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Right Internal Carotid Agenesis: A Rare Case Anatomical, Neurosurgical and Radiological Perspective

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Abstract- We present a case of 35 year old female with Right Internal carotid artery agenesis . The Axial and coronal T2- weighted MRI demonstrated an absent right internal carotid artery flow void. A subsequent magnetic resonance angiography showed absence of the right internal carotid artery. This finding was confirmed by magnetic resonance angiography of the cervical vessels, and axial computed tomography angiography showed agenesis of the right carotid artery. The literature reports such finding in association with other anomalies such as transsphenoidal encephaloceles and circle of Willis aneurysms. These associations were not observed in the present case. The patient remained asymptomatic.

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I. Introduction

In the Medical OPD of SKIMS, 50 patients were worked upon for evaluation. These patients had neurological symptoms like headache , giddiness, weakness in limbs, loss of consciousness, dementia . After subjecting them for further evaluation one patient was found to have Neck Angiography revealing small right common carotid artery and no Internal carotid artery . MR Angiography revealed normal left petrous and Cavernous internal carotid. Right Middle cerebral artery and right anterior cerebral artery are likely supplied by anterior communicating artery and posterior communicating artery. In addition bilateral hyper intensity lesions were seen in heads of Caudate nuclei.

II. Discussion

The Cerebral circulation is divided into Anterior circulation and posterior circulation. The internal carotid arteries form the anterior circulation and the vertebral arteries form the posterior circulation. These two meet at the Circle of Willis and most of the blood supply is derived from the internal carotid system. Embry-ologically the internal carotid is formed by the portion of the third arch artery distal to the bud along with the original dorsal aorta cranial to the attachment of third arch artery.

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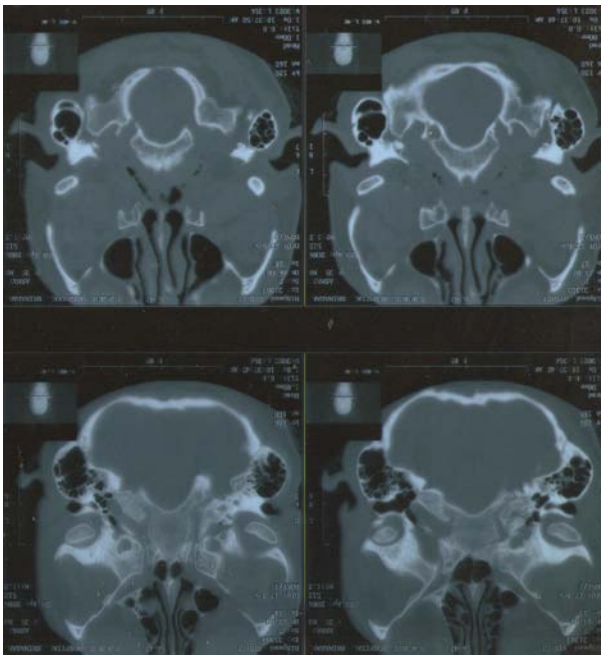
By inherent nature Agenesis of Carotid arteries is a rarity with not so frequent cases reported worldwide. It is mostly asymptomatic because of the fact of compensation by Blood flow through Circle of Willis. Internal carotid agenesis occurs when one of the blood vessels which supply blood to the brain does not develop (agenesis). It is rare, occurring in less than 0.01% of people.[1] Usually there is a pair of internal carotid arteries, one on the left side and one on the right side; agenesis occurs on the left side three times more frequently than on the right side.[2]

However, if symptoms occur, they may include headache, blurred vision, paralysis of some of the nerves in the head (palsy), epilepsy, or muscle weakness on one side of the body (hemiparesis).[2] The main concern with internal carotid agenesis is the increased risk for enlargement of the other blood vessels (aneurysm), which can occur in up to 67% of people with this condition (compared to 2-4% of individuals without this condition).[3] It usually presents unilaterally and rarely has been reported bilateral[4] Associated defects seen are Aneurysms in the Circle of Willis Especially the Anterior circulation and Encephaloceles, intracranial hemorrhages[5, 6] and Arachnoid cysts.[7,8]

According to Padget [9], the internal carotid artery originates from the dorsal aorta and the third aortic arch at approximately the 3-mm embryonic stage, but complete development does not occur earlier than the 16–18 mm stage (40 days). So far, there is no exact explanation for developmental anomalies of the internal carotid artery, but all variations are thought to occur because of insults to the developing embryo. Keen [10] suggested that mechanical insults to the developing embryo such as excessive folding of the embryo to one side, pressure effects, or restriction by amniotic bands may cause unilateral absence of internal carotid artery.

