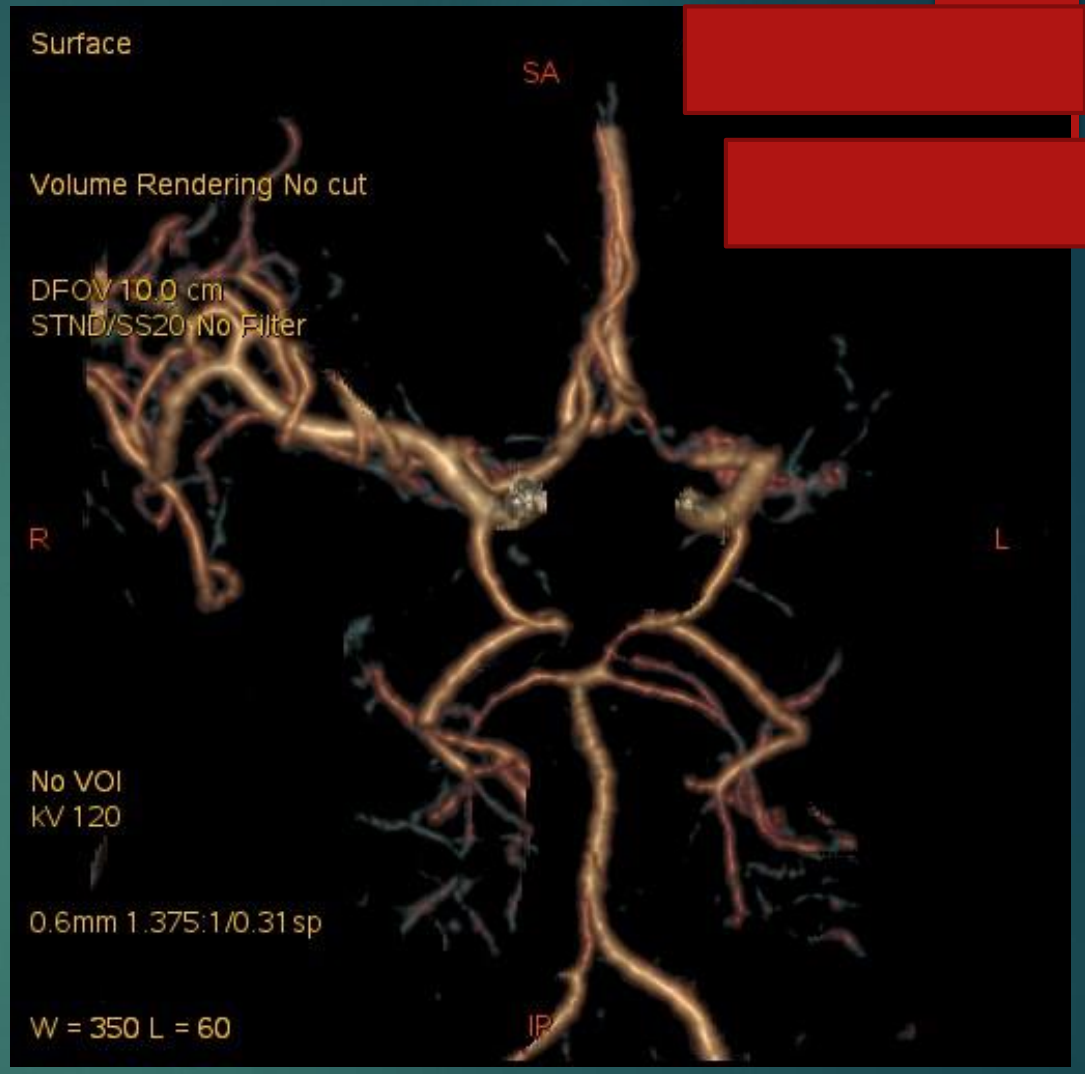
Interventional Stroke Management

DR. JAMES MCEACHERN

Faculty Disclosure

- No conflicts of interest or disclosures



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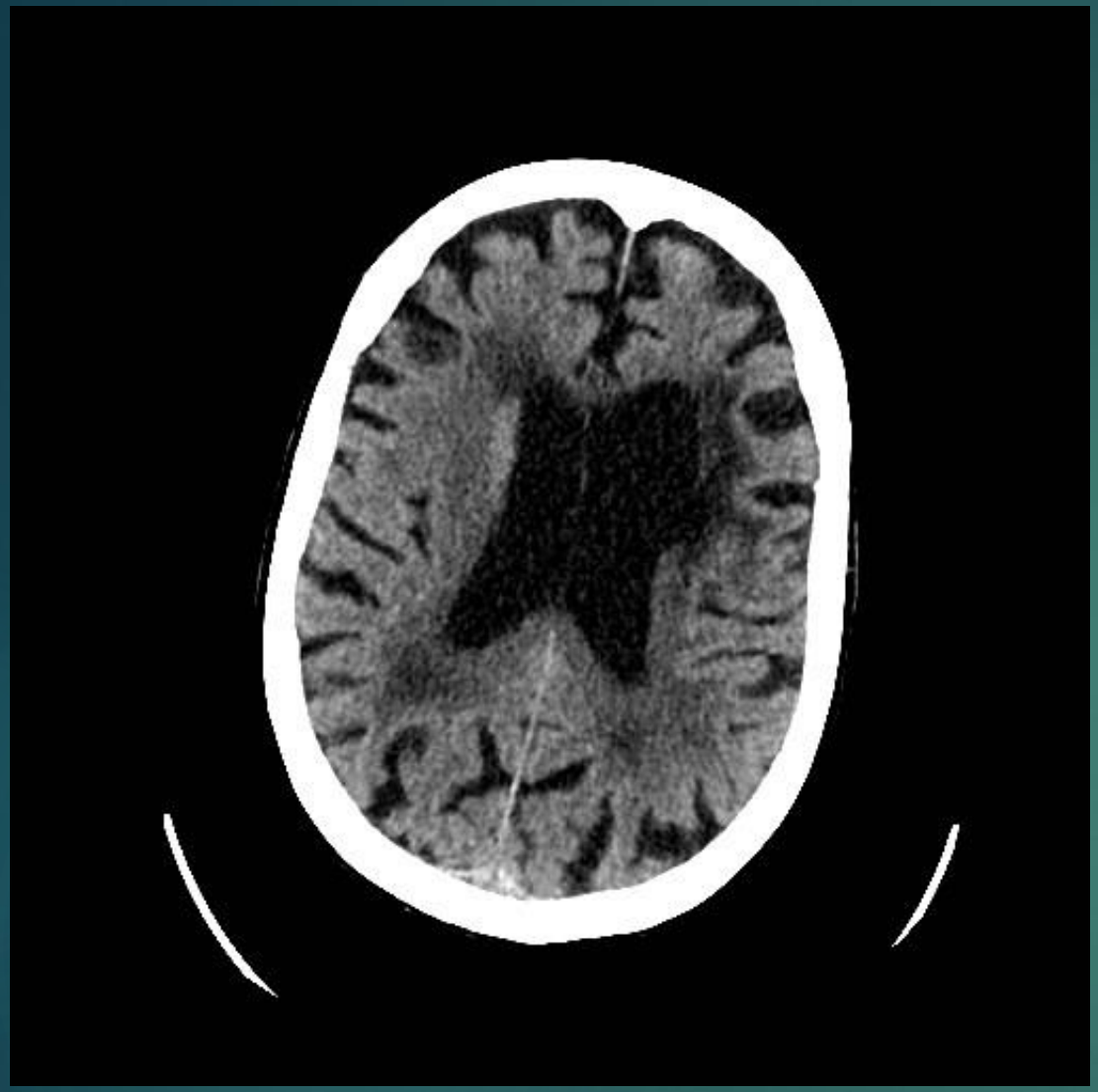

