

ANATOMY



CIRCLE OF WILLIS AND ITS CLINICAL
IMPORTANCE

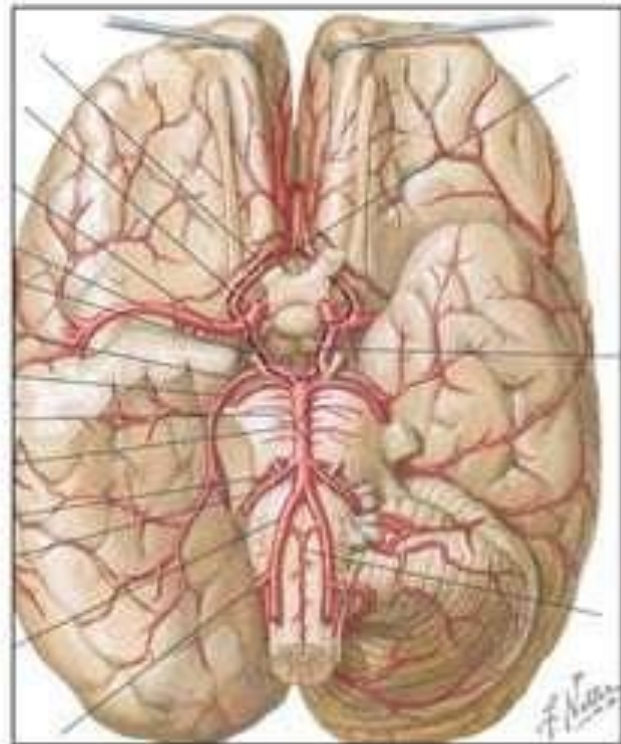
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INTRODUCTION

- The circle of Willis is a circulatory anastomosis that supplies blood to the brain and surrounding structures. It is named after Thomas Willis (1621–1675), an English physician
- The brain receives its arterial supply from this cerebral arterial circle (of Willis).
- It is also called **Willis' circle**, **loop of Willis**, **cerebral arterial circle**, and **Willis polygon**

