Mechanical thrombectomy: Current techniques and indications

May 11, 2026

Justin Granstein, MD, MPH
BIDMC Brain Aneurysm Institute
Instructor of Neurology,
Harvard Medical School

Beth Israel Lahey Health

Beth Israel Deaconess Medical Center

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

Evolution of acute stroke care

- Estimated 700,000-800,000 strokes annually
  - 80-85% ischemic
  - High degree of treatment disparity
- Treatment
  - →1994: Blood pressure control, secondary prevention, rehabilitation
  - 1995→present: tPA(/TNK)
  - 2015→present: Fibrinolytic therapy +/- mechanical thrombectomy
    - 0.5% (2011) → 3.1% (2016) → 4.9% (2018) → ~6.6% (2022)

Indications for intervention

Time Is Brain—Quantified

Jeffrey L. Saver, MD

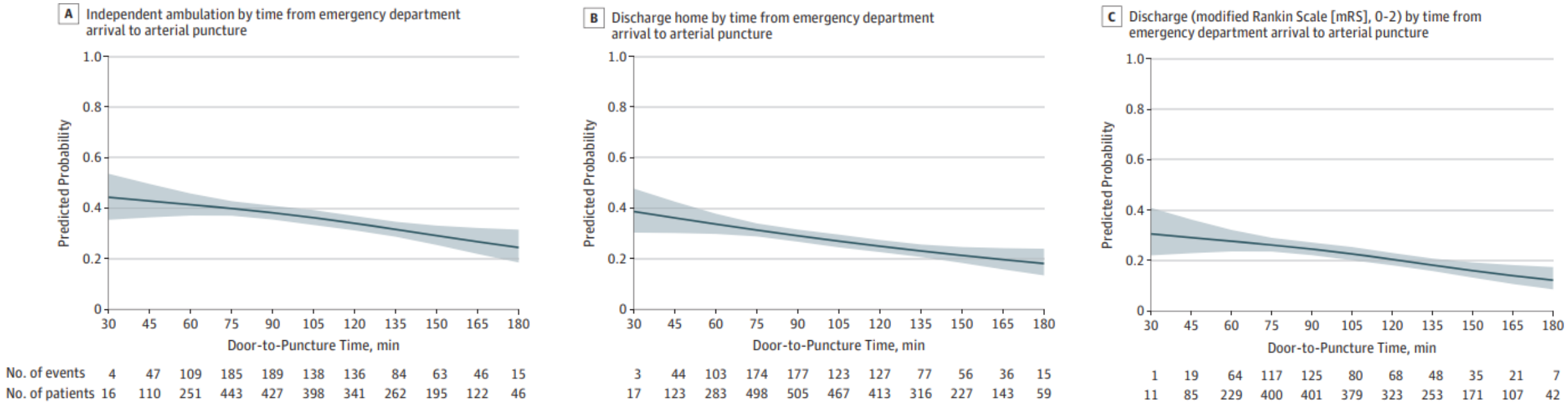
"In patients experiencing a typical large vessel acute ischemic stroke, 120 million neurons, 830 billion synapses, and 714 km (447 miles) of myelinated fibers are lost each hour. **In each minute, 1.9 million neurons, 14 billion synapses, and 12 km (7.5 miles) of myelinated fibers are destroyed.** Compared with the normal rate of neuron loss in brain aging, the ischemic brain ages 3.6 years each hour without treatment."

Stroke. 2006;37:262-22.