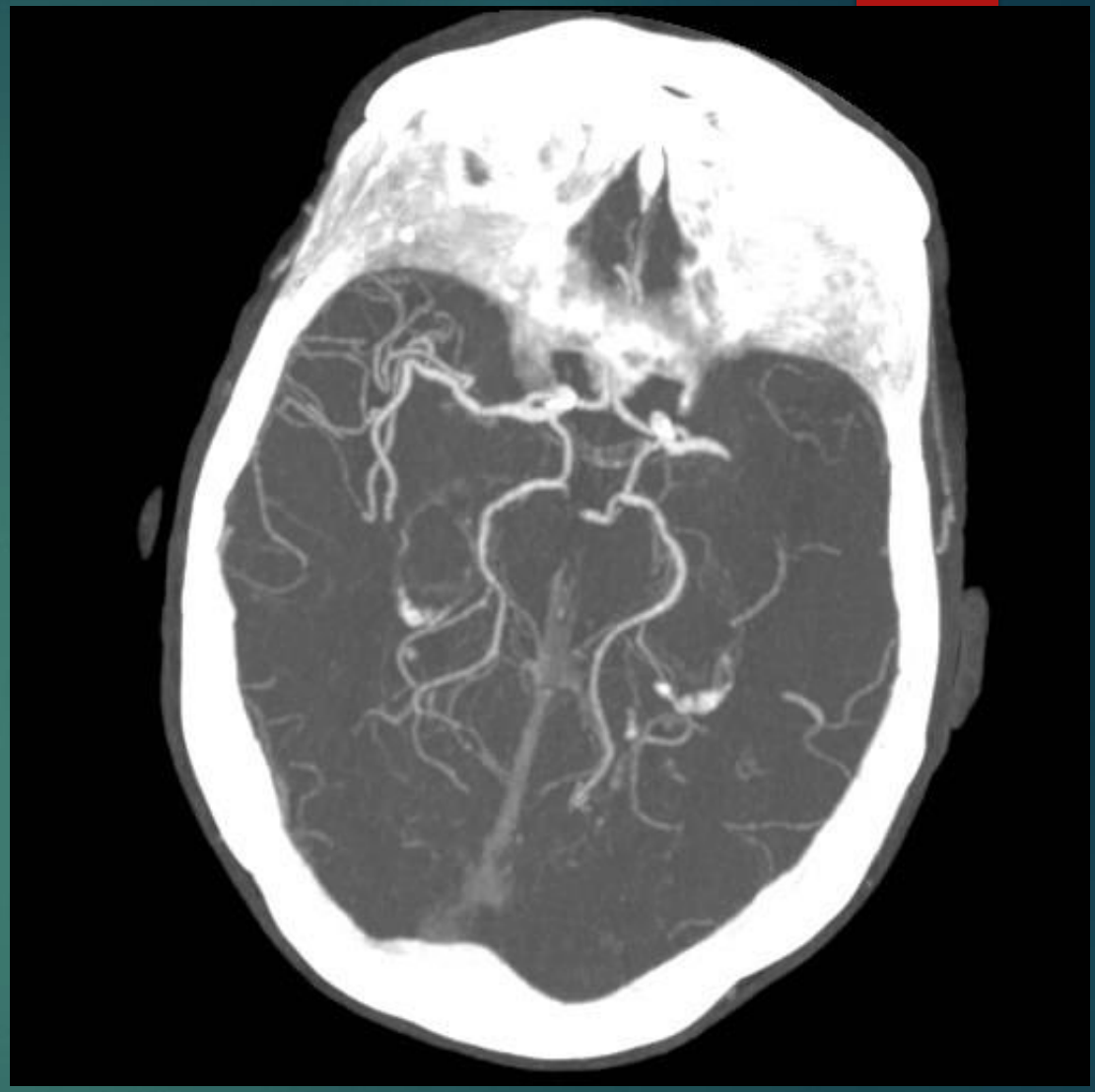

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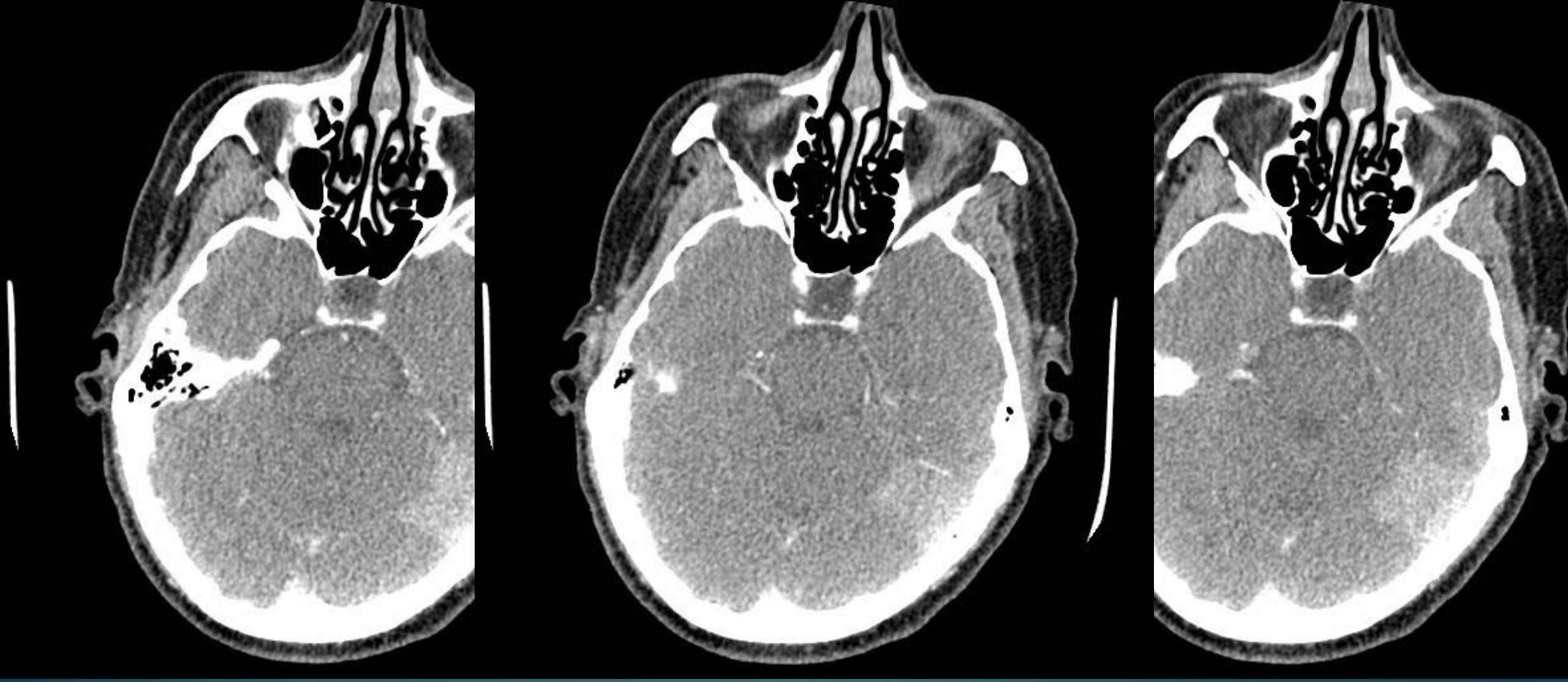


Case 3: ~50y F with acute onset LOC, found down. Recovered to baseline by time of arrival to hospital and has been stable since symptom onset ~6h ago. Now has having multiple cranial nerve symptoms with a relatively mild neurological deficit.

Outline

- Overview of Interventional stroke treatment
  - Treatment strategies
  - Technical Aspects
  - Evidence
  - Patient Selection
  - Case examples

Treatment Strategies

- Intra arterial tPA
- Mechanical Thrombectomy
  - Stent-retrievers
  - Aspiration