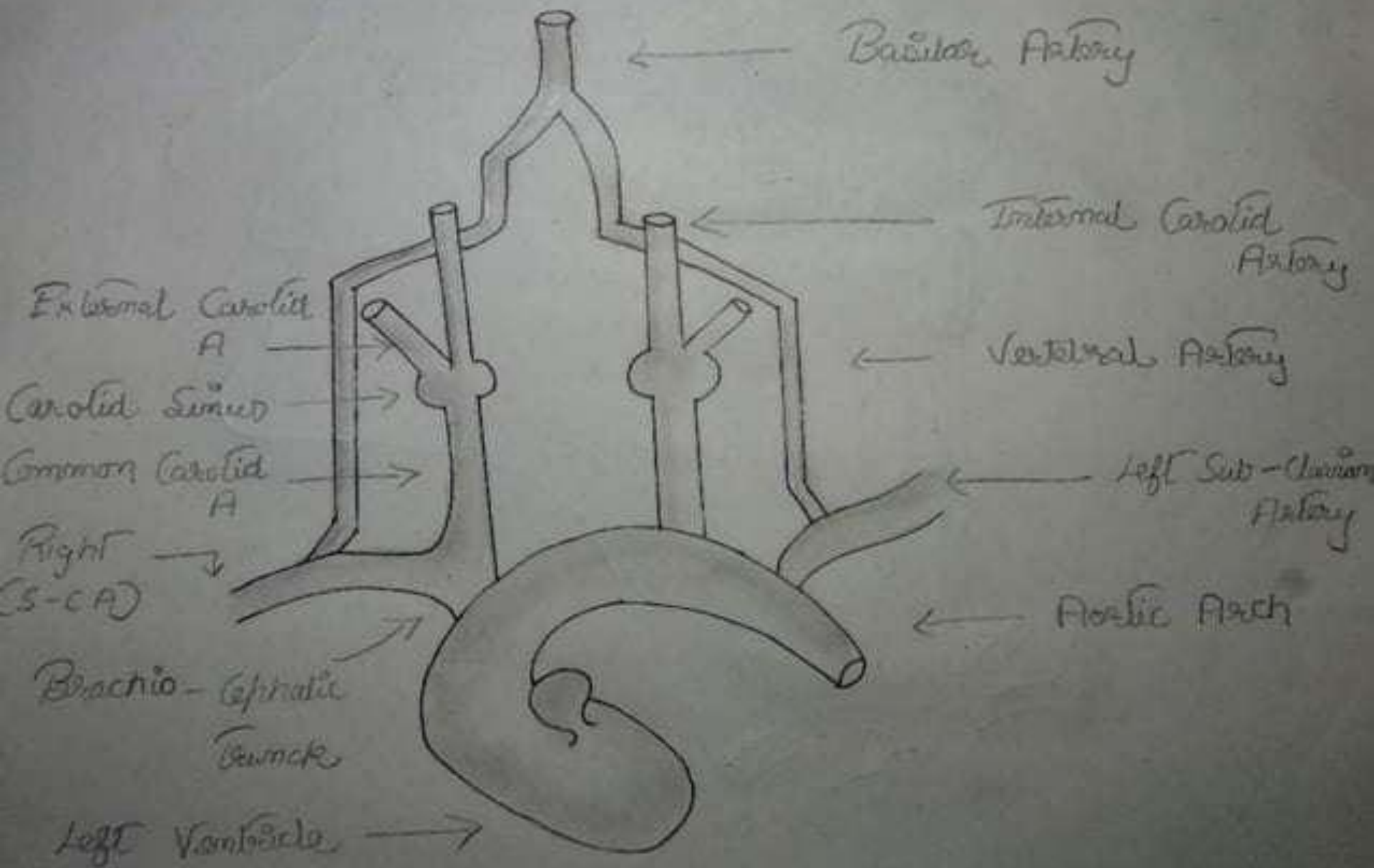
ANATOMICAL POSITION

- It is located at the base of brain around optic chiasma and hypothalamus.



