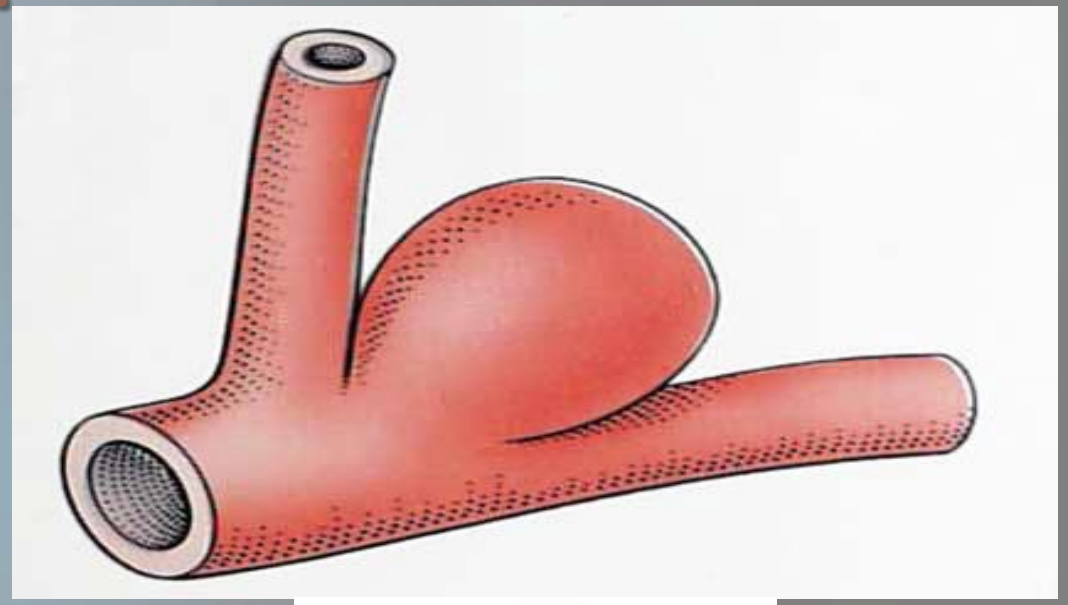
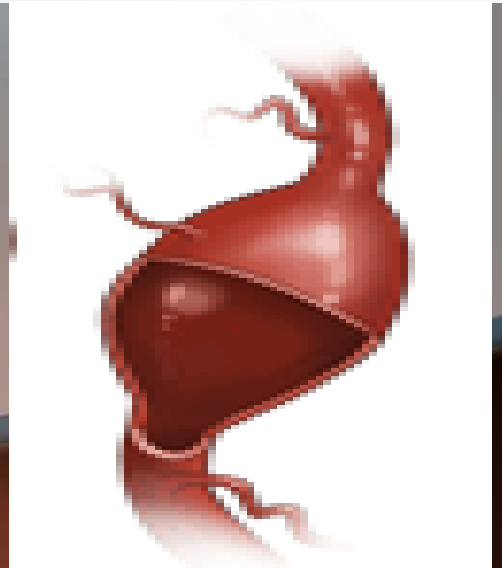
Coiling Versus Clipping of Intracranial Aneurysms

Prasad Reddy, MD

What is a cerebral aneurysm?

- A dilation of an artery in the brain that results from a weakening of the muscular layer (tunica media) of a blood vessel wall.
  - Saccular (berry)
  - Fusiform





Risk Factors

- Hypertension
- Cigarette smoking
- Family history of intracranial aneurysms

- Drug use
  - Cocaine
  - Methamphetamines

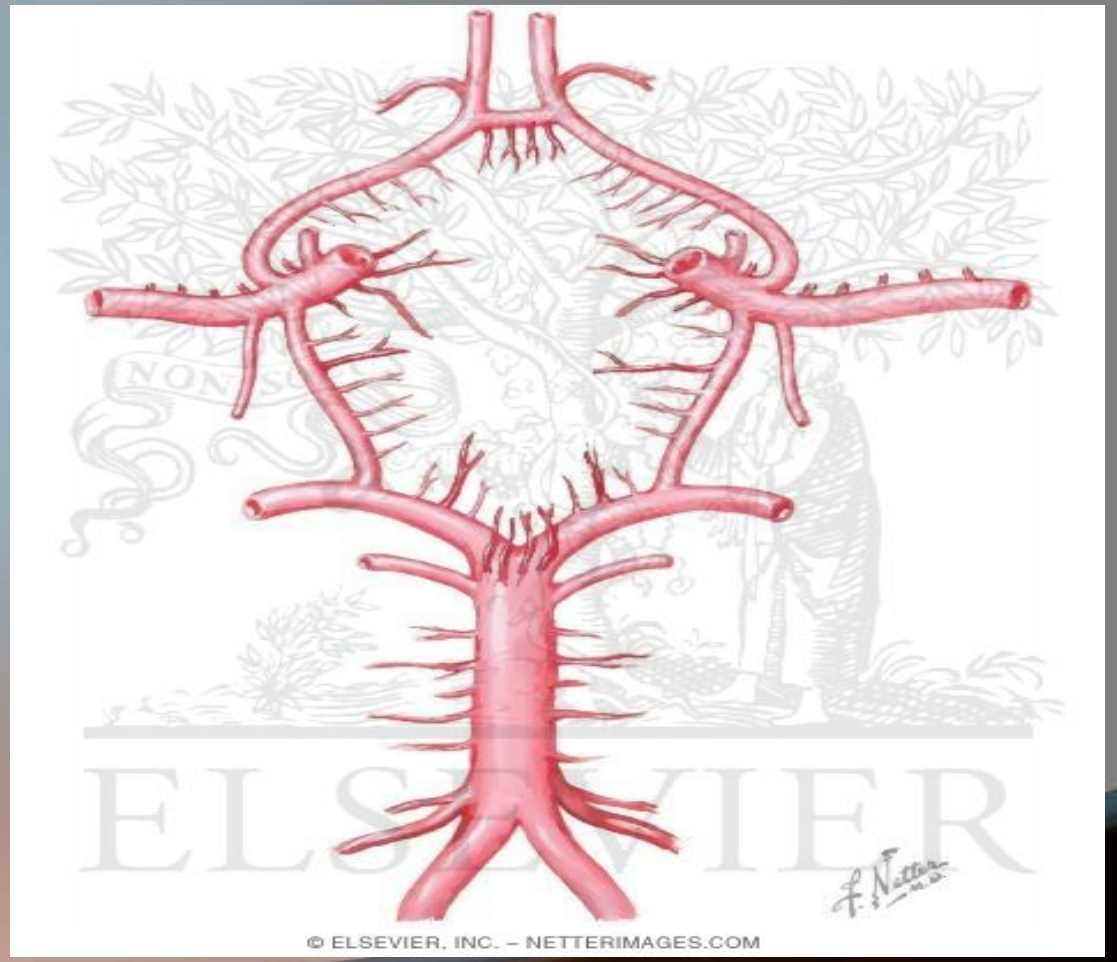
Other Risk Factors

- Connective tissue disorders
  - Ehlers-Danlos Syndrome
  - Marfan's Syndrome
  - Fibromuscular dysplasia
- Polycystic kidney disease
  - 15%
- Infection
- Trauma

Prevalence

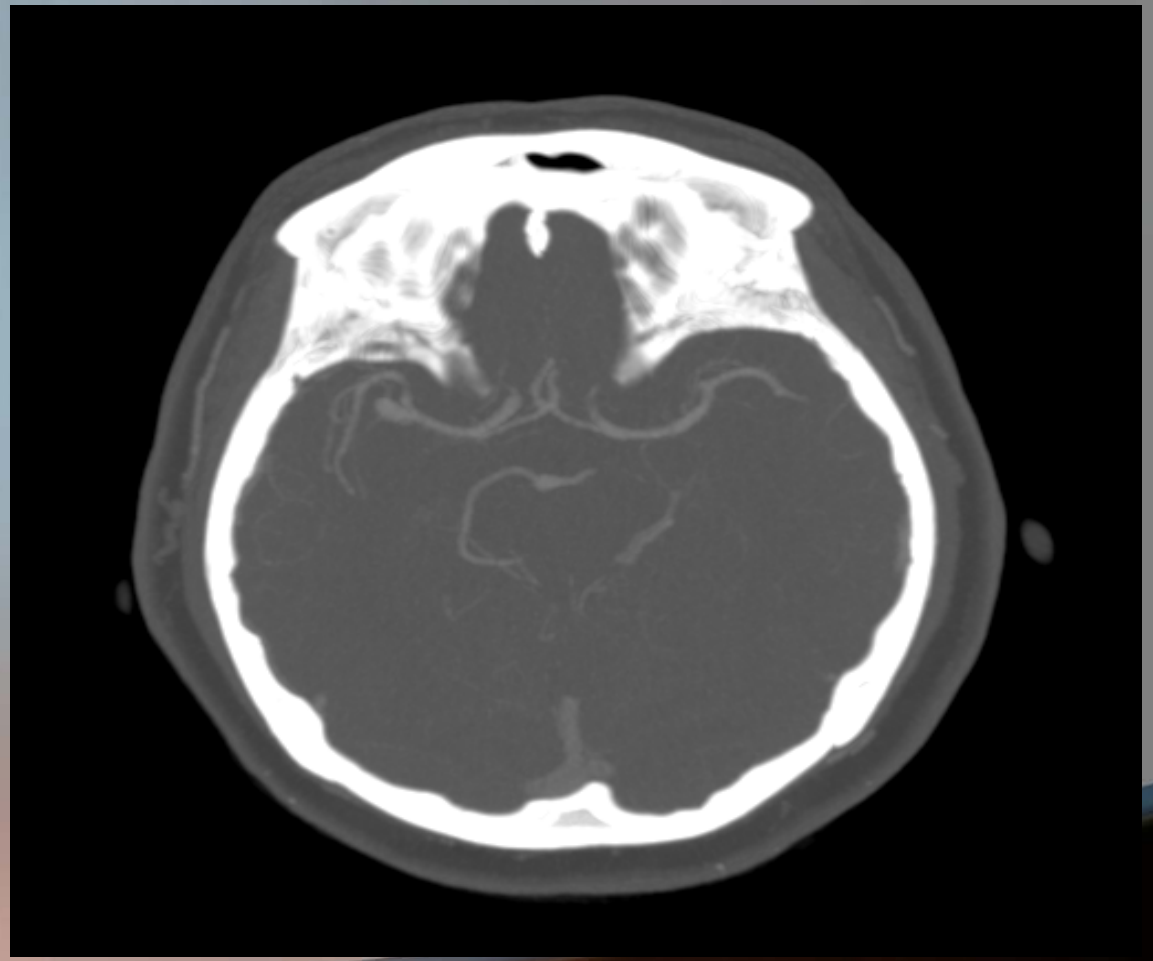
- 5%
- Age 40-60
- Female:Male ratio, 3:2
- 20% have multiple aneurysms
- Annual incidence of aneurysm rupture: 30,000 people (U.S.)
  - ~15% die before reaching hospital
  - Fatal in 40-50%

