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Hyperdense Artery Sign in Basilar Oclussion: Report of Two Cases and Review

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ABSTRACT

Stroke represents one of the main causes of mortality in the world, being estimated as the clinical condition with the highest number of associated deaths only behind ischemic heart disease [1]. Of which approximately 80% of stroke are of ischemic origin [2]. One third of these events may correspond to proximal occlusions of the intracranial arteries of the anterior or posterior circulation. Basilar artery occlusion (BAO) represents approximately 1% of ischemic strokes and 5% of all occlusions of large cerebral vessels [3].

BAO is a catastrophic event, 70% of patients have a fatal outcome or severe disability [3]. Recent studies have shown that endovascular treatment of BAO is safe, with a greater probability of reperfusion and leads to better outcomes than medical treatment [4,5]. Successful endovascular management of BAO depends in part on the promptness of intervention. However, early identification of BAO can sometimes be difficult. Simple cranial computed tomography (CT), which is the recommended image for the initial evaluation of patients with suspected stroke, has a low sensitivity for detecting posterior fossa ischemic signs compared to brain MRI [6]. Additionally, the clinical presentation of BAO is challenging and difficult to interpret, taking into account the large territory that the basilar irrigates, which gives rise to a variety of symptoms and signs, as well as sharing some similar clinical characteristics with stroke of the anterior system [7].

In proximal occlusions of the intracranial arteries, it is sometimes possible to detect the hyperdense artery sign on simple skull CT. The sign consists of a hyperdense image corresponding to the course of an artery. Intravascular hyperdensity may appear before ischemic parenchymal changes and in this context represents acute thrombus formation. The hyperdense appearance is determined by the increase in hematocrit and the relative decrease in plasma within the thrombus [8]. The hyperdense sign has been more frequently described in proximal occlusions of the middle cerebral artery and has been associated with a greater probability of a stroke of cardioembolic origin. The hyperdense sign in BAO has been less frequently described and its association with the mechanism of ischemia and patient prognosis has not been established [9].

Two cases of the hyperdense sign on simple skull CT due to BAO are presented below.

Keywords
Oclussion, Basilar artery, Hyperdense sign, stroke, Thrombectomy.

Case 1

63-year-old woman who suddenly presents altered state of consciousness with tonic posture in extension of all 4 limbs lasting 2 minutes. She does not regain consciousness and is brought to the emergency department. He was admitted with hemodynamic stability and a Glasgow score of 7 points. Due to his clinical condition, orotracheal intubation was performed and sedation with

midazolam and fentanyl was initiated. The patient's history includes systemic arterial hypertension, dyslipidemia, and endometrial cancer in remission. He is evaluated by the neurology service, finding a patient under pharmacological sedation with RASS -5 and orotracheal intubation. 3 mm hyporeactive pupils, absence of oculocephalogyric reflexes. No motor response to deep painful stimulus. Bilateral neutral plantar response with generalized +/++++ musculotendinous reflexes. Absence of meningeal signs. In the CT scan of the skull, a chord sign is documented in the basilar artery and hypodensity is suggested in the lower part of the pons (Figure 1). She is taken to endovascular treatment, BAO is confirmed from its proximal third, mechanical thrombectomy is performed achieving a TICI 3 and she is transferred to the intensive care unit. However, the patient did not show clinical recovery and died 24 hours after admission.

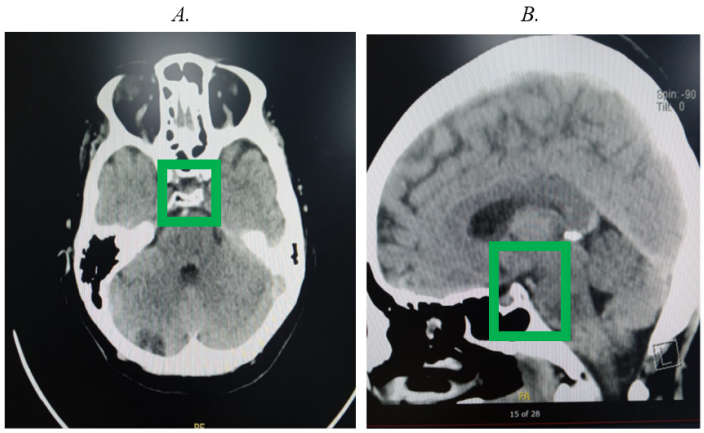

Figure 1: Simple skull CT. A. In the axial plane, a hyperdense point in the course of the basilar artery is seen in the frame. B. In the sagittal plane, hyperdensity of the basilar artery and hypodensity of the pons is observed in the frame.

