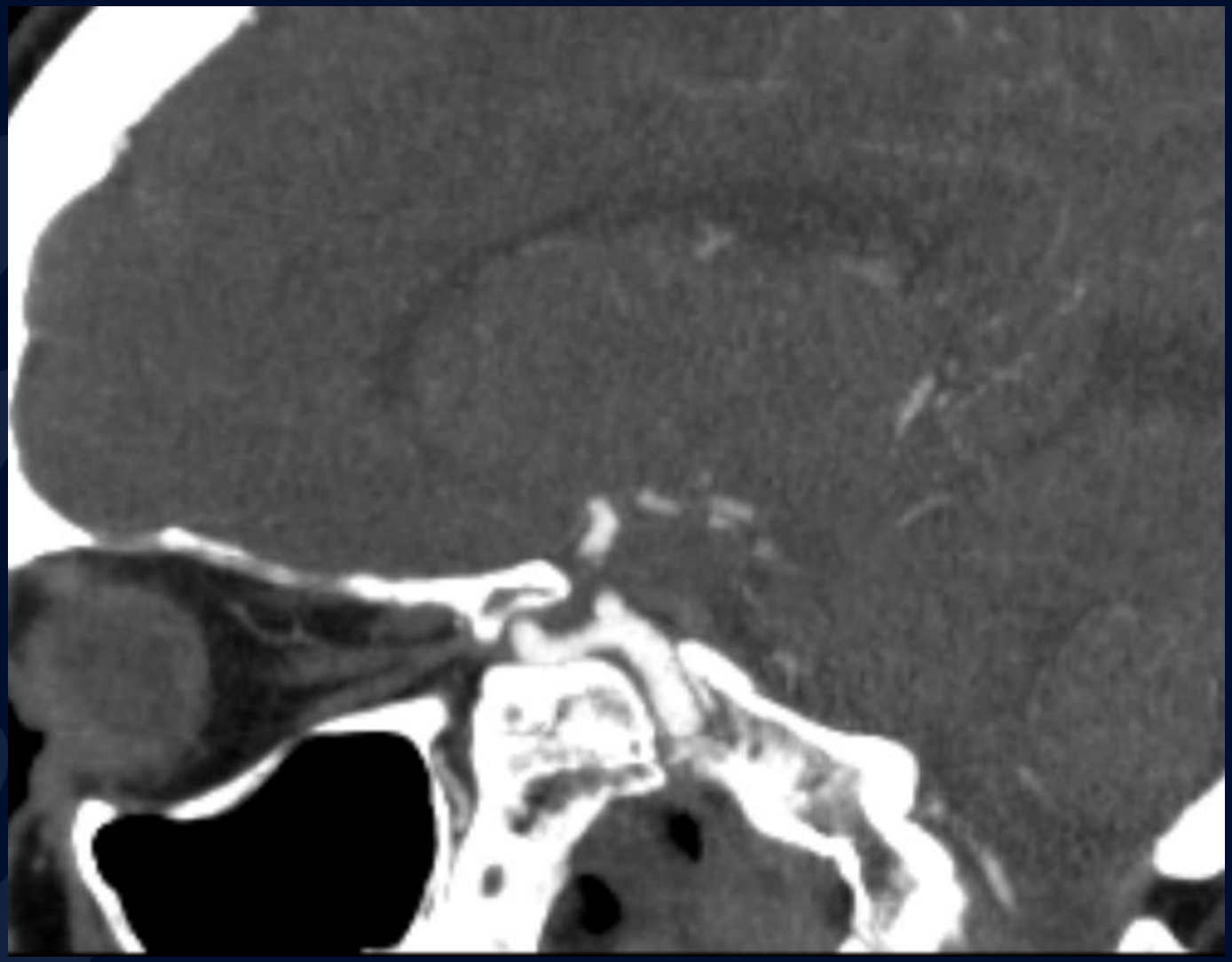
57-year-old female for evaluation of stroke with incidental finding on angiography

