

Subarachnoid Hemorrhage

during a pandemic

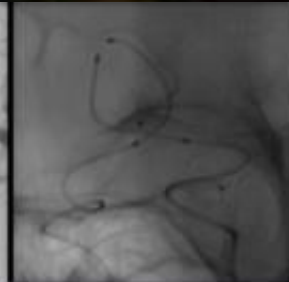
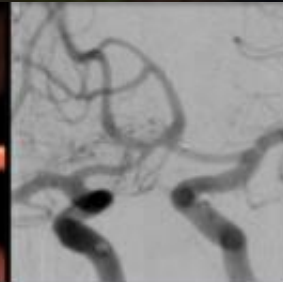
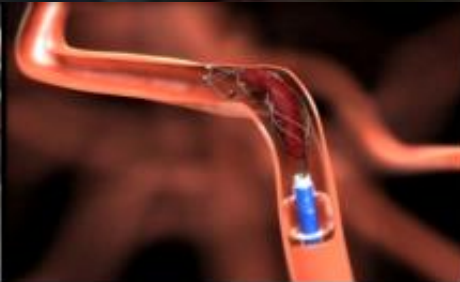


David Loy, M.D., Ph.D.

Assistant Professor, University of Virginia

Co-Medical Director, Comprehensive Stroke Center

St. Mary's Hospital – Richmond, VA



SAH in Virginia

- 85% - ruptured brain aneurysm or AVM
- 15% - unknown cause (perimesencephalic)
- Incidence 9/100,000 person-years
 - Higher in Finland and Japan
- 800/year in Virginia (8.6M pop est)
- 10-15% die before reaching hospital
- 700 hospitalizations