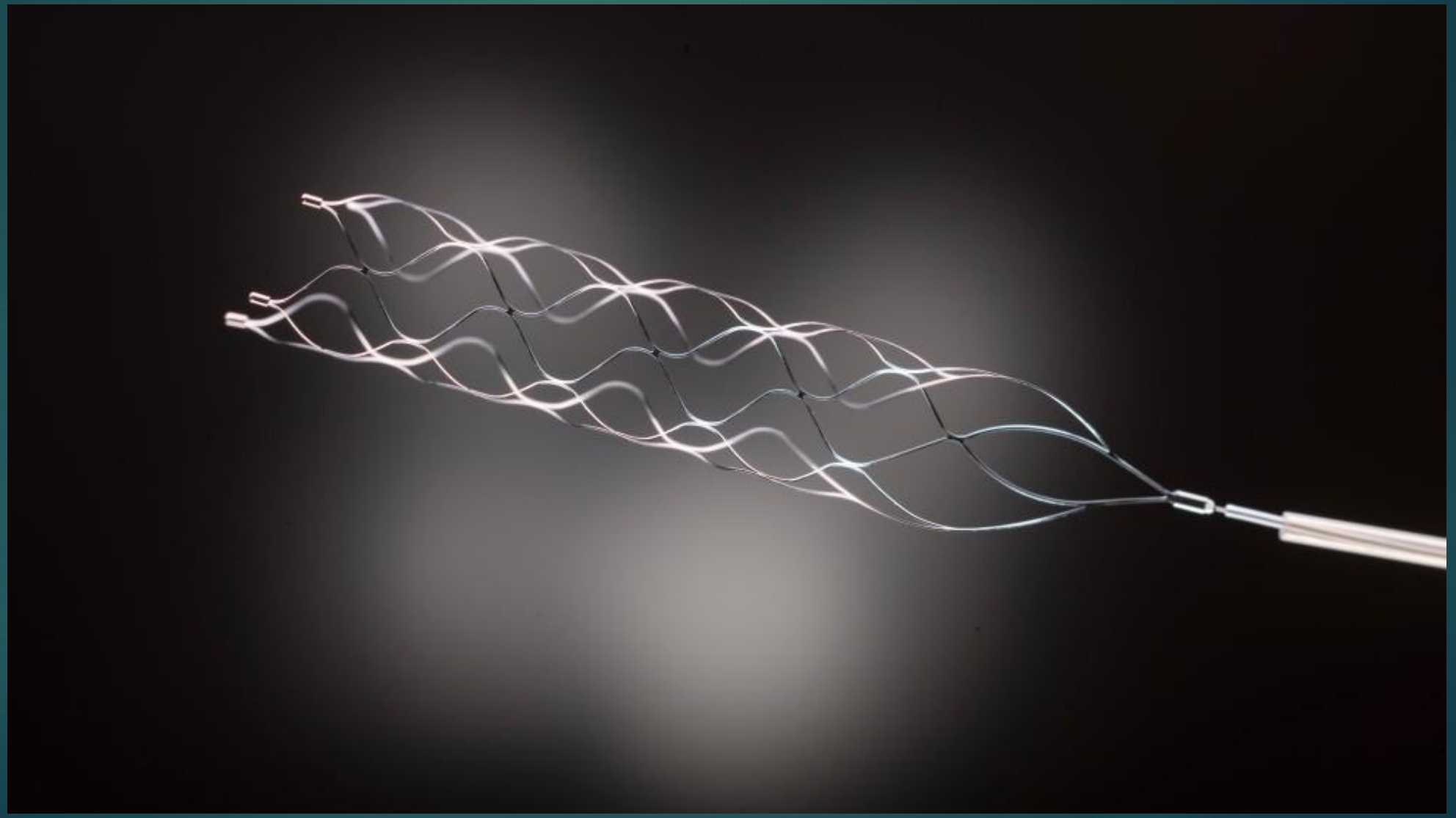
Intra-arterial Thrombolytics

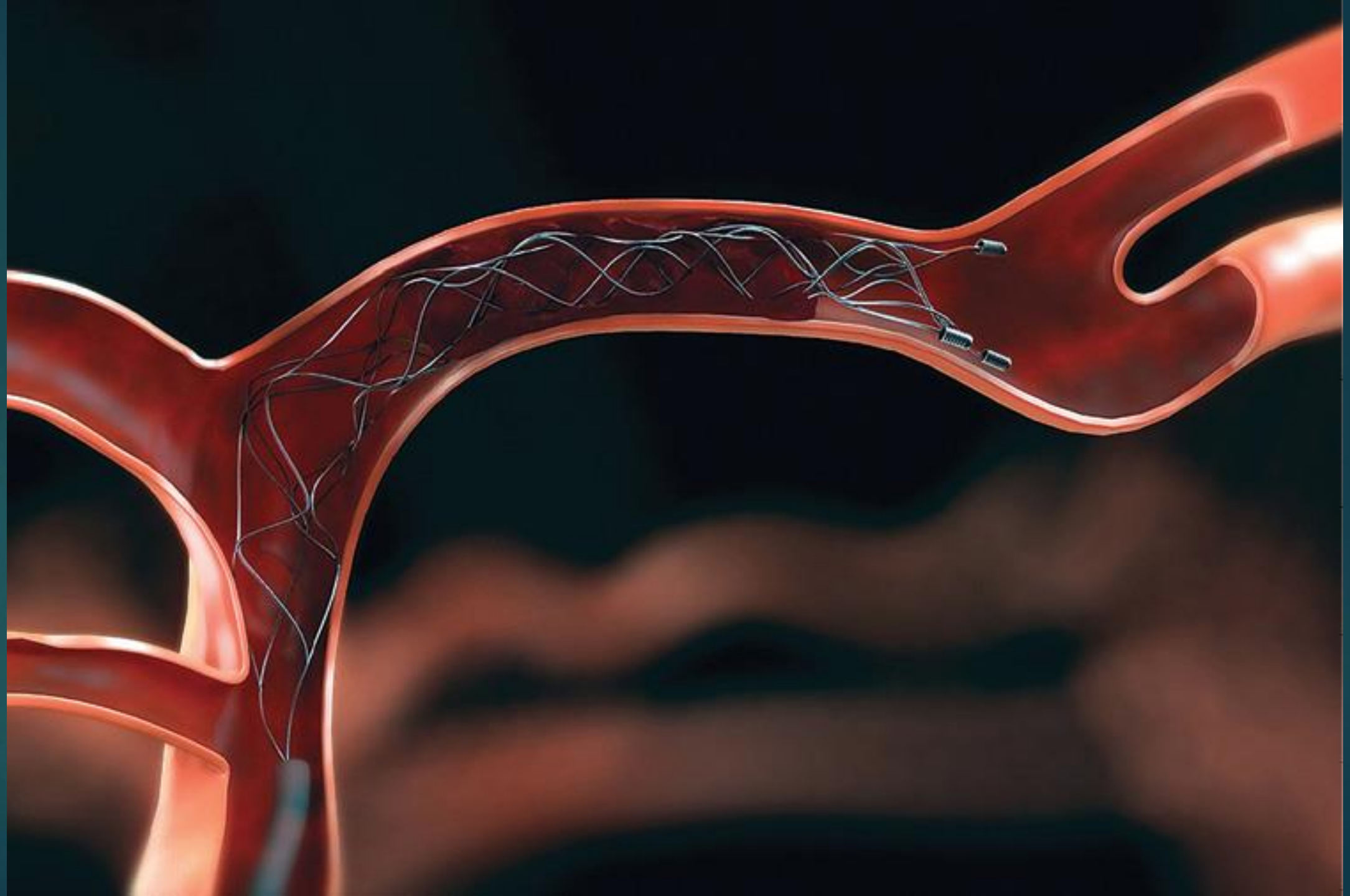
- Administering thrombolytic drugs (tPA) through a small catheter placed proximal to an occluded vessel
- Series of trials in the late 90's
  - Impressive recanalization rates
  - High rates of intracranial hemorrhage (~10%)

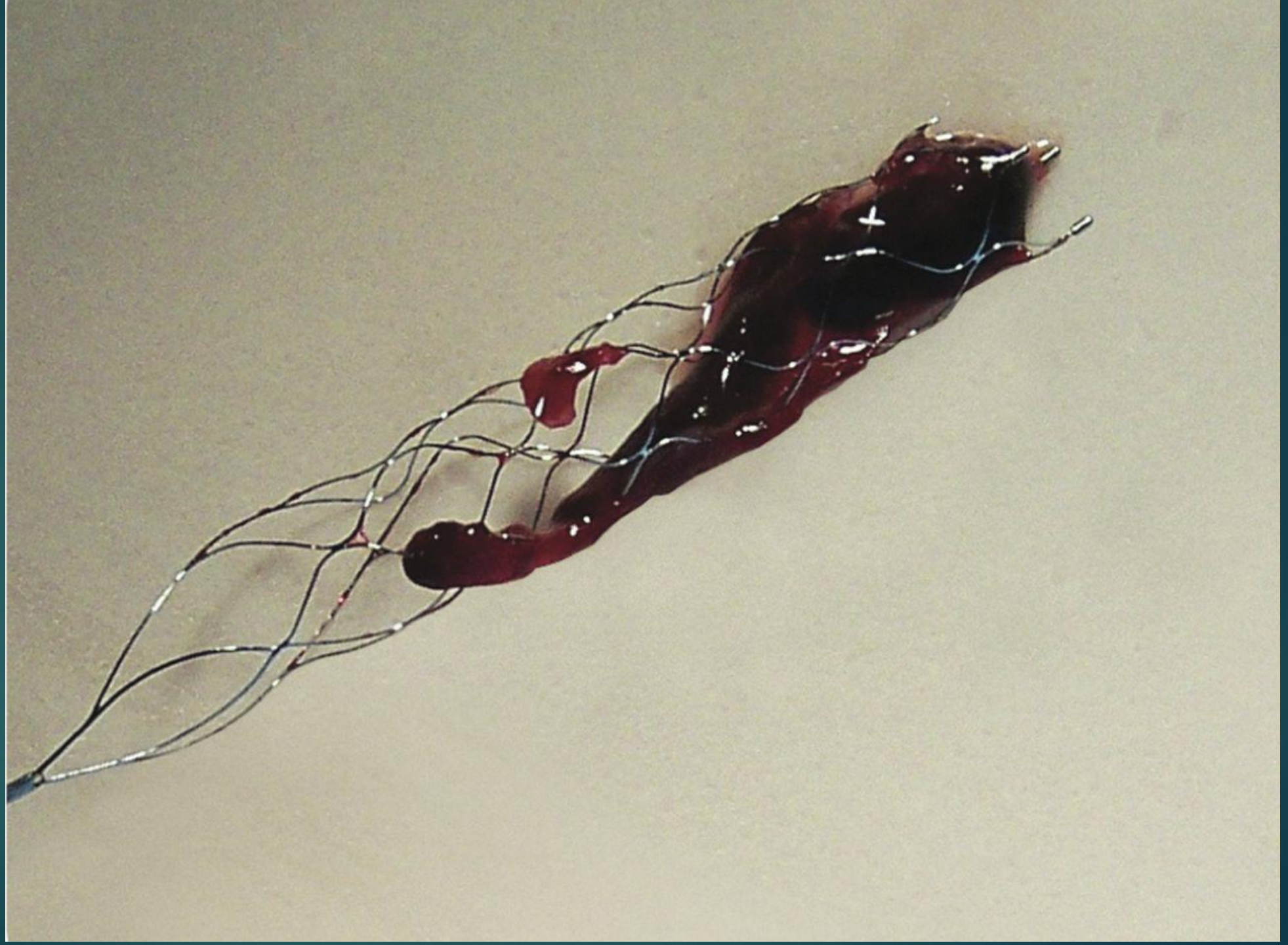
Mechanical Thrombectomy

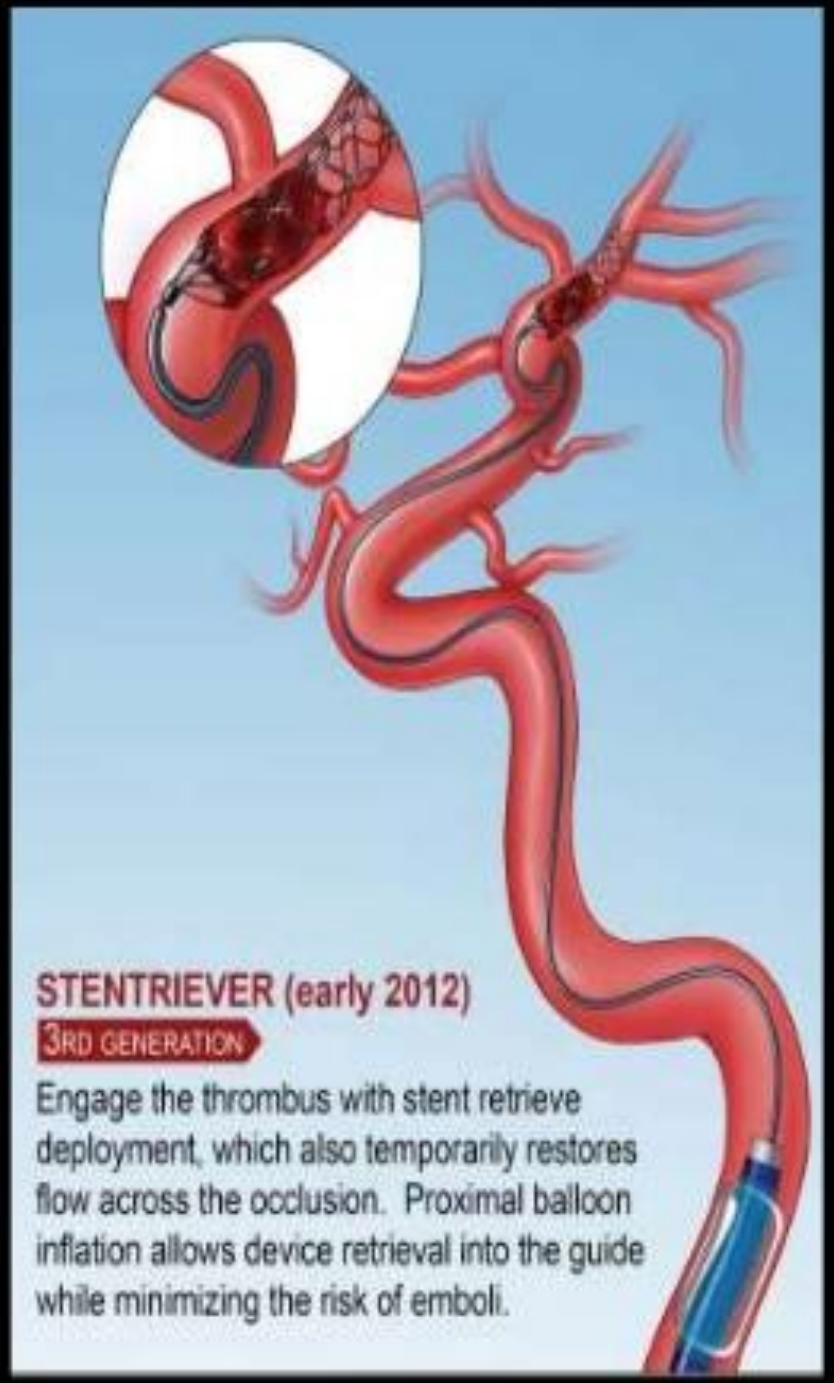
- Removal of a large vessel occlusion through an angiographic approach
- Arterial access obtained, usually from the common femoral artery
- Series of catheters constructed, sequentially smaller
  - Larger catheters positioned within the neck
  - Smaller catheters advanced intracranially to remove the clot
- Stent retriever and Aspiration systems