Indications for intervention

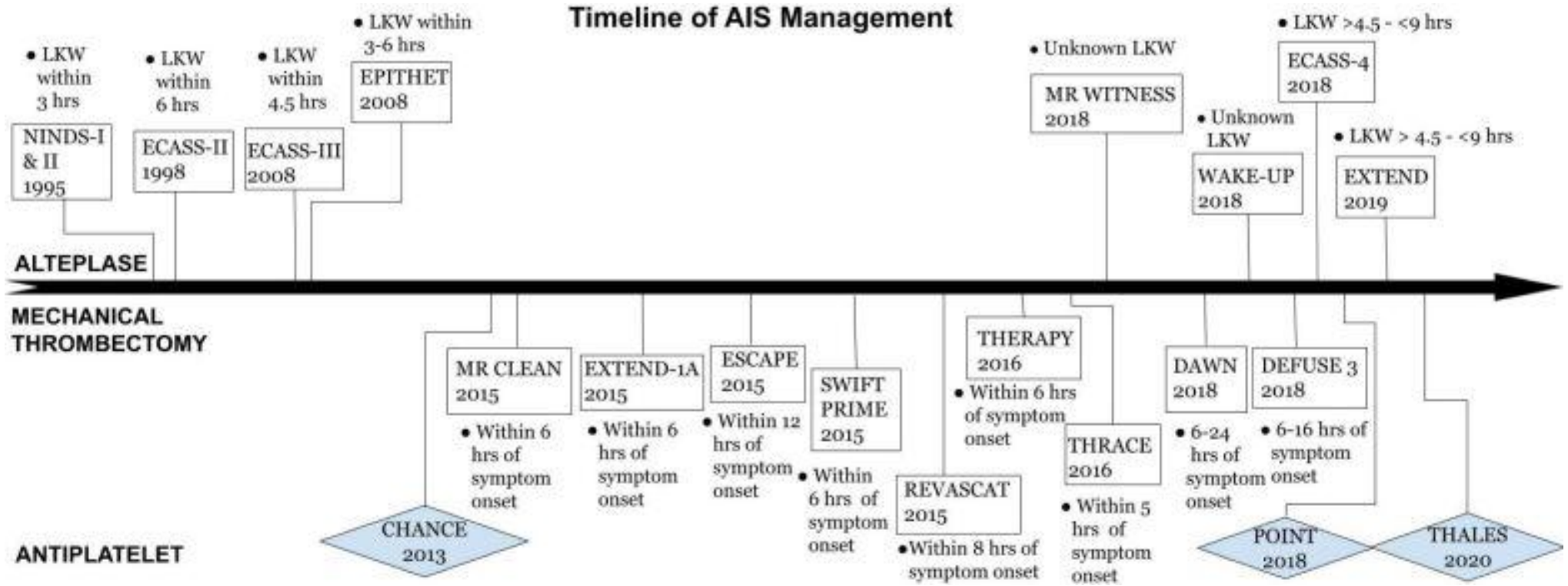
Beth Israel Deaconess Medical Center

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL



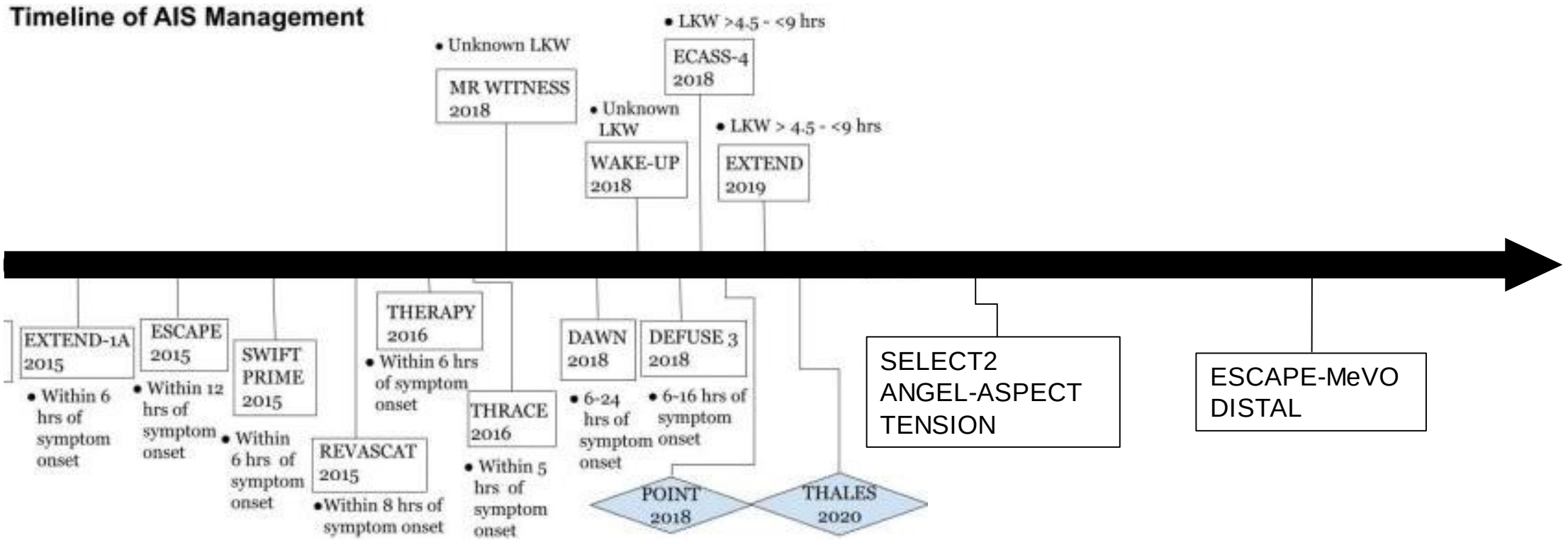
JAMA. 2019;322(3):252-263.

