Superior cerebellar artery (SCA)

- Persistent trigeminal artery variant functioning as a duplicate superior cerebellar artery
- Endovascular Treatment of Wide-Neck Intracranial Aneurysms Using the Novel Contour Neurovascular System: 5-Year Follow-Up
- The Vagoaccessory Triangle (VAT): The Arena of ELITE
- Bilateral superior cerebellar artery pure arterial malformation masquerading as aneurysms
- A case of recurrent hemangioblastoma receiving blood supply from the mastoid and transosseous branches of the occipital artery
- Considerations regarding the morphological variability of the superior cerebellar artery
- Anatomical Variations of the Trigeminal Arachnoid Membrane: Implications for Microvascular Decompression Surgery in Trigeminal Neuralgia
- Idiopathic Secondary Eosinophilia: Revealing Cerebral Aneurysms as a Vascular Complication

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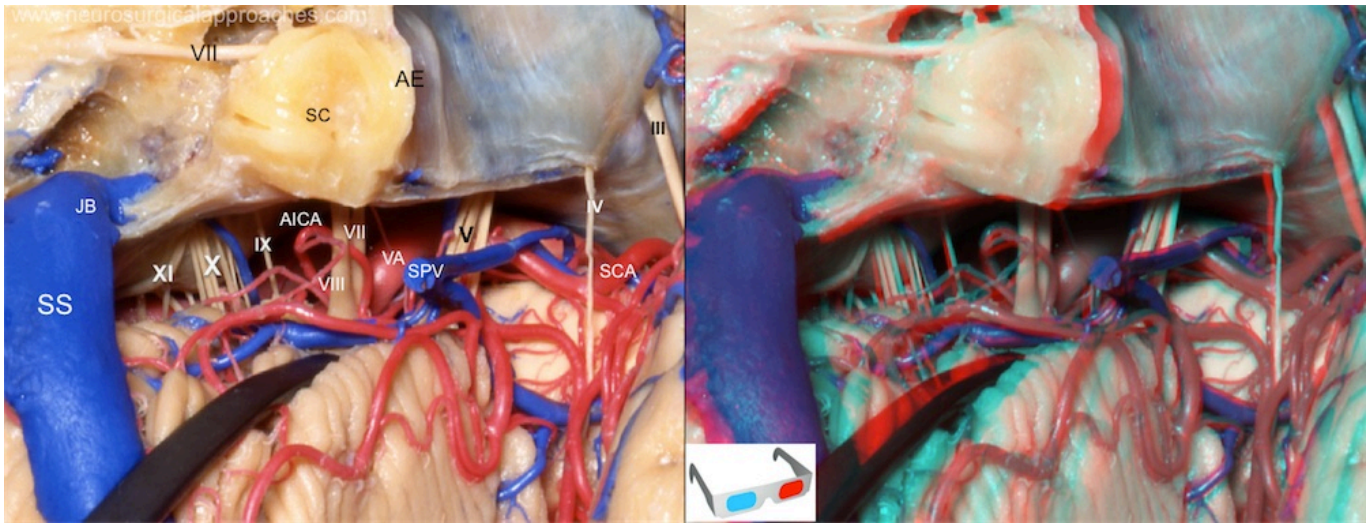
The superior cerebellar artery (SCA) arises near the termination of the basilar artery.

The SCAs leave the brainstem between cranial nerves IV and V to enter the cerebellomedullary fissure, and then after several sharp hairpin turns give rise to the precerebellar arteries that pass along the superior cerebellar peduncle to reach the superior fourth ventricle and dentate nucleus. Upon leaving the fissure the arteries supply end branches to the tentorial surface of the cerebellum.

It passes lateralward, immediately below the oculomotor nerve, which separates it from the posterior cerebral artery, winds around the cerebral peduncle, close to the trochlear nerve, and, arriving at the upper surface of the cerebellum, divides into branches which ramify in the pia mater and anastomose with those of the anterior and posterior inferior cerebellar artery.