Stent Retriever Systems





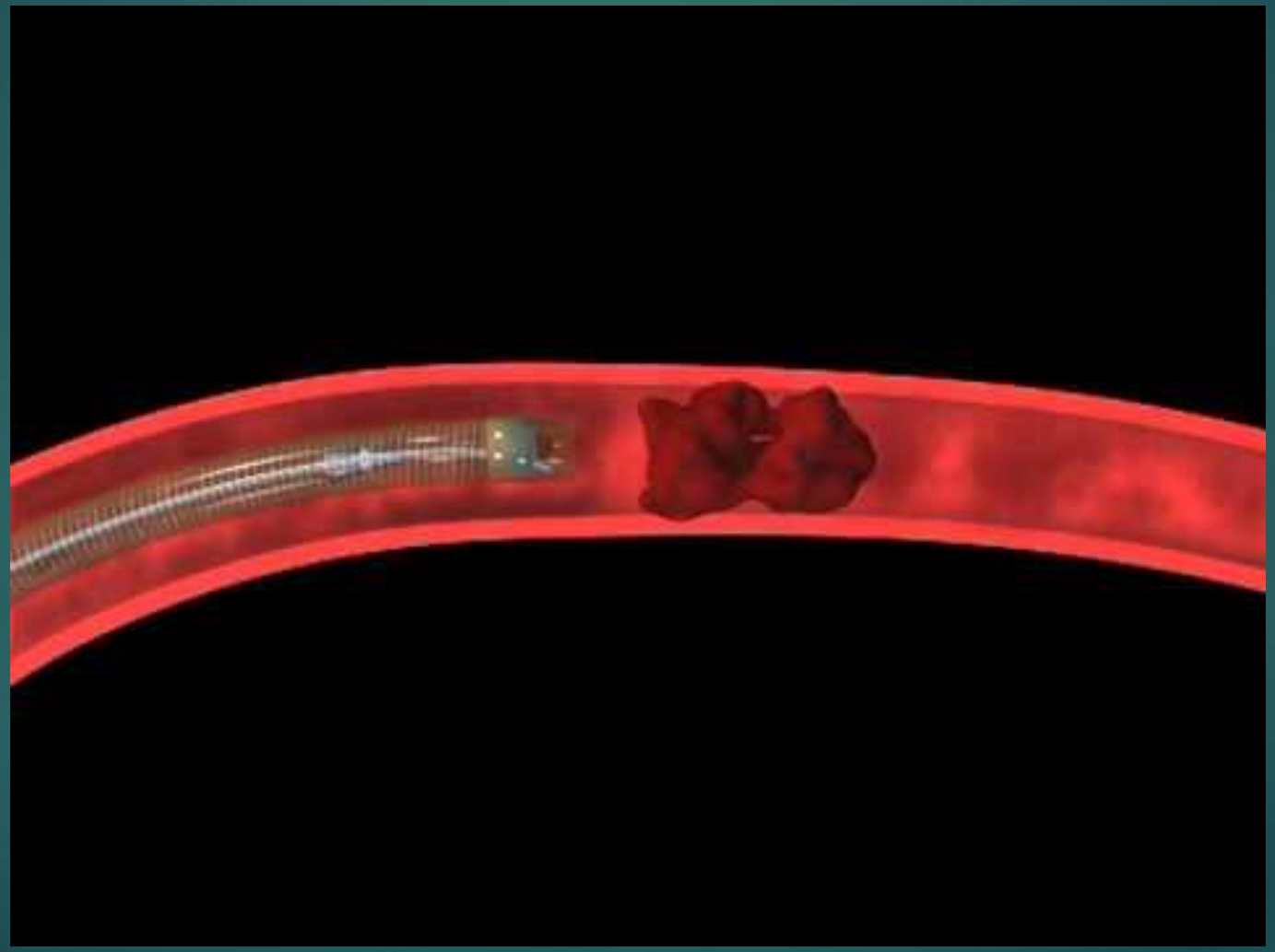


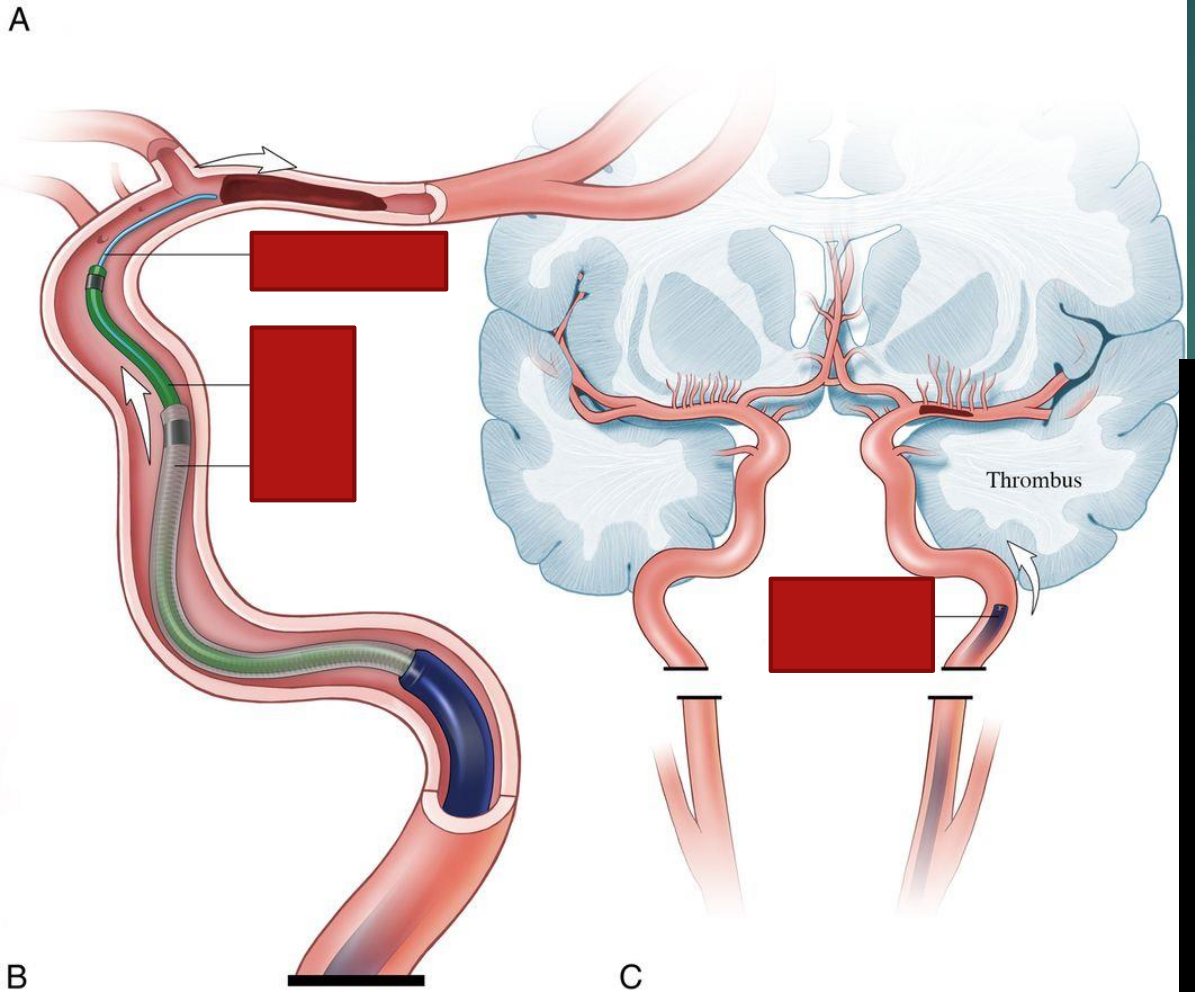


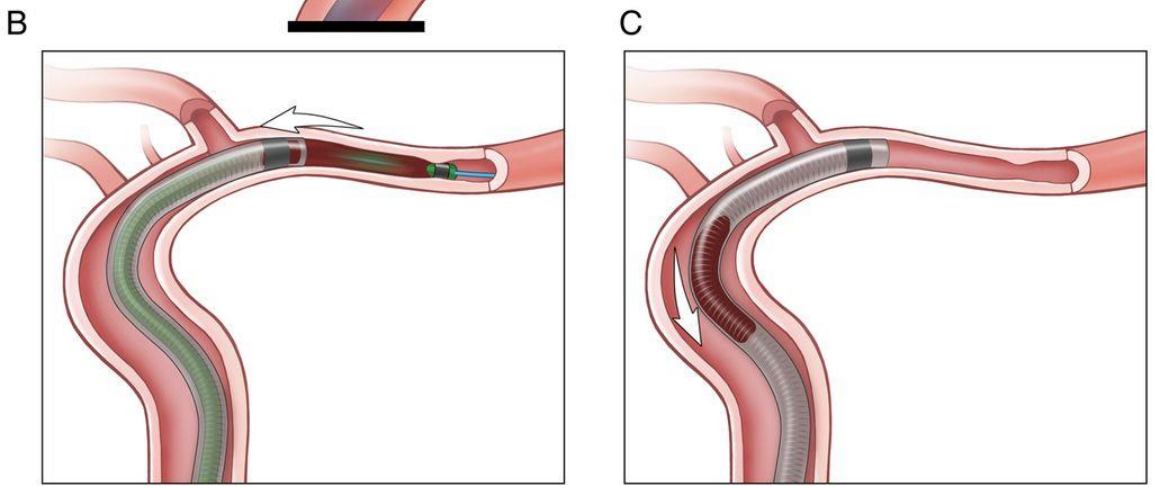
STEPS

- **Check clinical status**
- **Don't wait for lines , complete draping**
- Local anesthesia.- anesthetist in lab – sedation
- If restless , consider GA
- But should be done without delay , avoiding drop in BP
- If IV tPA – single wall puncture, micropuncture set (closure device)
- 8 F short sheath
- 3000-5000 U heparin (not if tPA)