Indications for intervention



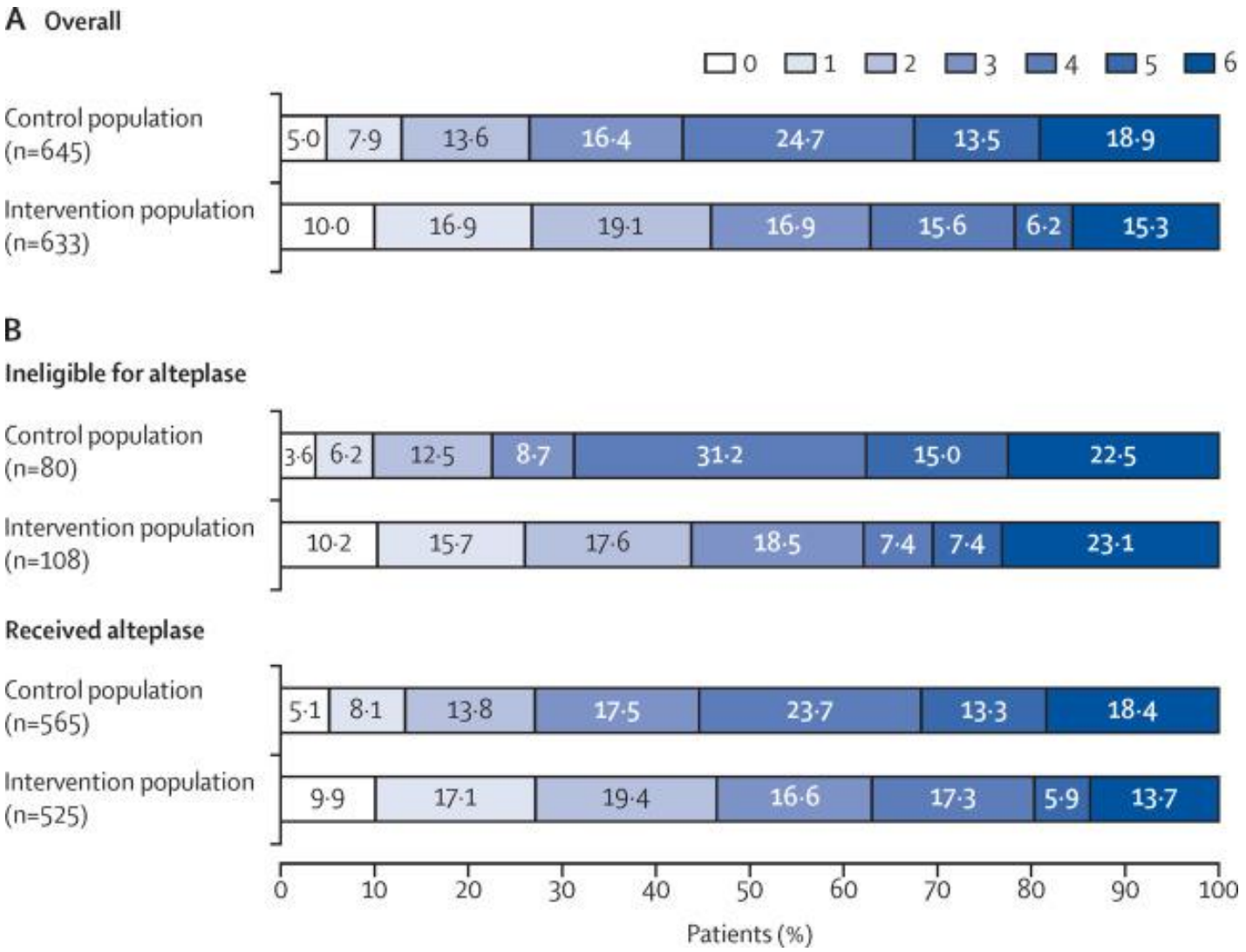
Aging Dis. 2021;12(4):1000-1009.

Indications for intervention



Aging Dis. 2021;12(4):1000-1009.

