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Study of Congenital absent Right internal carotid artery in Sudanese Patient.

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Abstract:-
Congenital unilateral agenesis of the internal carotid artery (ICA) is a rare anomaly.Due to the proper sufficient collateral circulation via the circle of Willis most cases are asymptomatic, but patients can also present with ischemic or hemorrhagic cerebrovascular insults. The absence of the bony carotid canal is essential to differentiate this anomaly from chronic ICA occlusion. Awareness of this situation by clinicians and radiologists is essential because these patients have an increased incidence of various intracranial pathologies. The current case he is 26 years old. When he was 14 years old he suffer from asthma and sudden he had complete coma so he refered to to do MRI his MRI clearified that he had absent right internal carotid artery. Current the patient he is 26 years old with normal condition he is also master student in Medical field doing good job. And doing regular check for follow up by MRI. Doing his Best to acheive his goal and objectives, Working hard, looking forward to acheive his future goals.

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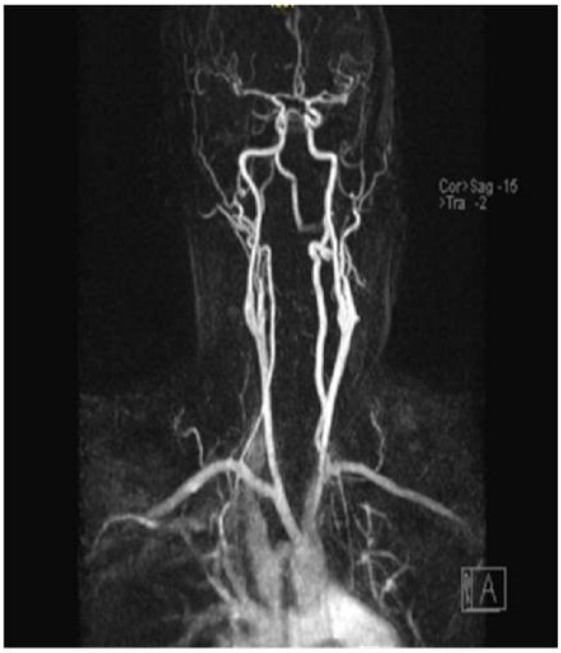
I. Introduction:-

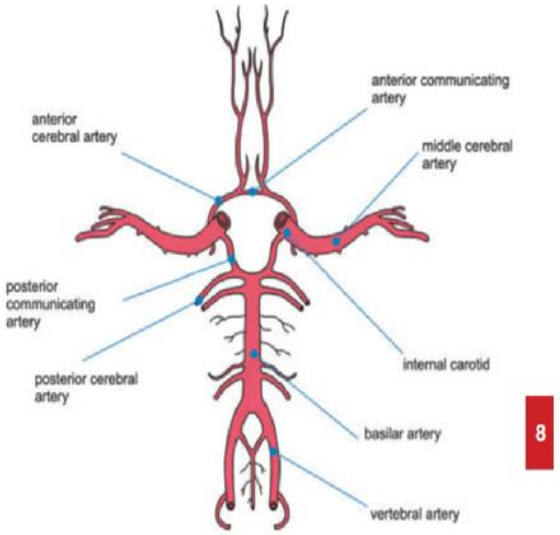
Internal carotid artery agenesis is a rare congenital anomaly, reported in less than 0.01% of the population.(1) The spectrum of findings ranges from agenesis (complete absence of the ICA and carotid canal) to aplasia (absence of parts of the ICA and of the carotid canal) and hypoplasia (narrowing of the ICA and carotid canal).(1) Most cases of unilateral agenesis are asymptomatic, because of the collateral circulation that develops during the fetal period. Three patterns of collateral circulation have been reported.(1) The most common type, which is similar to the one found in the present case, is the fetal variant, in which the anterior cerebral artery on the affected side is supplied by the contralateral ICA via the anterior communicating artery, and the middle cerebral artery arises from the basilar artery through the posterior communicating artery.(1) The second pattern is the adult variant, in which the anterior and the middle cerebral arteries are supplied by the basilar artery through the posterior communicating arteries.(1) In the third pattern, which is the rarest, transcranial anastomoses develop from the external carotid system, either from the contralateral internal carotid artery or from primitive vessels.(1) ICA agenesis is usually an incidental finding on head and neck imaging tests, such as Doppler ultrasound, CT, or magnetic resonance imaging.(1) However, some patients present alterations, especially when there is progression of the atherosclerotic disease. The absence of the ICA is also associated with a high incidence of cerebral aneurysms, which is approximately 25-35% in individuals without an ICA, compared with 2-4% in the general population. Less commonly, it may be associated with delayed neuropsychomotor development and agenesis of the corpus callosum, especially in patients with bilateral carotid agenesis.(1). In addition, this anomaly has major implications for the planning and execution of endarterectomy and transsphenoidal pituitary surgery.(1) In the present case, the patient had no aneurysms or other associated malformations.(1) researchers conclude that ICA agenesis is rare and usually asymptomatic.(1) However, careful examination of the vascular signal on magnetic resonance imaging and of carotid canals on CT, in search of stenoses (responsible for common neurological complaints), may lead to the detection of this condition, which, although asymptomatic, can be accompanied by other potentially serious diseases.(1) Magnetic resonance angiography (MRA) is increasingly used as a non-invasive method to assess carotid arteries. Contrast-enhanced MRA (CE-MRA) has benefited from rapid technological developments, including specific hardware and pulse sequence design.(2) In the evaluation of stenoses of the extracranial internal carotid artery (ICA), CE-MRA using "first generation" CE-MRA gadolinium (Gd)-based chelates can be a substitute for conventional digital subtraction angiography (DSA), although CE-MRA tends to overestimate the degree of stenosis.(2) Studies describing the use of high-relaxivity contrast agents like gadobenate dimeglumine (Gd-BOPTA) reveal that this agent is safe and well tolerated for CE-MRA.(2) The use of Gd-BOPTA shows