Case 2

A 77-year-old woman presented with sudden onset of altered consciousness with subsequent appearance of multiple episodes of tonic posture in flexion of all 4 extremities. History of systemic arterial hypertension, cerebral infarctions and ischemic heart disease. Upon admission physical examination, the patient was found to be hemodynamically stable, in a deep coma, with pupils of 3, isochoric, unreactive, absence of oculocephalogyric reflexes, bilateral absent corneal reflex, absence of gag reflex. There is no type of motor response to deep painful stimulation, generalized flaccidity, generalized normoreflexia and bilateral Babinski response. There are no abnormal movements or meningeal signs. A simple skull CT scan documented extensive posterior fossa infarction with cerebellar and pontine involvement with a chord sign in the basilar artery in its middle third (Figure 2). The patient is considered not to be a candidate for reperfusion measures and is transferred to the intensive care unit for medical treatment. The patient died 72 hours after admission.

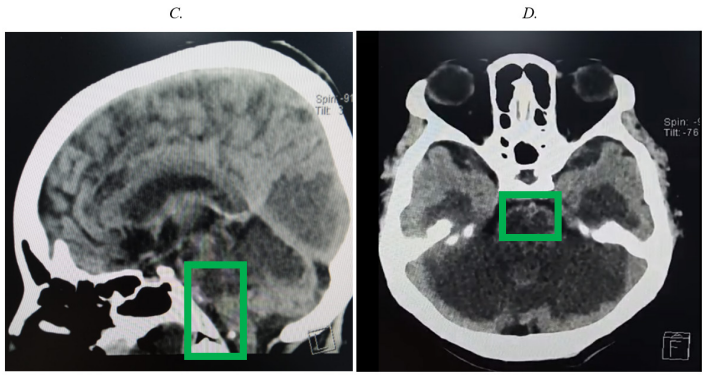

Figure 2: Simple cranial CT C. In the sagittal plane in the frame, hyperdense sign is observed with hyperdensity of the basilar artery in its middle third. D. In the axial plane, extensive infarction of the pons and cerebellum is observed.

Discussion

The two clinical cases show several clinical-radiological aspects of OAB to highlight: hyperdense basilar sign, the non-specific nature of its presentation and the poor prognosis of the patients. The hyperdense basilar artery sign can be useful for the diagnosis of OAB; it has a sensitivity between 30 and 90% depending on the thickness of the tomographic slices and a specificity between 80 and 98%. The sensitivity of the sign increases if there is a high clinical suspicion [10]. The optimal values to define hyperdensity of the basilar artery due to thromboembolic occlusion range between 40 to 60 Hounsfield units [11]. However, other conditions can emulate a hyperdense artery sign, including increased hematocrit, contrast medium, atheromatous plaques, foreign bodies and vessel dissection. Therefore, it is essential to relate the imaging findings with the patient's clinical picture. OAB generally presents with a sudden pattern of altered consciousness with involvement of cranial nerves and long pathways. However, sometimes the condition may have a non-sudden presentation and manifest with episodes of tonic postures of 4 limbs with altered consciousness. One of the prognostic determinants of cerebral infarctions is the compromised vessel. OAB has been associated with a poor prognosis due to the involvement of structures important for alertness, swallowing, and movement. The hyperdense artery sign has been associated with severe infarctions, with poor clinical outcomes and a lower probability of recanalization with intravenous thrombolytic therapy. This is because the sign may be related to a larger thrombus.

The two previous cases show the importance of evaluating in detail the anatomical structures of the posterior fossa in patients with sudden alteration of consciousness. Finding a hyperdense basilar artery (chord sign) must be related to other clinical-radiological signs and in the case of OAB it is possible to interpret this sign as having a poor prognosis.

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