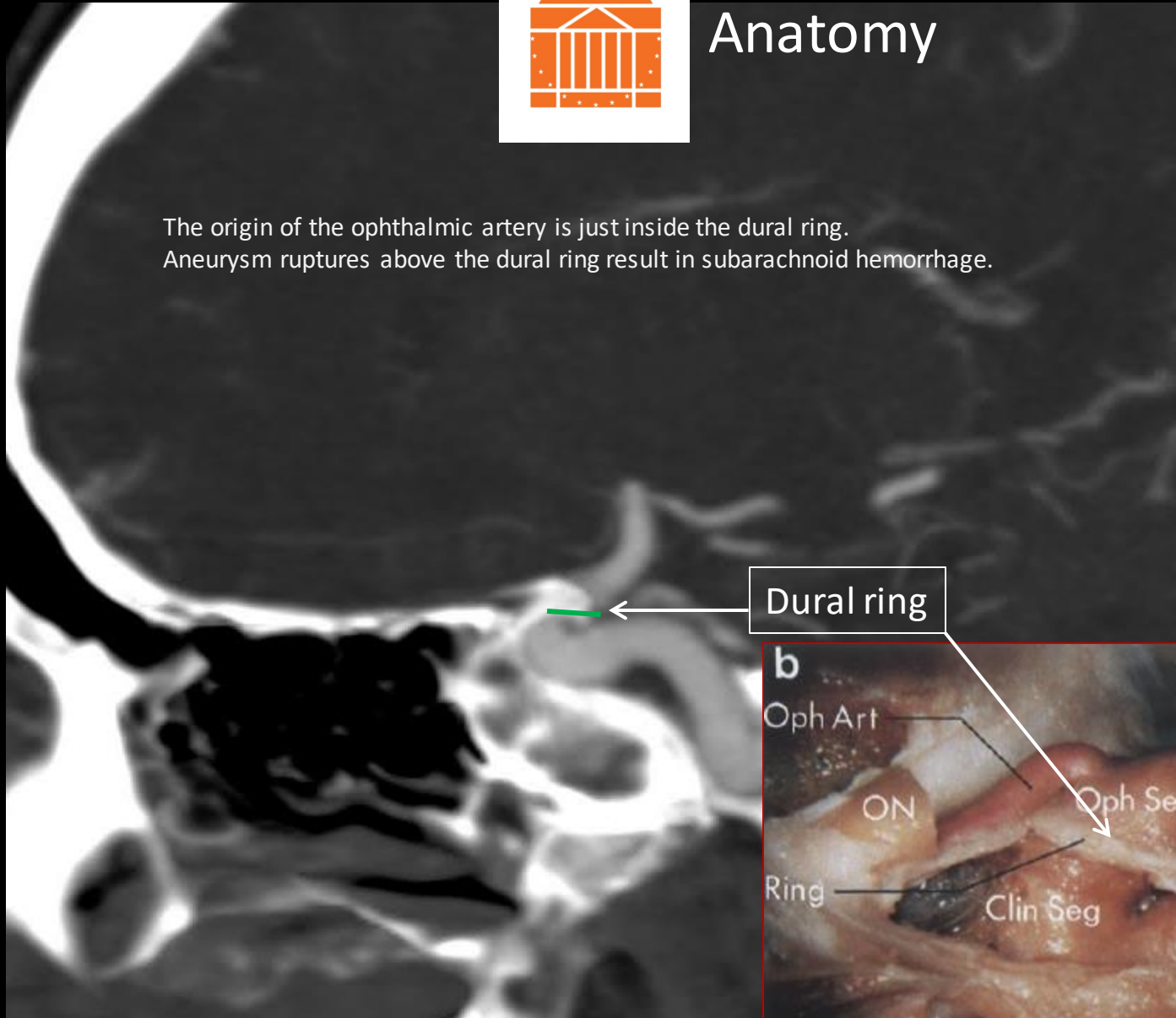
SAH in Virginia

- 5% of strokes
- Mean length of stay (LOS) = 14.1 days
- 10,000 ICU days/year
- LOS increased by complications
 - Cerebral vasospasm, delayed cerebral ischemia
 - Hydrocephalus
 - Pneumonia
 - Sepsis

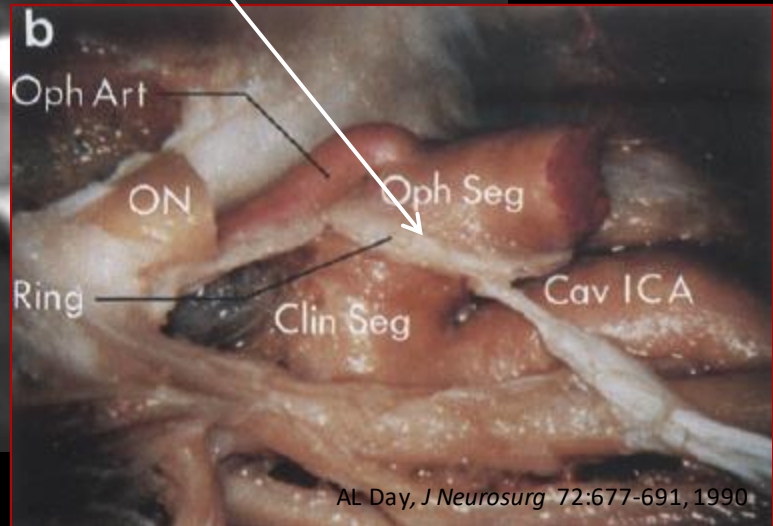


Anatomy

The origin of the ophthalmic artery is just inside the dural ring.
Aneurysm ruptures above the dural ring result in subarachnoid hemorrhage.