Subarachnoid Hemorrhage

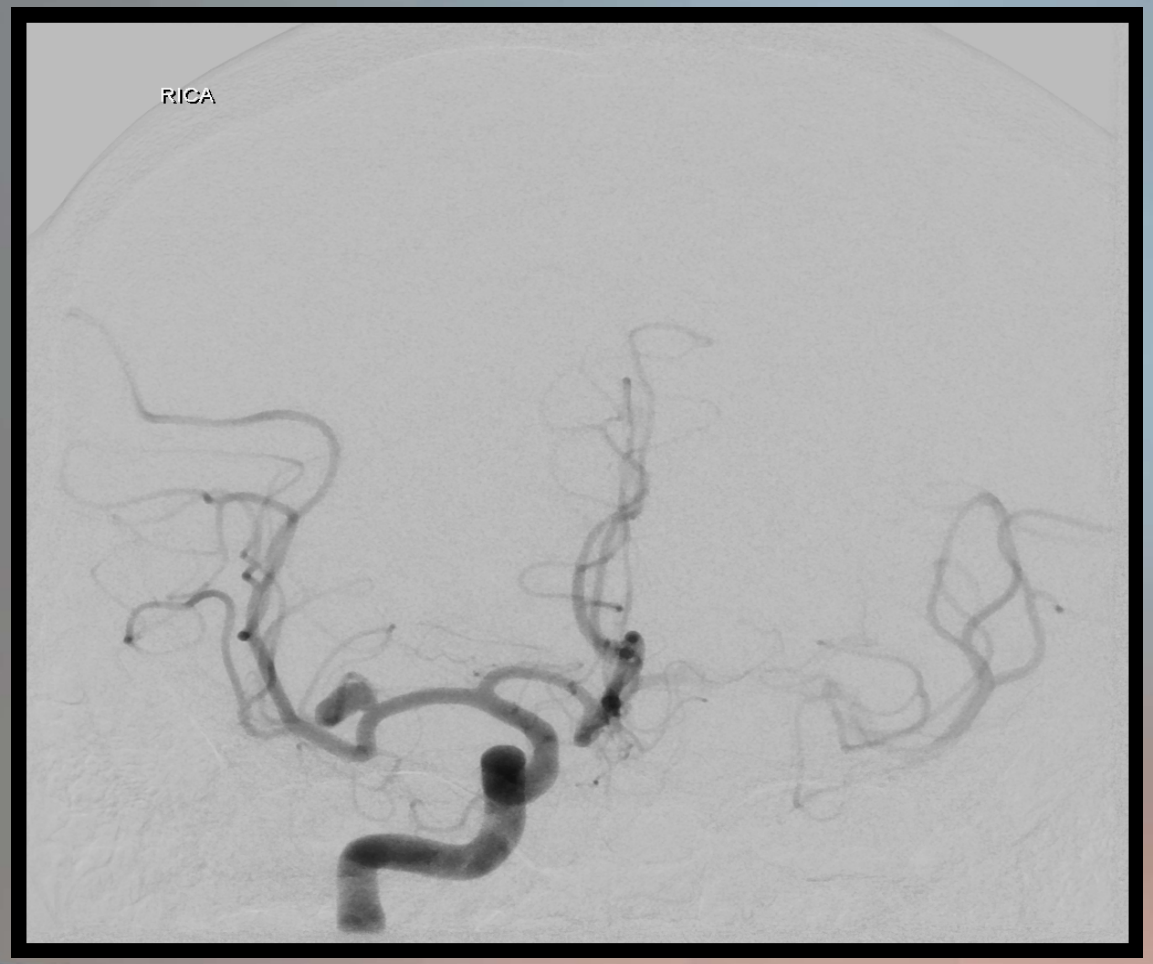


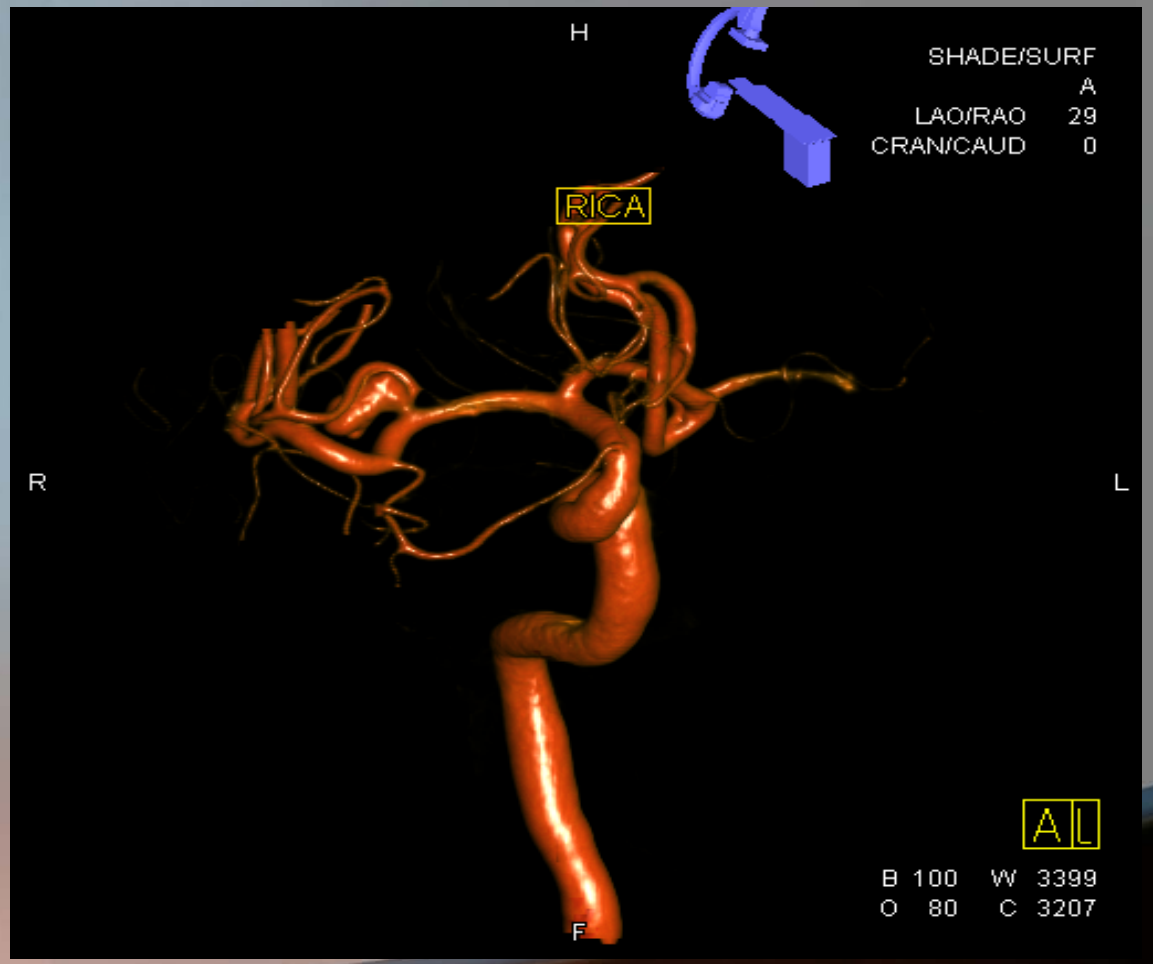
MRA

CTA



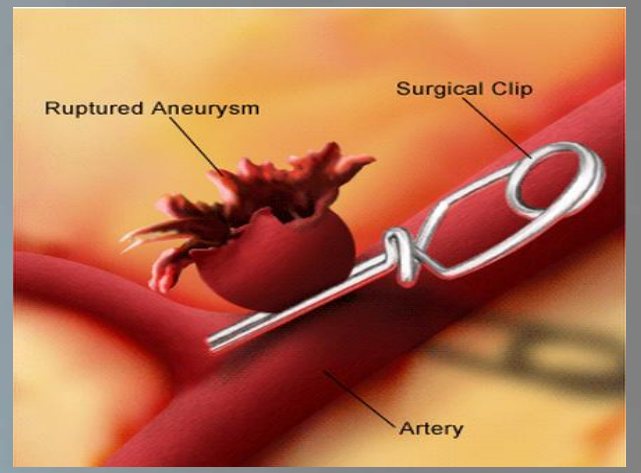
Cerebral Angiogram



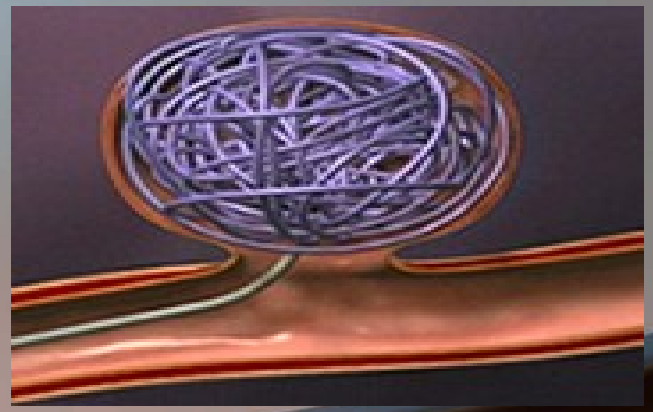


Treatment

- Surgical
  - Craniotomy for clipping
    - Walter Dandy, 1937

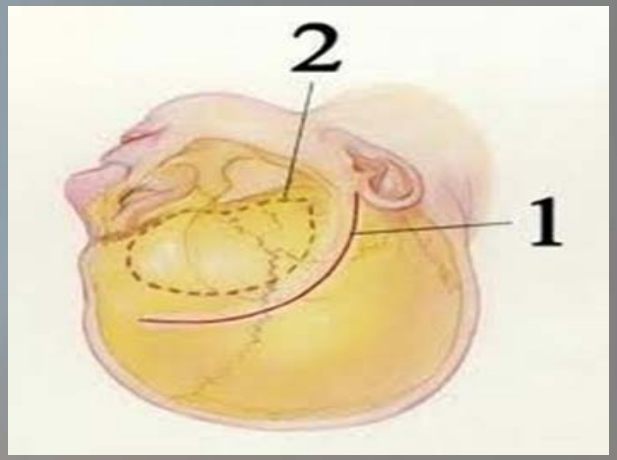


- Endovascular
  - Coil embolization
    - Guido Guglielmi, 1991



Clipping

- Incision
- Bone flap
- Dural opening
- Sylvian fissure dissection
- Proximal control
- Clipping
  - Intraoperative angiogram
- Closure



Clipping

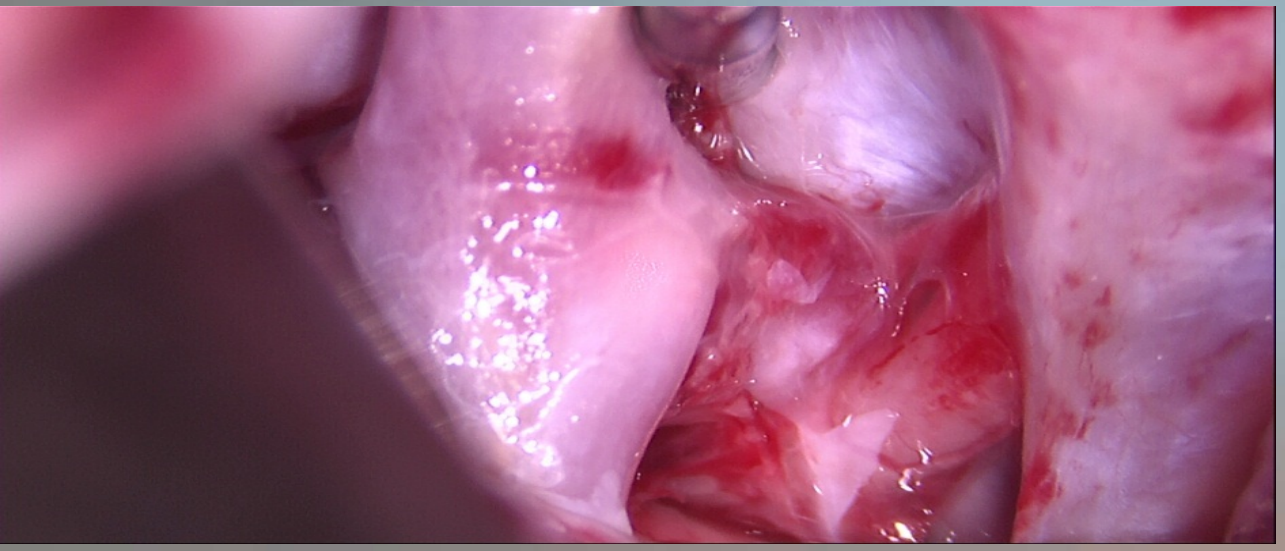
Pros

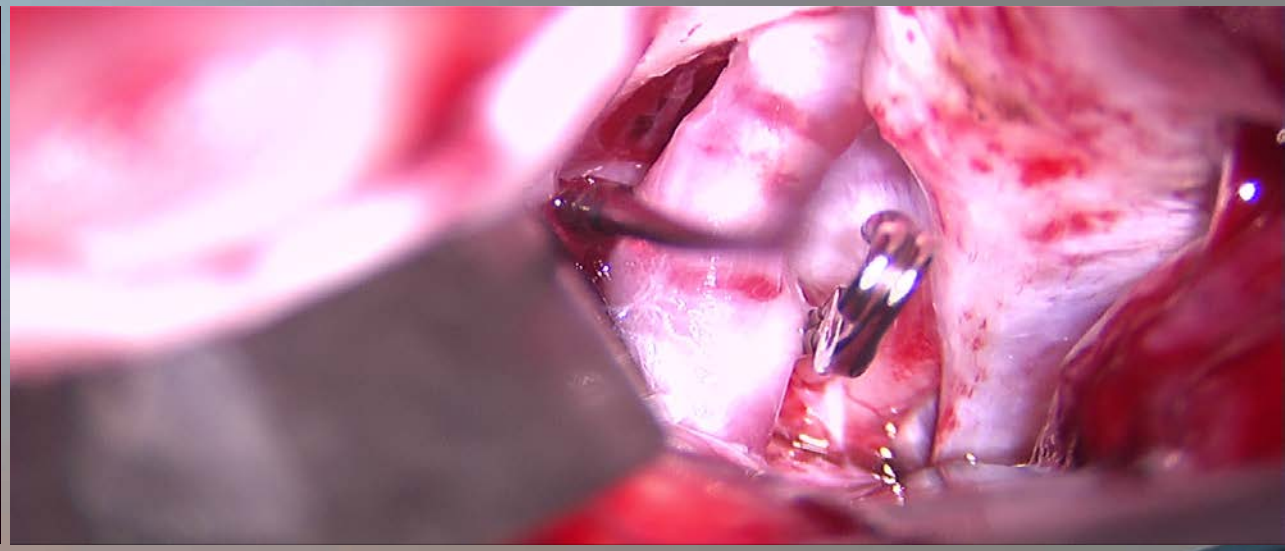
- Definitive
- Durable
- 3-D visualization