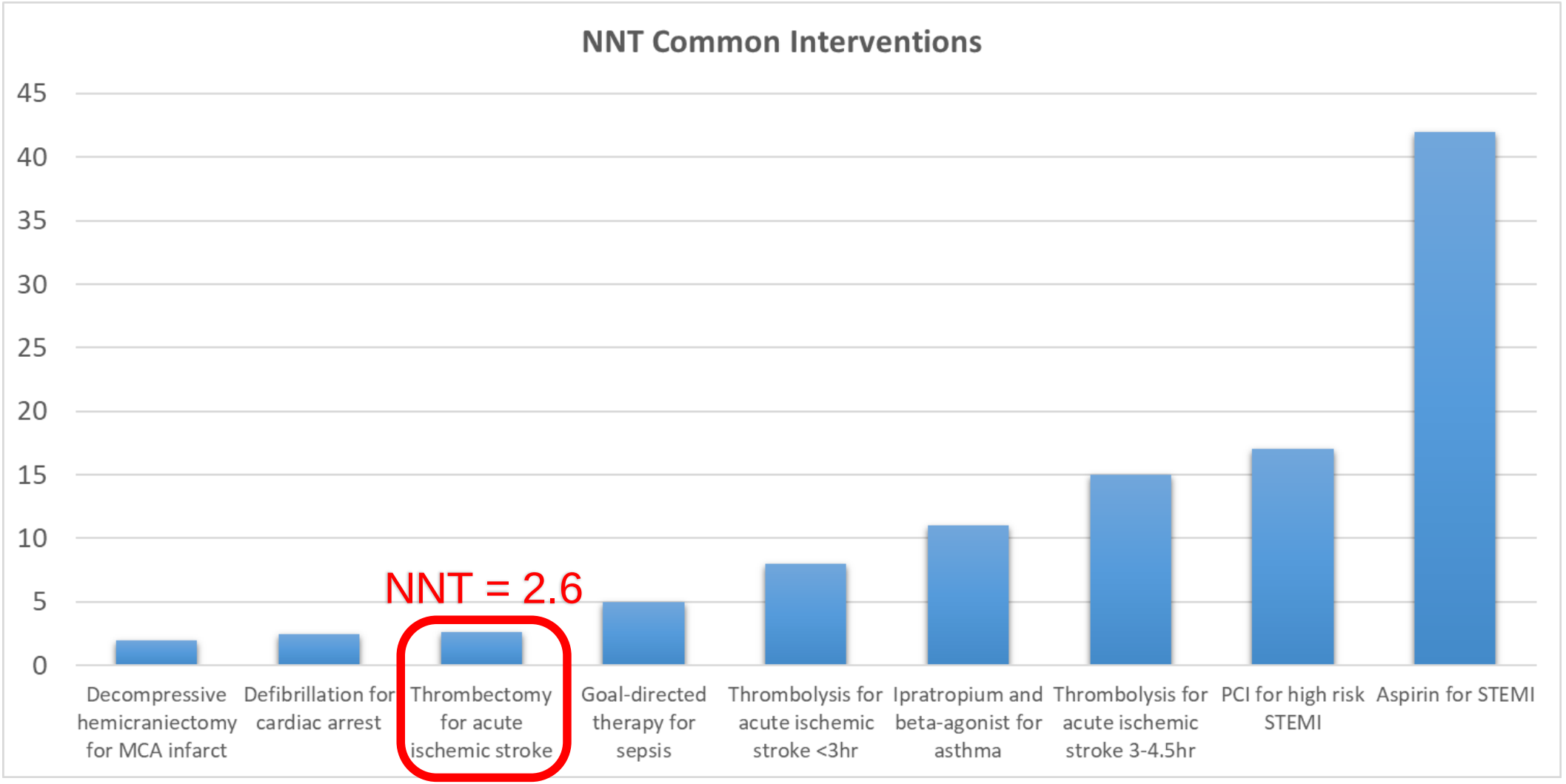
Indications for intervention



MR CLEAN
ESCAPE
REVASCAT
SWIFT PRIME
EXTEND IA

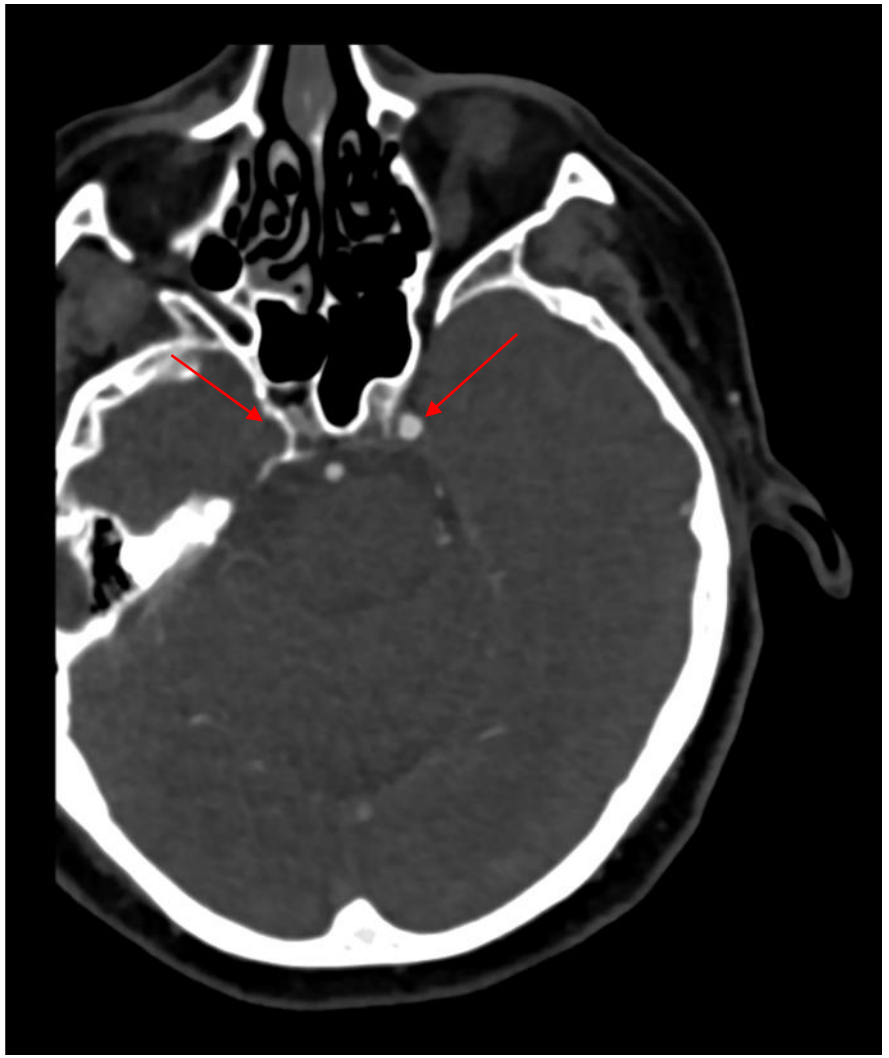
Lancet. 2016;387(10029):1723-1731.