significantly better quantitative and qualitative performance than carotid CE-MRA using first generation Gd-based chelates.(2) In fact, CE-MRA with Gd-BOTPA provides information comparable to that attainable with rotational DSA.(2) In conclusion, high-relaxivity contrast agents combined with dedicated MRA software appear to be optimal for achieving high-quality evaluation of the carotid arteries.(2) The most common MRI sequences are T1-weighted and T2-weighted scans.(3) T1-weighted images are produced by using short TE and TR times.(3) The contrast and brightness of the image are predominately determined by T1 properties of tissue. Conversely, T2-weighted images are produced by using longer TE and TR times.(3) In these images, the contrast and brightness are predominately determined by the T2 properties of tissue.(3) A third commonly used sequence is the Fluid Attenuated Inversion Recovery (Flair). The Flair sequence is similar to a T2-weighted image except that the TE and TR times are very long.(3) By doing so, abnormalities remain bright but normal CSF fluid is attenuated and made dark.(3) Another modalitie for Diagnosis of internal carotid artery disease is A carotid artery duplex scan is a type of vascular ultrasound study done to assess occlusion (blockage) or stenosis (narrowing) of the carotid arteries of the neck and/or the branches of the carotid artery.(4) A carotid artery duplex scan is a noninvasive (the skin is not pierced) procedure.(4) This type of Doppler examination provides a 2-dimensional (2D) image of the arteries so that the structure of the arteries and location of an occlusion can be determined, as well as the degree of blood flow.(4) A transducer sends out ultrasonic sound waves at a frequency too high to be heard.(4) When the transducer (like a microphone) is placed on the carotid arteries at certain locations and angles, the ultrasonic sound waves move through the skin and other body tissues to the blood vessels, where the waves echo off of the blood cells.(4) The transducer picks up the reflected waves and sends them to an amplifier, which makes the ultrasonic sound waves audible. Absence or faintness of these sounds may indicate an obstruction to the blood flow.(4)

Normal MRA of carotid arteries.