Cons

- Longer hospital stay
  - 1-4 days
- Post-operative pain

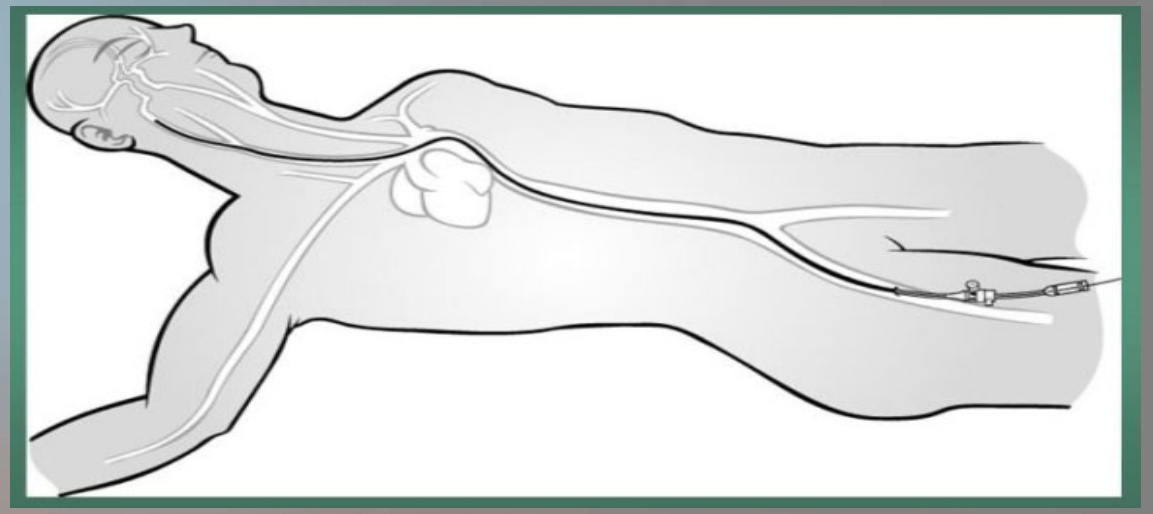
Clipping of PCOM aneurysm





Coiling

- Small groin incision
- Catheterization of femoral artery
  - Heparinization
- Guide catheter placement
- Catheterization of aneurysm
- Coil embolization
- Closure of arteriotomy



Coiling

Pros

- Tiny incision
- Minimal pain
- Shorter hospital stay
  - 1-2 days

Cons

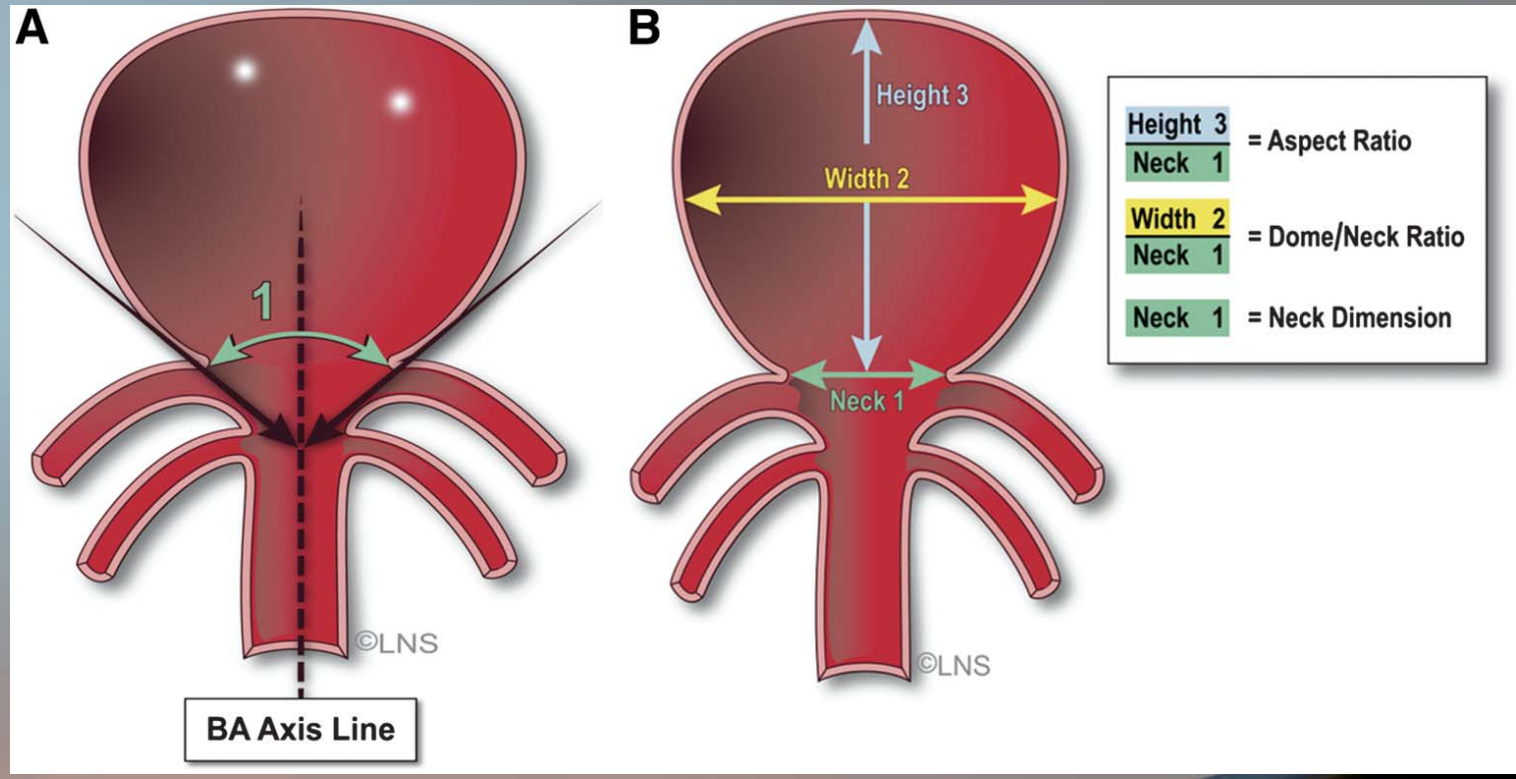
- Need for follow-up
  - Recanalization
  - Coil compaction
- 2-D visualization

Factors that favor clipping

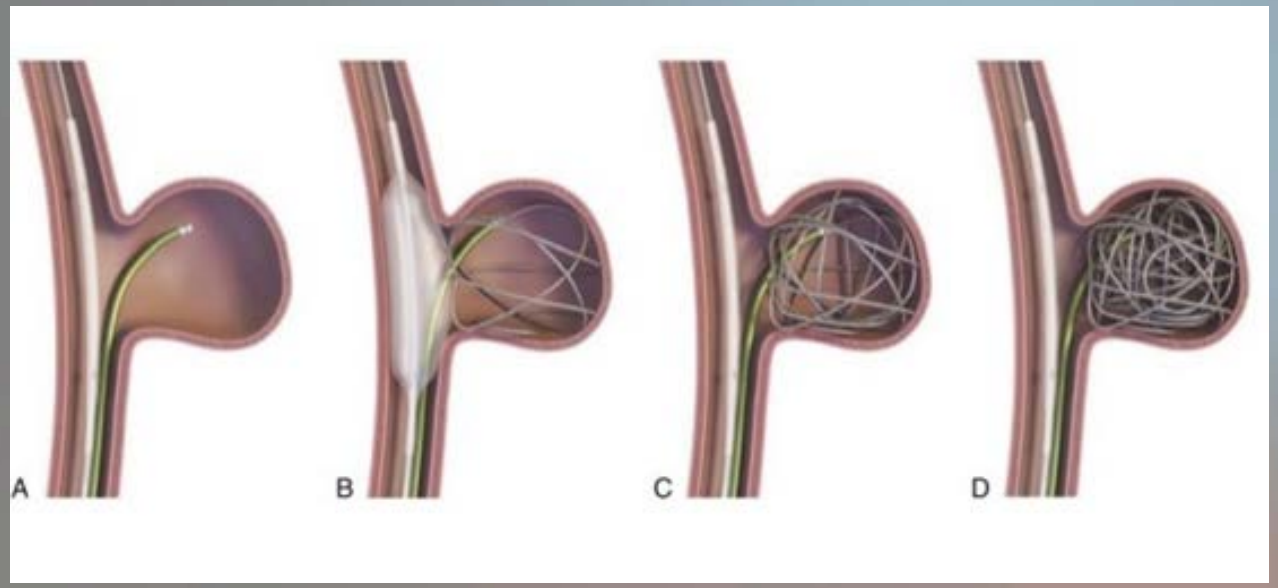
- Younger age
- Middle cerebral artery (MCA) aneurysms
- Giant aneurysm (>2.5cm)
  - High recanalization rate with coiling
- Small aneurysms (<2mm)
- Wide necked aneurysms

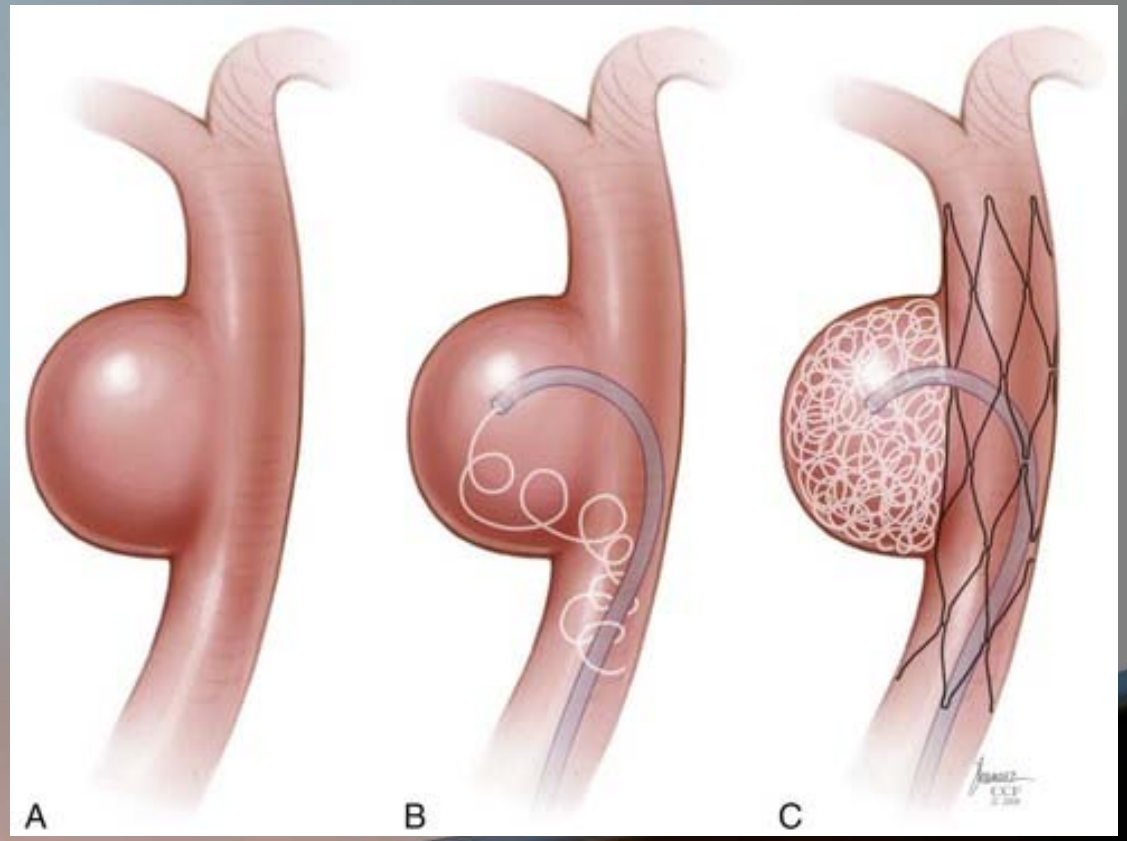
Factors that favor coiling

- Elderly patients (>75 yrs)
- Poor clinical grade
- Aneurysm configuration
  - Dome-to-neck ratio ≥ 2
- Posterior circulation aneurysms
- Patients on Aspirin/Plavix