Indications for intervention

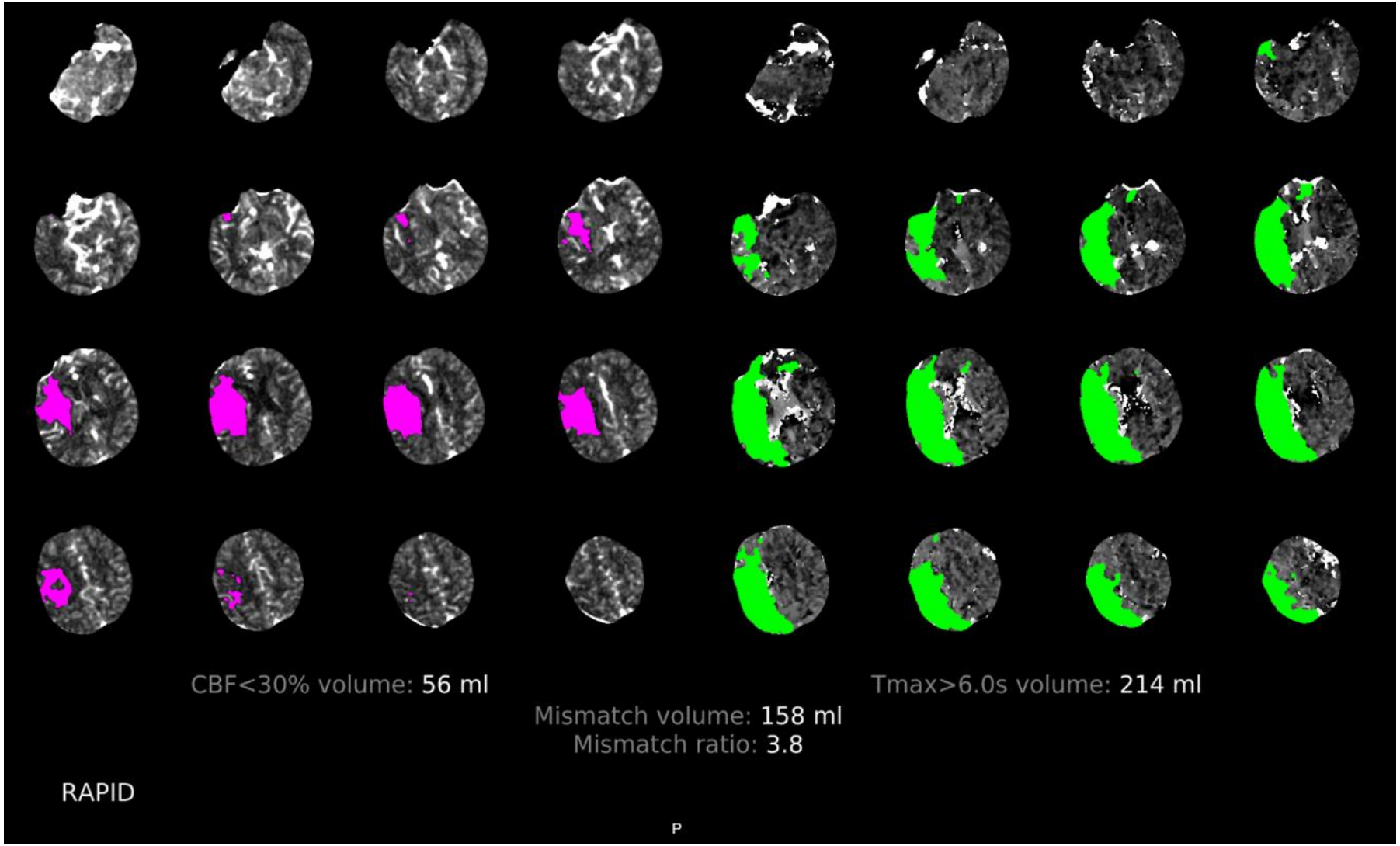


Adapted from *Br J Neurosurg*. 2018;32(3):245-249.