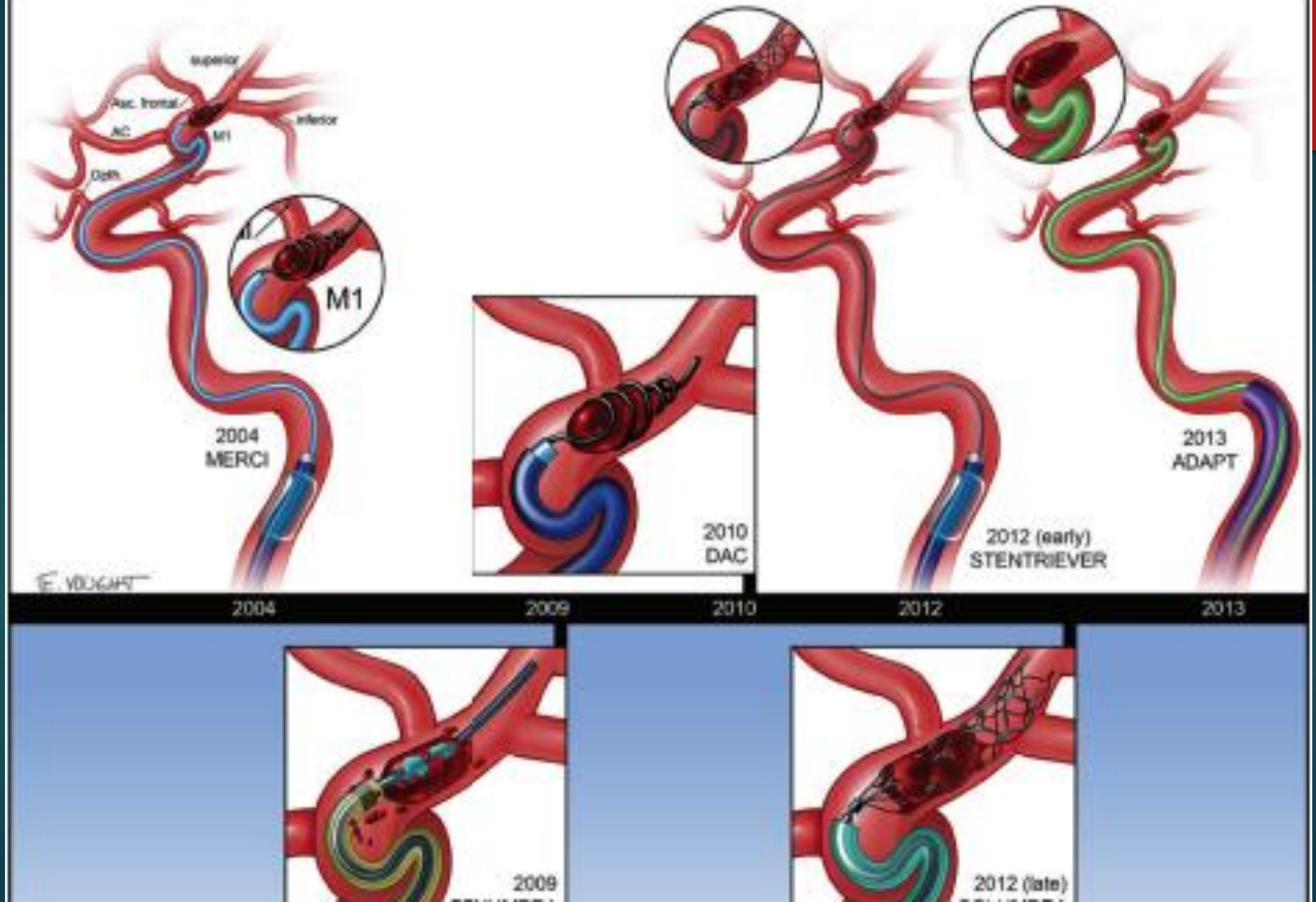
Aspiration Systems




A
Thrombus


B

C


superior
Pac. frontal
inferior
AC
M1
Opth.
M1
2004
MERCI
2010
DAC
2012 (early)
STENTRIEVER
2013
ADAPT
2004
2009
2010
2012
2013
2009
2012 (late)

Evidence

- Early experience with thrombectomy
  - Anecdotal positive outcomes
  - Limited experience, was a new procedure
- No large trials to prove it could work

Evidence

- 2013 three large trials published studying the interventional management of stroke
- All three failed to show a benefit
- Study design and technological limitations
  - Limited availability of CTA
  - Older thrombectomy devices
  - Treatment delays
  - Patient selection

Evidence

- 2015
  - 4 Large trials published documenting a clear cut efficacy
  - Varied design, patient selection, etc; however,
    - All included some form of advanced imaging (minimum CTA)
    - Patient selection
    - Advanced devices
    - Emphasized time and efficiency
  - Additional trials subsequently published further supporting mechanical thrombectomy.

Evidence

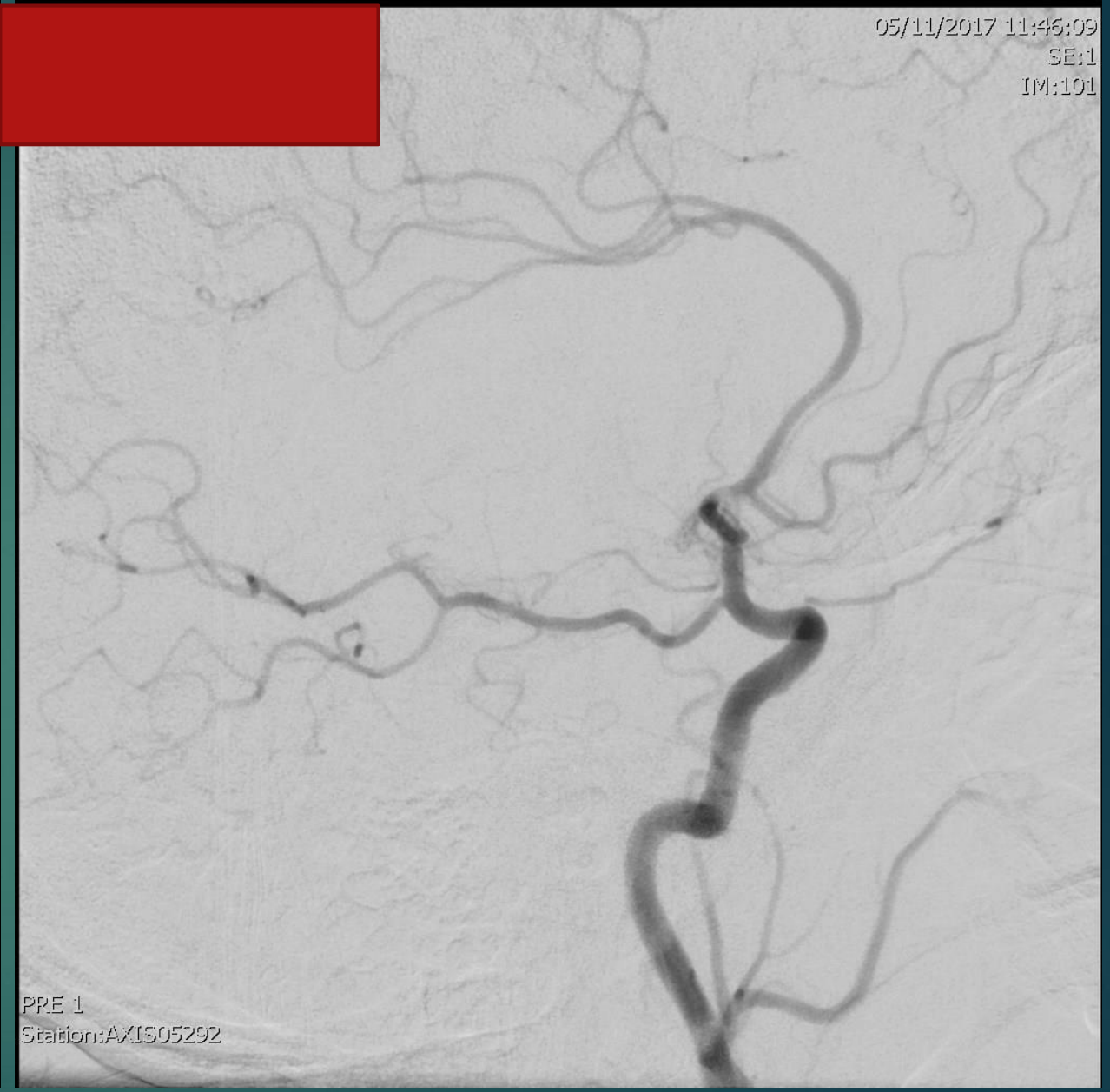
- Trials established that mechanical thrombectomy
  - Improves clinical outcomes
    - Significant increase in patients living independently
    - Trend towards decreased mortality
  - Is safe
    - Low complication rates
    - Overall better outcomes
    - Similar rates of intracranial hemorrhage
  - Is cost effective
    - High up front cost
    - Less time in hospital acutely
    - Less time in advanced care/assisted living facilities

Patient Selection

- Different trials utilized different selection criteria
- Individual hospitals attempt to standardize workflows taking into account their own resources, geography and experience
- General selection criteria include
  - Time since last known normal
  - Age
  - Stroke symptom severity
  - Imaging criteria
  - Pre morbid functional status

- Last Known Normal
  - Trials varied
  - 6h up to 12h
  - Ongoing studies to evaluate 12-24h
  - Longer time intervals → more dependent on imaging criteria
- Age
  - Generally not an exclusion criteria by itself**
- Stroke severity
  - NIHSS >2 as a minimum; most consider >6-8
  - Patient dependent

- Pre morbid functional status
  - Most considered baseline independence to be a requisite
  - Patient specific
- Imaging selection
  - Minimum: CT (-) and CTA
    - Large vessel occlusion (ICA, MCA – M1/M2)
    - ASPECTS >6-7
    - No hemorrhage
  - Advanced imaging
    - CT/MR perfusion
    - Multiphase CTA