Keerthana Sharma Anand, MBBS

Clifford Yang, MD

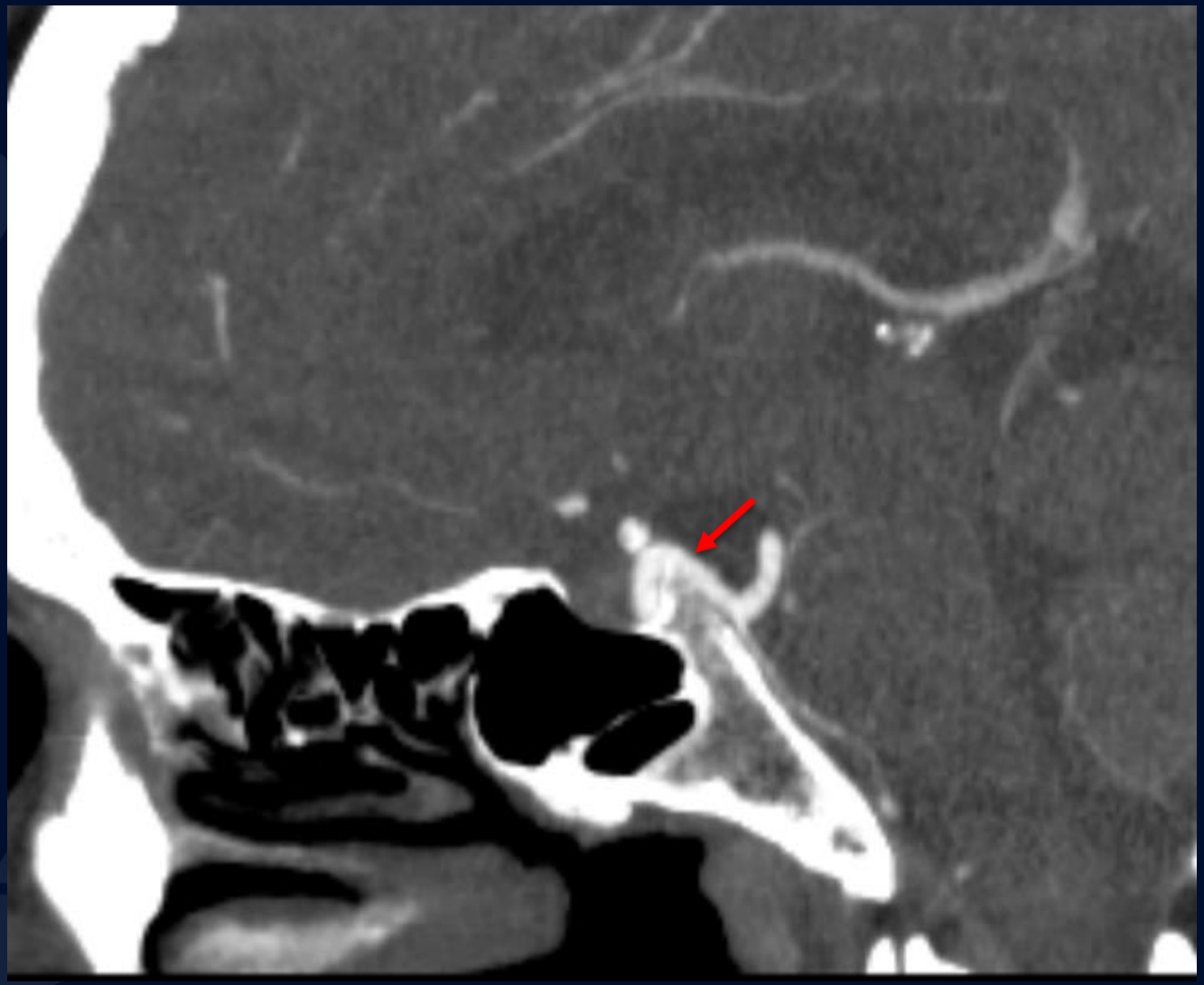
UCONN HEALTH

RADIOLOGY



Sagittal CT Angiogram

UCONN HEALTH
RADIOLOGY



Sagittal CT Angiogram

UCONN HEALTH
RADIOLOGY

Axial CT Angiogram

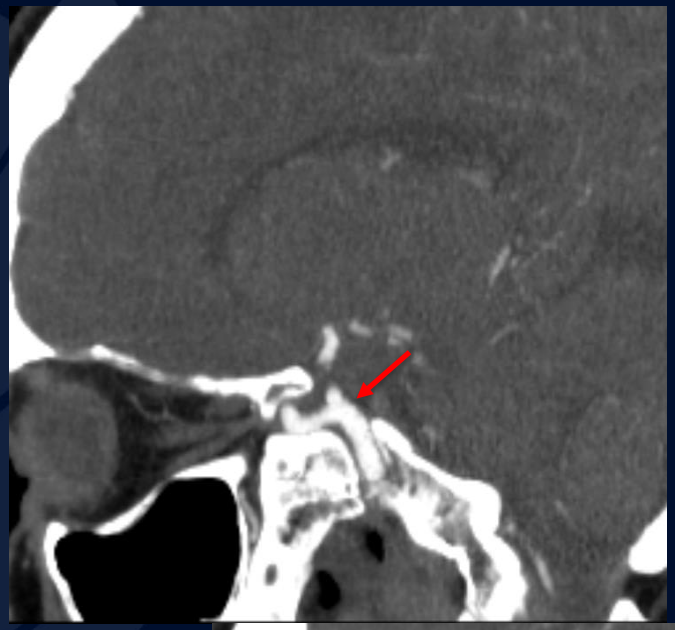
UCONN HEALTH
RADIOLOGY

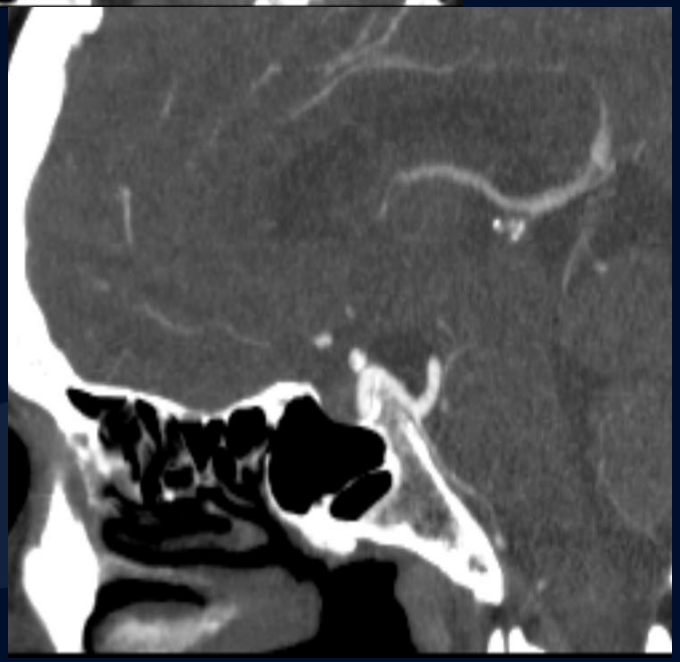
?

UCONN
HEALTH
RADIOLOGY

Persistent Primitive Trigeminal Artery

UCONN HEALTH
RADIOLOGY





Sagittal CT Angiogram

Here the trigeminal artery is seen arising from the internal carotid at the level of the carotid siphon, giving rise to the classic trident appearance.

The artery then travels posteromedially and has an intrasellar course before piercing the dorsum sella, which makes this the medial variant of trigeminal artery.

UCONN HEALTH
RADIOLOGY

Axial CT Angiogram

On the axial slice, the trigeminal artery is again seen traversing the sella turcica before piercing the dorsum sellae to anastomose with the basilar artery.

The basilar artery caudal to the anastomosis is diminutive, which is a commonly associated finding with persistent primitive trigeminal artery.

UCONN HEALTH
RADIOLOGY

Persistent Primitive Trigeminal Artery

General features:

- Most common persistent vertebrobasilar anastomosis.
- Occurs due to failure of regression of the embryonic connection between the internal carotid and basilar arteries.

Classification:

Medial vs Lateral subtypes

Medial: posteromedial course with intrasellar/trans-hypophyseal course, close proximity with pituitary gland

Lateral: posterolateral course, associated with CN V

Saltzman Classification System:

Type 1: Trigeminal artery supplies the entire vertebrobasilar system cranial to the anastomosis, posterior communicating artery is absent.

Type 2: Trigeminal artery joins the basilar artery caudal to the superior cerebellar artery; posterior circulation is supplied by the posterior communicating artery.