Indications for intervention

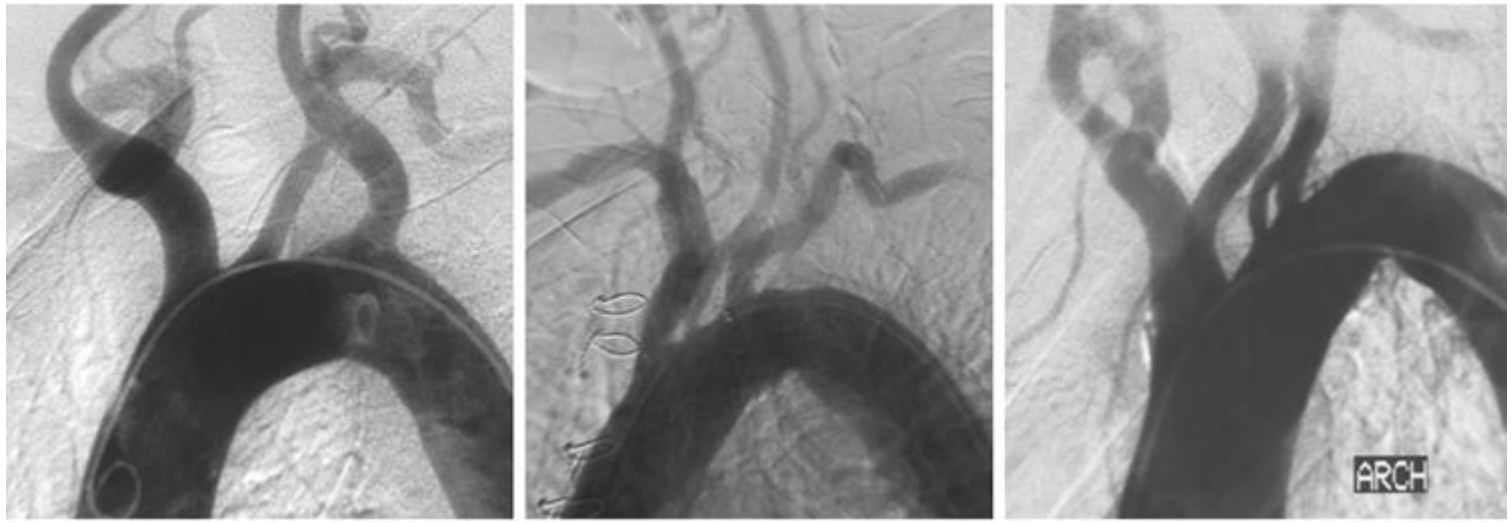


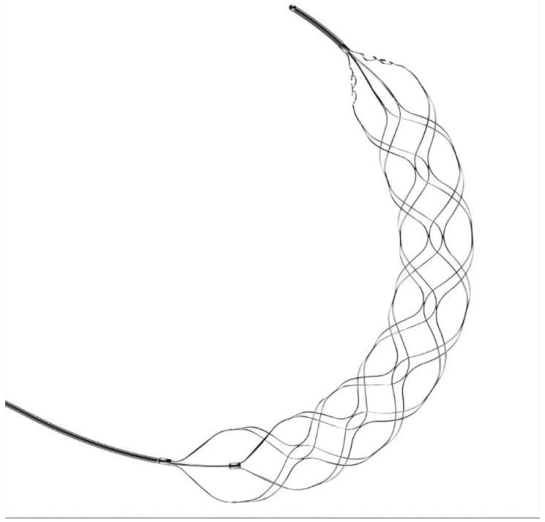
Indications for intervention



Technique

- Access
  - Femoral
  - Radial
  - Other
- Retrieval
  - ADAPT
  - Stent-retriever
  - Combined
- Miscellaneous
  - Intracranial stenting
  - Extracranial stenting