Dural ring



AL Day, *J Neurosurg* 72:677-691, 1990

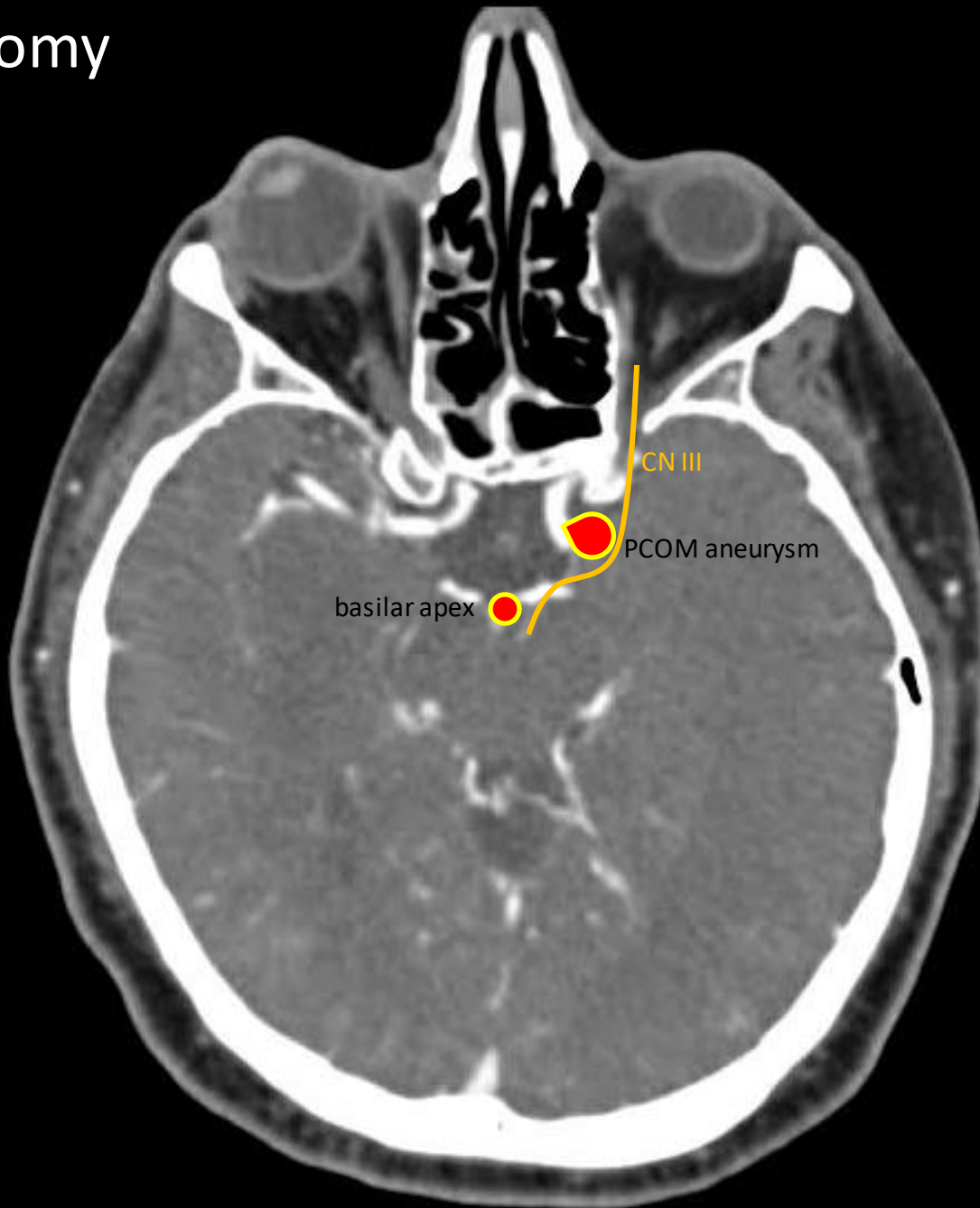
CASE STUDY



60 yo male with “worst headache of his life”
Now confused and sleepy. Opens eyes to
voice. CN 3 palsy. PCOM aneurysm.



