Case report
Acute ischemic event of bilateral total internal carotid artery

ABSTRACT: Cerebrovascular disease represents one of the leading causes of morbidity worldwide and is the main cause of acquired disabilities. The degree of neurological damage varies according to the extent of the infarction and hemispheric dominance. The middle cerebral artery is the most commonly affected vessel in cerebrovascular pathology. Although rare, obstruction of both internal carotid arteries can occur and is rarely described. Below is a case report of this phenomenon.

KEYWORDS: *Acute ischemic stroke; CT signs; MRI sings; bilateral stroke; thrombectomy.*

ABBREVIATIONS:
CVD – Cerebrovascular Disease;
NIHSS – The National Institutes of Health Stroke Scale;
CT – Computed Tomography;
ACR – American College of Radiology;
TIA – Transient Ischemic Attack;
MRI – Magnetic Resonance Imaging;
ASPECTS – Alberta Stroke Program Early CT Score

INTRODUCTION:

Cerebrovascular disease (CVD) is historically characterized as the neurological dysfunction caused by acute damage in a specific region of the central nervous system, originating from vascular factors such as ischemia or hemorrhage. It is a significant cause of disability and mortality worldwide. [1] The main risk factors that increase the likelihood of developing it are advanced age, female gender, smoking, dyslipidemia, systemic arterial hypertension, and diabetes mellitus. Symptoms manifest according to the affected vascular region and may improve or worsen gradually depending on the penumbra area.

There is a scale used to determine the severity of CVD, The National Institutes of Health Stroke Scale (NIHSS); its importance lies in its utility for identifying patients with proximal thrombosis and, consequently, the probability of treatment by mechanical thrombectomy. [2]

The etiology can be of five types according to the TOAST classification [3] (1. large artery atherothromboembolic, 2. cardioembolism, 3. small vessel disease, 4. infarction of determined etiology, 5. infarction of undetermined etiology).
The treatment of CVD will be directed depending on its etiological origin, with thrombosis being the main cause. [3]

Thanks to technological advances, through the use of non-invasive sectional imaging studies, such as computed tomography (CT) or magnetic resonance imaging (MRI), it is possible to precisely determine whether a patient is experiencing an ischemic event or a condition that simulates its symptoms. According to the American College of Radiology (ACR) appropriateness criteria, these are the initial images to be performed in clinical scenarios related to CVD. [4]

CASE PRESENTATION

A 69-year-old female patient with grade 1 obesity, ~~a~~ history of systemic arterial hypertension, and type 2 diabetes mellitus under adequate control, presented to the emergency department. The reason for consultation was a sudden neurological deficit in the morning, with an approximate lapse of 80 minutes between its onset and hospital evaluation. During the evaluation, the patient scored 30 on the NIHSS scale, suggesting a cerebrovascular event. Neuroimaging studies were decided, starting with a simple cranial computed tomography with multiplanar reconstruction (Fig. 1). Due to the patient's clinical condition and the absence of imaging correlation with the cranial CT, a brain MRI was requested by the emergency department (Figure 2) with a STROKE protocol (DWI, ADC, Gradient Echo, T2 FLAIR), highlighting bilateral restriction to diffusion in the internal carotid artery territory in DWI confirmed on the ADC map, as well as hyperintensity in the FLAIR sequence.

