

Surgical Management of Brain Cavernous Malformations and Moyamoya Disease

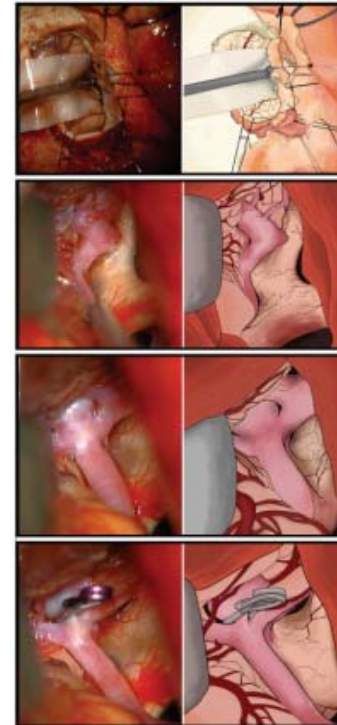
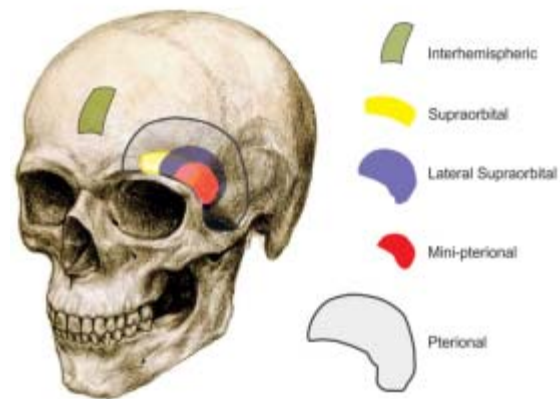
Achal Singh Achrol, M.D.

Director, Neurovascular Surgery, Pacific Neuroscience Institute
Chief, Glioma Surgery Program, John Wayne Cancer Institute
Providence Saint John's Health Center

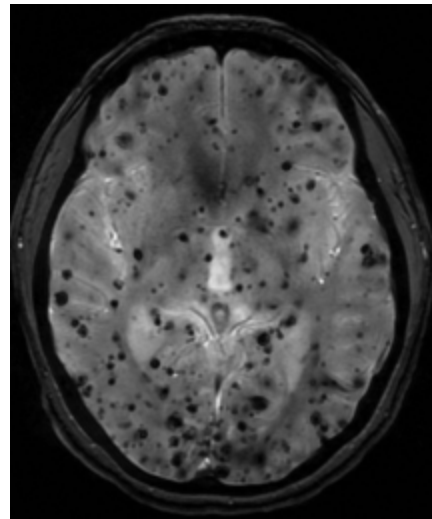
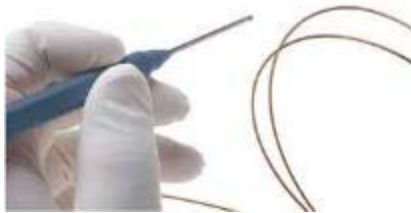
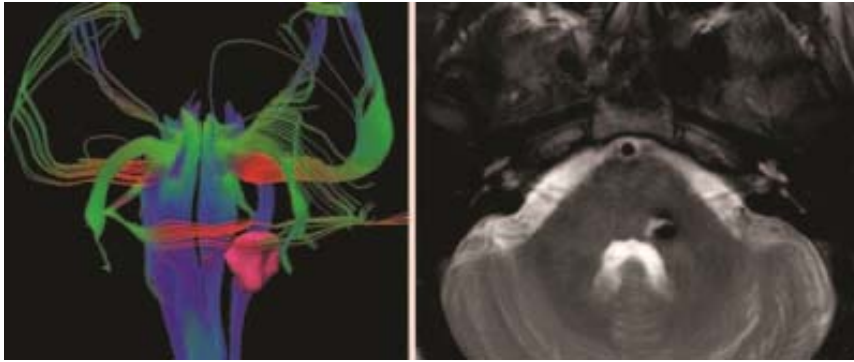