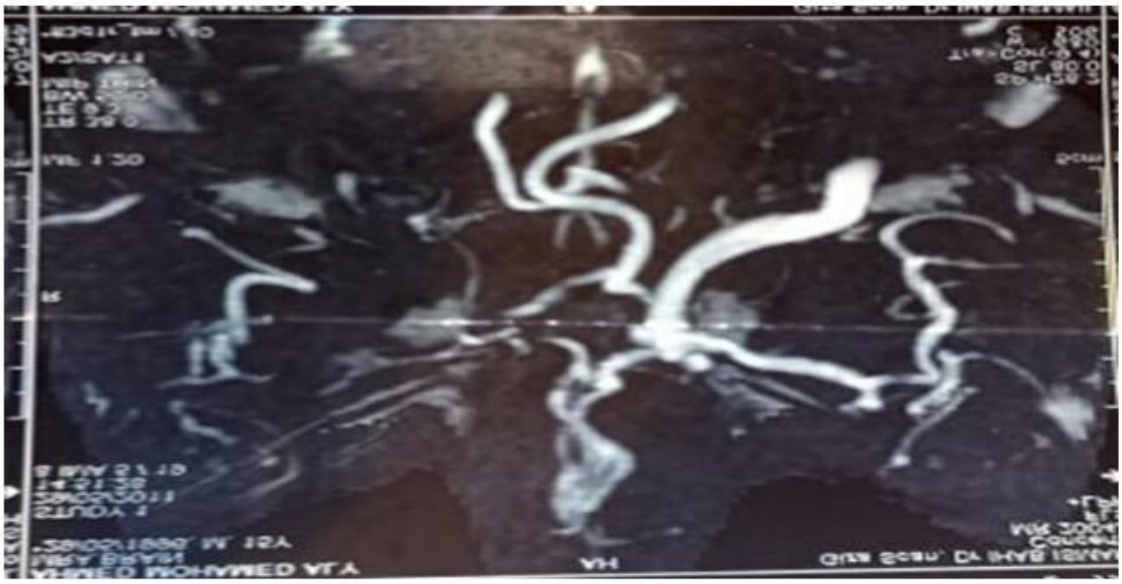
Normal anatomy of Circle of wills



II. Case Report:-

A patient 14 years old came to the hospital with a history of asthma and suddenly he lost consciousness. He fell into a coma. The oxygen in the brain stopped and the heart stopped for twenty minutes. He was transferred to the intensive care unit, where he stayed for twenty days. He was transferred to the MRI department by using TOF MRA Followed by MIP reconstruction this sequence was saw No flow signal seen from the right internal carotid artery. finally diagnosed patient with Congenital absent of Right internal carotid artery. The patient regained consciousness, but he was paralyzed and after doing physical therapy, the patient returned to a normal health condition.

TOF MRA with maximum intensity of carotid arteries



III. Discussion:-

Agenesis of ICA firstly reported by Tode in 1787 after postmortem examination.(5)There after Verbiest reported this anomaly angiographically in 1954. According to the classification of developmental anomalies of ICA, our case can particularly be categorized as an agenesis. (5) This condition has been occurred more often at the left side by 3:1 ratio.(5) The reported frequency is low, but as most patients are asymptomatic, the condition probably underreported.(5) The vast majority of reported asymptomatic cases with ICA agenesis are one-sided, although there are scarce papers of asymptomatic cases of bilateral ICA agenesis.(5)The agenesis of ICA is associated with a higher incidence of intracranial aneurysms, transsphenoidal encephaloceles, and an extensive rete mirabilis (vascular network interrupting the continuity of an artery or vein in the tissue) in the cranial base .(5) The clinical symptoms may be related with associated vascular insufficiency and/or intracranial ischemia due to changes in collateral flow.(5) Cases may present with recurrent headaches, blurring vision, loss of audition, hemi-paresis with or without cranial nerve palsy . Patients may also present with subarachnoid hemorrhage as a complication of an associated aneurysm.(5) Intracranial aneurysms are found in approximately 25% of patients of symptomatic ICA agenesis presented with all intracranial hemorrhagic manifestations .(5) In cases of unilateral or bilateral ICA agenesis, the reported associated structural anomalies are agenesia of the corpus callosum and persistent cavum verge, arachnoidal cyst, anomaly of the basilar artery, olivopontocerebellar atrophy, hypopituitarism neurofibromatosis, meningocele, coarctation of the aorta, and cardiac abnormalities.(5) Embryologically, the primitive internal carotid arteries (ICAs) originate from terminal segments of the dorsal aorta and third aortic arch arteries at around the 3 mm fetal stage (24th day of embryogenesis), with complete development of the ICA by six weeks . (5) The development of the carotid channel is directly associated with the development of the ICA. At the fifth to sixth weeks of fetal life, the skull base begins to develop. If the primitive internal carotid arteries fail to develop before 3–5 weeks of fetal life, the bony carotid canal cannot develop .(5) In both of our cases, lack of both the ICA and the carotid canal was compatible with an incident having eventuated before three to five weeks of fetal life.(5)

IV. Conclusion:-

Congenital agenesis of the ICA is a rare, usually asymptomatic, vascular anomaly. Although most patients are asymptomatic rarely, they can be presented with some neurological disorders including intracranial hemorrhage or ischemia. To our knowledge an intracranial ischemia as in our recent case is a very rare complication. The goals of imaging when suspecting ICA agenesis are: confirming the diagnosis by evaluating the bony carotid canal, identifying the type of the collateral circulation, assessing the presence of associated anomalies and ruling out acute complications including intracranial hemorrhage and ischemic lesions. MRI and MR angiography coupled with CT and color Doppler sonography allow accurate diagnosis. It is also beneficial for the educating of the patients and families about the benign feature of the disease and the oncoming implications, as well as the potential complications.

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