Anatomy





Anatomy

CT Angio Head w/o ar
CTA

CORONAL

M4

M3

M2

ICA terminus

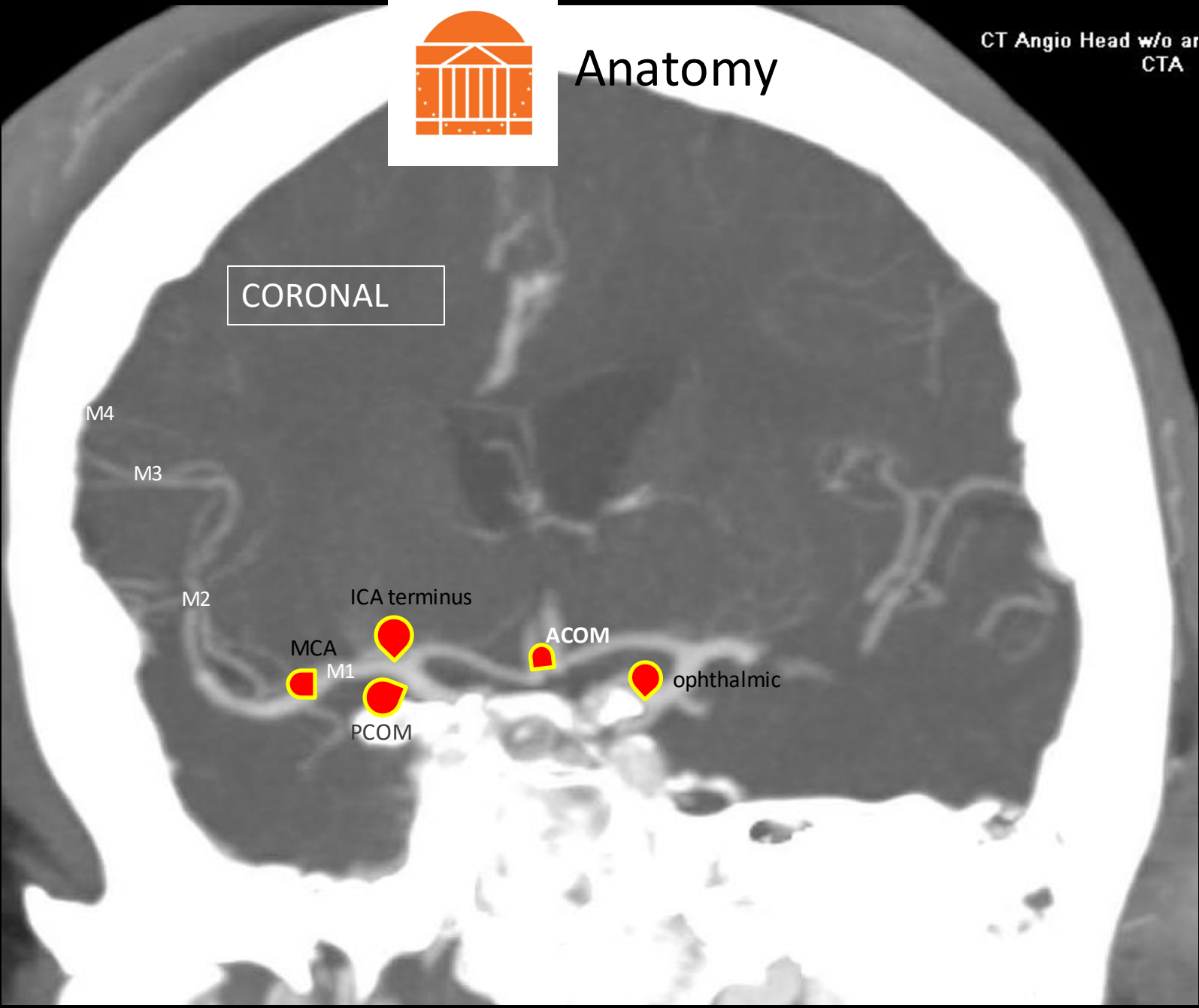
MCA

M1

ACOM

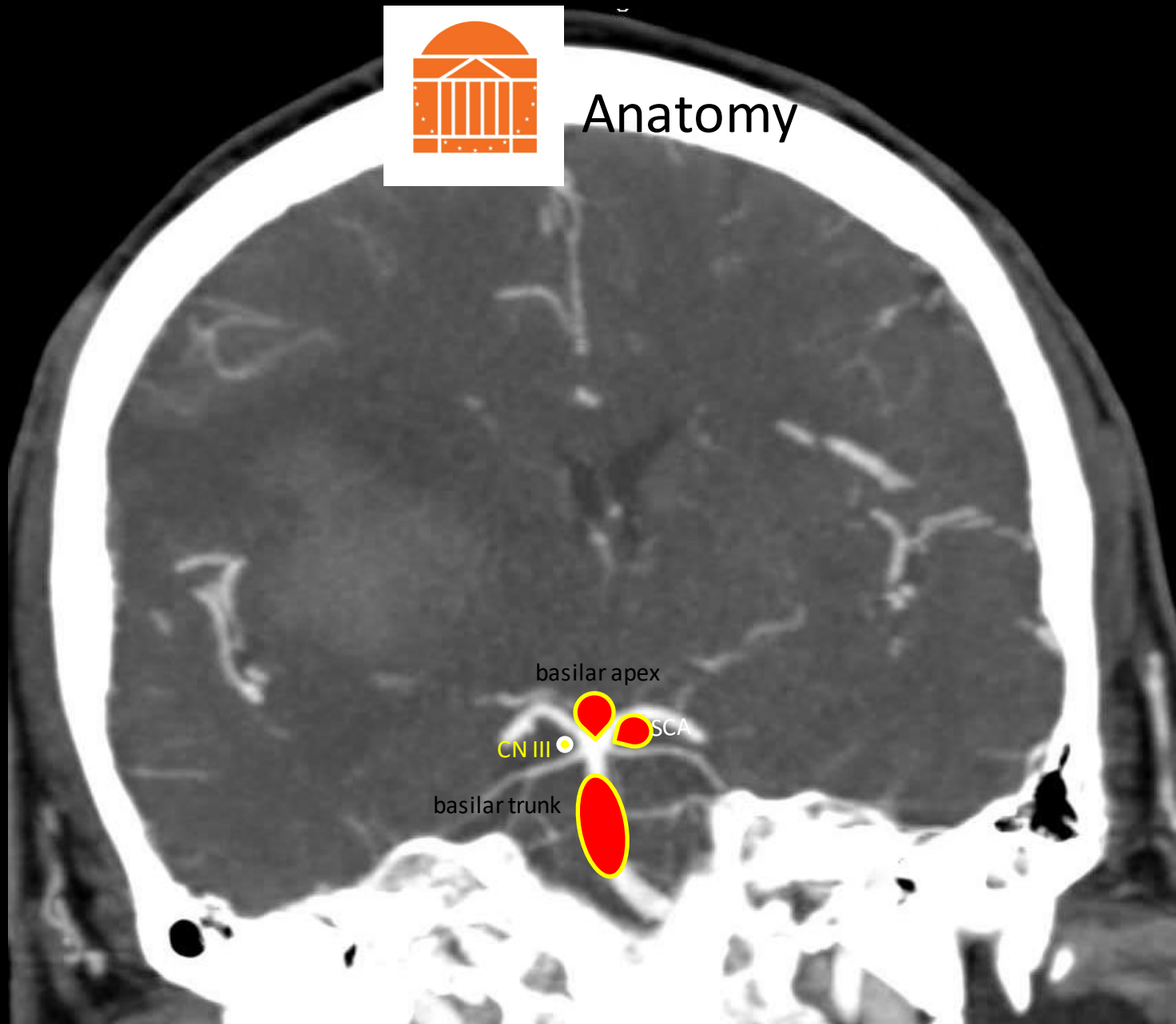
ophthalmic

PCOM





Anatomy



Aneurysm Causes and Risks