Several branches are given to the pineal gland, the anterior medullary velum, and the tela chorioidea of the third ventricle.



AE: arcuate eminence; AICA: anteroinferior cerebellar artery; JB: jugular bulb; SC: semicircular canals; SCA: superior cerebellar artery; SPV: superior petrosal vein; SS: sigmoid sinus; VA: vertebral artery.

Anatomical variants

Anatomical variants of the SCA refer to variations in the course, origin, or branching pattern of this artery. These variants can have clinical relevance, as they may impact blood supply to specific areas of the cerebellum. Here are some common anatomical variants of the superior cerebellar artery:

Duplication of the Superior Cerebellar Artery (Double SCA): In some individuals, the SCA may have a duplicated origin. This means that instead of a single SCA arising from the basilar artery, two separate branches originate, each supplying different parts of the cerebellum. This variation can have implications for surgical procedures and vascular interventions in the posterior cranial fossa.

Fenestrations: Fenestrations are small openings or splits within the SCA, creating multiple smaller branches from a single artery. These fenestrations can affect the distribution of blood supply in the cerebellum.

Anomalous Origins: In some cases, the SCA may originate from arteries other than the usual source, which is the basilar artery. For example, the SCA can originate from the posterior cerebral artery (PCA) or the posterior communicating artery (PCoA). These anomalous origins can alter the blood supply pattern in the cerebellum.

Aneurysms: Abnormal dilations of the SCA can occur, leading to aneurysms. These aneurysms may result from congenital or acquired factors and can pose a risk of rupture, causing subarachnoid hemorrhage. The exact location and nature of the aneurysm can vary.

Variant Branching Patterns: The branching pattern of the SCA can differ among individuals. Variations may include the number, size, and distribution of branches originating from the SCA. Understanding these patterns is essential for neurosurgeons and interventional radiologists when planning procedures related to cerebellar pathology or vascular conditions.

Crossing Loops: Some SCAs may have a looping or crossing course as they travel to their destination. These loops can be relevant during surgical planning, as they may affect the approach to the target area.

These anatomical variants are important to consider in the fields of neurosurgery, neuroradiology, and vascular neurology. Understanding these variations is crucial for diagnosing and treating cerebellar disorders, including aneurysms, arteriovenous malformations (AVMs), and other vascular pathologies, as well as in planning surgical interventions or endovascular procedures for patients with such conditions. Variations in the SCA can impact the success and safety of these medical procedures.

Pathology

The vessel that most often causes trigeminal neuralgia (TN) is the superior cerebellar artery (SCA)

see Superior cerebellar artery aneurysm.

When approaching vermian arteriovenous malformations, the SCA feeders are identified by incising

the posterior arachnoid of the quadrigeminal cistern on both sides of the vermian apex and opening the cerebellomesencephalic fissure where the cortical branches (s4 segments) emerge. Feeders are traced to the AVM margin and coagulated, carefully preserving arteries to the tectum and posterior midbrain. PICA feeders originate beyond its cranial loop along the distal telovelotonsillar (p4) and cortical (p5) segments. Venous drainage is through superior vermian veins, which drain to the Galenic complex (unlike inferior vermian veins). Vermian AVMs are not considered eloquent unless they extend to the cerebellar nuclei, and can be near but not associated with the trochlear nerve [1)]. [2)].

1)
Rodríguez-Hernández A, Kim H, Pourmohamad T, Young WL, Lawton MT. University of California, San Francisco Arteriovenous Malformation Study Project. Cerebellar arteriovenous malformations: Anatomic subtypes, surgical results, and increased predictive accuracy of the supplementary grading system. Neurosurgery. 2012 Dec;71(6):1111–1124.
2)
Rodríguez-Hernández A, Rhoton AL Jr, Lawton MT. Segmental anatomy of cerebellar arteries: a proposed nomenclature. Laboratory investigation. J Neurosurg. 2011 Aug;115(2):387-97. doi: 10.3171/2011.3.JNS101413. Epub 2011 May 6. PubMed PMID: 21548748.