UCONN HEALTH
RADIOLOGY

Imaging Features

Modality of choice: MRA, CTA or conventional cerebral angiography.

Location: Seen as a large-caliber anomalous vessel arising from the intracavernous ICA, which then anastomoses with the basilar artery.

Imaging findings:

- Characteristic tau or trident sign may be seen as the trigeminal artery arises from the ICA, as two upward pointing vessels.
- Angiography may reveal other associated arterial anomalies such as a saccular aneurysm.
- Proximal basilar artery is often hypoplastic.

UCONN HEALTH
RADIOLOGY

Clinical Features

- Typically asymptomatic, discovered as an incidental finding.
- Medial variant can cause mass effect on the pituitary gland causing hypopituitarism, visual field defects.
- Lateral variant can cause trigeminal neuralgia due to close proximity with CN V.
- Increased association with intracranial aneurysms is controversial, screening for aneurysm not indicated.

Clinical significance:

- Identification is important to avoid fatal hemorrhage during trans-sphenoidal surgery.
- Stroke or vascular diseases of the ICA can cause ischemia of posterior circulation due to hypoplastic basilar artery and its branches.

- **Treatment:** No treatment required unless associated with aneurysms.

UCONN HEALTH
RADIOLOGY

References

- Lam, Jeremy Jia Hong et al. “Persistent primitive trigeminal artery associated with a cavernous carotid aneurysm. Case report and literature review.” *Journal of radiology case reports* vol. 12,11 1-11. 30 Nov. 2018, doi:10.3941/jrcr.v12i11.3500

- Radiopaedia: Persistent primitive trigeminal artery. https://radiopaedia.org/articles/persistent-primitive-trigeminal-artery

- STATdx: Persistent Carotid Basilar Anastomoses. Hediyeh Baradaran, MD; Karen L. Salzman, MD

- Persistent Primitive Trigeminal Artery. Sharma K, Yang C. Radiology Online (2021)

UCONN HEALTH
RADIOLOGY