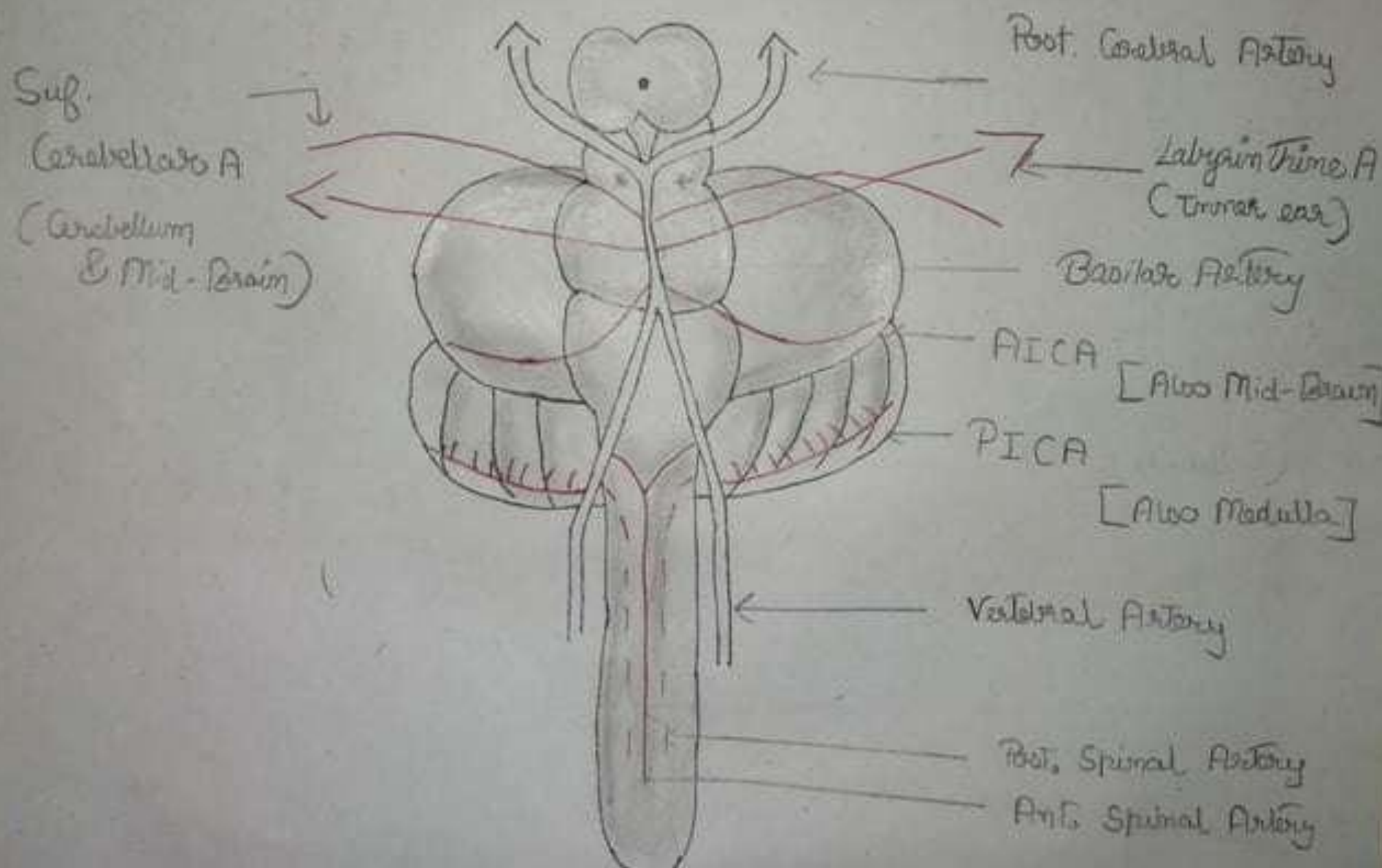
FORMATION OF CIRCLE OF WILLIS

- The Aorta gives off the following branches-
- Right subclavian artery which in turn gives right common carotid and right vertebral arteries.
- Left subclavian artery which gives left vertebral artery
- Left Common Carotid artery
- There are two systems participating in the formation of Circle of Willis
- 1. Vertebral System
- 2. Carotid system