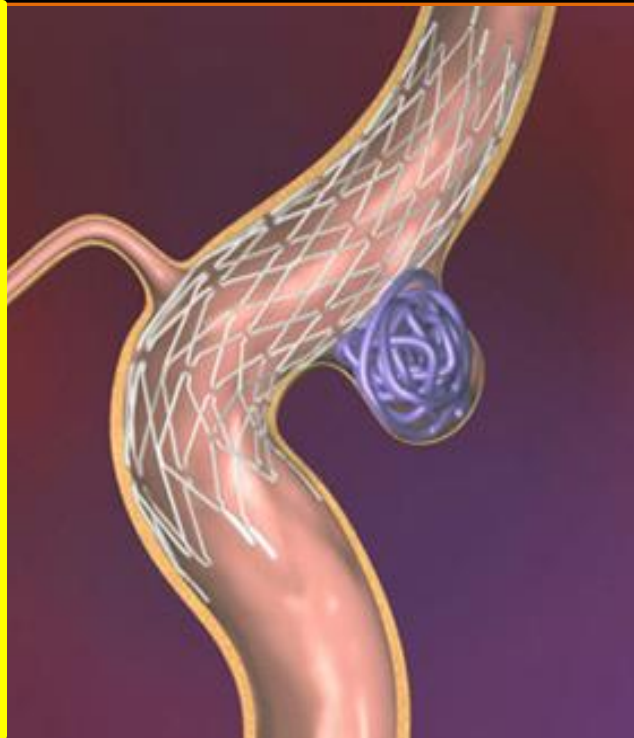
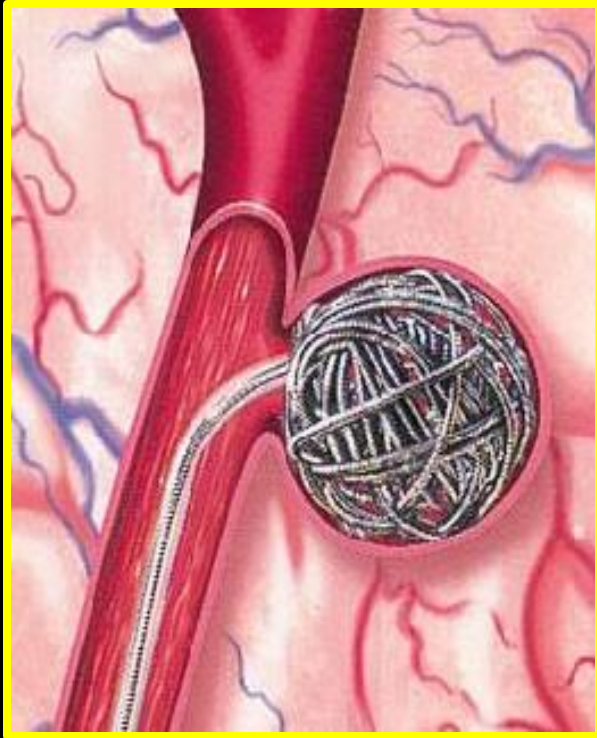
- Cigarette smoking ↑ 2.7x
- Hypertension
- Genetics
 - Connective tissue (FMD, Ehlers-Danlos, Marfans)
 - Polycystic kidney disease
- Age
- Sex (Female > Male)
- Annual incidence of SAH = 1.1%