Complex Coiling Techniques



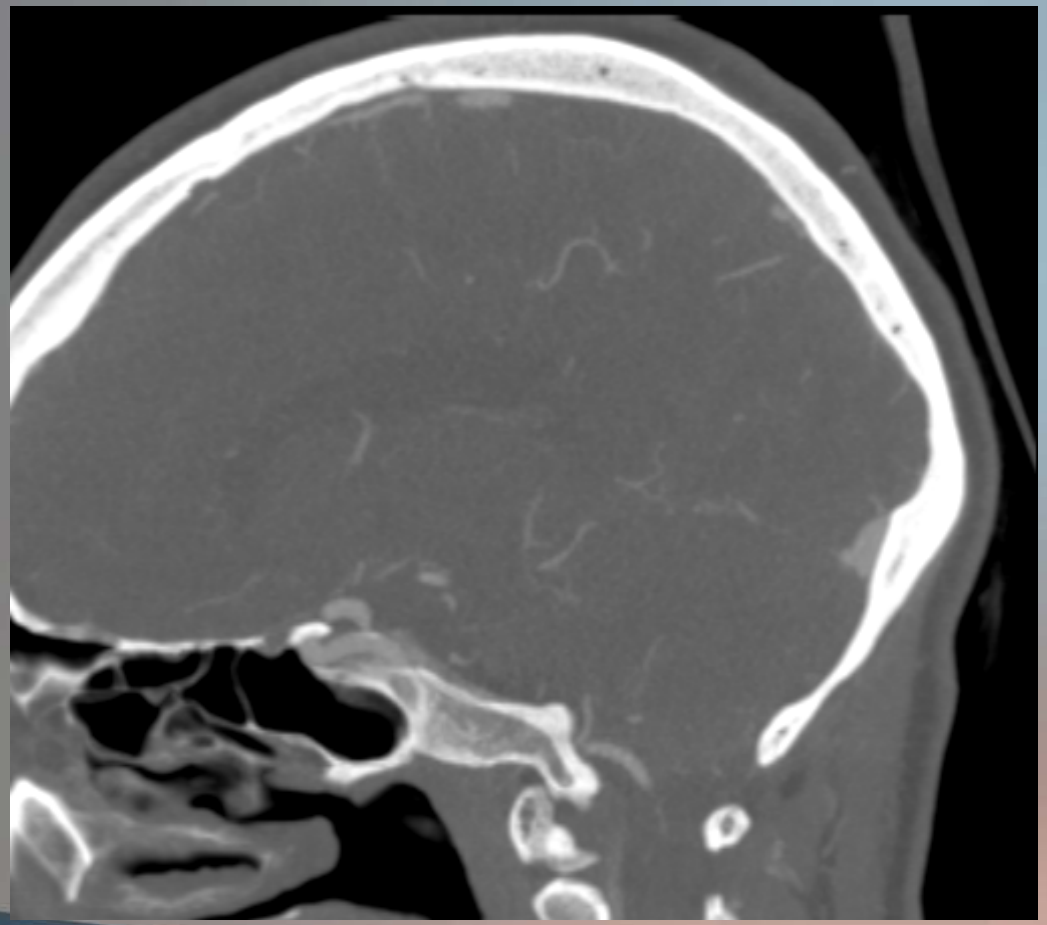


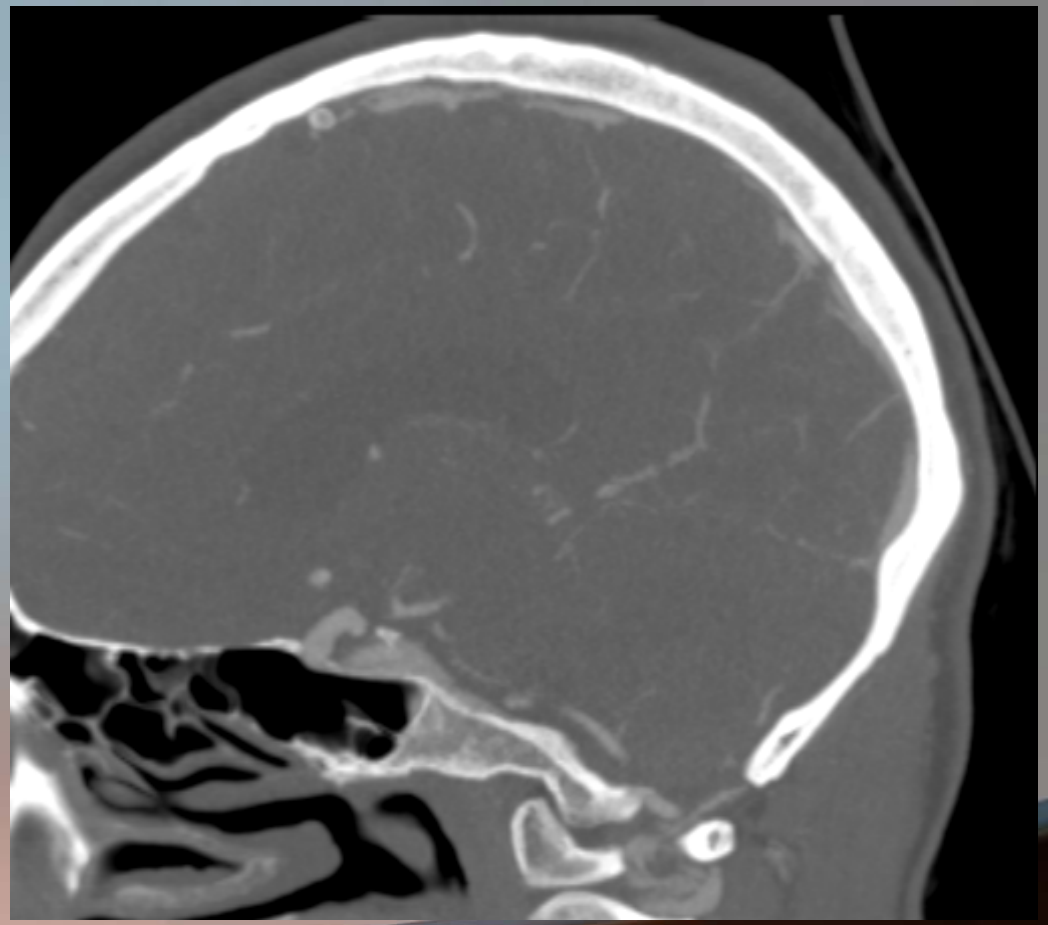
Case #1

- 55 year old female
- Sudden onset worst headache of life during intercourse
  - Vomiting
  - Neck pain (meningismus)
  - Photophobia

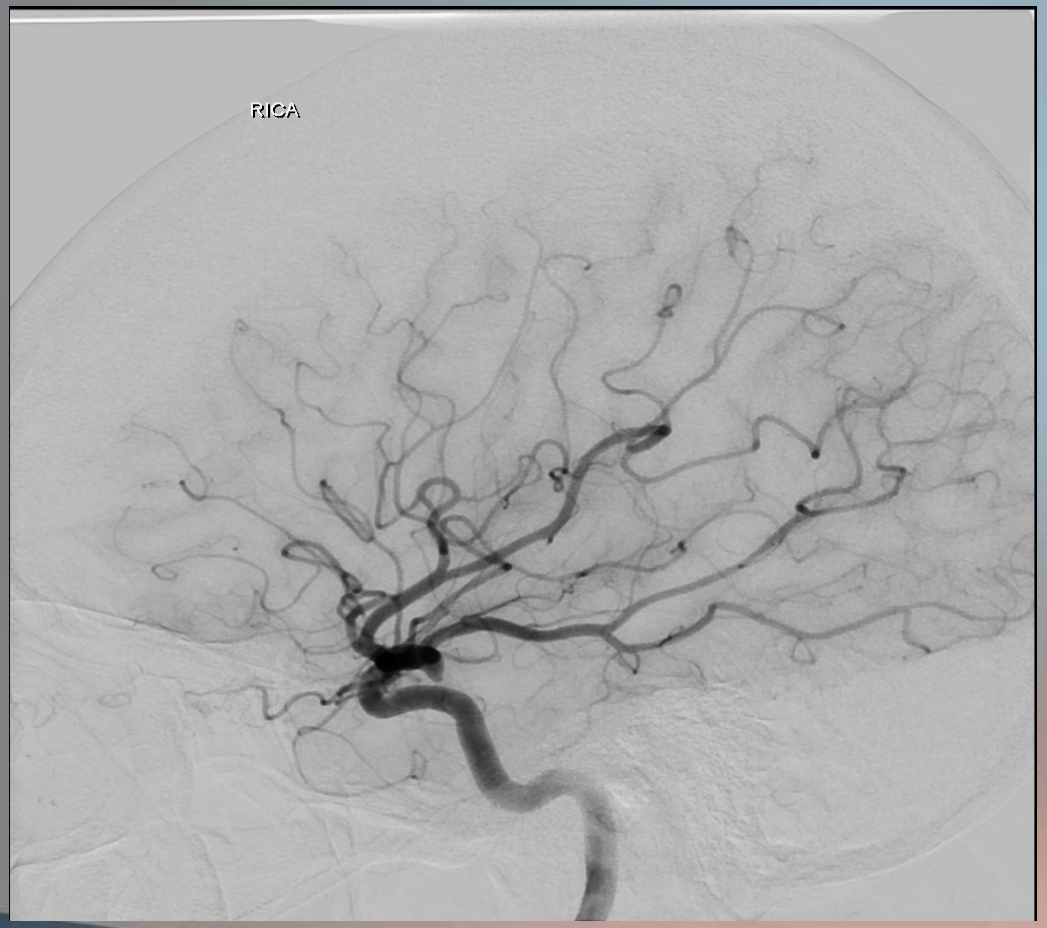
- Past Medical History
  - Hypertension
  - Former smoker