A 35 year old female who had dementia reported to a medical OPD in SKIMS Soura. All her Lab Parameters were with normal range. A CT/ MRI was asked to be done by a Neurologist which revealed an Absent cavernous carotid artery . Neck Angiography revealing small right common carotid artery and no Internal carotid artery . MR Angiography revealed normal left petrous and Cavernous internal carotid. Right Middle cerebral artery and right anterior cerebral artery

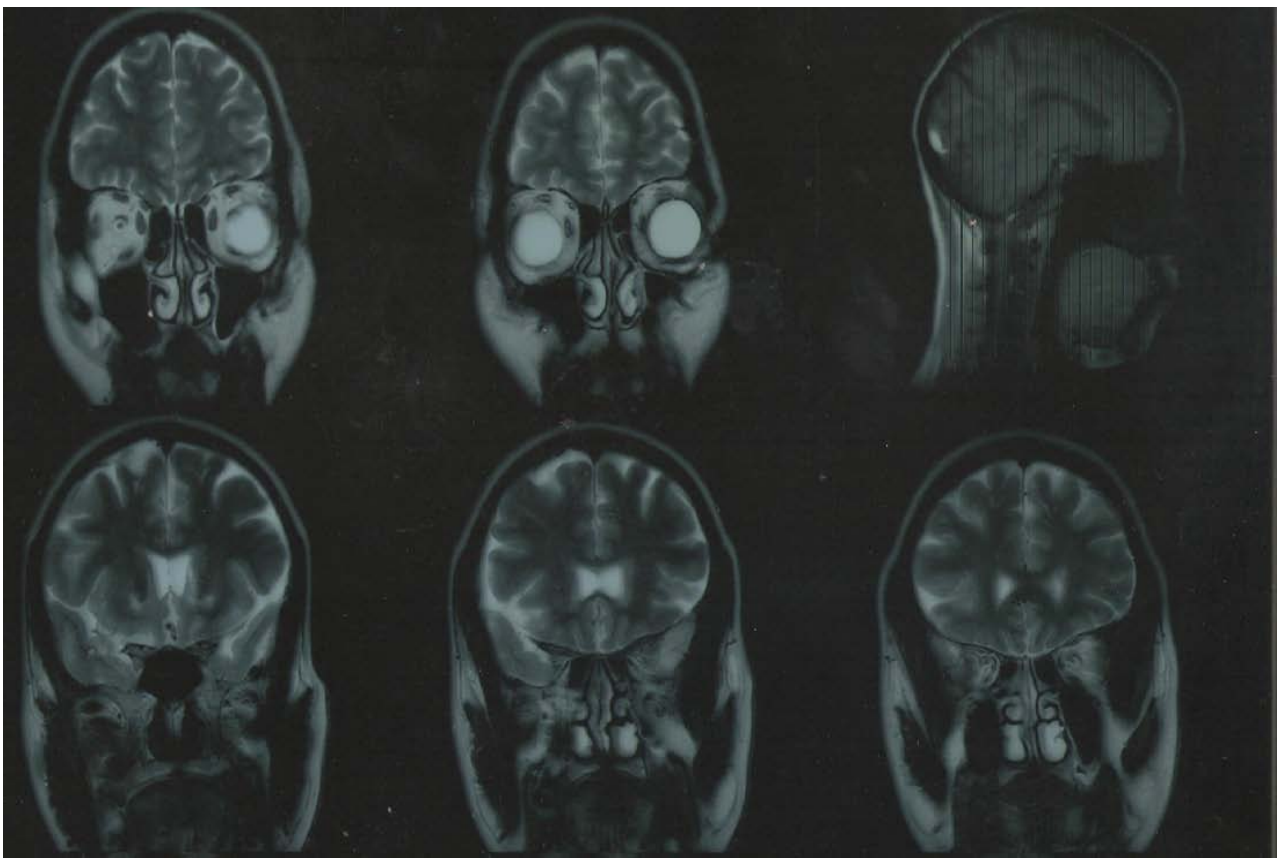
are likely supplied by anterior communicating artery and posterior communicating artery. In addition bilateral hyperintensity lesions were seen in heads of Caudate nuclei.



Magnetic resonance angiography of the cervical vessels showing agenesis of the right carotid artery

III. Conclusion

There are multiple variations in the cerebral vasculature but rarely do patients present with such a rare anomaly. Such cases are usually detected incidentially or in some cases where a clinician would not suspect such a diagnosis in the first instance.



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