ACOM risk is higher

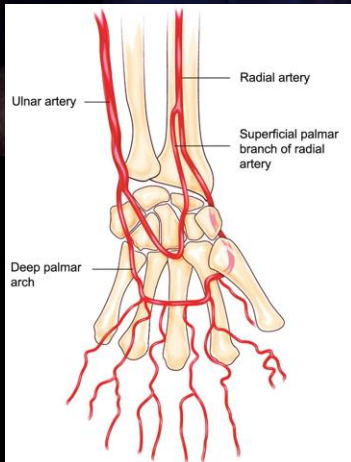
- Rupture more frequently, and smaller
- Bijlenga et al, *Stroke* 2013
- n = 932 patients
- ACOM aneurysms (3.5x)
- Posterior circulation (2.6x)
- ACOM 4-7 mm (2.0x)

Small ACOM rupture





Ultra-minimally invasive

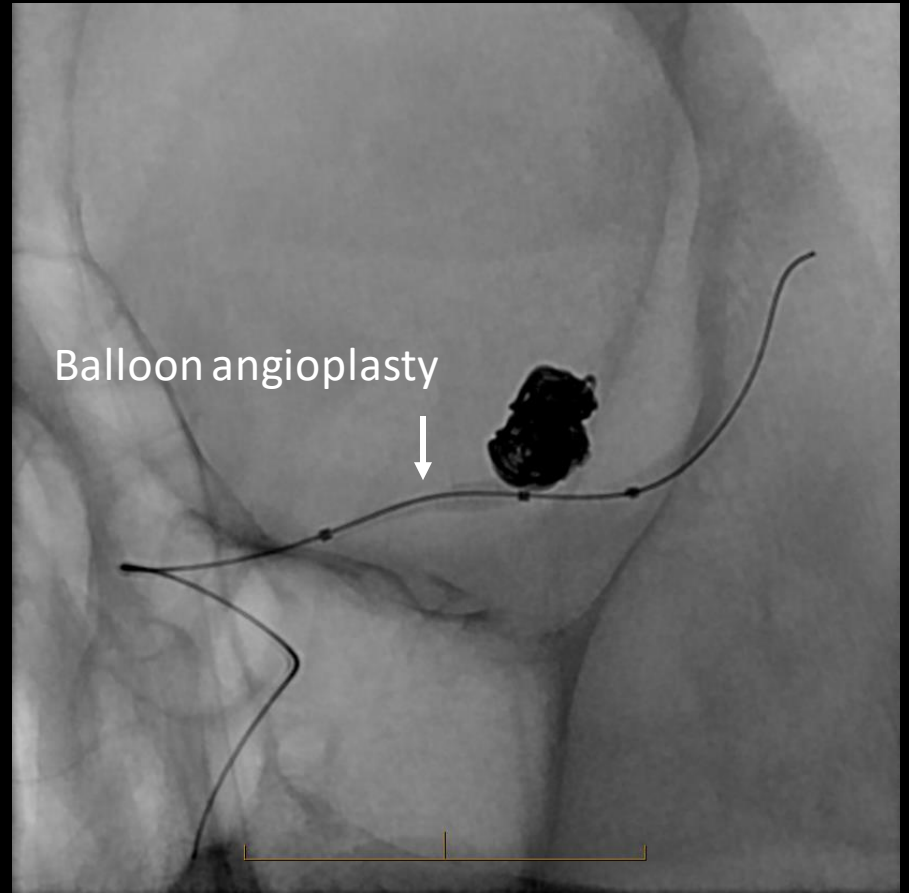
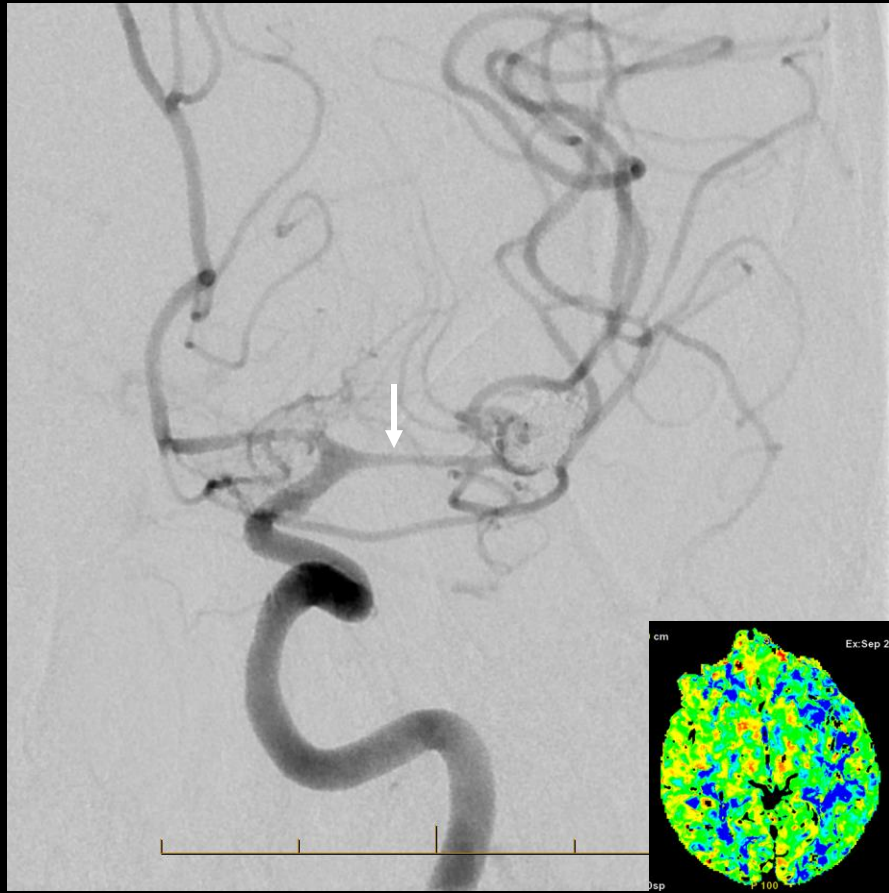


