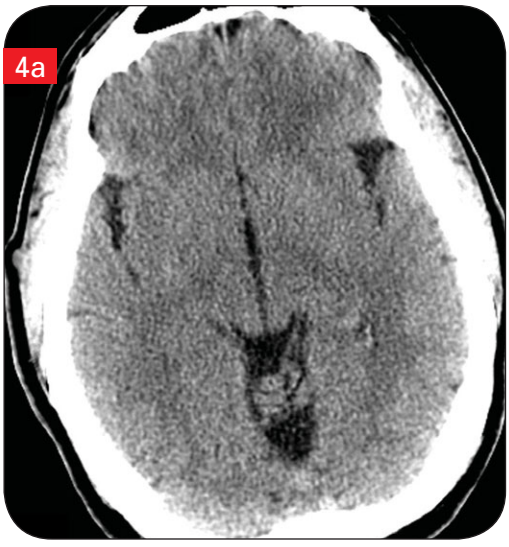
Patient 2



Patient 3



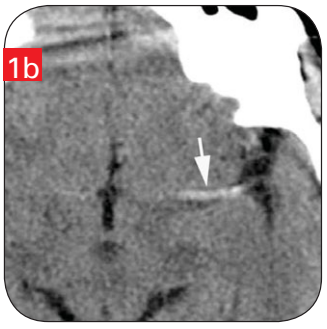
Patient 4



>> Four patients present to your emergency department, each with a focal neurologic deficit suggesting a cerebral infarction. Which findings (if any) on each CT image support the diagnosis of acute infarction?

Turn page for answers >>

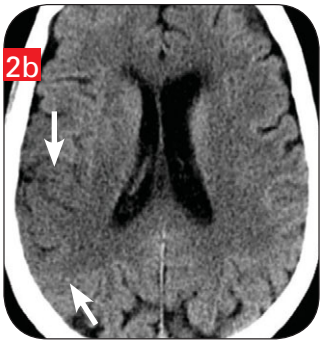
ANSWER



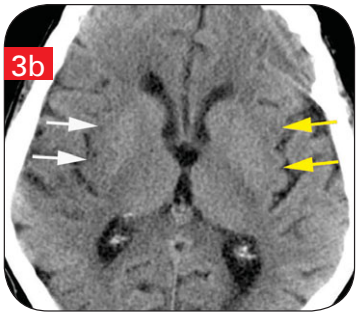
>> Noncontrast CT is the imaging modality of choice for the initial evaluation of patients presenting with possible acute cerebral infarction. While not all hyperacute infarctions will be evident on CT, certain findings provide important diagnostic clues. Noncontrast CT is also the test of choice to exclude hemorrhage.

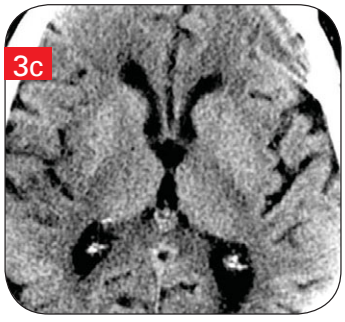
In patient 1, the left middle cerebral artery is hyperdense (white arrow, Figure 1b), which represents clotted blood. A hyperdense artery is an early finding that is specific for stroke, but it is seen in only the minority of cases.[1]

In patient 2, there is loss of differentiation of gray matter from white matter in the right posterior temporal-parietal lobes (white arrows, Figure 2b). This may be seen within hours of the infarction. Gray matter (cortex) is normally associated with greater density than white matter. With ischemia, cerebral edema and decreased cerebral blood volume cause a decrease in the density of the gray matter, resulting in loss of gray-white differentiation. In this case, the initial CT scan was obtained 4 hours after the onset of symptoms. Follow-up CT at 24 hours (Figure 2c) better depicts the infarction.

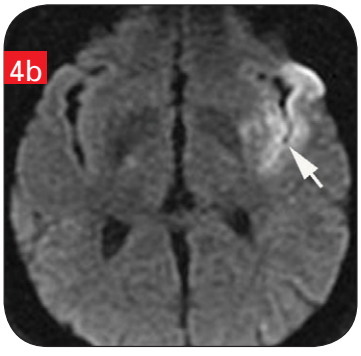


In patient 3, there is an insular ribbon sign (white arrows, Figure 3b). The insular ribbon is normally dense (yellow arrows) but becomes less dense with infarction. This results in loss of contrast with the underlying white matter of the external capsule. Loss of gray-white differentiation is optimally seen when CT images are viewed with a narrow window—a stroke window (Figure 3c). All CT images in patients that may have acute ischemia should be viewed not only at standard window widths and levels but also with stroke windows (width of 8 and level of 32).





In patient 4, the CT image is normal. It is important to remember that CT findings may be normal in patients with a cerebral infarction, especially in the first 6 hours. In this case, MRI was performed. A left middle cerebral artery infarction is demonstrated by increased signal on the diffusion-weighted sequence (white arrow, Figure 4b).



REFERENCE

1. Comunale JP, Sanelli P, Zimmerman RD. Advanced CT and MR imaging of acute cerebral infarction. *Contemp Diagn Radiol.* 2007;30(10):1-6.

Dr. Comunale is an associate professor of clinical radiology at NewYork-Presbyterian Hospital/Weill Cornell Medical College, New York City. **Dr. Hentel**, editor of "Emergency Imaging," is an assistant professor of radiology at Weill Cornell Medical College. He is also chief of emergency/musculoskeletal imaging and the vice-chairman for clinical operation for the department of radiology at NewYork-Presbyterian Hospital/Weill Cornell Medical Center. He is a member of the EMERGENCY MEDICINE editorial board.