Unilateral agenesis of the internal carotid artery
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Section: Head & neck imaging
Case Type: Anatomy and Functional Imaging
Authors: Basekim CC, Ozturk E, Kizilkaya E
Patient: 32 years, male

Clinical History:
We present an internal carotid artery anomaly in an asymptomatic patient.

Imaging Findings:
The patient presented with headache. Physical examination was within normal limits. Computed tomography (CT) images revealed ethmoidal sinusitis which was the probable cause of headache and an absent left carotid canal (Fig 1). Cervical digital subtraction angiography (DSA) showed absence of the left internal carotid artery (ICA); whereas the right one was normal (Fig 2). Three dimensional (3D) magnetic resonance angiography (MRA) showed the left ICA was absent, the left posterior communicating artery (PCoA) and A1 segment of the right anterior cerebral artery (ACA) was enlarged, A1 segment of the left ACA and right PCoA were absent (Fig 3).

Discussion:
Absence of the ICA is a very rare anomaly of the embryonic development. Absence may be referred to agenesis which is with absence of the carotid canal or aplasia which the carotid canal is present. The left-right distribution is about 3:1. This entity rarely occurs bilaterally. Most of the cases with unilateral agenesis are asymptomatic because of the extensive collateral supply to the intracranial arteries from the contralateral ICA and the vertebrobasilar system via the circle of Willis. Three types of collateral circulation were described. The first type is termed the “fetal” type. This is the most common type and it was similar with our case. In this particular type, anterior and posterior communicating arteries of the affected side are patent, and these arteries reconstitute the anterior and middle cerebral artery circulations. In the second type which is called the “adult” type, both the anterior and middle cerebral arteries are supplied by a patent anterior communicating artery. In the third type, an intercavernous vessel arising from the contralateral internal carotid artery supplies most of the cavernous and the supraclinoid portion of the vessel. This is the least common type. The frequent association between agenesis of the ICA and the intracranial aneurysm has been reported. Hemodynamic stress in the collateral arteries could be the origin of the aneurysm development. For this reason, demonstration of the intracranial vessels is important. DSA and/or MRA can be use for this screening.

Differential Diagnosis List: AGENESIS OF THE INTERNAL CAROTID ARTERY

Final Diagnosis: AGENESIS OF THE INTERNAL CAROTID ARTERY

References:
Cali RL, Bare R, Rama K. Bilateral internal carotid artery agenesis: a case study and review of the literature.

Midkiff RB, Boykin MW, McFarland DR, Bauman JA. Agenesis of the internal carotid artery with intercavernous anastomosis AJNR 1995; 16(Jun):1356-1359. (PMID: 7677040)


Description: A CT of the skull base exhibits an absent of left carotid canal. The right carotid canal (arrow) is normal. Origin:
Description: DSA shows absence of the left ICA, where as the right one was normal. Origin:
Description: DSA shows absence of the left ICA (b), where as the right one was normal. Origin:
**Figure 3**

**Description:** a. Non-reconstructed MRA image demonstrates absence of the left ICA, 
b. 3-D reconstructed MRA image demonstrates absence of the left ICA, absence of the A1 segment of the left ACA, and absence of the right PCoA. Left PCoA (arrow) and A1 segment of the right ACA (arrow head) are enlarged. **Origin:**
Description: a. Non-reconstructed MRA image demonstrates absence of the left ICA, b. 3-D reconstructed MRA image demonstrates absence of the left ICA, absence of the A1 segment of the left ACA, and absence of the right PCoA. Left PCoA (arrow) and A1 segment of the right ACA (arrow head) are enlarged. Origin: