



2025

KARNATKA RADIOLOGY EDUCATION PROGRAM

CEREBRAL Arterial ANATOMY OF THE BRAIN - 2

ARTERIAL CIRCLE OF WILLIS

Situation : At the base of the brain around the optic chiasma and other structures of the interpeduncular fossa.

BOUNDARIES OF THE CIRCLE OF WILLIS

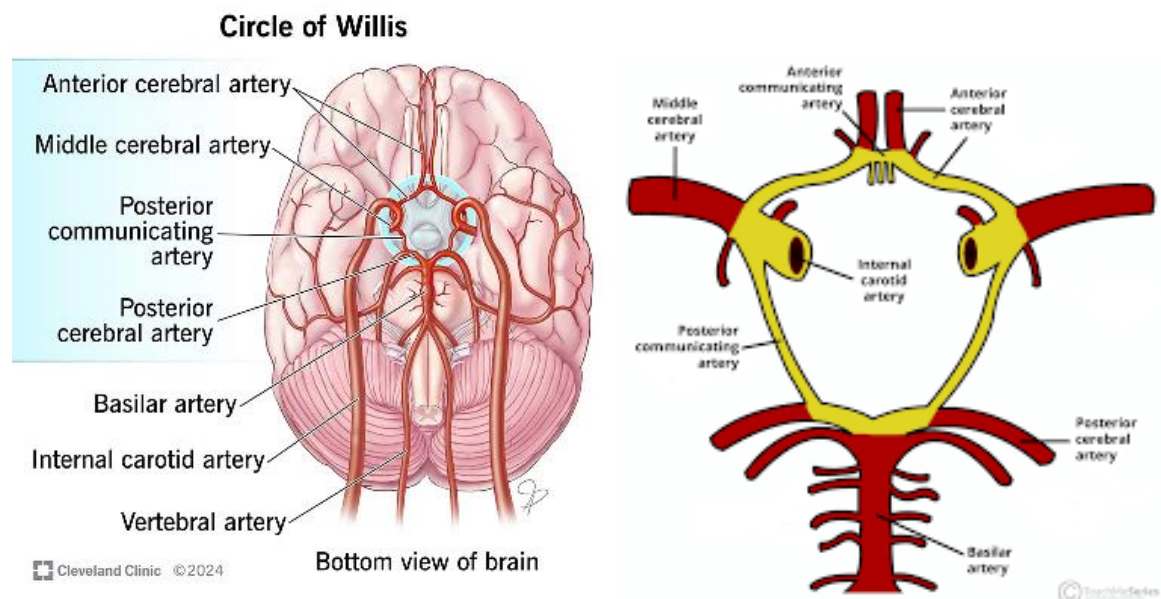
Front – Anterior communicating artery

Behind – 2 Posterior cerebral arteries

Antero-laterally – 2 Anterior cerebral arteries

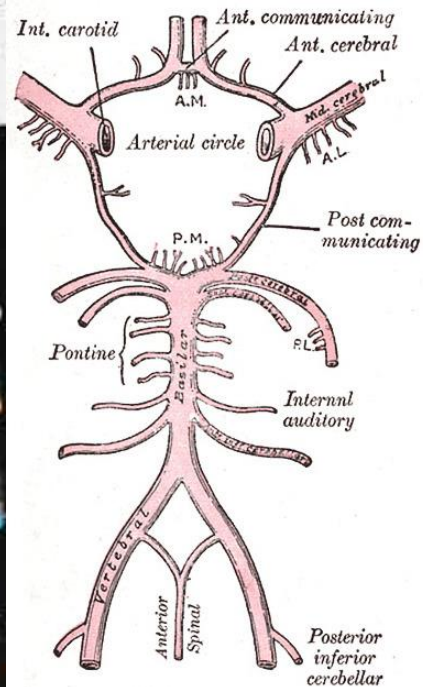
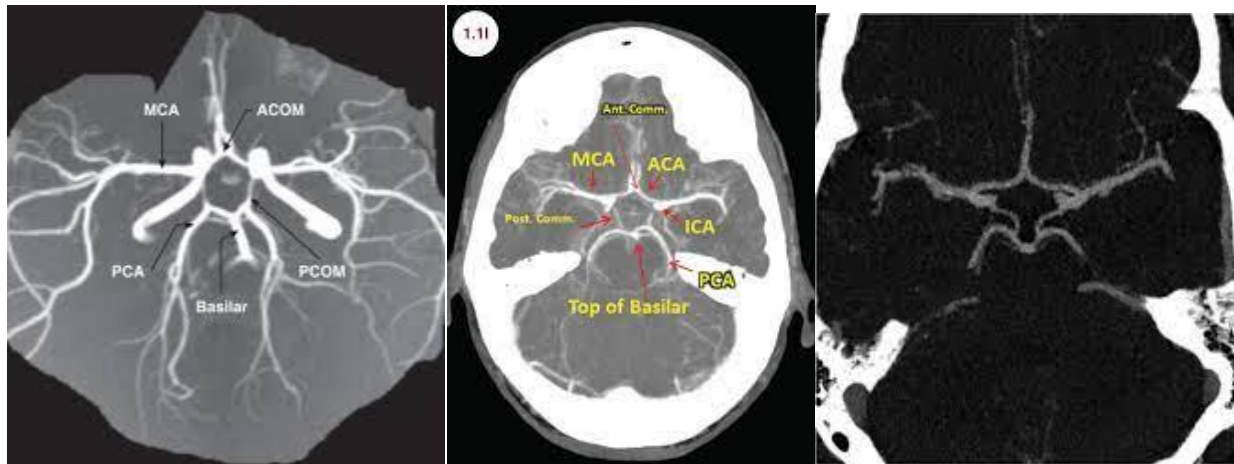
Postero-laterally – 2 Posterior communicating arteries

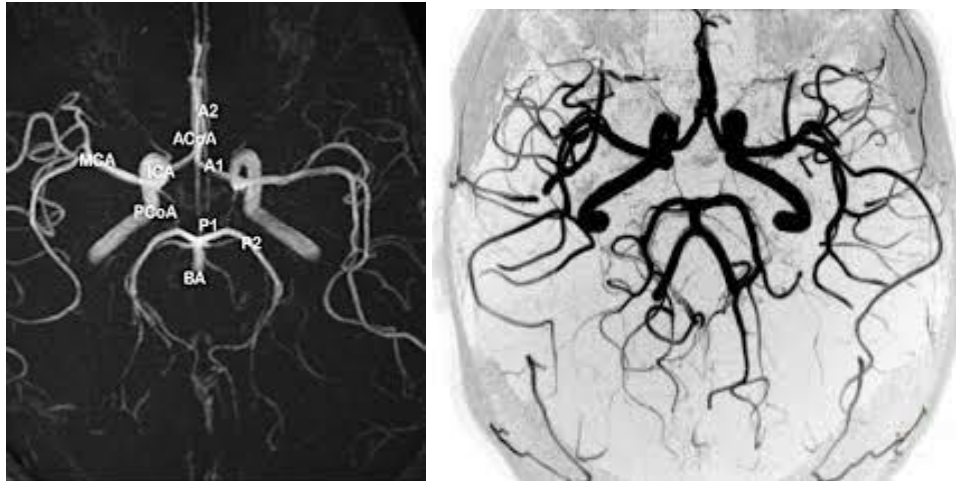
Laterally – Both the Internal carotid arteries



The circle of Willis (COW) or circulus arteriosus is an arterial polygon (heptagon) formed as the internal carotid and vertebral systems anastomose around the optic chiasm and infundibulum of the pituitary stalk in the suprasellar cistern.

This communicating pathway allows equalization of blood-flow between the two sides of the brain, and permits anastomotic circulation, should a part of the circulation be occluded.