CTA

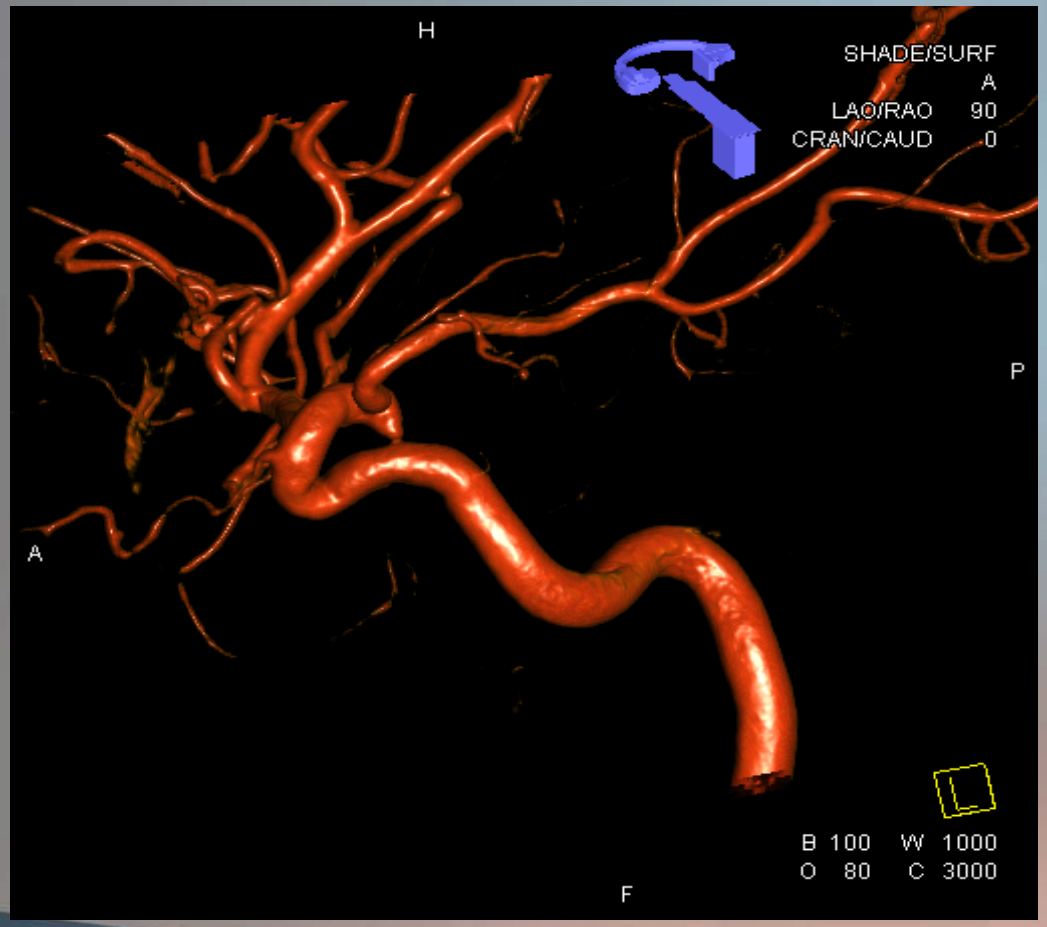


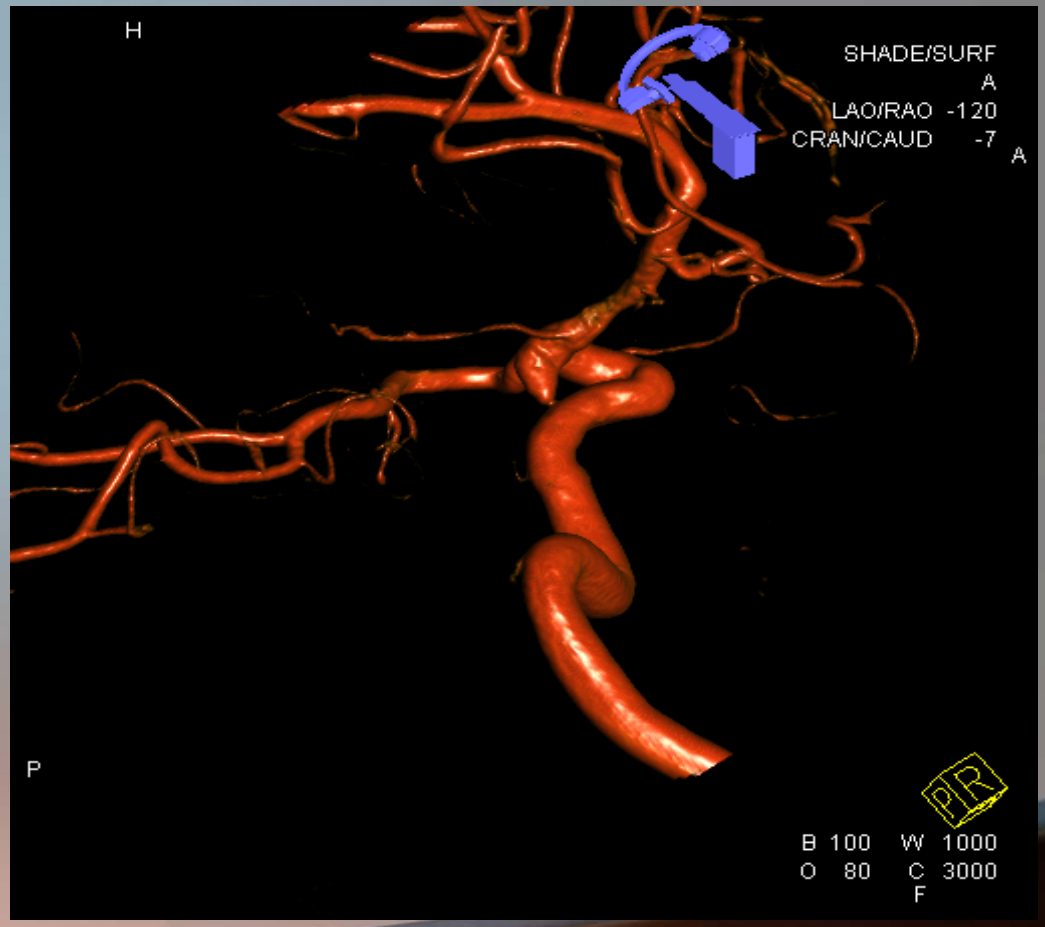


Angiogram

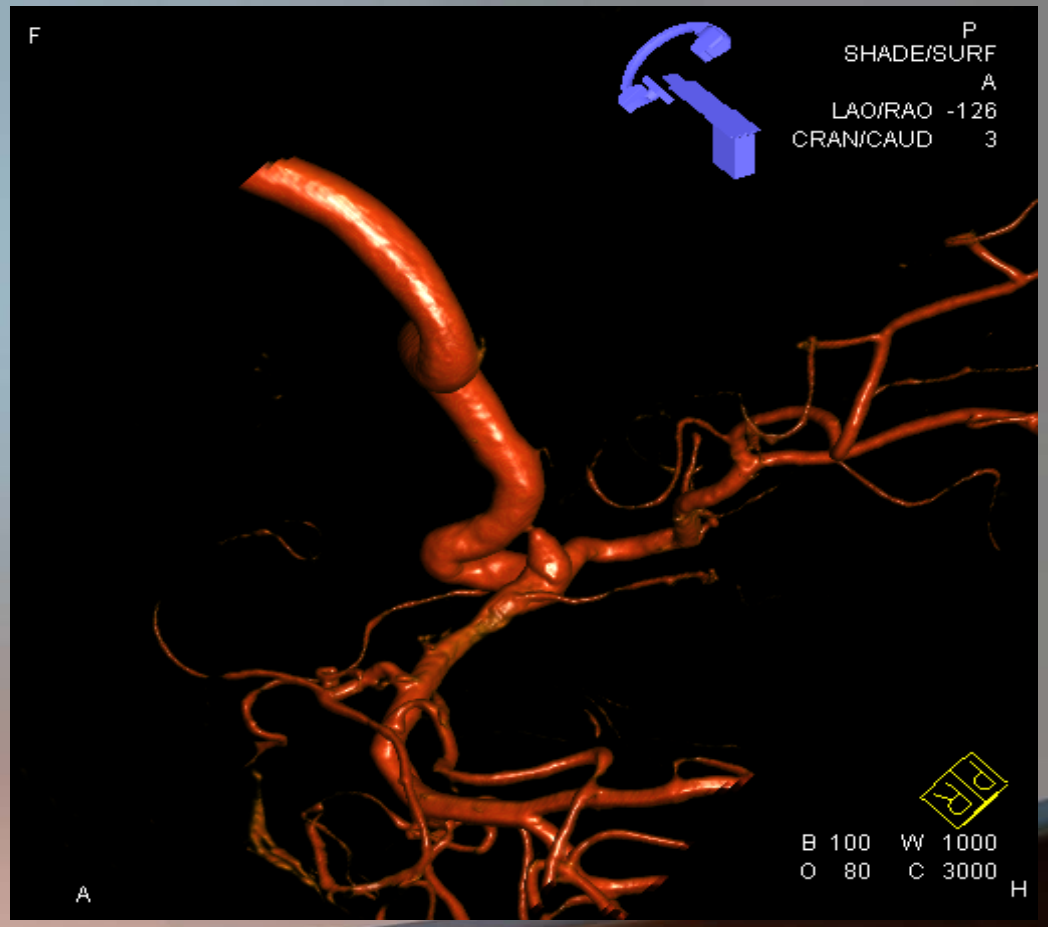


3D Angiogram

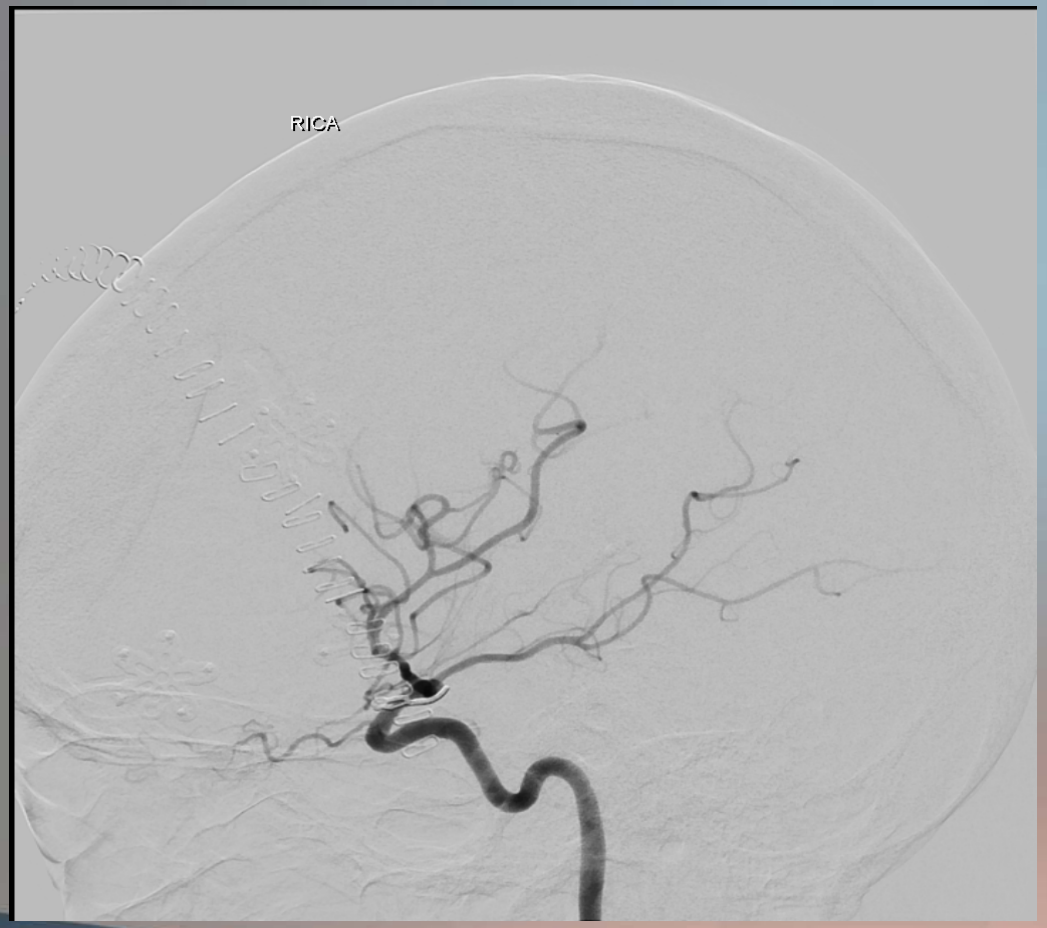


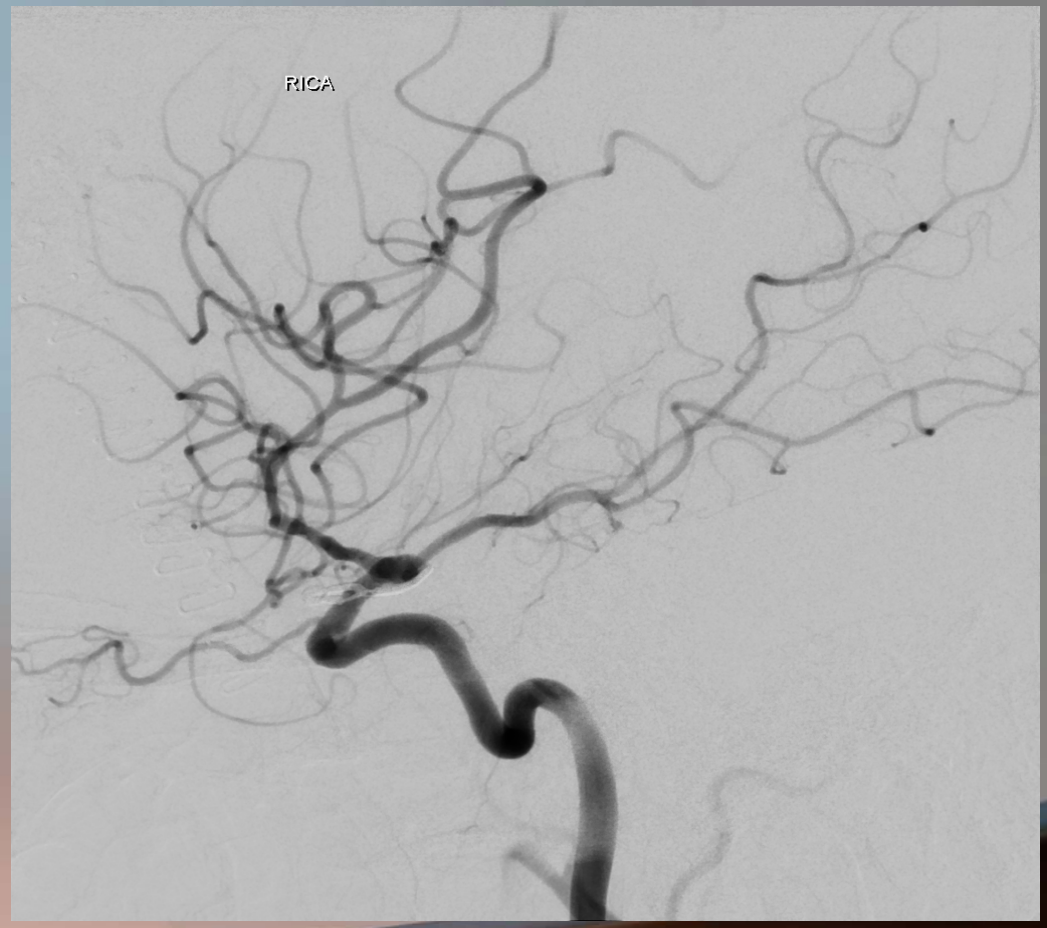