achrol@jwci.org
PACIFICNEURO.ORG

Keyhole Approaches in Vascular Neurosurgery

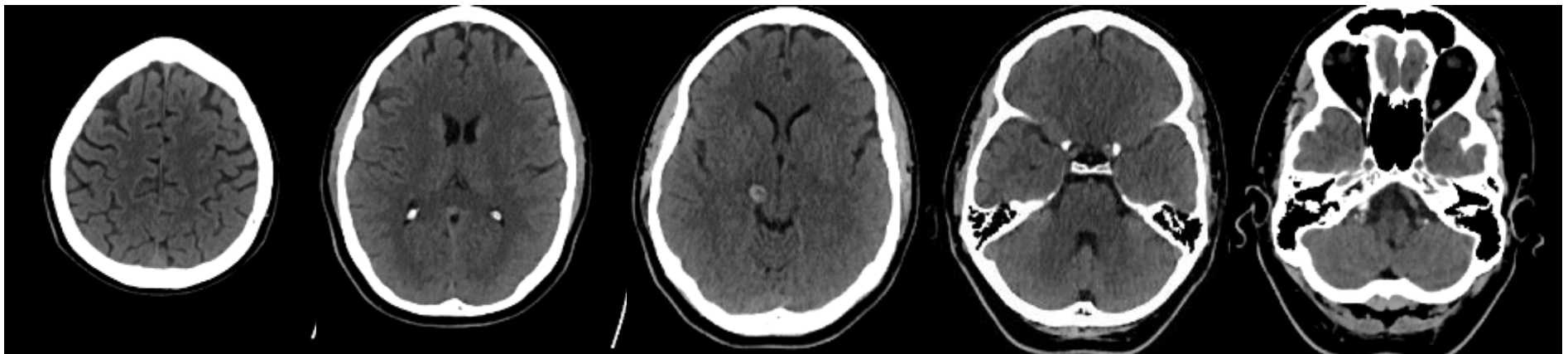


Management of Brainstem Cavernomas

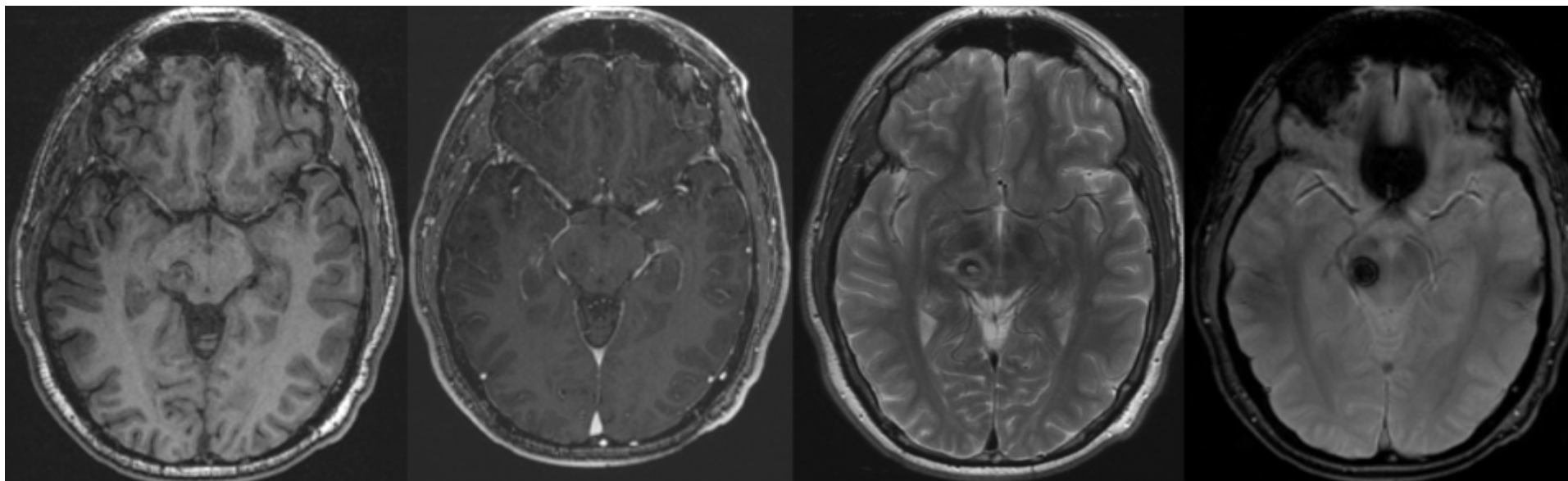


- ◆ Brainstem, thalamic, motor cortex and other eloquent symptomatic cavernoma
- ◆ OmniGuide Laser and DTI-guided microsurgical resection with advance neuromonitoring; awake craniotomies in select patients
- ◆ **Clinical trials:** targeted therapies for familial multiple CCMs

44yo M h/o rosacea, HL, acute onset L hand and foot numbness after playing basketball the day before, now includes L hemibody numbness and tingling, blurry vision, anisocoria 5mm L, 3mm R, subtle L ptosis. V1-3 intact less on L w paresthesias, 3+ reflexes in BLE.