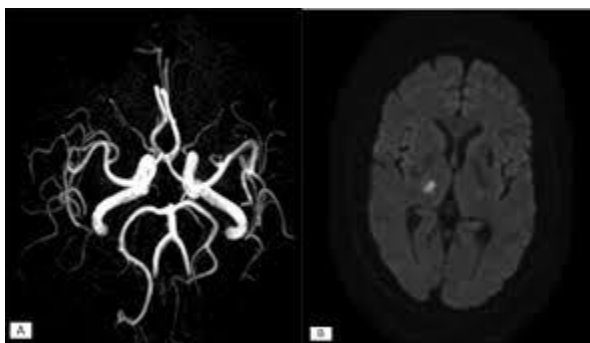


Variant anatomy

A complete circle of Willis (in which no component is absent or hypoplastic) is only seen in 20-25% of individuals. Posterior circulation anomalies are more common than anterior circulation variants and are seen in nearly 50% of anatomical specimens.

Common variants

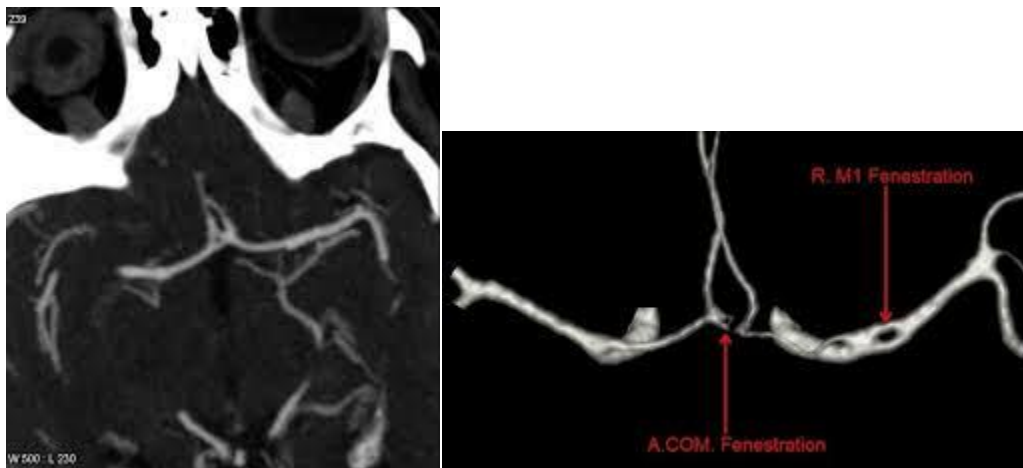
- *hypoplasia of one or both PCOM ~30% (range 25-34%)*
- *hypoplastic/absent A1 segment of ACA ~15% (range 10-15%)*
- *absent or fenestrated ACOM ~12.5% (range 10-15%)*
- *origin of PCA from the ICA with absent/hypoplastic P1 segment (fetal PCA) ~20% (range 17-25%)*
- *infundibular dilatation of the PCOM origin ~10% (range 5-15%)*
- Posterior communicating artery hypoplasia refers to the absence of the posterior communicating artery, a blood vessel that connects the posterior cerebral artery with the internal carotid artery, thus acting as a connection between the anterior and posterior portions of the circle of Willis.



