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Case Report

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Radiological CT findings and time evolution in acute stroke: case report

Abstract

Case report of a 95-year-old female patient that was admitted to the emergency room with a sudden weakness on the right who underwent propaedeutic imaging with cerebral perfusion study by CT using artificial intelligence (AI) software for clinical suspicion of acute stroke. The case illustrates a frequent and specific imaging finding for stroke and its disappearance in the control exam even without optimized treatment.

Keywords: computed tomography, brain, hyperdense artery sign, stroke, perfusion, middle cerebral artery

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Abbreviations: HAS, hyperdense artery sign; CT, computed tomography; MCA, middle cerebral artery; AI, artificial intelligence; CTA, computed tomography angiography; MRA, magnetic resonance angiography

Case report

A 95-year-old female patient was admitted to the emergency room with a sudden weakness on the right. She underwent computed tomography of the brain, followed by computed angiotomography of the neck and brain with cerebral perfusion study by CT using artificial intelligence (AI) software for clinical suspicion of acute stroke.

As propaedeutic findings, the patient presented ASPECTS score = 10, sign of the hyperdense artery affecting the distal M1 segment of the left middle cerebral artery in at non-contrast CT scan (Figure 1) and, in the angiographic study, filling failure in the distal end of the respective M1 segment and proximally in the M2 segments, suggesting arterial subocclusion (Figure 2). As an additional finding, filling failure compatible with thrombus/embolus in the trunk of the left pulmonary artery (Figure 3).

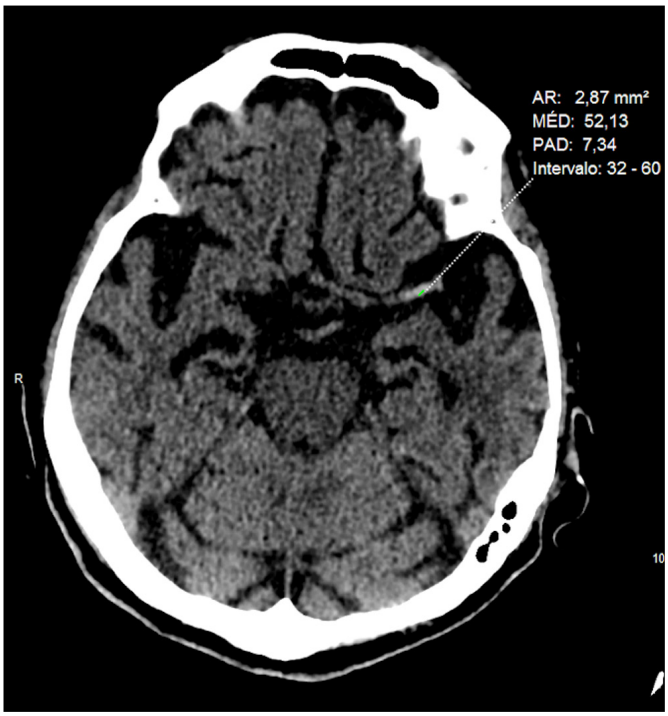

Figure 1 Non-contrast CT scan.

Figure 2 Arterial subocclusion.

