

## Case report

## The “carotid CT crescent” sign

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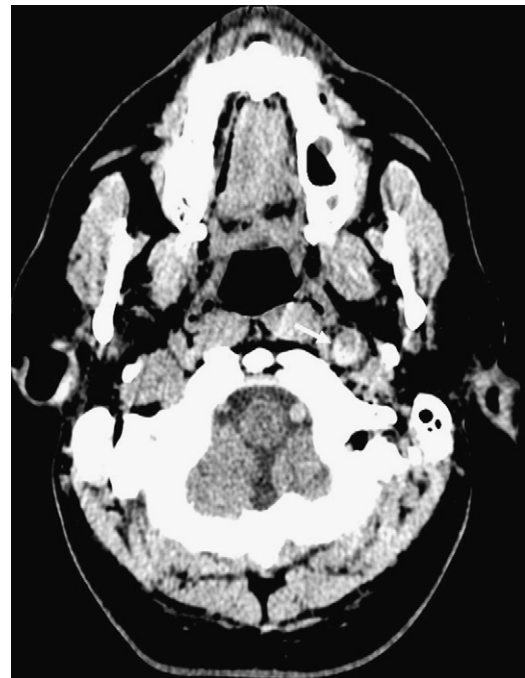
## 1. Introduction

Spontaneous carotid artery dissection (CAD), characterized by the presence of a mural hematoma located in the arterial wall, is a major cause of cerebral infarction in young adults [1]. Mural hematoma, defined as a crescent-shaped rim of hyperintense signal surrounding a lumen that is reduced in size, is the most specific sign for CAD. It is easily seen on T1-weighted axial cervical MRI scans by use of a fat-saturation technique, but can be missing within the first days of developing CAD [2].

Although MRI is known to be the gold standard non-invasive imaging modality for assessment of patients with suspected CAD, we aimed to report a case of CAD seen early on cervical CT scan, by showing intramural hematoma (the “carotid CT crescent” sign) whereas MRI failed to detect it.

## 2. Case report

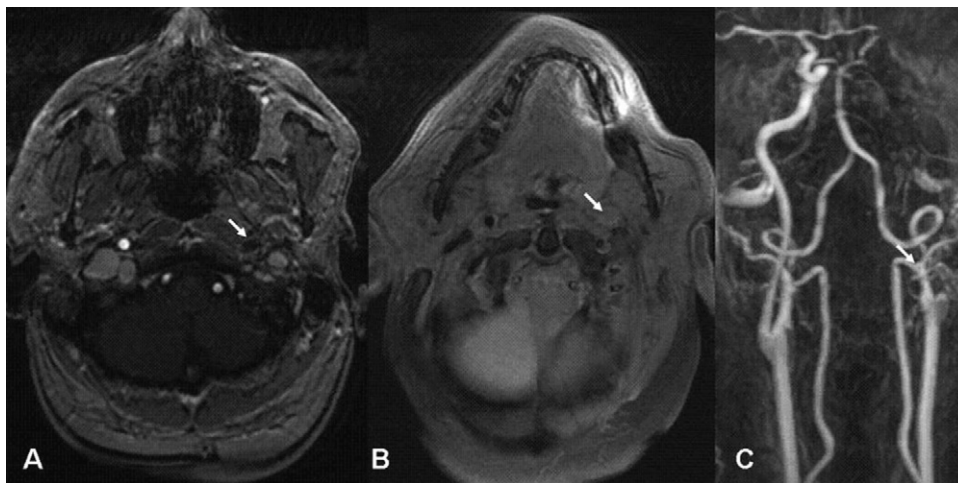
A 45-year-old man presented to the local hospital with a sudden right-sided weakness. He had no significant medical history and presented no known cardiovascular risk factors. Three hours after symptoms onset, the patient did not complain of headache or neck pain. However, he reported transient left neck pain a few hours before when he was swimming. On examination, he had right



**Fig. 1.** Nonenhanced brain CT scan showing a spontaneous hyperdense crescentic mass (arrow) in the left cervical carotid artery, expanding the arterial wall.