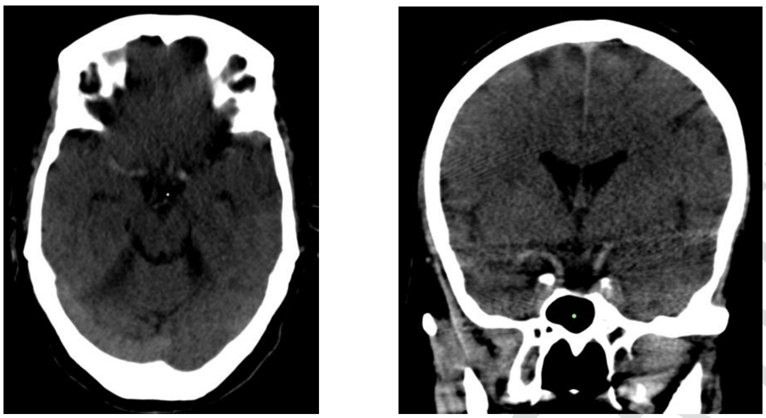
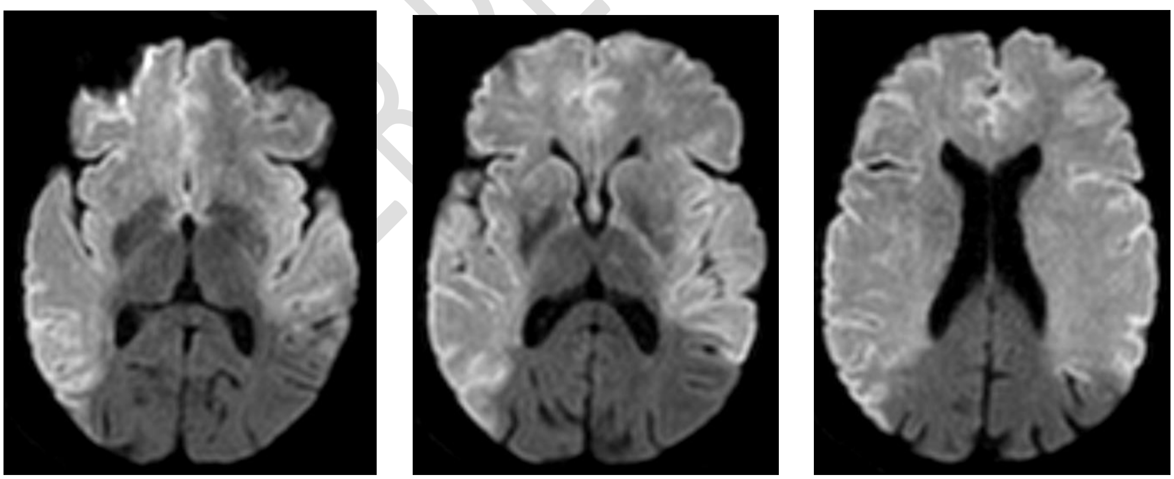


Figure 1: Simple skull tomography: Axial (A) and coronal (B) section; in both, the sign of bilateral hyperdense MCA is observed.