Cerebral vasospasm in ICU

- Nimodipine 60 mg q4h – level 1 evidence
- **Strict Euvolemia is key**
 - I/O's are not enough!
 - NICOM non-invasive monitoring
 - IVC ultrasound
 - +/- fludrocortisone
 - milrinone IV
- Transcranial doppler
- BP augmentation (MAPs are better)
- Culture shift



Cerebral Vasospasm



COVID

- Mantra “No regrets”
- Treat everyone, covid+ or not
- Safe intubation
 - providers, anesthesia, engineering, nursing, techs, ED, ICU – rapid consensus early in pandemic
 - never waived
- Telemetry repurposed for intermediate/ICU patients to accept higher acuity (SAH)

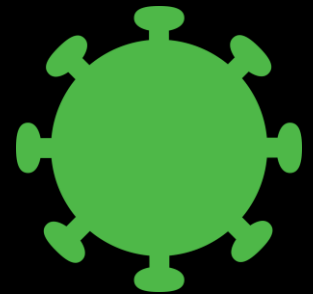
COVID - The Lift



- Interdisciplinary effort – frontline staff, APPs, UVA neuro, admin, educators
- Neuro telemetry nurses rotated through ICU
 - Neuro fellowship trained RNs and ENLS certified
- Most experienced APN assigned to telemetry for rapid education (a lines, pressors, EVDs, etc)
- Online training modules created independently by ICU nursing staff to support effort
- Abbreviated basic stroke course created

SAH Summary

- Treat every patient like your family.
- Productive paranoia is good.
- Embrace the uncomfortable.
- Be flexible.
- Share what works. Communicate.
- Euvolemia!
- No regrets when COVID is over.





804-690-3803 cell
david.loy@virginia.edu



BON SECOURS



UNIVERSITY
of VIRGINIA