3D Angiogram

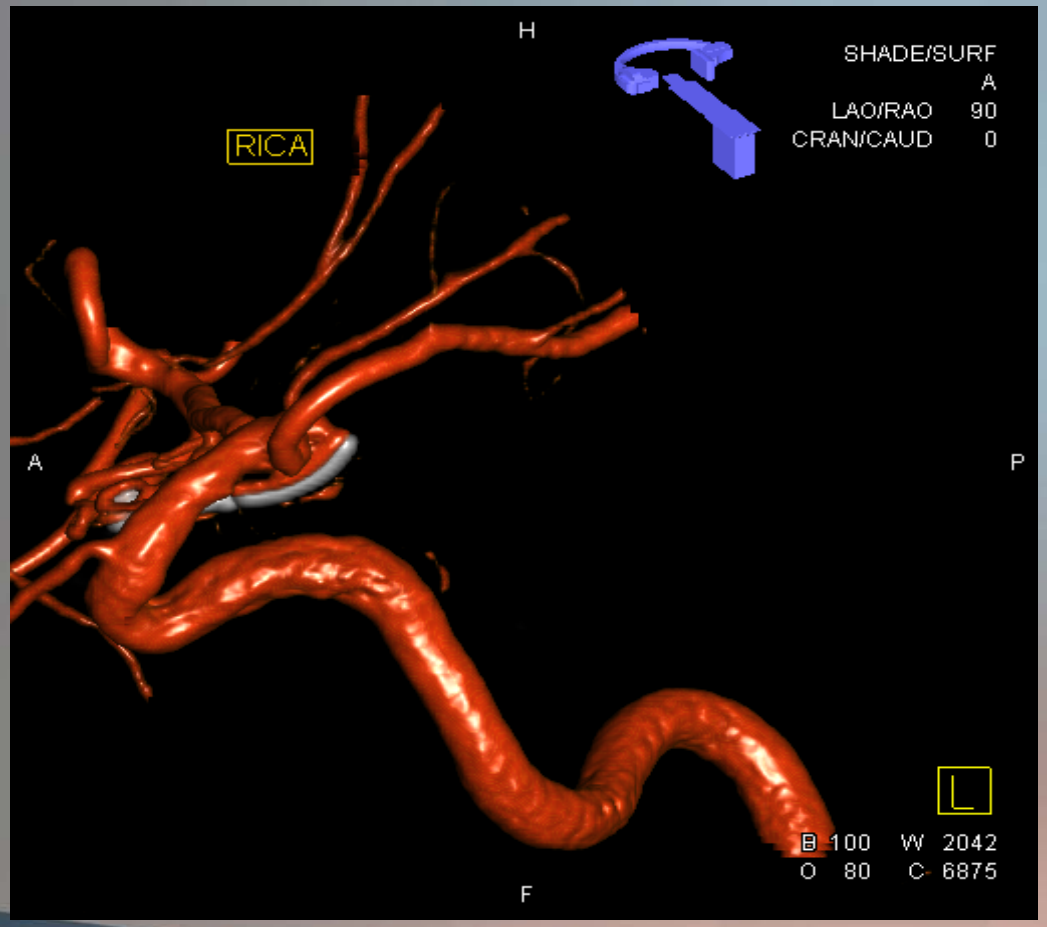


Post-Clipping Angiogram

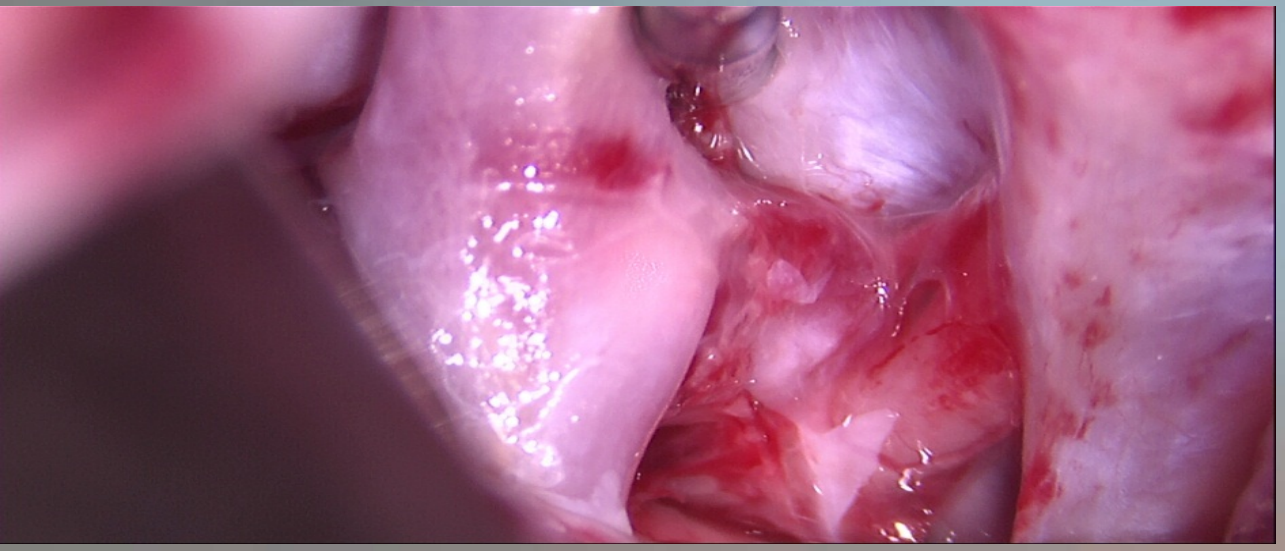


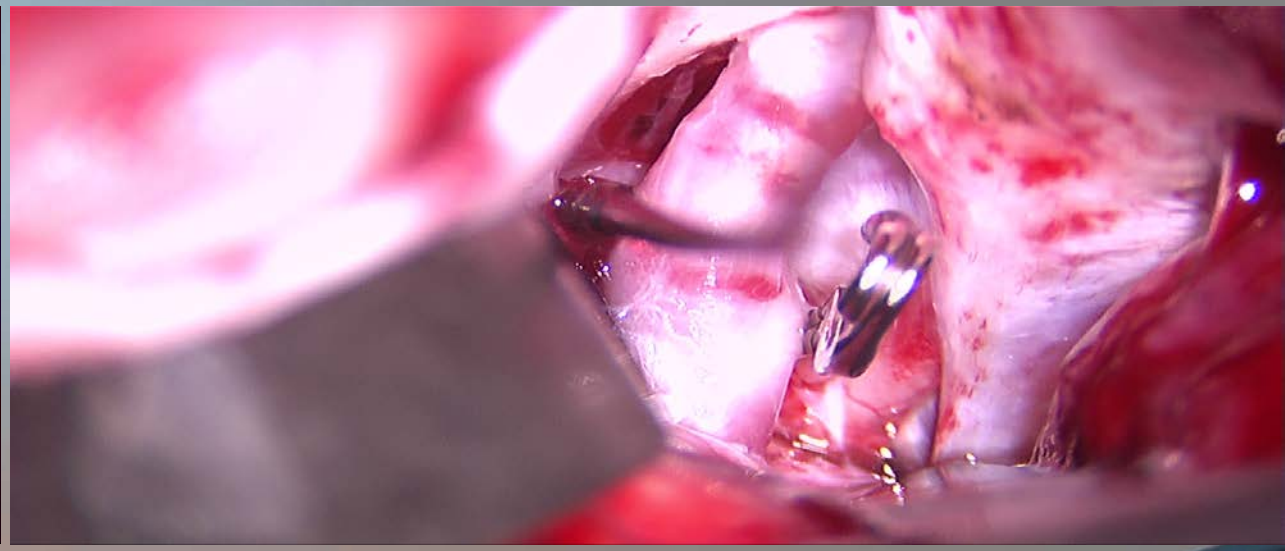


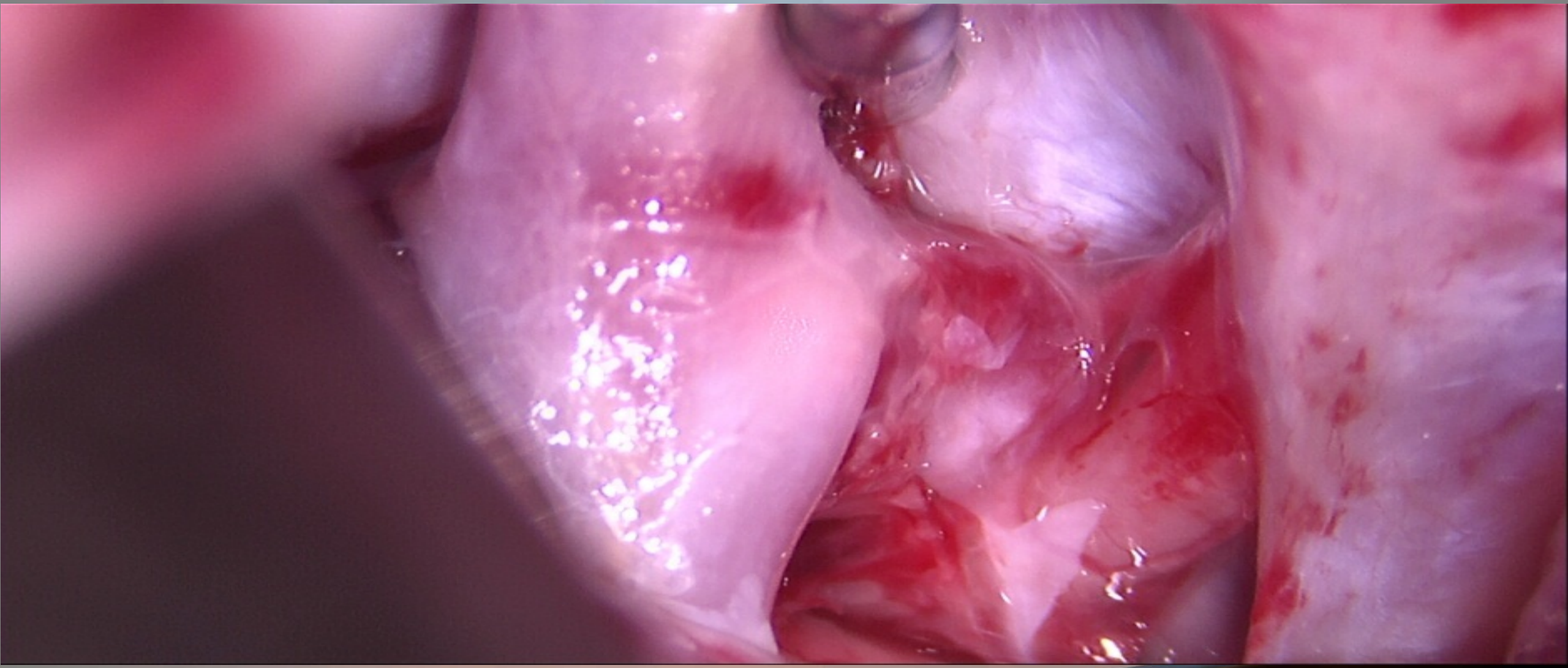
Post-Clipping 3D Angiogram