Vertebral system

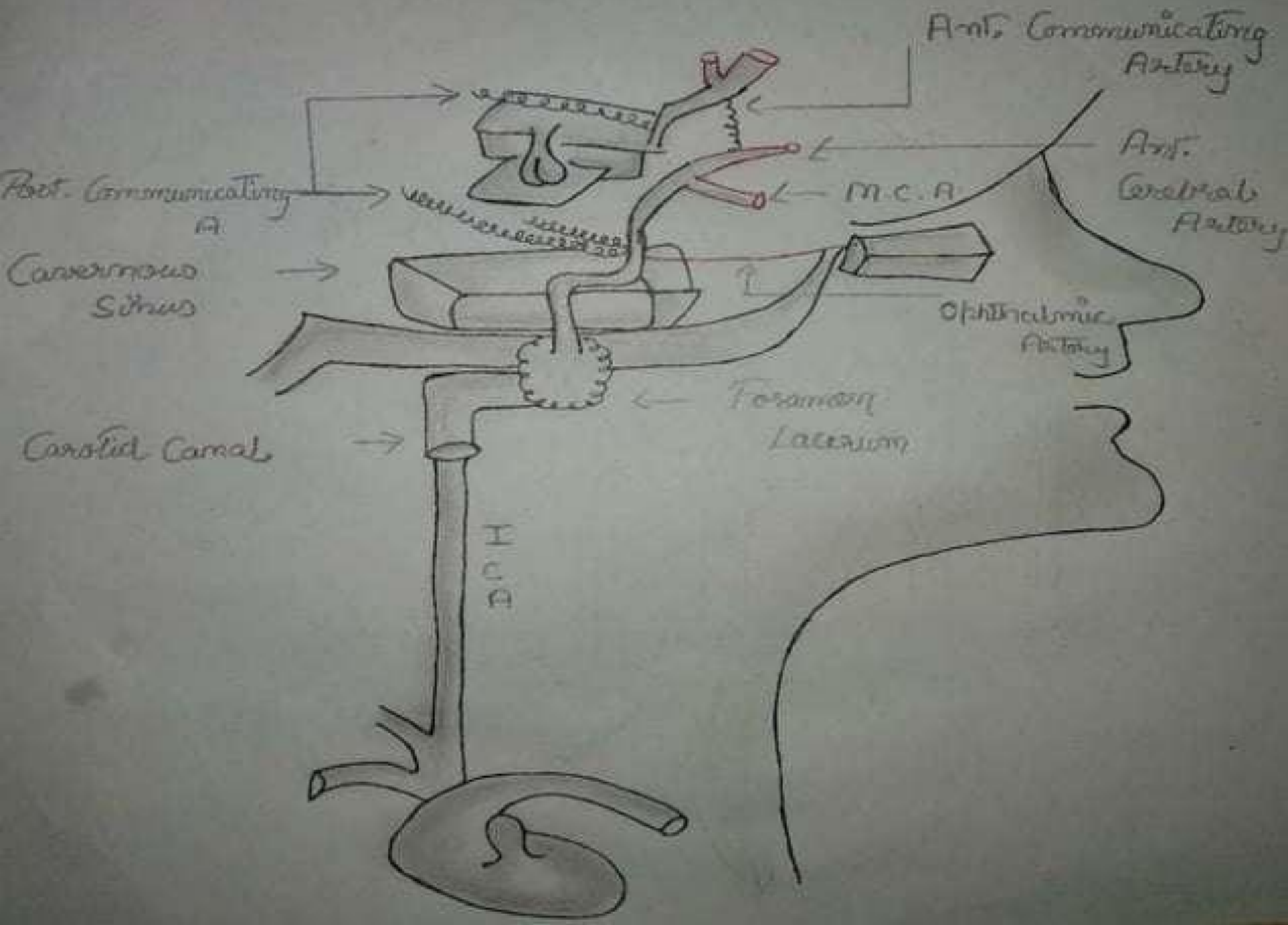
- The left and right vertebral arteries arise from the subclavian arteries and form the basilar artery .
- The basilar artery gives the following branches-
- **1. Posterior cerebral artery**-It supplies oxygenated blood to the posterior aspect of the brain (occipital lobe)
- **2. Superior cerebral artery**- It supplies the superior half of the cerebellum and parts of the midbrain. It is not a part of circle of Willis.