1 cm hyper-attenuating lesion on non-contrast CTH at the junction of the right thalamus and midbrain.



T1 Pre

T1 Post

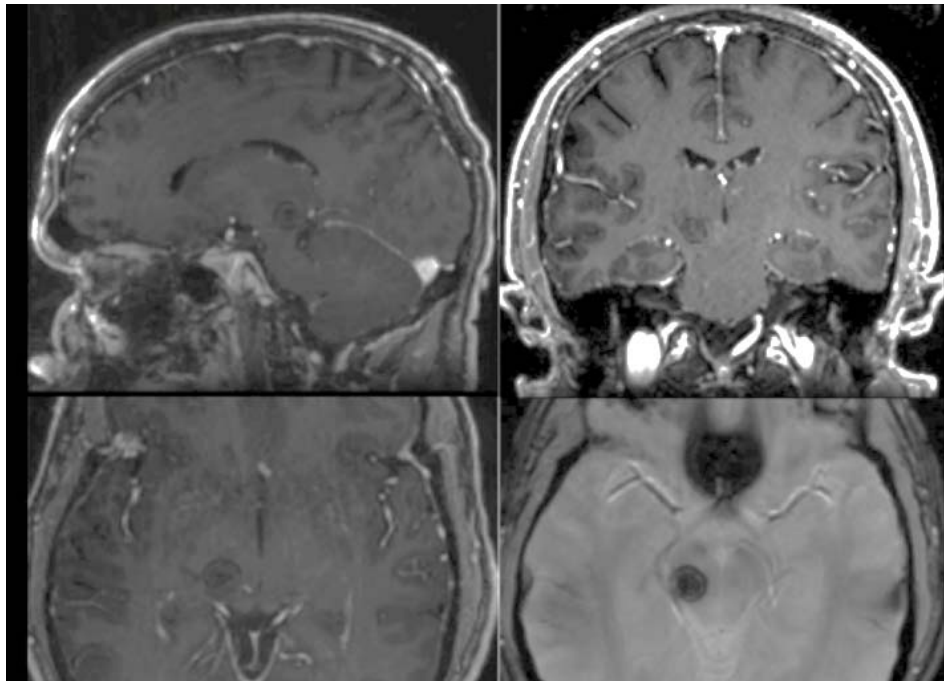
T2

GRE

Management

- Treatment recommended for symptomatic cavernomas, efficacy established both for control of epilepsy and prevention of rebleeding.
- Only treatment is total microneurosurgical resection.
- Eloquent, deeply-seated or infratentorial brainstem cavernomas may benefit from functional MRI, DTI, and/or electrophysiologic mapping

Operative Approach



Operative Approach

Posterior fossa “suboccipital” supracerebellar infratentorial approach

Occipital transtentorial approach

Subtemporal (transtentorial) approach

Anterior transpetrosal approach

Posterior transcallosal approach

Posterior transventricular approach

Anterior transcallosal or transcortical subchoroidal approaches

Operative Approach

Considerations when selecting an approach:

Optimal approach gives straight-line access to lesion, least impact on surrounding brain

Two-point method (Brown et al). One point placed at center of lesion, second point placed where lesion comes closest to a pial surface or at safest entry point into brainstem. Connecting these two points, a line is drawn and extended to the skull guides selection of the most appropriate craniotomy.

Long-Axis method (Steinberg et al). **Draw a line along the long axis of the lesion extended to skull to guide selection of the most appropriate craniotomy.**

Operative Approach

Posterior fossa “suboccipital” (right superolateral) supracerebellar infratentorial approach

Intraoperative electrophysiologic monitoring guide “safe entry zones” into the brainstem.

identify cranial nerves, motor nuclei, corticospinal or corticobulbar pathways and their possible displacements

Safe entry zones to brainstem include:

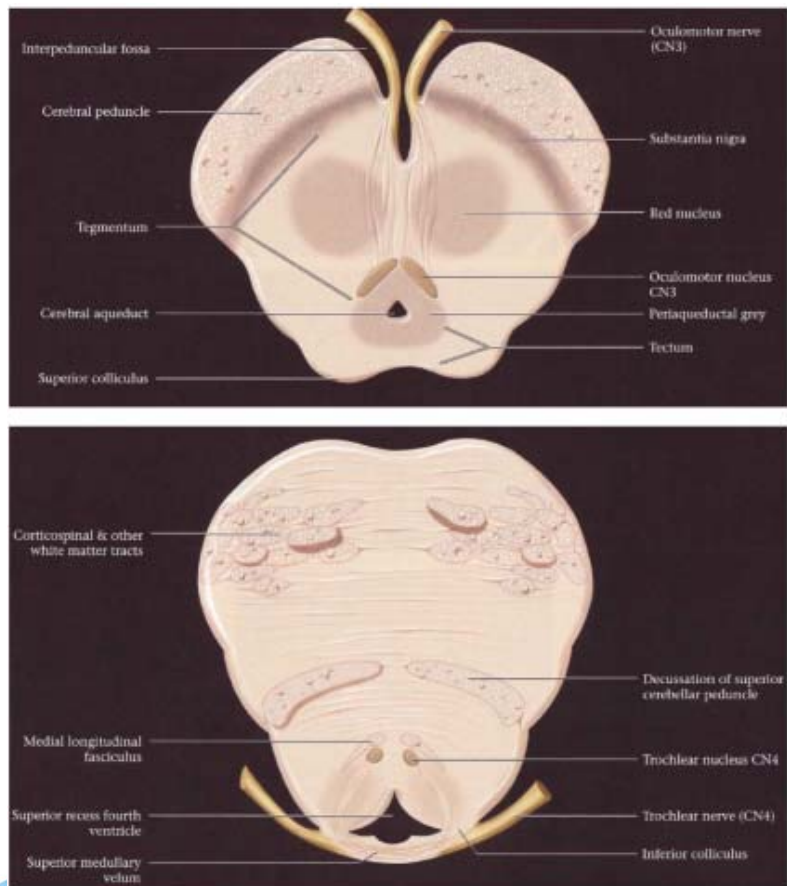
lateral mesencephalic sulcus, interpeduncular zone, peritrigeminal area (between the emergence of cranial nerves V and VII), the supra- and infracollicular zone, the suprafacial triangle (immediately above the facial colliculus), the infrafacial triangle (immediately below the facial colliculus), and the retroolivary sulcus.