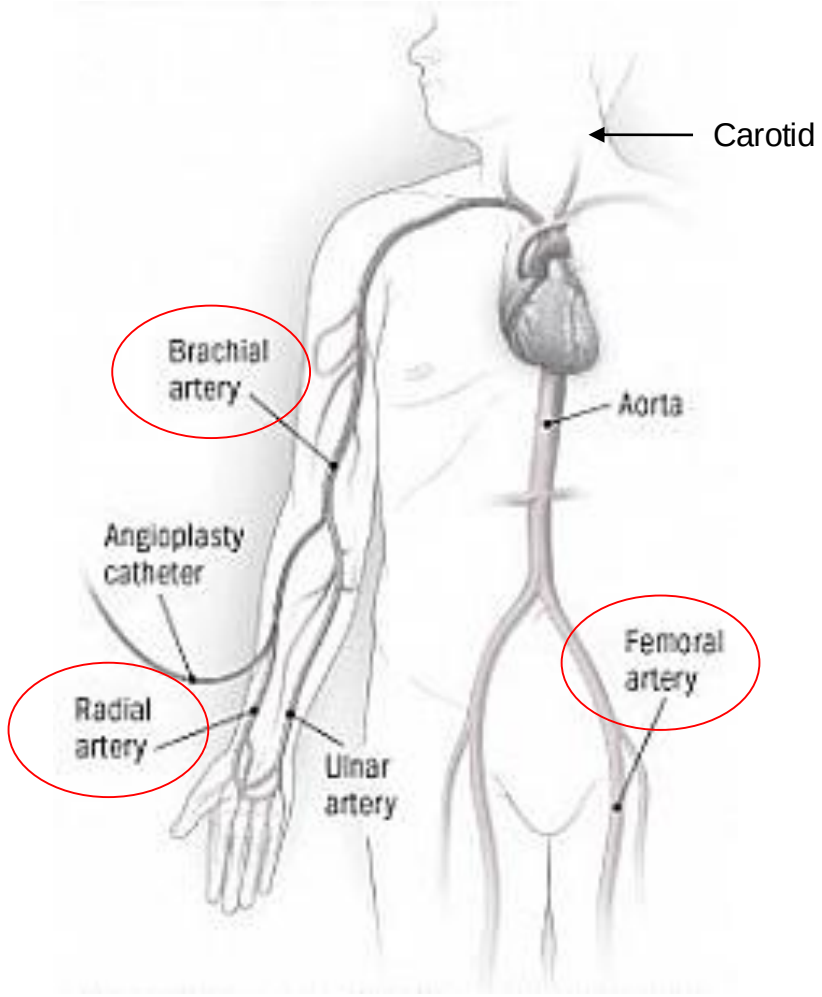


Vascular access

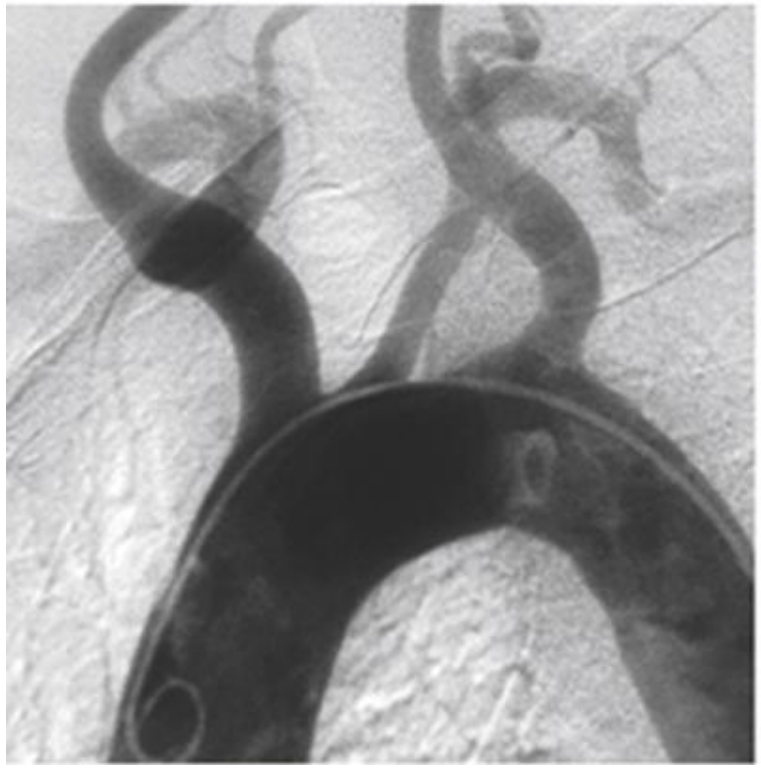
- Femoral arterial access
  - Fits larger bore catheters
  - Introducer sheath vs “bareback” technique
  - Aortic arch configuration consideration

- Radial artery
  - Location of occlusion
  - Aortic arch configuration
  - Intraabdominal or peripheral vascular disease