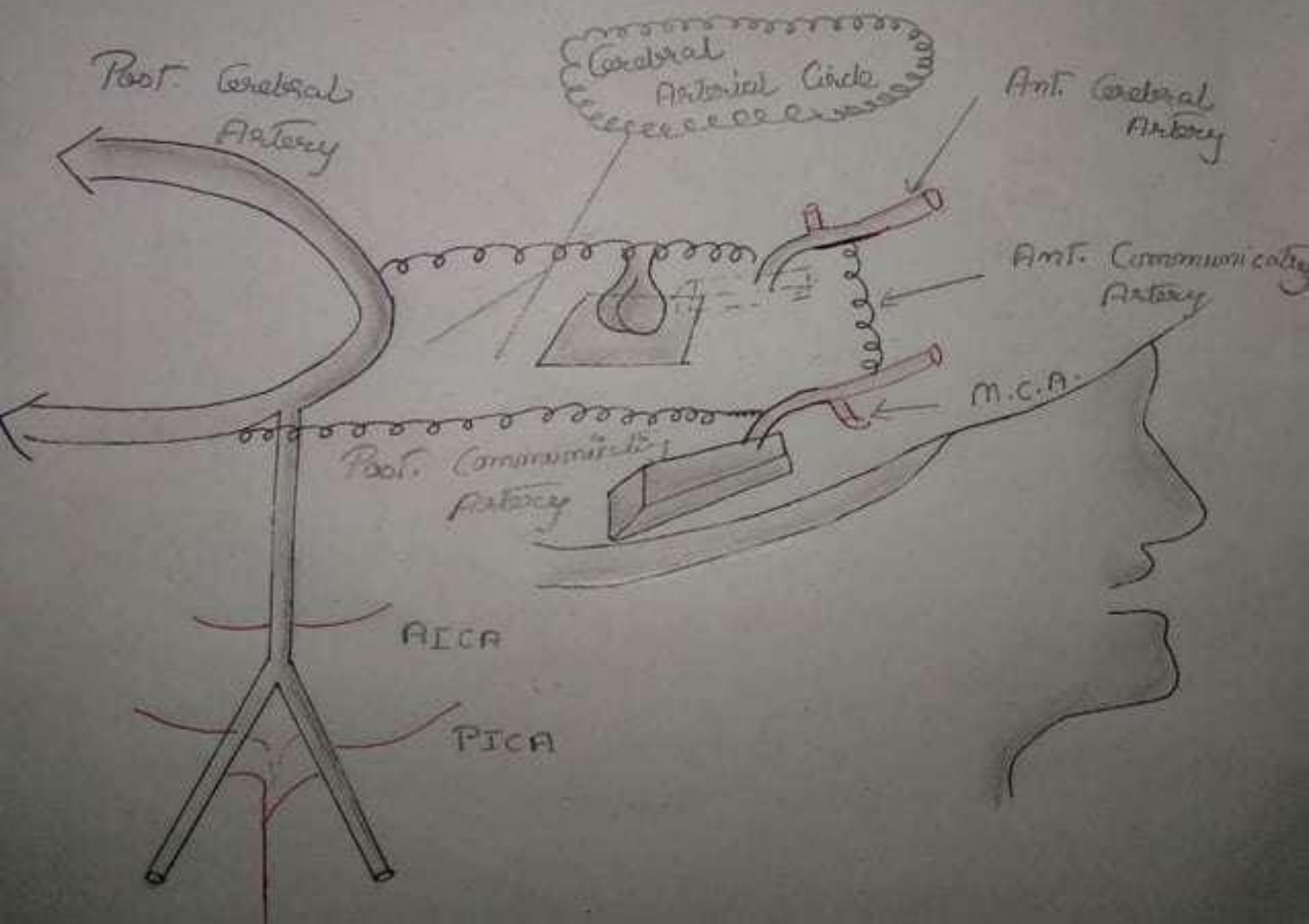


CAROTID SYSTEM

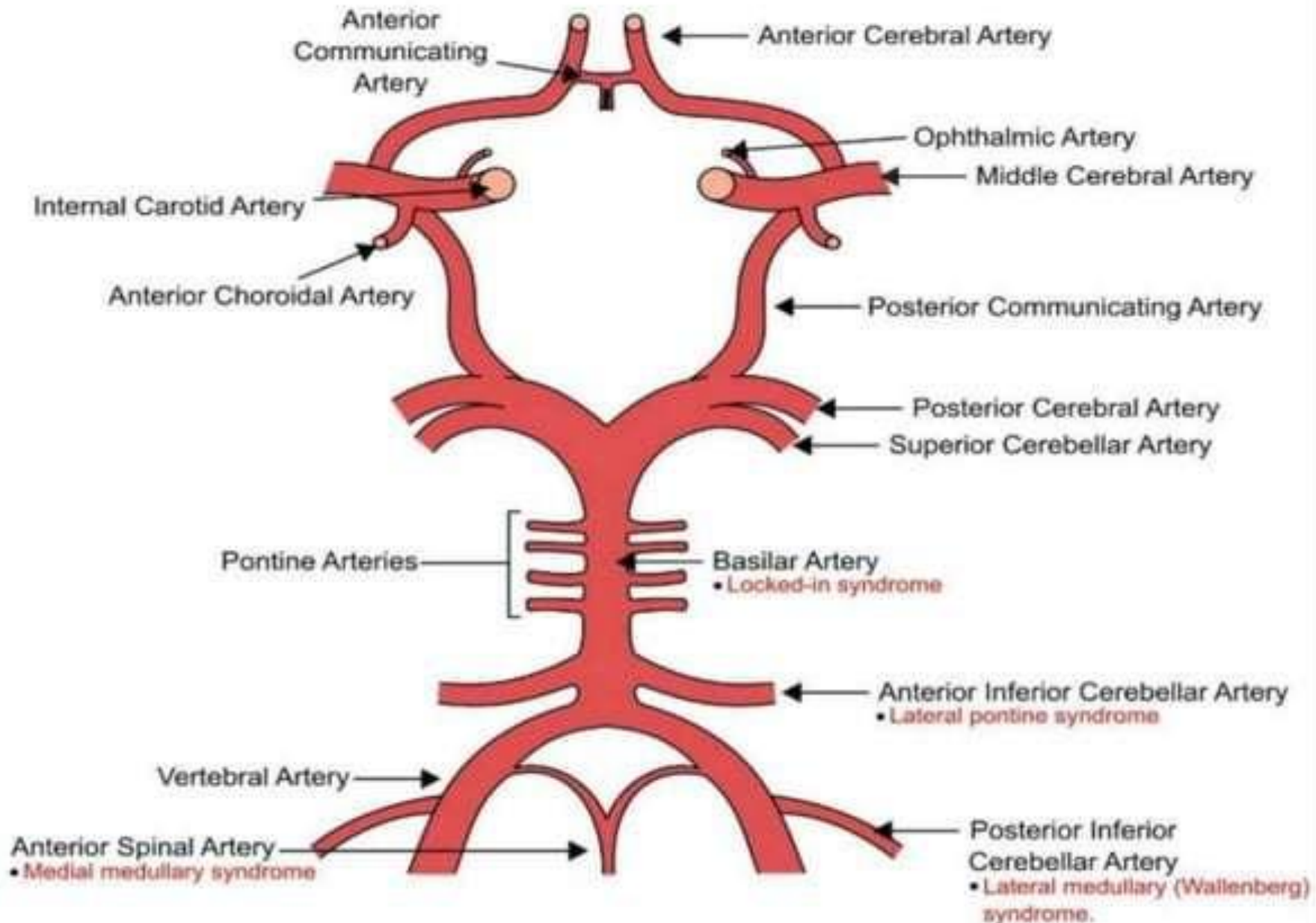
- The internal carotid artery mainly supplies the anterior aspect of the brain that's why it is also known as the anterior system
- It gives of the following branches-
- **1. Anterior cerebral artery**-The anterior cerebral artery forms the anterolateral portion of the circle of Willis. The anterior cerebral artery supplies a part of the frontal lobe, specifically its medial surface and the upper border. It also supplies the front four-fifths of the corpus callosum.
- **2. Middle cerebral artery**-It does not contribute to the circle.