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**Fig. 2.** (A) Axial contrast-enhanced MRA of the neck showing an enlargement of the left internal carotid artery diameter with vessel occlusion (arrow). (B) Axial T1-weighted-fat-suppressed image showing the absence of a crescent-shaped rim of hyperintense signal. (C) Coronal magnetic resonance angiogram of the neck vessels showing complete occlusion of the left internal carotid artery distal to its bifurcation.

hemiparesis and right facial palsy. Language testing was normal. The National Institutes of Health Stroke Scale (NIHSS) score was measured at 4/42. Brain CT scan, performed 4 h after symptoms onset, was considered normal. Following the diagnosis of ischemic stroke, aspirin was started and the patient was transferred to our Neurovascular Unit.

During the transfer, the patient developed massive right-sided hemiplegy. At his arrival, the patient was alert and spoke normally. Further cognitive evaluation showed minor hemisphere syndrome with right spatial neglect. Cranial nerve examination revealed a left homonymous visual field defect and a left Horner syndrome. There was a right gaze preference with otherwise full extraocular movements and no nystagmus. There was a right lower facial paresis. Motor examination revealed right hemiplegy. Sensory examination was limited by his anosognosia, but he appeared to present right-sided deficits to pinprick, with a left plantar-extensor response. The NIHSS score was measured at 24/42. Brain CT scan was reviewed and was considered normal, but the lowest slices showed a spontaneous hyperdense crescent mass with enlargement of the left carotid artery suggestive of intramural hematoma (Fig. 1). Internal carotid artery dissection (CAD) was confirmed by MRI and MRA, although this imaging modality failed to detect intramural hematoma (Fig. 2A–C). Chest radiography, electrocardiogram, transthoracic echocardiography and transesophageal echocardiography and standard laboratory studies were normal. Coagulation work-up showed no mutation of factor V Leiden or prothrombin gene G20210A, and protein C, S, antithrombin III, factor VIII and homocysteine were normal. Antibody screening was negative.

The patient presented two days after his admission an acute neurological decline with decreased level of consciousness. Emergency brain MRI showed a malignant cerebral oedema in the left middle cerebral artery territory and MRA disclosed the occlusion of the left carotid artery. The patient underwent a left decompressive hemicraniectomy within 2 h of acute neurological decline, with placement of the skull bone in between right anterior abdominal wall muscles to preserve the bone flap. The patient was then transferred to our rehabilitation unit. His bone flap was replaced 3 months after initial decompressive craniectomy. Color Doppler Ultrasound and MRA showed complete regression of the left ICA dissection 5 months later. At 6 months, the patient presented a motor weakness in the right superior and inferior limbs, a right lower facial paresis and a

right homonymous visual field defect (NIHSS = 9, modified Rankin scale = 3).

### 3. Discussion

MRI is known to be the gold standard non-invasive imaging modality for assessment of patients with suspected CAD by showing intramural hematoma through T1-, T2-weighted axial cervical MRI with the fat saturation technique [1]. Intramural hematoma, characterized by an eccentric, crescent-shaped, hyperintense signal surrounding a lumen that is reduced in size, can be iso or hypointense on T1- and T2-weighted images within the first days and MRI may fail to detect it, showing only an increase of the external diameter of the artery [2,3]. Carotid ultrasonography is also a safe and easy method to screen for cervical CAD, by showing mural hematoma as a thickened hypochoic vessel wall. Unfortunately, it was not performed in our case.

We report the first case of carotid intramural hematoma seen early on cervical CT, the “carotid CT crescent” sign. As the emergency assessment of most patients with acute stroke still relies on non-enhanced CT scan alone [4], this case highlights the interest of cervical CT as the first line “vascular” imaging technique for evaluation of neurovascular disease, allowing an early diagnosis of CAD. Indeed, early recognition and appropriate management of CAD are of great importance, and cervical CT scan may thus help physicians to achieve these objectives.

Recently, Lum et al. reported a similar finding in patients with dissection of the V<sub>3</sub> portion of the vertebral artery: using CT angiography; they described the “suboccipital rind” sign, defined as a characteristic thickening of the wall of the artery with normal arterial lumen [5].

Further studies are needed to establish the prevalence of our sign in CAD.

### 4. Conclusion

This case suggests that cervical CT may provide an early diagnosis of CAD in order to achieve rapid treatment.

### Conflict of interest

The authors have no conflict of interest to declare.

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