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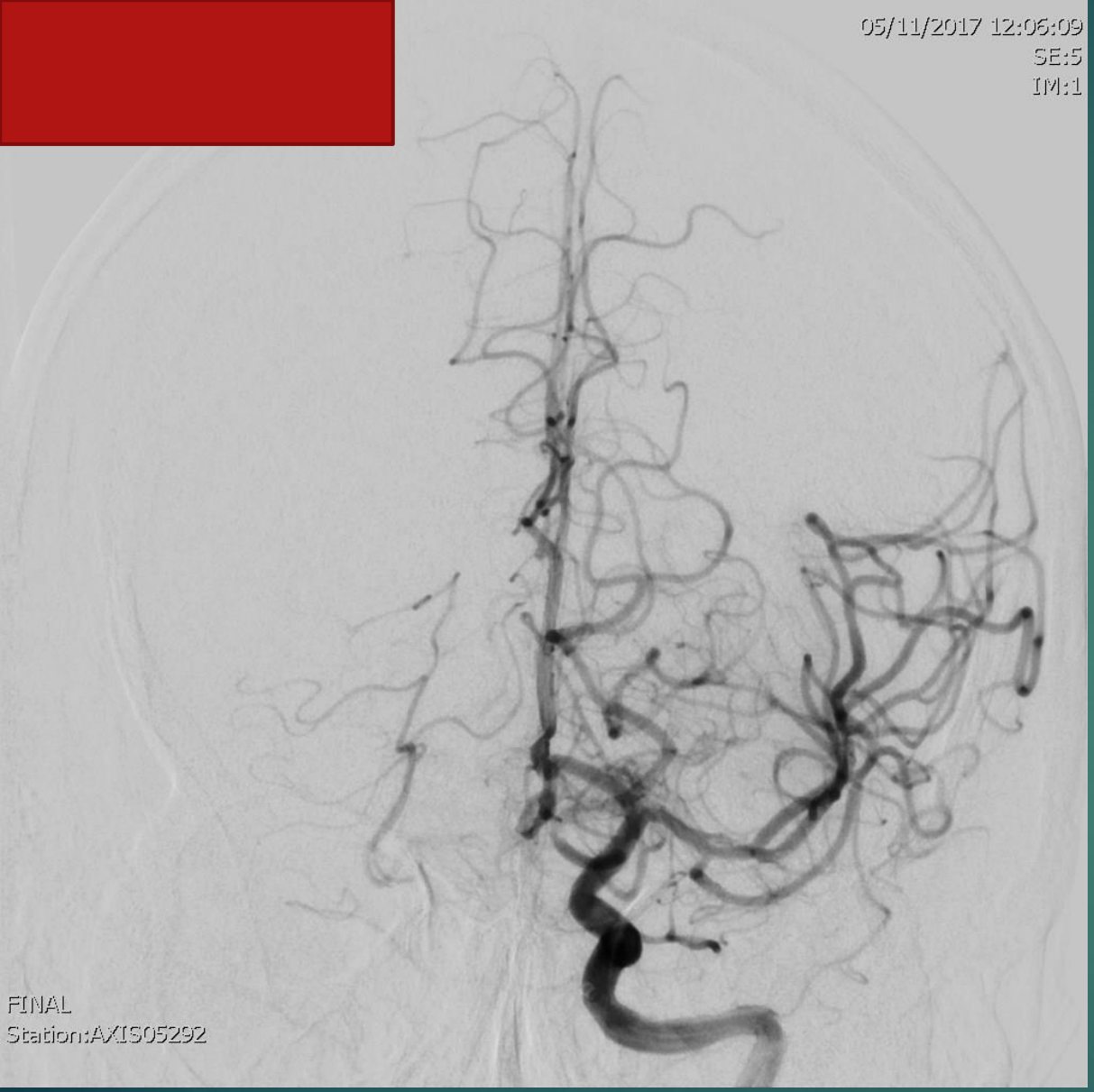
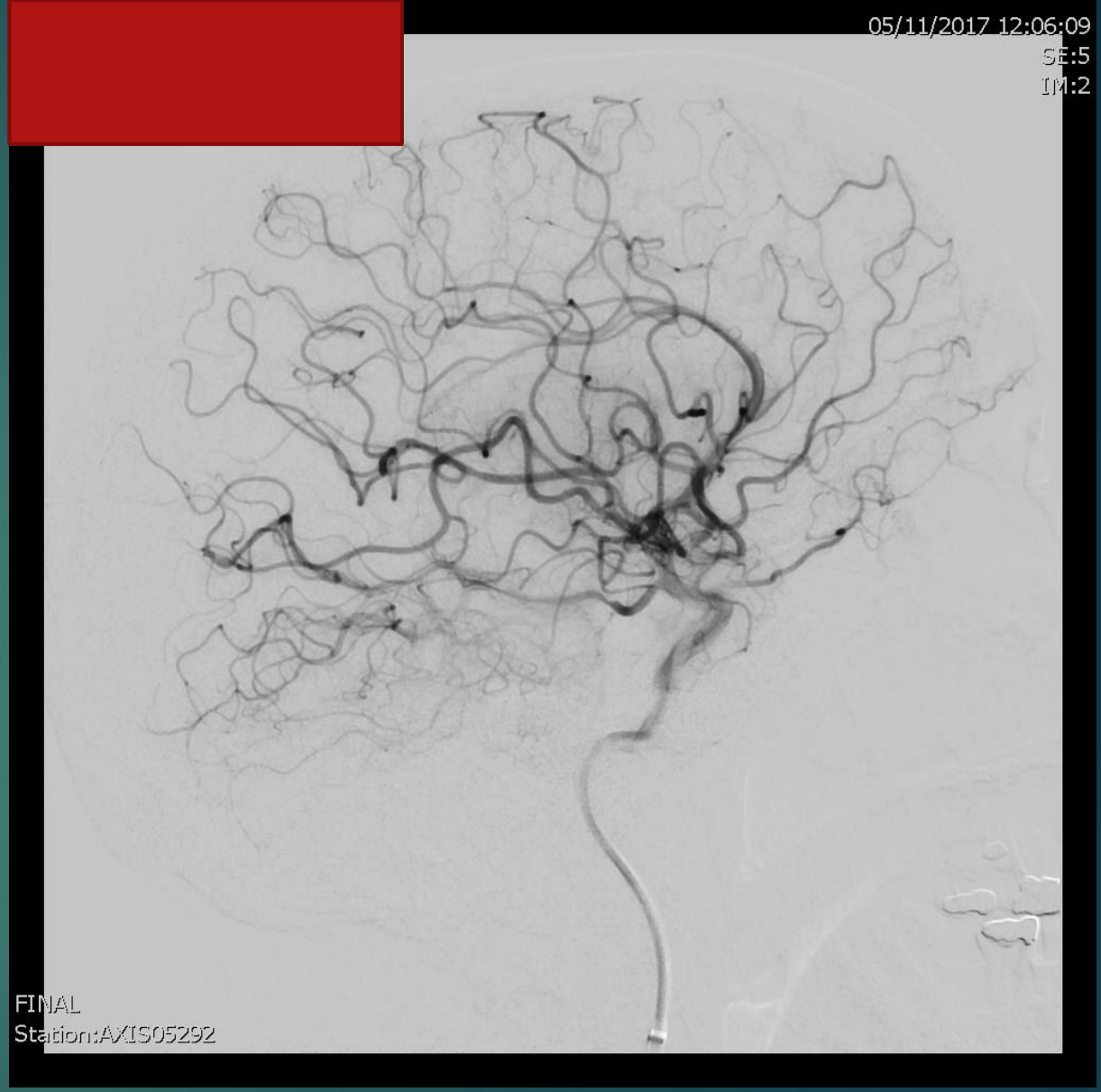
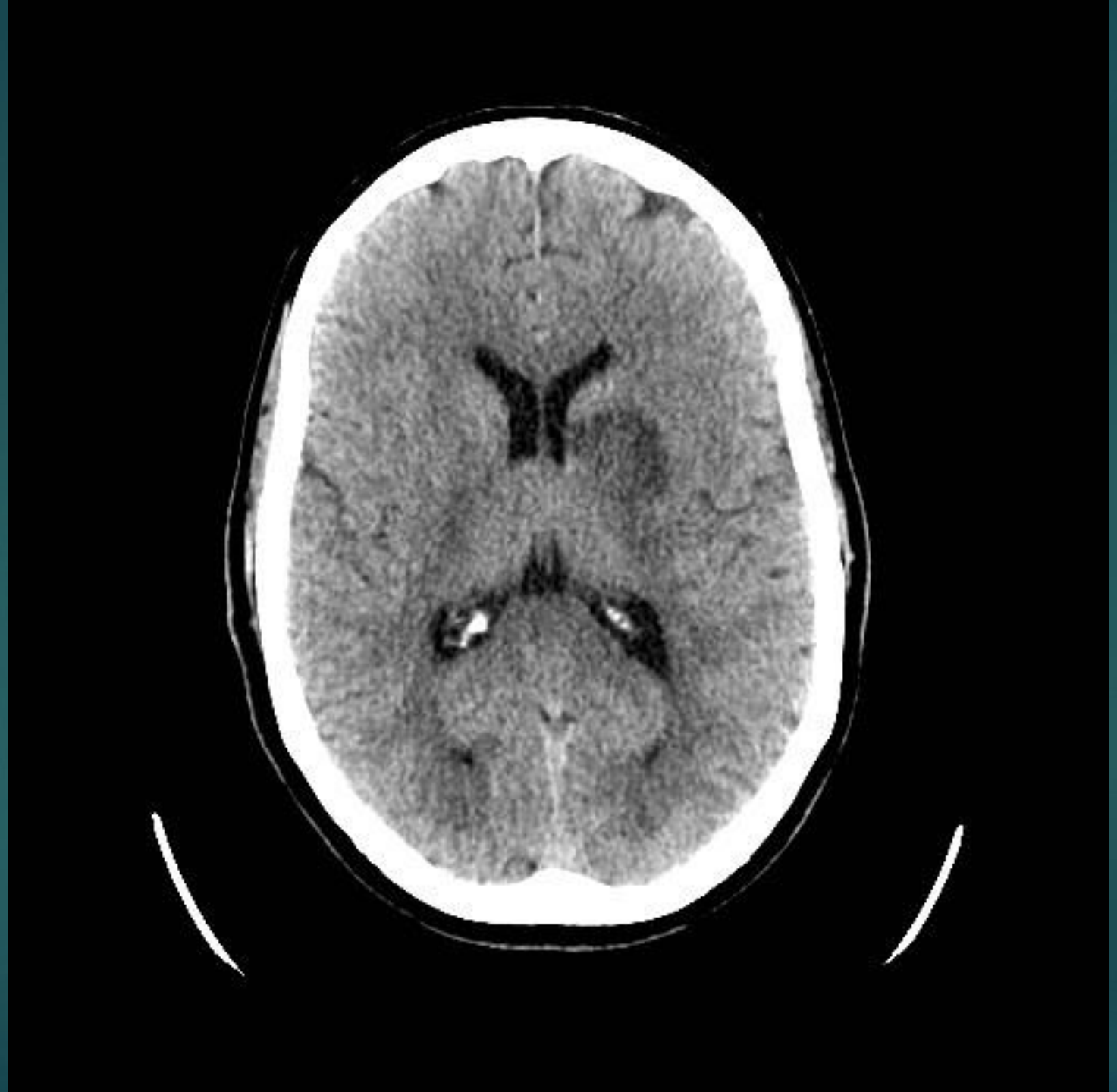