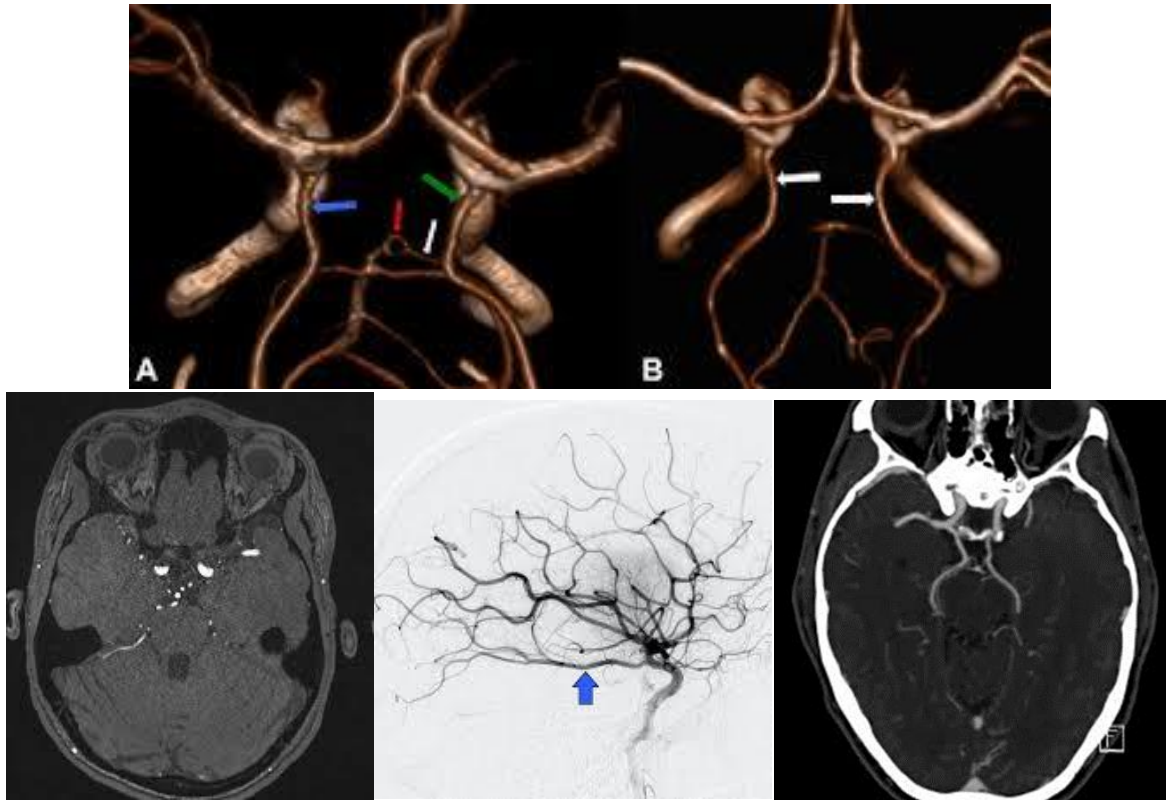
- Anterior cerebral artery hypoplasia or absence (aplasia) is an uncommon anatomical variant involving the first portion (A1 segment) of the anterior cerebral artery. The artery may be underdeveloped, as in hypoplasia, or completely absent, as in aplasia.



- Fenestration is a normal anatomical variant, seen more commonly in the posterior circulation. Although fenestration has no clinical significance, an association has been observed between fenestration and aneurysm formation.

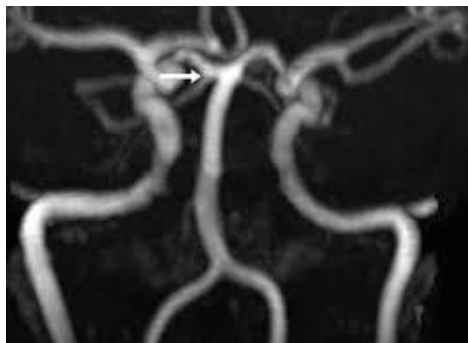


- A fetal PCA describes a situation whereby the posterior communicating artery (PCom) is larger than the P1 segment of the posterior cerebral artery (PCA) and, thus, supplies the bulk of the blood to the PCA 4,5. The P1 can be small (hypoplastic) or absent in this setting. When bilateral fetal PCAs are present, the basilar artery will be significantly smaller in caliber than normal re



- Infundibular dilatation of the PCOM origin

An infundibular dilatation (ID) of the PCoA was described as a funnel shaped beginning from ICA, wherein PCoA continues from ID dome.



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Ref: <https://radiopaedia.org/articles/intracranial-arteries-variants-1>