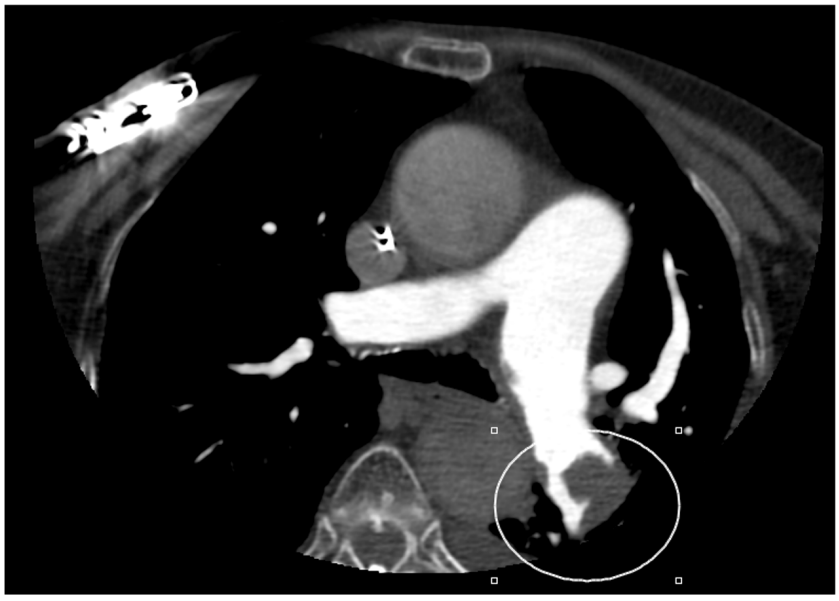

Figure 3 Embolus in the trunk of the left pulmonary artery.

The study of cerebral perfusion by CT using artificial intelligence (AI) software showed marked hypoperfusion in practically the entire territory of the left middle cerebral artery, secondary to the subocclusion of the M1-M2 transition of the left middle cerebral artery, although with good contralateral circulation, no evidence of recent infarction (ASPECTS=10), but with infinite mismatch in cerebral perfusion (Figure 4).

The patient was not submitted to thrombolysis or mechanical thrombectomy due to the high risk factors and underwent a new non-contrast CT scan two days after the neurological deficit as a control exam which evidenced the disappearance of the hyperdense artery sign (Figure 5).

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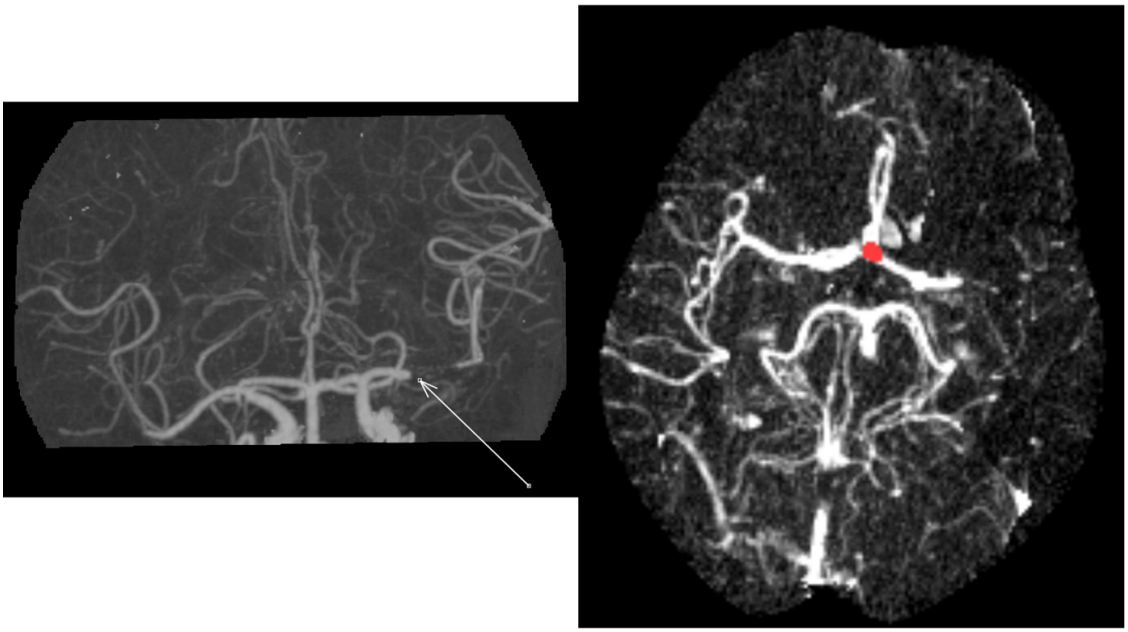

Figure 4 Infinite mismatch in cerebral perfusion.