Achal Singh Achrol M.D. achrol@jwci.org

PACIFICNEURO.ORG

Anatomy



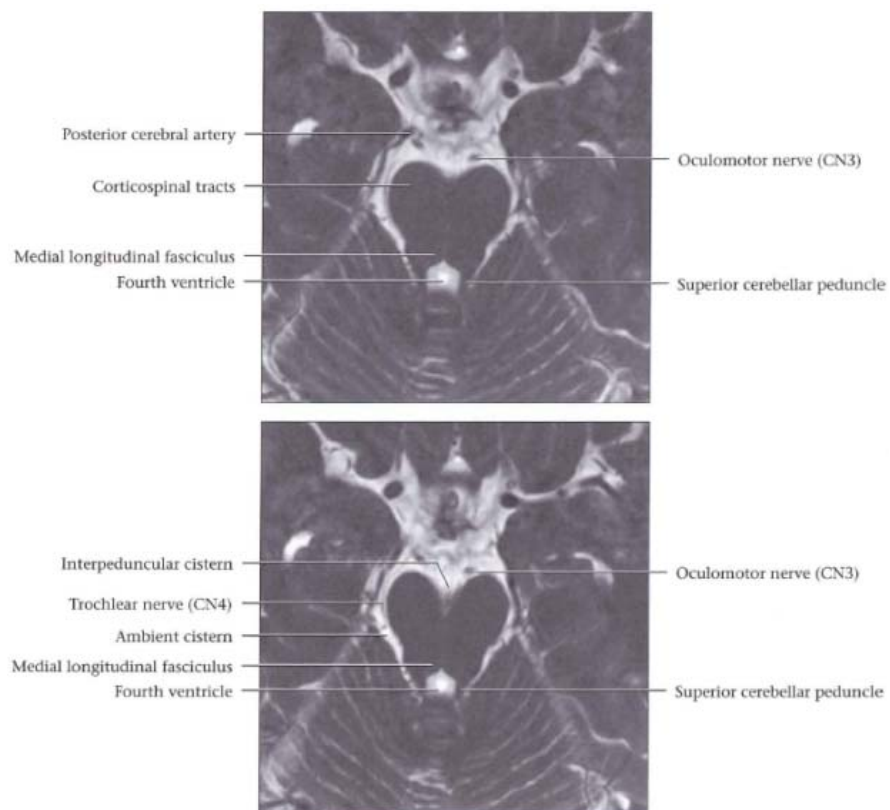
CN3 & 4 seen as they exit midbrain

CN3 at level of superior colliculus, seen in interpeduncular fossa

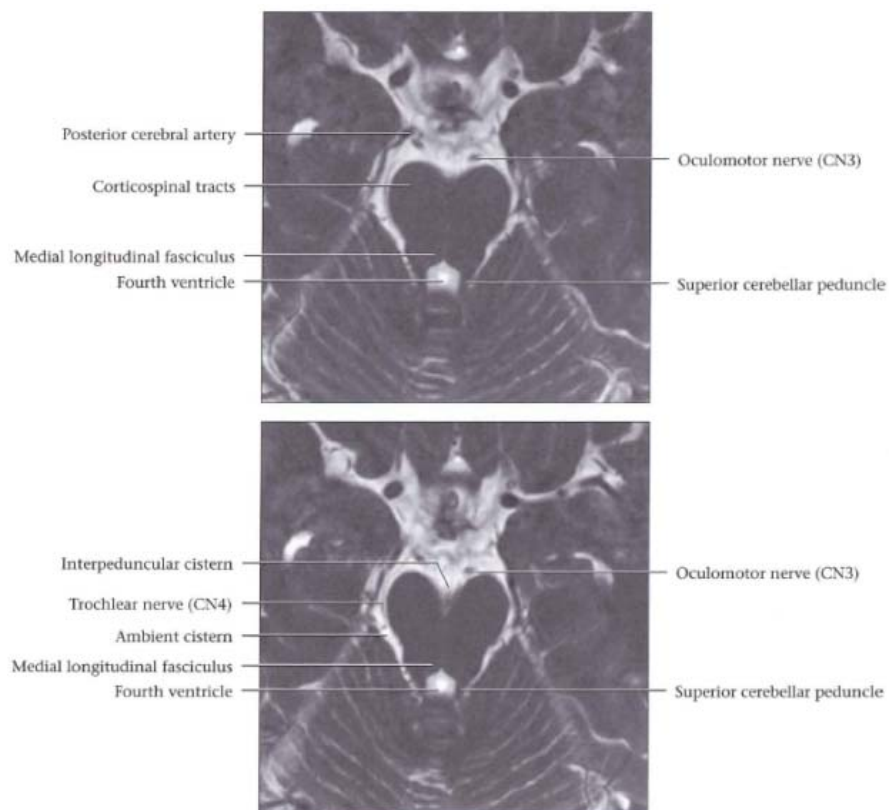
CN4 at level of inferior colliculus, seen dorsally and in ambient cistern as wraps around midbrain