- It also gives off posterior communicating artery which connects the internal carotid artery to the posterior circulation via posterior cerebral artery
- The left and right anterior cerebral arteries are connected by anterior communicating artery



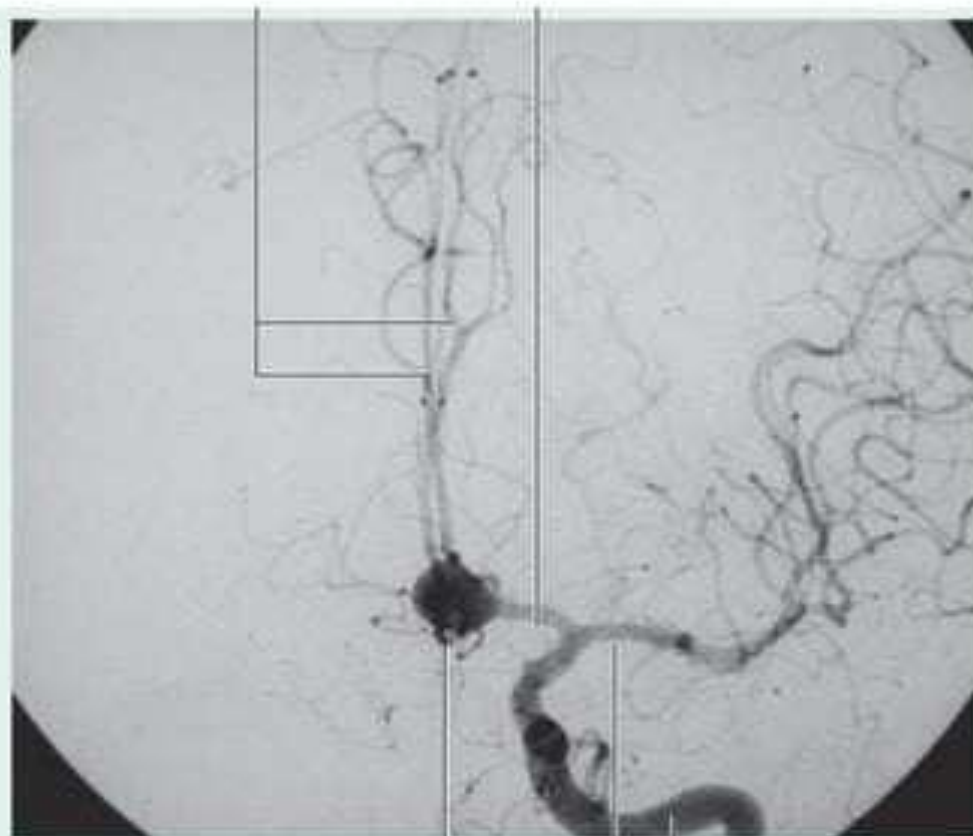


Circle of Willis



CLINICAL ASPECTS

- **1. Stroke-** It is the interruption of blood flow in the brain. It is of two types-
- **Ischemic Stroke-** it is dangerous because presence of plaque in the internal carotid artery can lead to the formation of thrombus(emboli) which travels to the circle of Willis and can obstruct blood flow causing an ischemic stroke
- **Hemorrhagic Stroke-** It can occur because of an aneurysm that grows and ruptures at a certain point which can cause hemorrhage and ultimately a stroke.
- **Aneurysms** are mostly formed at the division points of arteries as division points are considered as weak spots in a circulation.



Anterior communicating
artery aneurysm

- **2.Subclavian Steal Syndrome-**

- In subclavian steal syndrome, blood is "stolen" from the vertebral artery to preserve blood flow to the upper limb. Subclavian steal syndrome results from a proximal stenosis (narrowing) of the subclavian artery, an artery supplied by the aorta which is also the same blood vessel that eventually feeds the circle of Willis via the vertebral artery.

- The symptoms include-
- Presyncope (sensation that one is about to faint)
- Syncope (fainting)
- Blood pressure differential between the arms
- severe memory problems,etc

THANK YOU

REFERENCES-

- GRAY'S ANATOMY
- ACLAND'S VIDEOS
- YOUTUBE