Status post single pass with an aspiration system, complete restoration of flow and no complicating features



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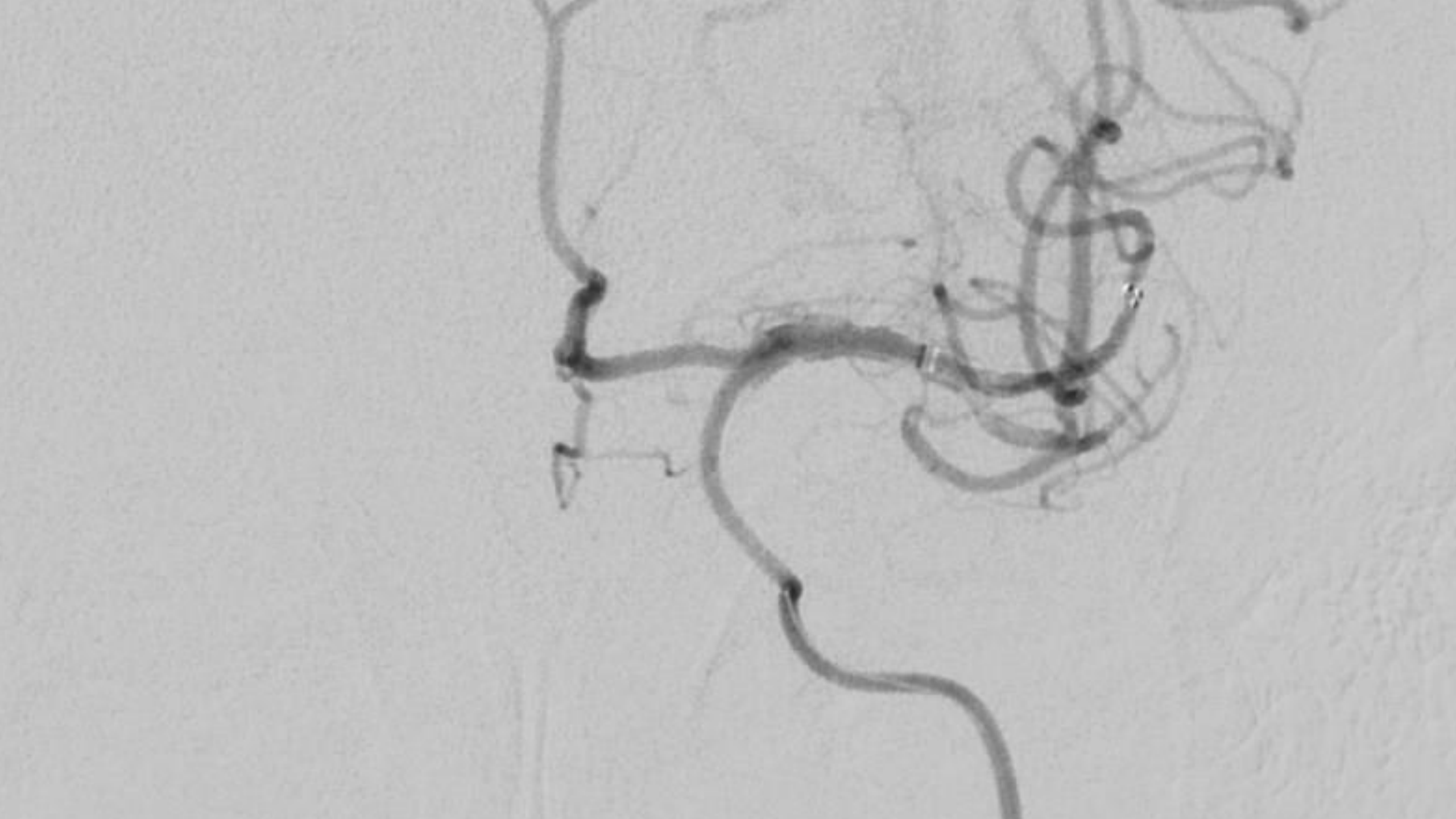
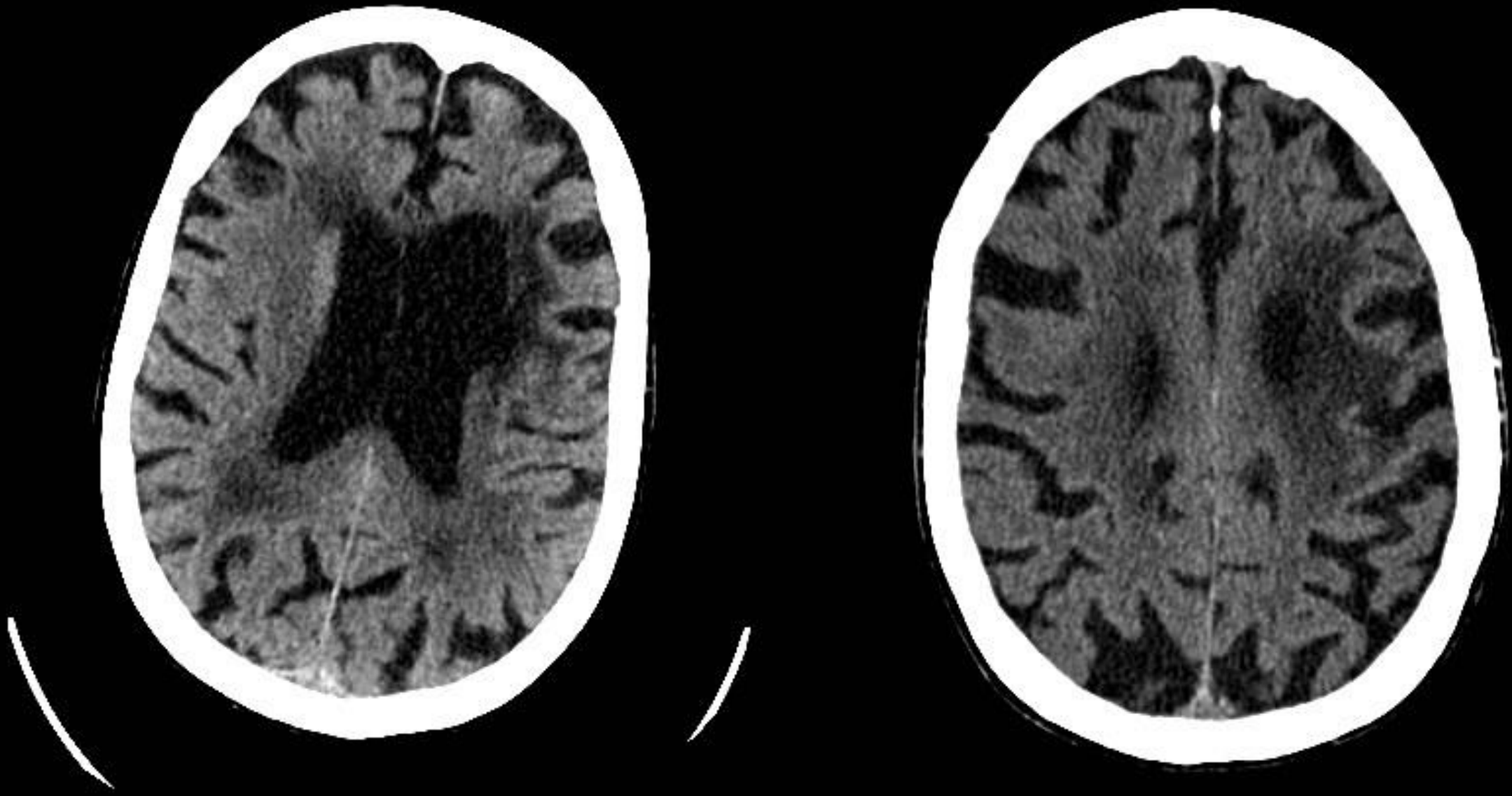
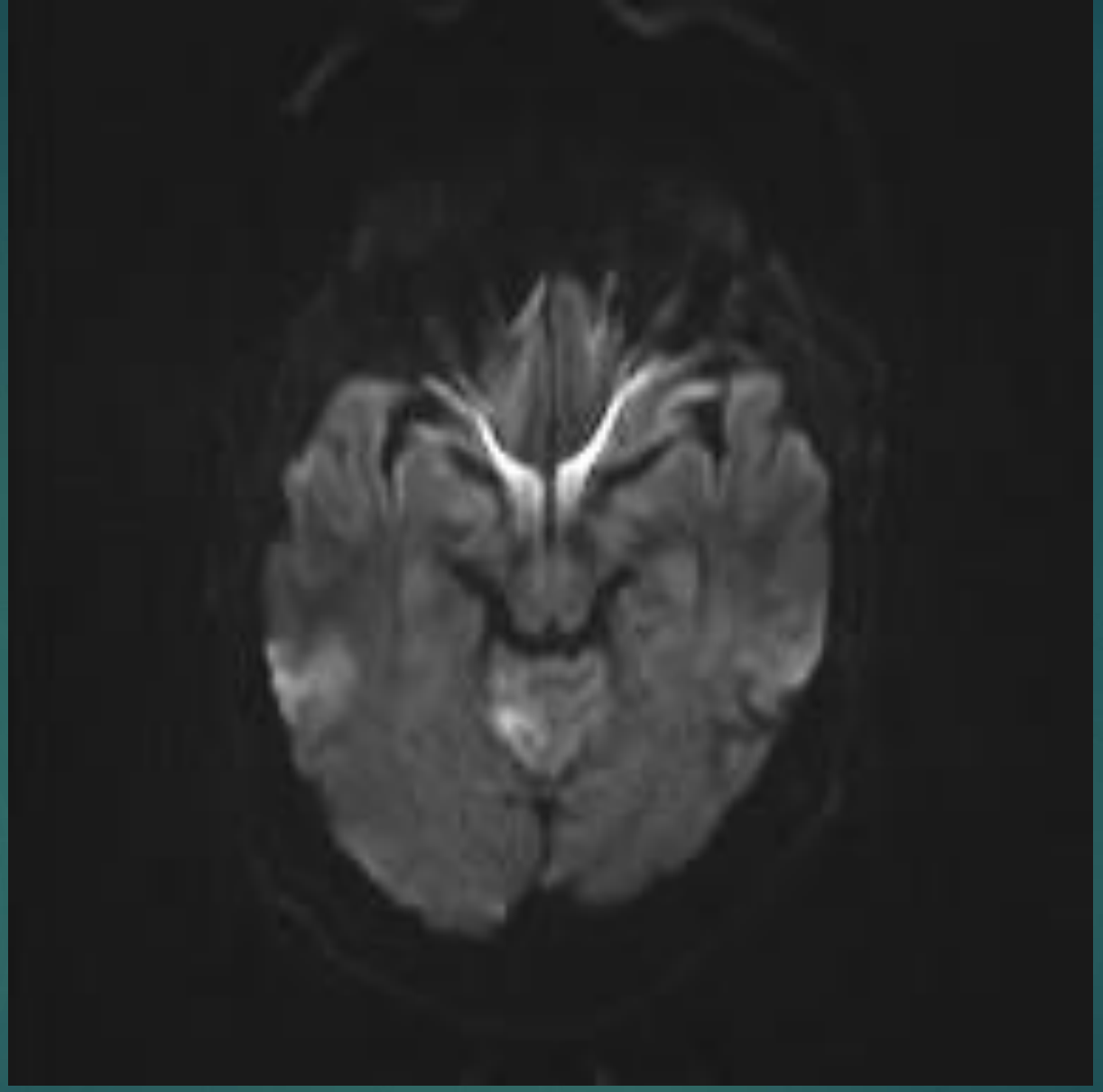