Achal Singh Achrol M.D. achrol@jwci.org
PACIFICNEURO.ORG

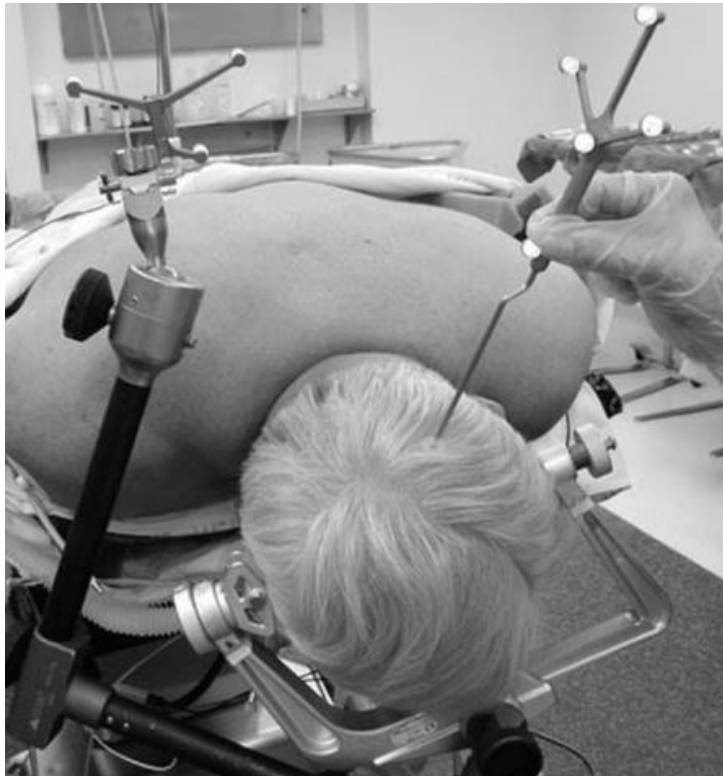
Anatomy



Anatomy



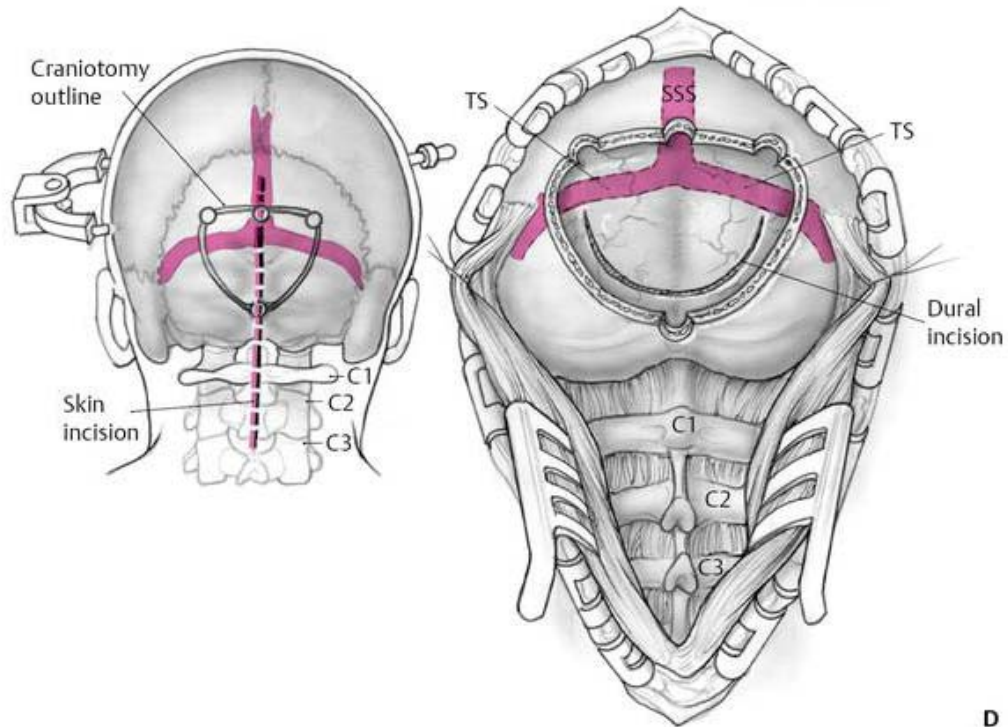
Positioning



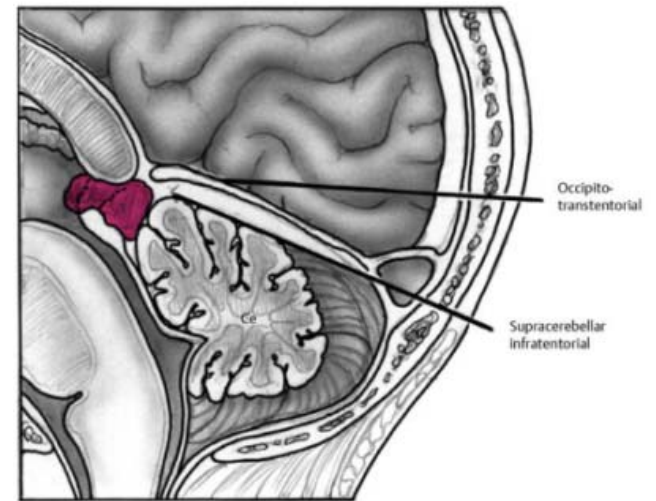
**PACIFIC
NEUROSCIENCE
INSTITUTESM**