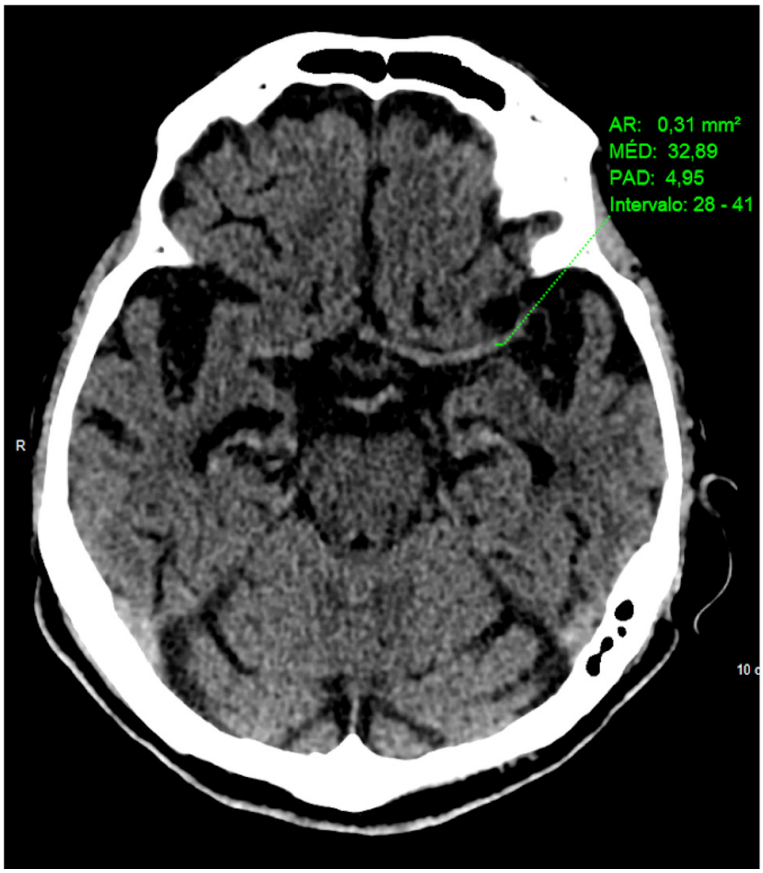

Figure 5 Disappearance of the hyperdense artery sign.

Discussion

Cerebral stroke is a very common cause of death that each episode may be responsible for a 35% mortality rate.[1] Atherosclerosis of the common and internal carotid artery are the most common territories that can originate an emboli which can cause middle cerebral artery (MCA) occlusion and the hyperdense artery sign (HAS) at non-contrast computed tomography (CT) scan.[1-2]

Unenhanced CT is widely available, can be performed quickly, can help identify a hemorrhage and also detect early-stage acute ischemia by depicting features such as the hyperdense vessel sign, the insular

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ribbon sign, and obscuration of the lentiform nucleus and are present in up to 60% of the patients between 3 and 6 hours. The totality of the patients will have abnormalities at the end of the first 24 hours. These findings may require appropriate windows with the intention of accentuating the small attenuation differences between normal and ischemic gray and white matter tissue.[3-4] Such findings can be detected earlier with perfusion imaging.[1]

Patients that present HAS at admission often have poor outcome and significant neurological deficit due to the large territory infarct.[2] Such sign has a low sensitivity of only 30%, but a high specificity (90-100%) for acute stroke. Other causes of HAS are: high hematocrit, viral infection, dissection and retained contrast.[1-2]

CT is crucial to establish the presence or absence of hemorrhage and therefore guide treatment: thrombolysis or conservative management.[1-4] Imaging findings that contraindicate thrombolysis are hemorrhage, involvement of more than one third of the MCA territory and mass effect.[1-3] Computed tomography angiography (CTA) and magnetic resonance angiography (MRA) can detect the impaired blood flow territory immediately, showing the occlusion of branches of the middle cerebral artery, for example the M1 segment that allows the patient to be treated with intra-arterial thrombolysis or thrombectomy, if there are no contraindications.[1-4]

Conflicts of interest

There are no conflicts of interest.

Acknowledgments

None.

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