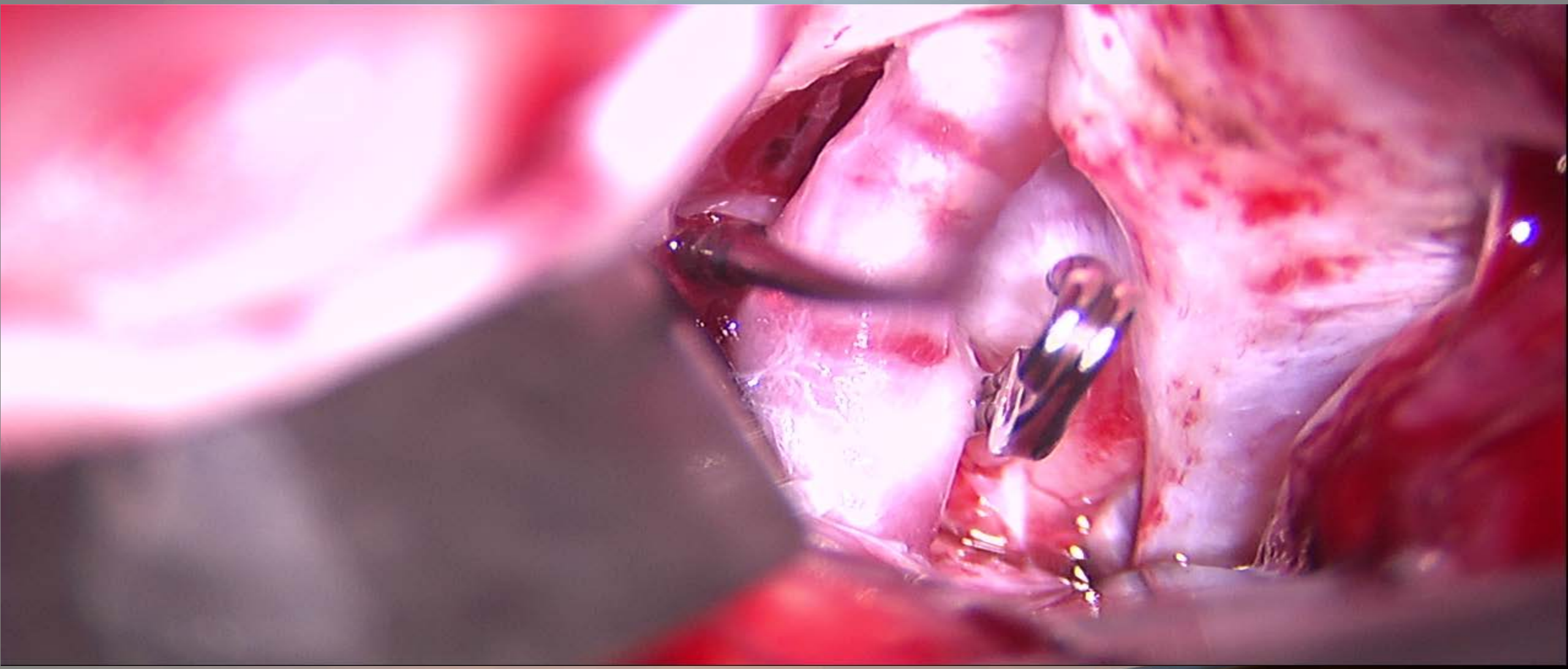


Clipping of PCOM aneurysm









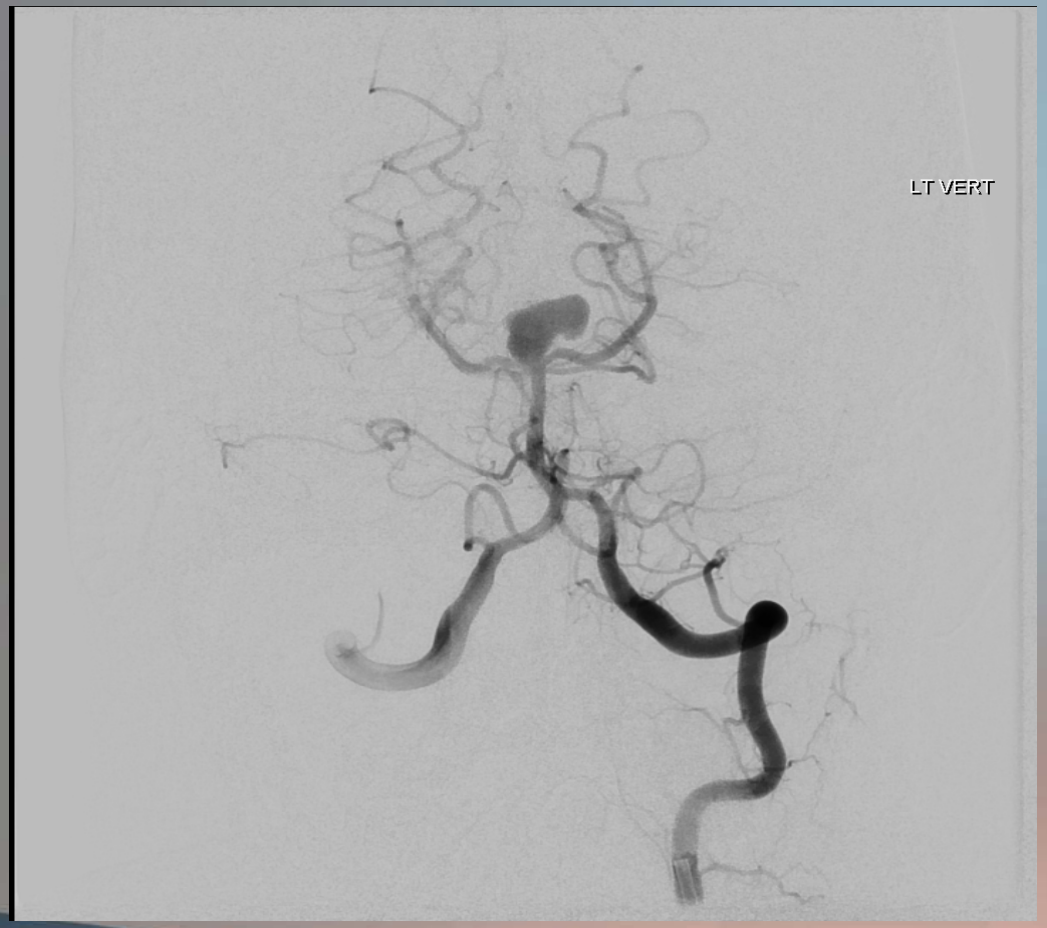
Case #2

- 57 year old male
- Fell down and passed out at work
  - Then complained of severe headache
- Past Medical History
  - Hypertension