Achal Singh Achrol M.D. achrol@jwci.org
PACIFICNEURO.ORG

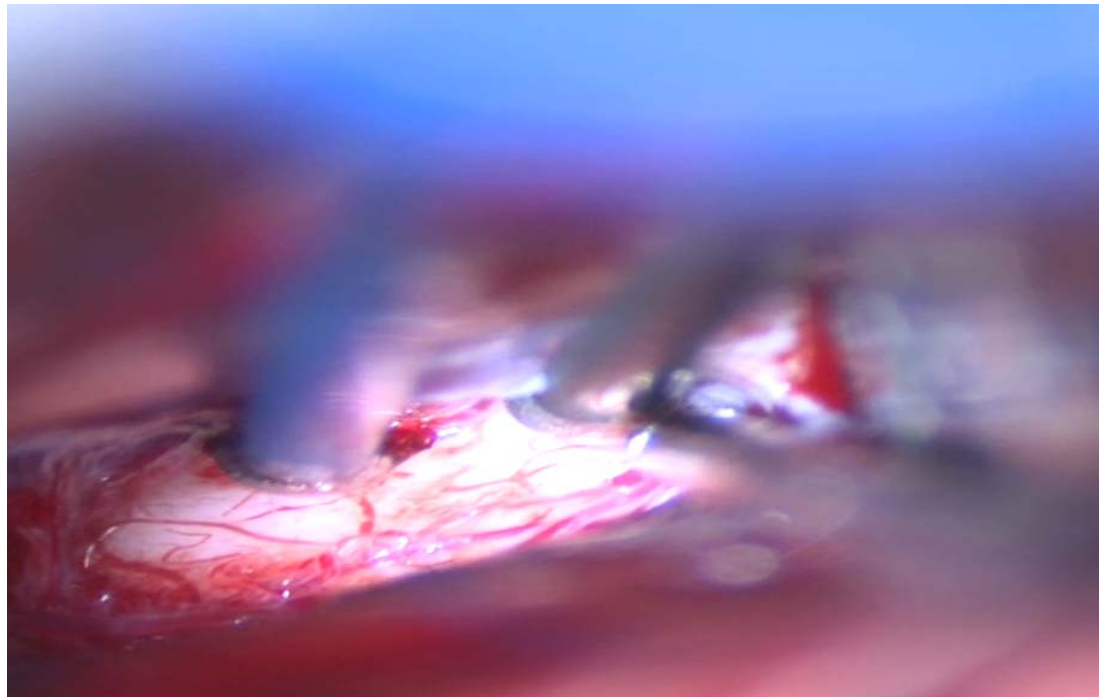
Approach



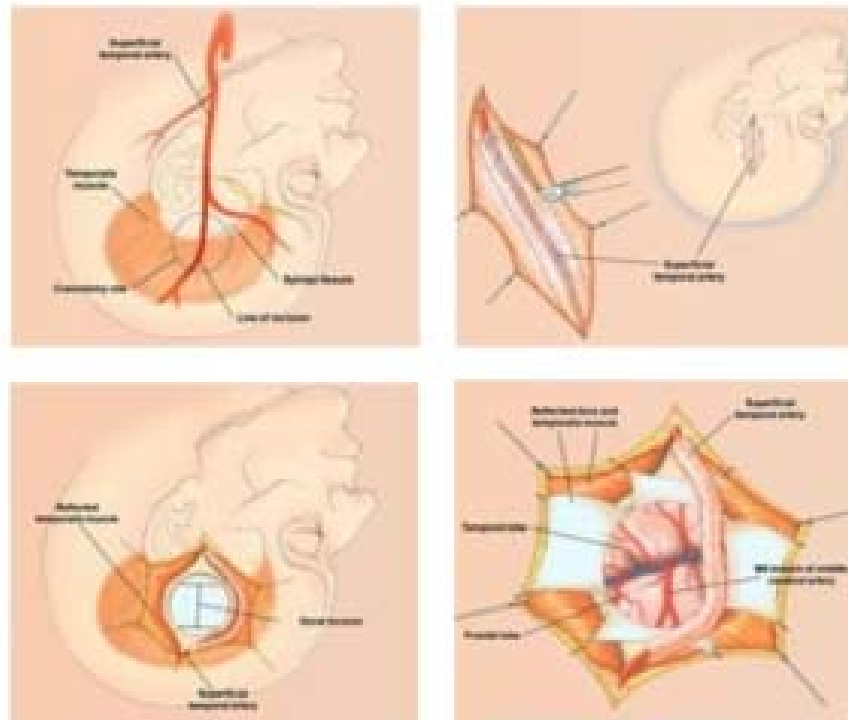
D



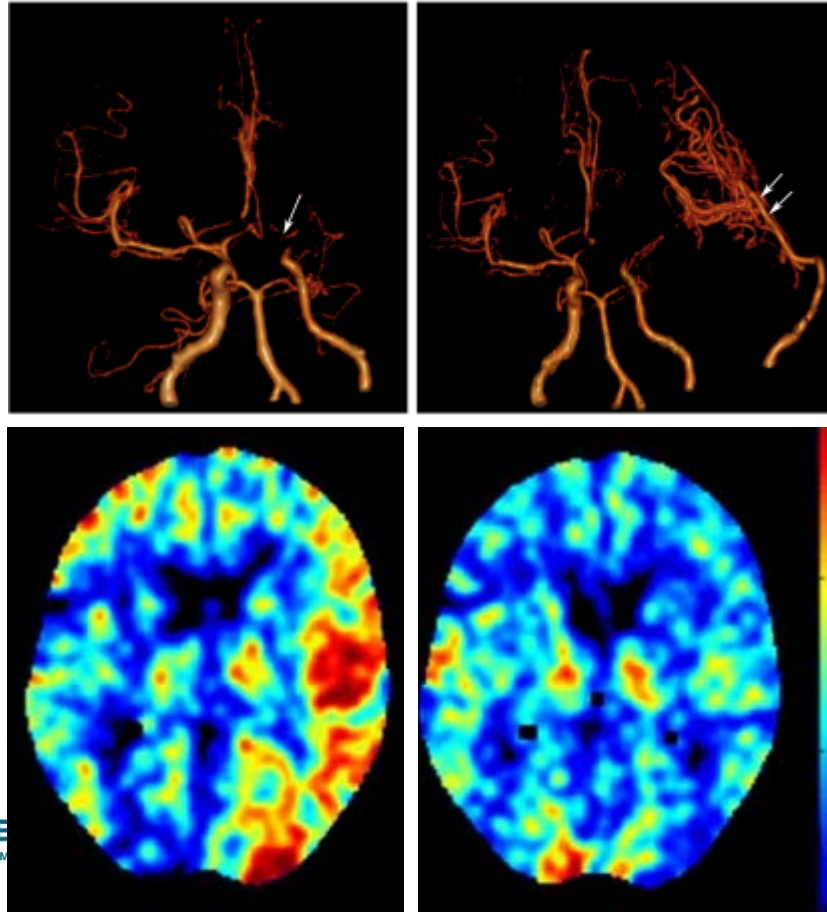
Intraoperative Video



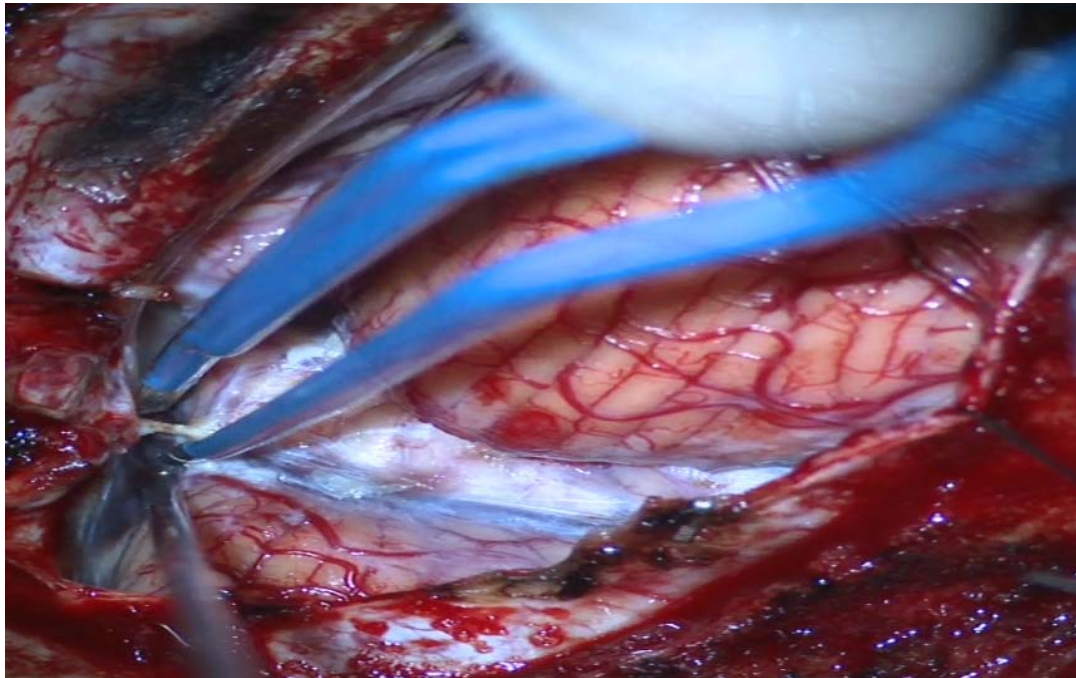
Management of Moyamoya Disease



Management of Moyamoya Disease



Intraoperative Video





**PACIFIC
NEUROSCIENCE
INSTITUTE** SM

**Saint John's
Health Center**
+ **PROVIDENCE** Health & Services



**JOHN WAYNE
CANCER INSTITUTE**
at Providence Saint John's Health Center