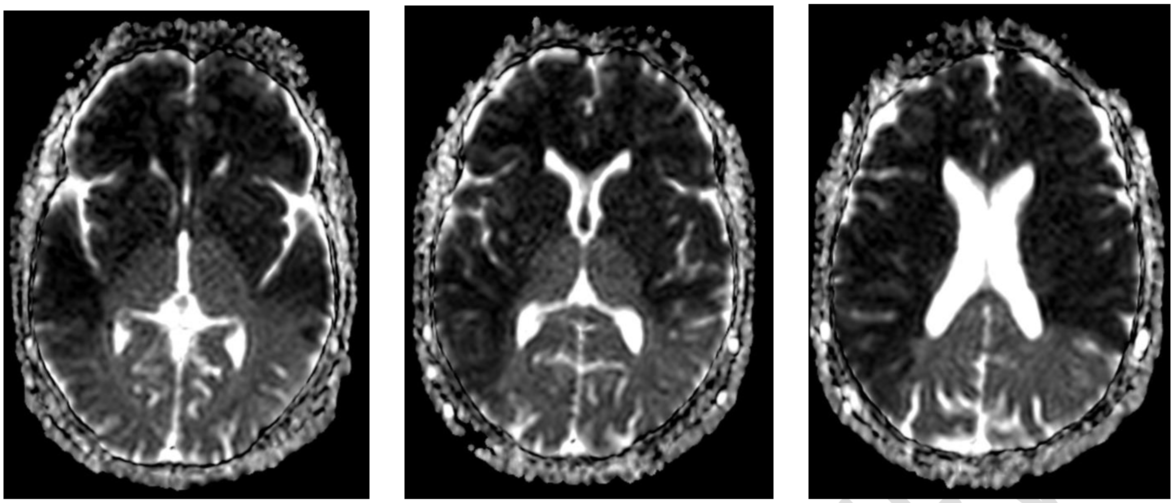


Figure 2: Brain MRI in axial sections: top row shows DWI sequence and bottom row shows ADC map; true diffusion restriction in the territory of the internal carotid artery is demonstrated bilaterally.

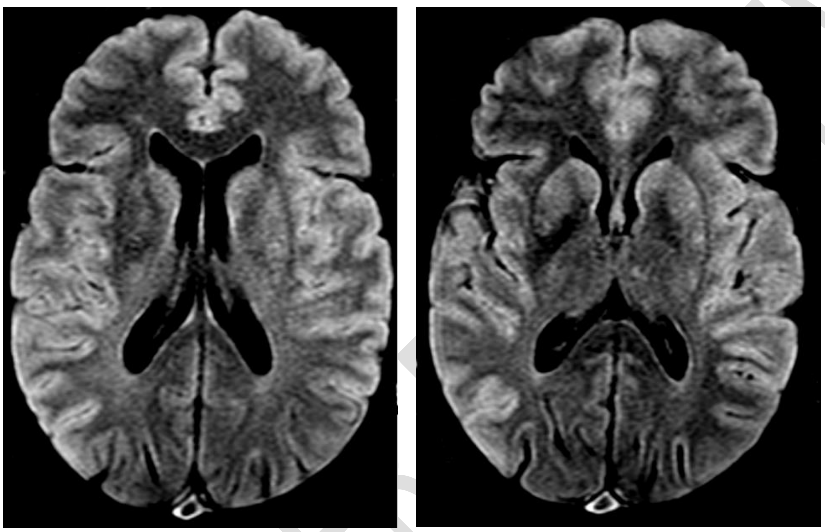


Figure 3: Brain magnetic resonance imaging in FLAIR axial sequence, with generalized and bilateral hyperintensity in the vascular territory of the internal carotid artery.

DISCUSSION:

To determine the origin of cerebrovascular disease, it is essential to evaluate various clinical aspects of the patient. This involves examining personal and family medical history, any previous episodes of stroke or transient ischemic attack (TIA), as well as the activity the patient was engaged in at the onset of the cerebrovascular event and how the neurological signs and symptoms have progressed.

It is crucial to know the patient's medical history, especially systemic diseases, as these may provide important clues about the underlying mechanism of the disease. For example, high blood pressure, heart murmurs, or other cardiac pathologies can significantly influence the identification of the mechanism of stroke. [1]

Non-contrast CT is the primary imaging modality to guide the management of patients with stroke. Initially, it is performed to rule out intracranial hemorrhage or identify early signs of ischemia (which are not always evident). However, for an accurate and rapid diagnosis of vascular occlusion, CT angiography is necessary. This method can identify anatomical variants, dissections, aneurysms, stenoses, or other vascular anomalies that may explain the patient's clinical status. Therefore, it is essential for radiologists, neurologists, as well as emergency personnel to be familiar with the typical and early findings identified by CT, and based on this, have the necessary tools to make precise and timely decisions for proper management, whether it is the intravenous administration of fibrinolytics in primary care centers or transfer of patients with large vessel occlusion to a specialized center for endovascular management through mechanical thrombectomy. [5]

The early signs of stroke on non-contrast CT have a sensitivity and specificity of 66% and 87%, respectively. The most frequent ones are: decreased differentiation between gray and white matter in the affected area, hyperattenuation of the middle cerebral artery, hypoattenuation of the lentiform arteries, effacement of cerebral sulci, hypoattenuation of the basal ganglia. [5],[6]