POST THROMBECTOMY
Station:AXIS05292





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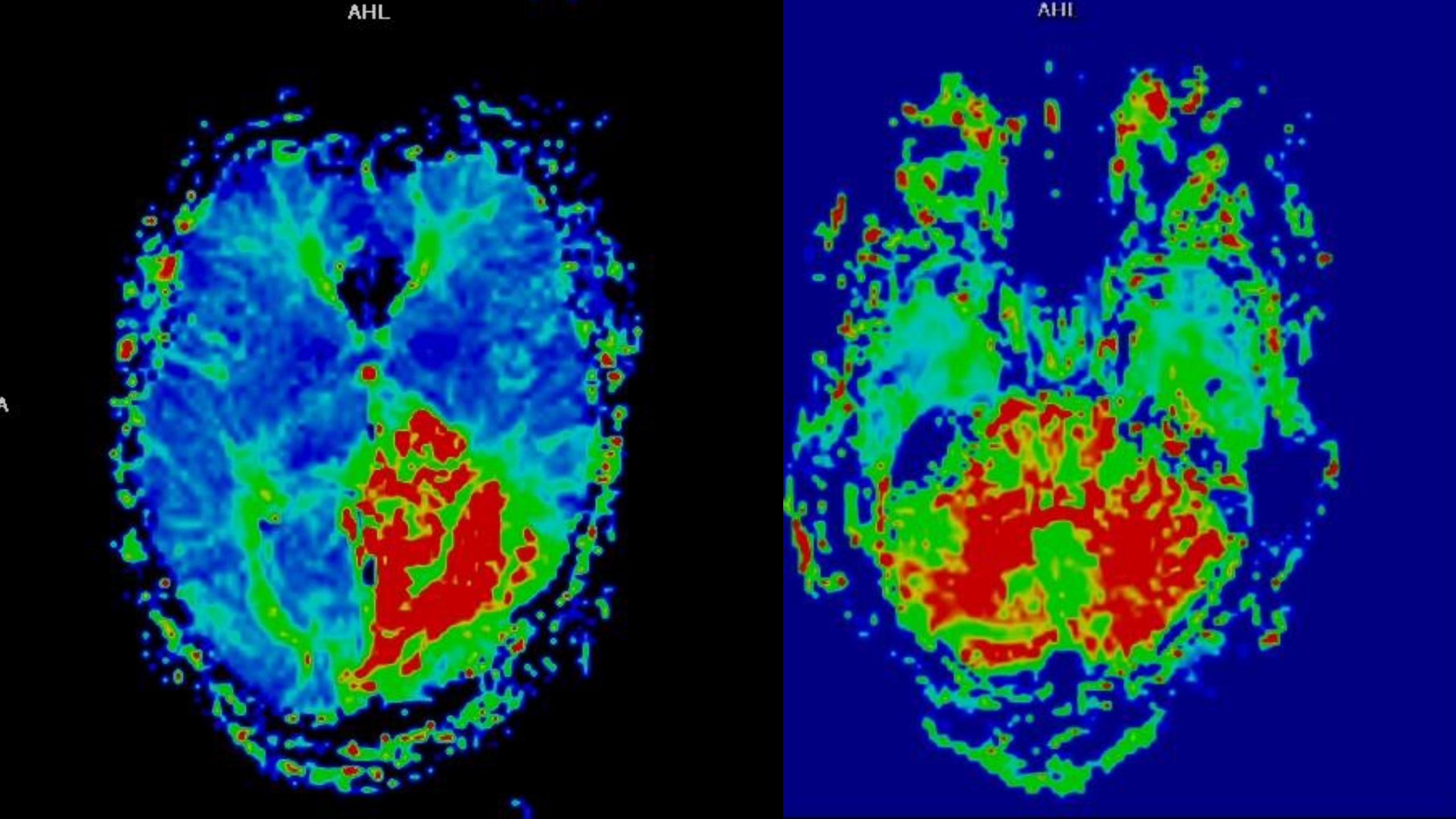
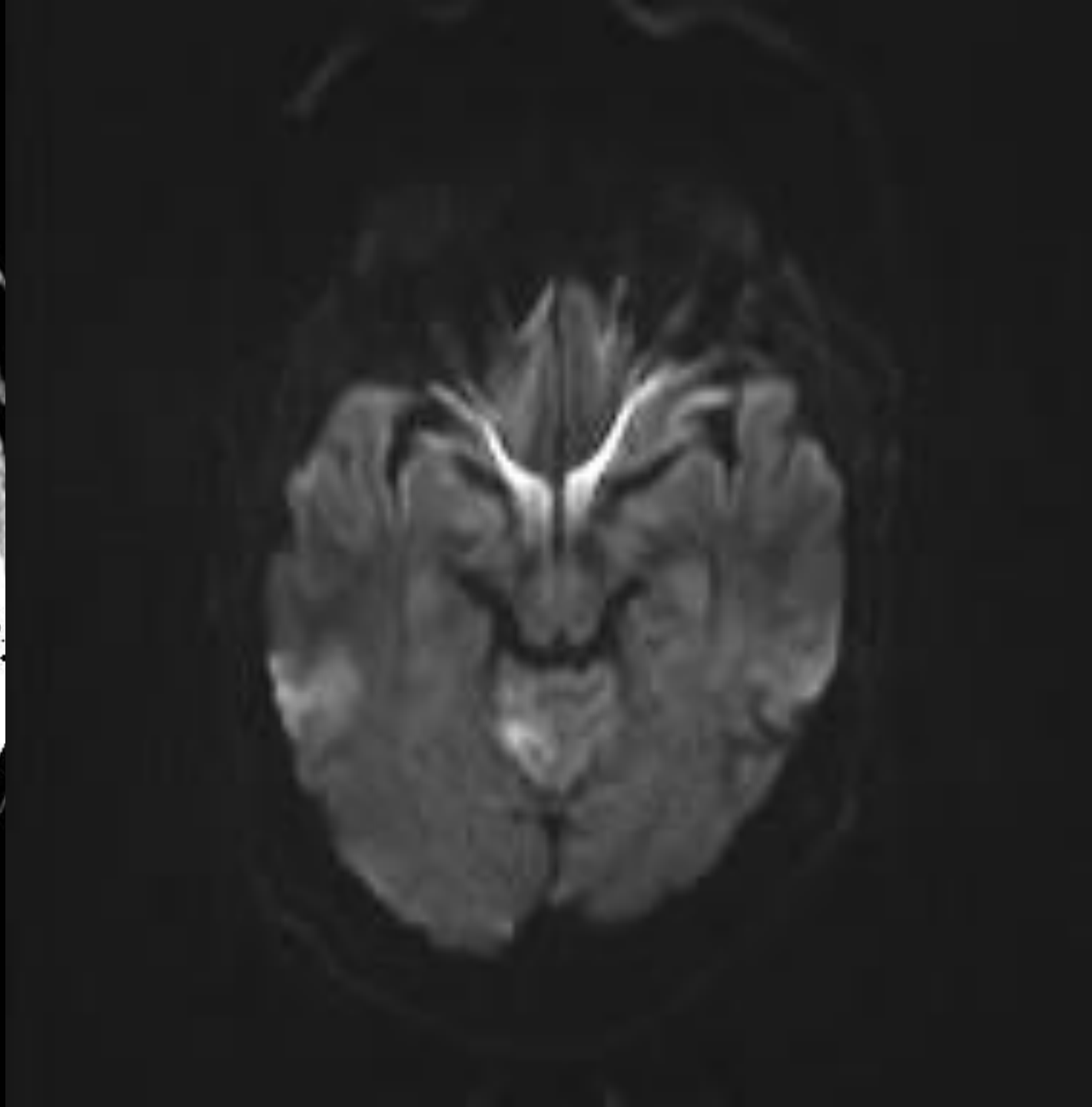

AHL
AHI



Final thoughts

- Stroke is a treatable disease
- Advanced imaging, devices and care systems are markedly improving patient outcomes
  - And saving money
- Team approach is critical
  - Patient, transport/EMS, ED/Primary care provider, Stroke neurology, Imaging staff CT/MRI, Interventionalists, ICU/Stroke Unit, Rehabilitation
  - Nursing expertise critical at all points in pathway

Acute Stroke is the new STEMI

- Time sensitive disease process with treatments that work
- These patients do not wait
  - Appropriate and timely transfer to appropriate center
  - Rapid access to the necessary imaging studies
  - Rapid interpretation of studies and clinical assesments
- This is NOT a novel or experimental procedure
- Level 1 evidence
- Standard of care
- MT systems are evolving analogous to acute MI pathways 20y ago