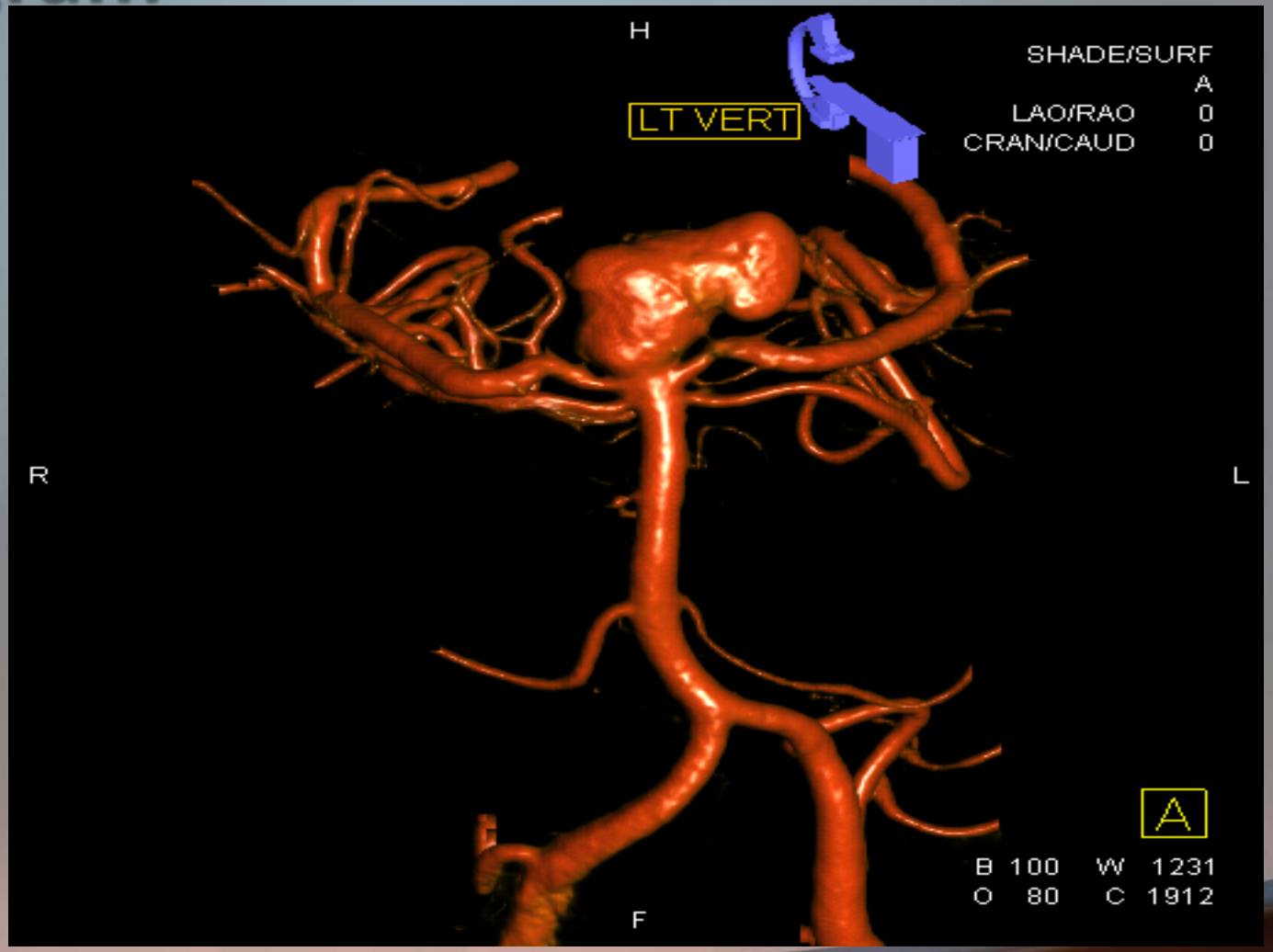
CT Scan

CTA

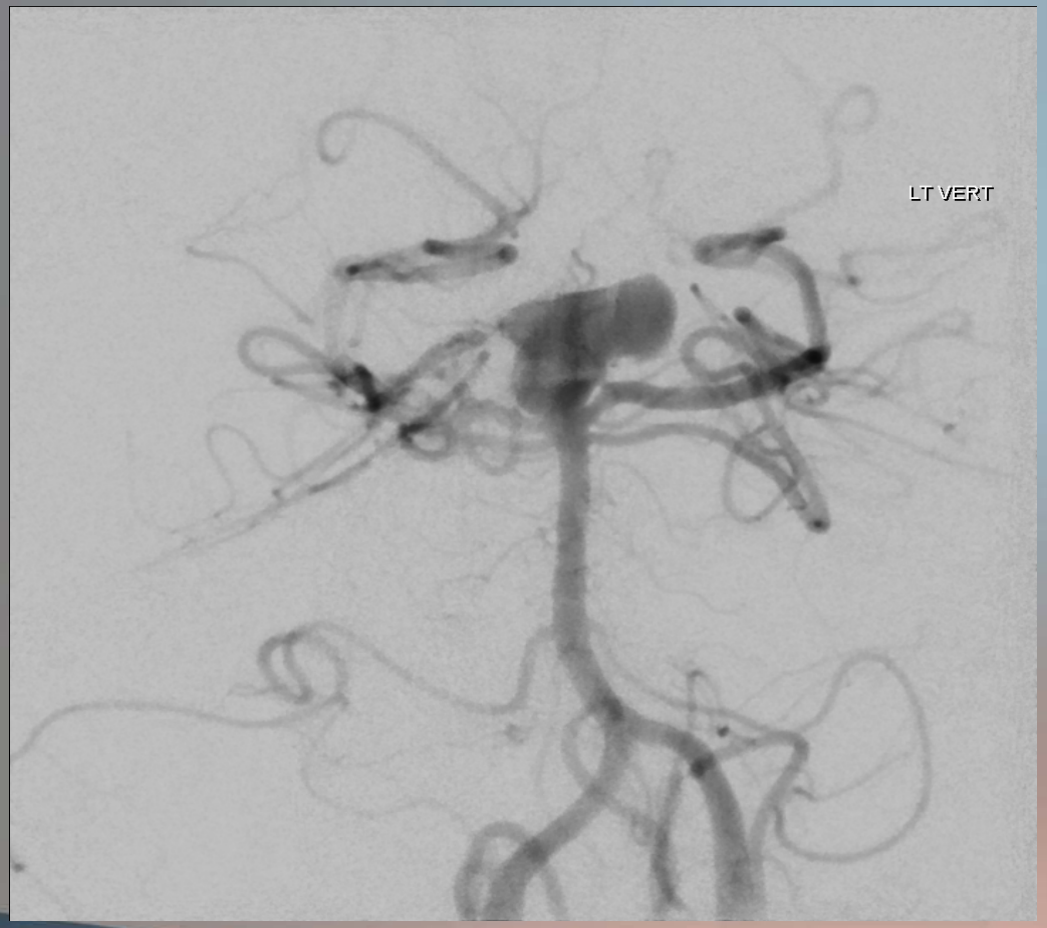
Angiogram



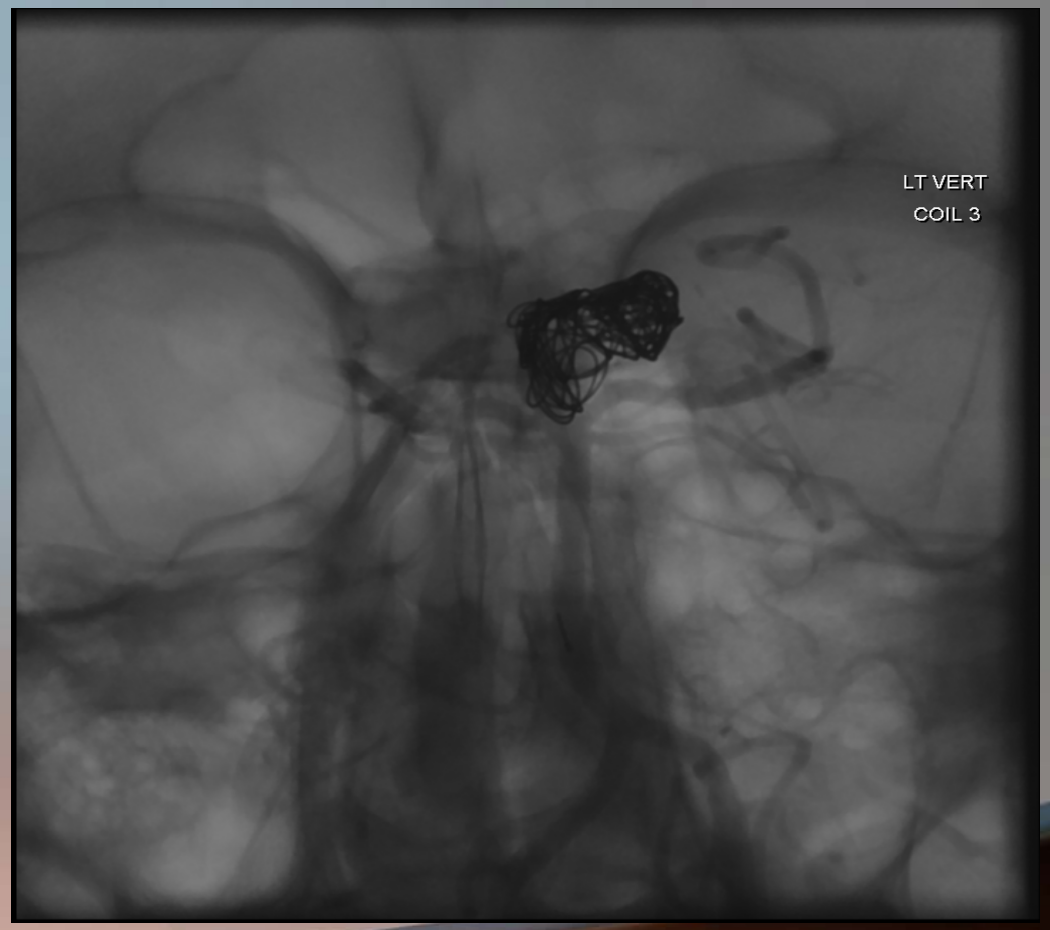
3D Angiogram



Coiling



Coiling



Completion of Coiling

Final Image

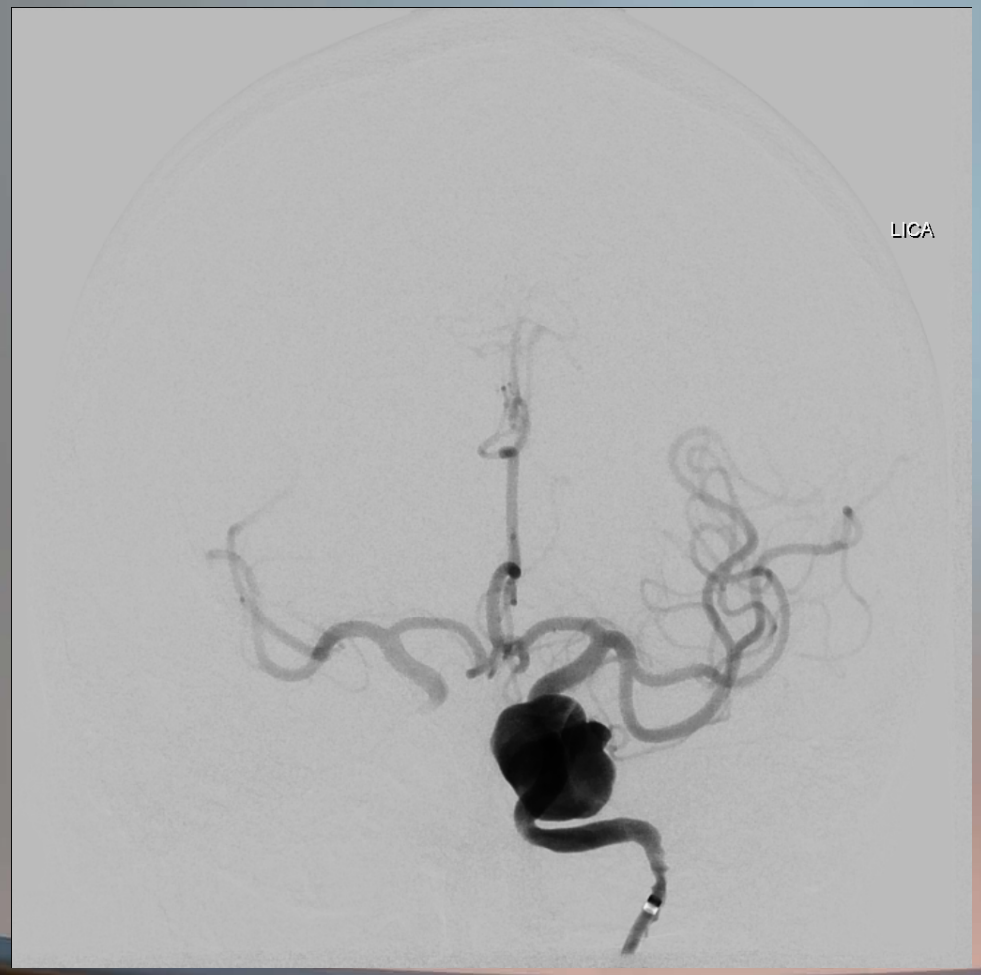
Vasospasm

Case #3

- 69 year old female
- Several month history of double vision
  - Left 6th nerve palsy on exam

- Past Medical History
  - Hypertension
  - Smoking

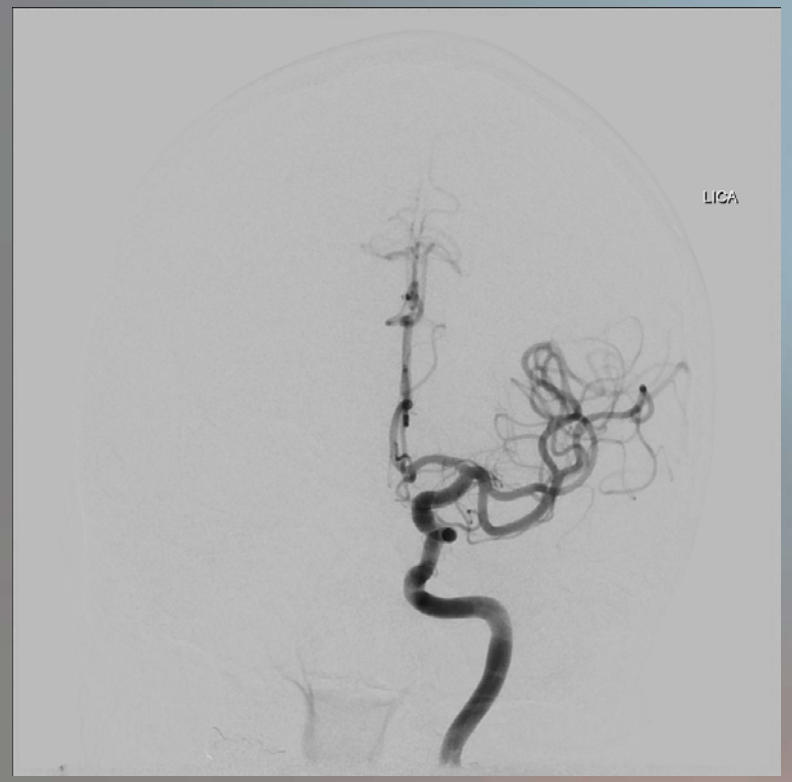
Angiogram

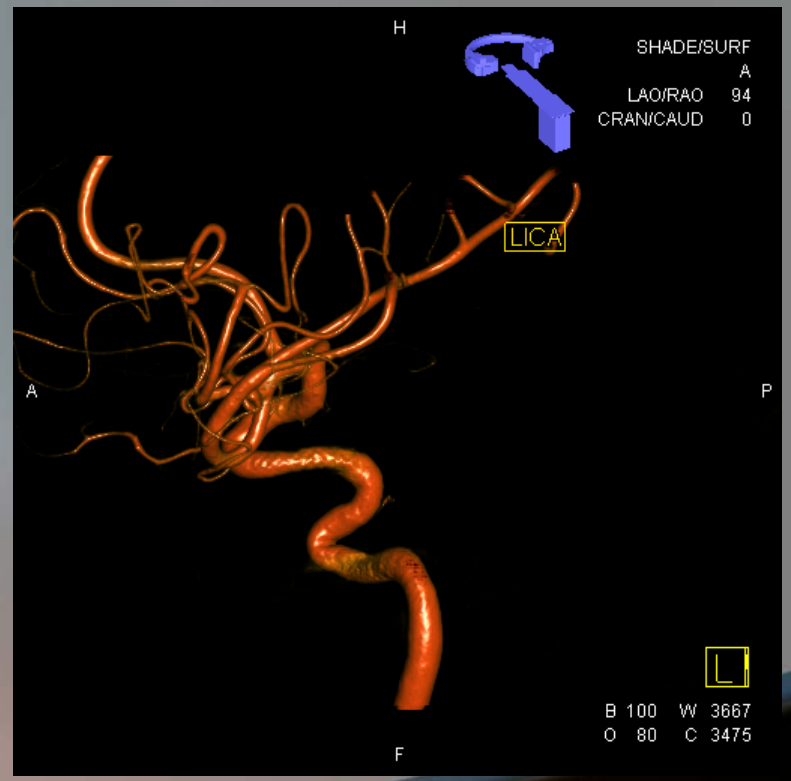


3D Angiogram

Flow-Diverting Stent Placement

Six Month Follow-up Angiogram





http://youtu.be/QR7sKMYCqec

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