Angiography is used to diagnose proximal occlusion of large vessels in patients with MCA or ACA syndrome. In addition, MRI with diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) mapping remains the standard for assessing the location and extent of infarction. Although non-contrast CT has lower sensitivity than diffusion to detect cytotoxic edema associated with early ischemia, its wide availability and speed make it the initial study in most medical centers. [6]

A quantitative score for early CT was developed to evaluate ischemic changes in less than 3 hours after the onset of stroke symptoms, the Alberta Stroke Program Early CT Score (ASPECTS) divides the MCA territory into 10 regions of interest and is recognized by the American Heart Association (AHA) as a recommendation criterion for endovascular treatment in those with a score ≤ 6 at the start of the study. There are currently variations of the scoring system applied in the posterior circulation called pc-ASPECTS.[7] (Figure 4).

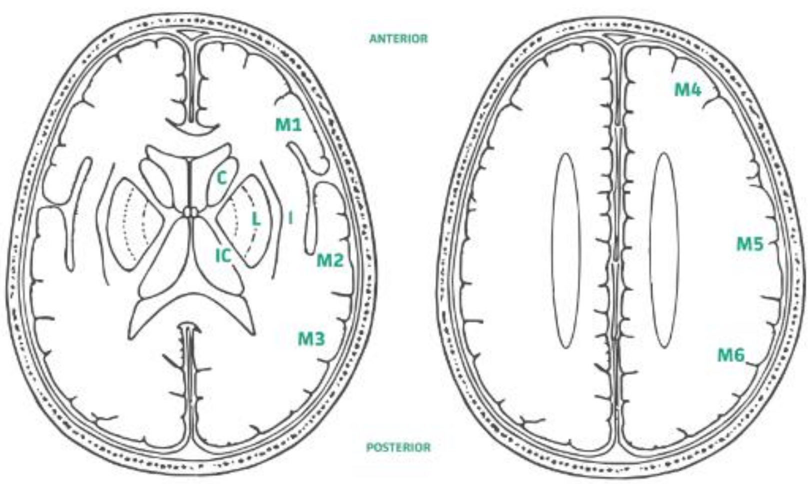


Figure 4. Content Contributors: Daniel Runde, MD.

Large vessel occlusions represent approximately one out of every two to four admissions for acute ischemic stroke, with 10% to 15% occurring in more than one territory, as additional clots may exist both within and outside the occluded territory. Identifying and correctly diagnosing multivessel occlusion is crucial for determining appropriate treatment.

Acute bilateral occlusion of a large intracranial artery is a rare phenomenon that can lead to bihemispheric ischemia, with an unfavorable prognosis, leading to conditions such as coma, decerebration, or death. Although some cases with recanalization after endovascular therapy have been reported, optimal revascularization strategies and prognosis are still unclear.

Some of the most relevant clinical trials, such as DAWN, report that collateral circulation capacity is more relevant than the absolute time from onset of the event and demonstrate that thrombectomy combined with standard care, as opposed to standard care alone, results in significant functional improvements even when performed between 6 and 24 hours after acute ischemic stroke, especially in patients with a discrepancy between clinical deficit and cerebral infarct area.

CONCLUSION:

Simultaneous occlusion of cerebral arteries, and even more so, common carotid arteries, although occurring infrequently, presents an unfavorable prognosis for the patient due to delayed diagnosis and treatment. Early determination of time of onset and disease severity is crucial, emphasizing the capability of personnel and access to appropriate diagnostic technology.

Although DWI is the standard for assessing the extent of ischemia, CT is more accessible, and the literature highlights the importance of vascular collateralization and combined medical care with thrombectomy to improve recanalization time and prognosis.

Limited literature reports good outcomes after mechanical thrombectomy, and it has been demonstrated that endovascular therapy is effective even when applied between 6 and 24 hours after disease onset, establishing itself as the standard treatment for intracranial large vessel occlusion.

CONSENT:

According to international standards or university standards, the authors have collected and retained written consent from the patient.

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