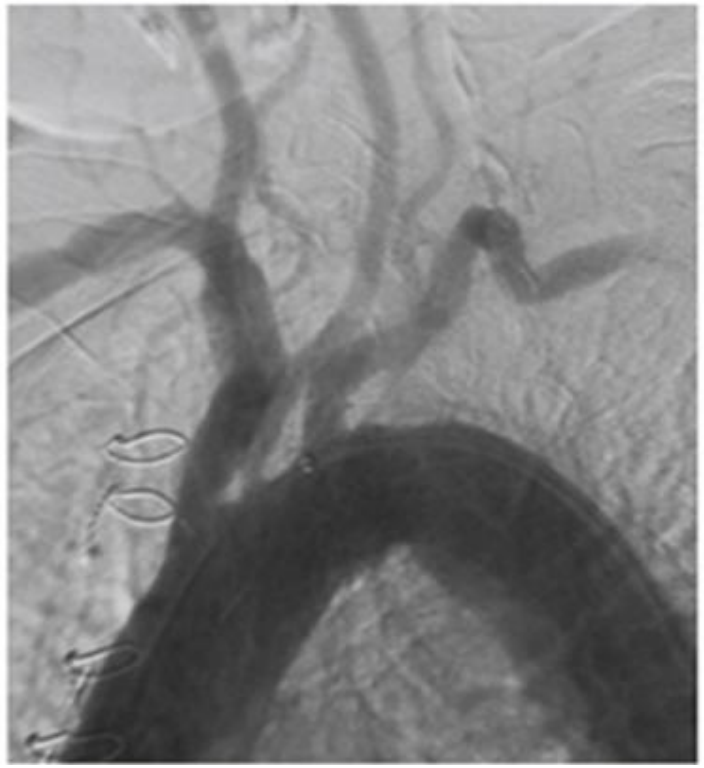
- Brachial artery



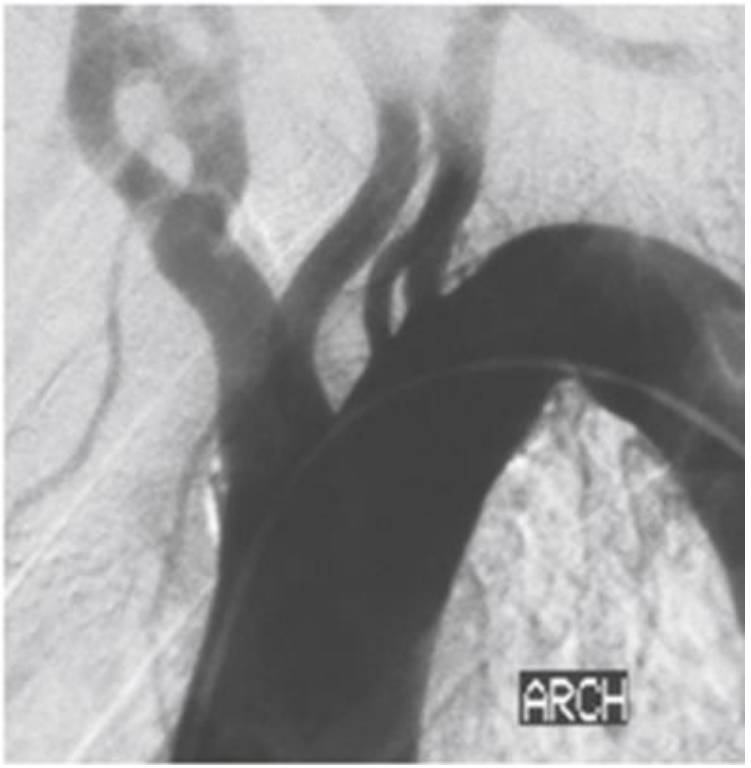
Intracranial access



Type I

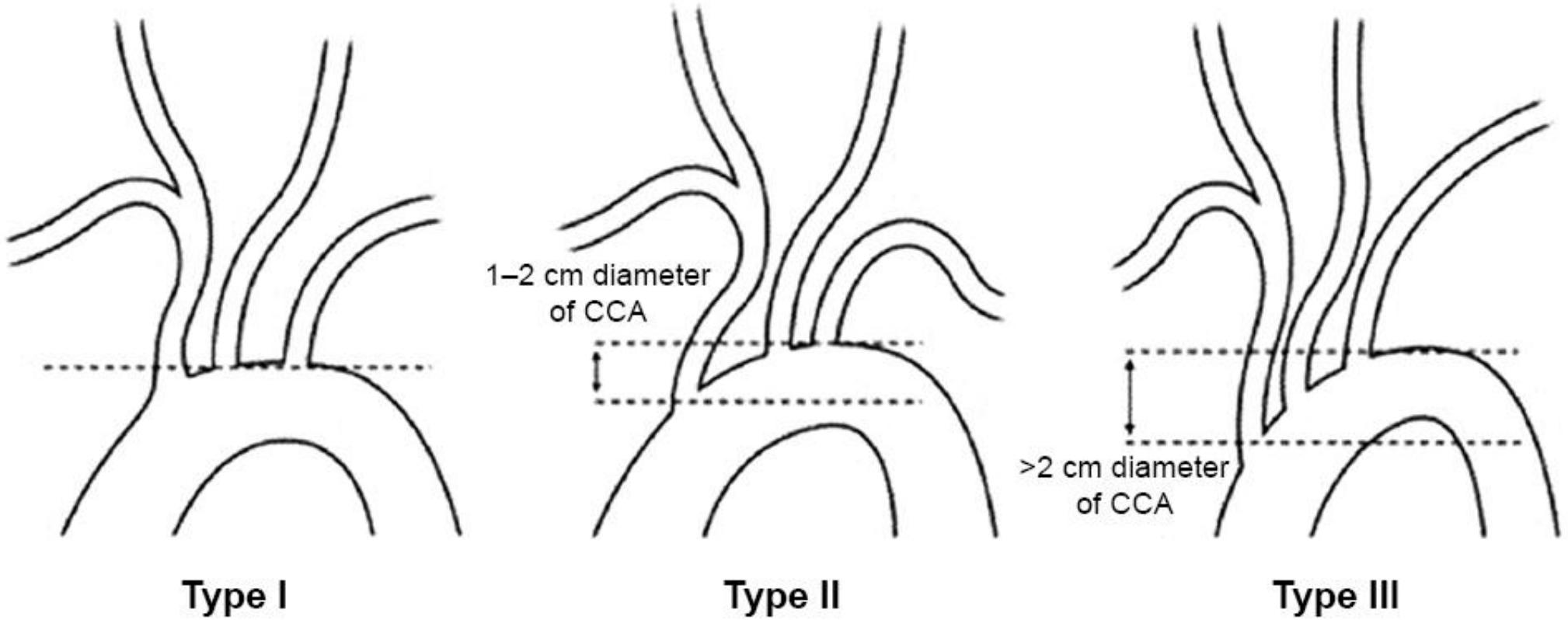


Type II

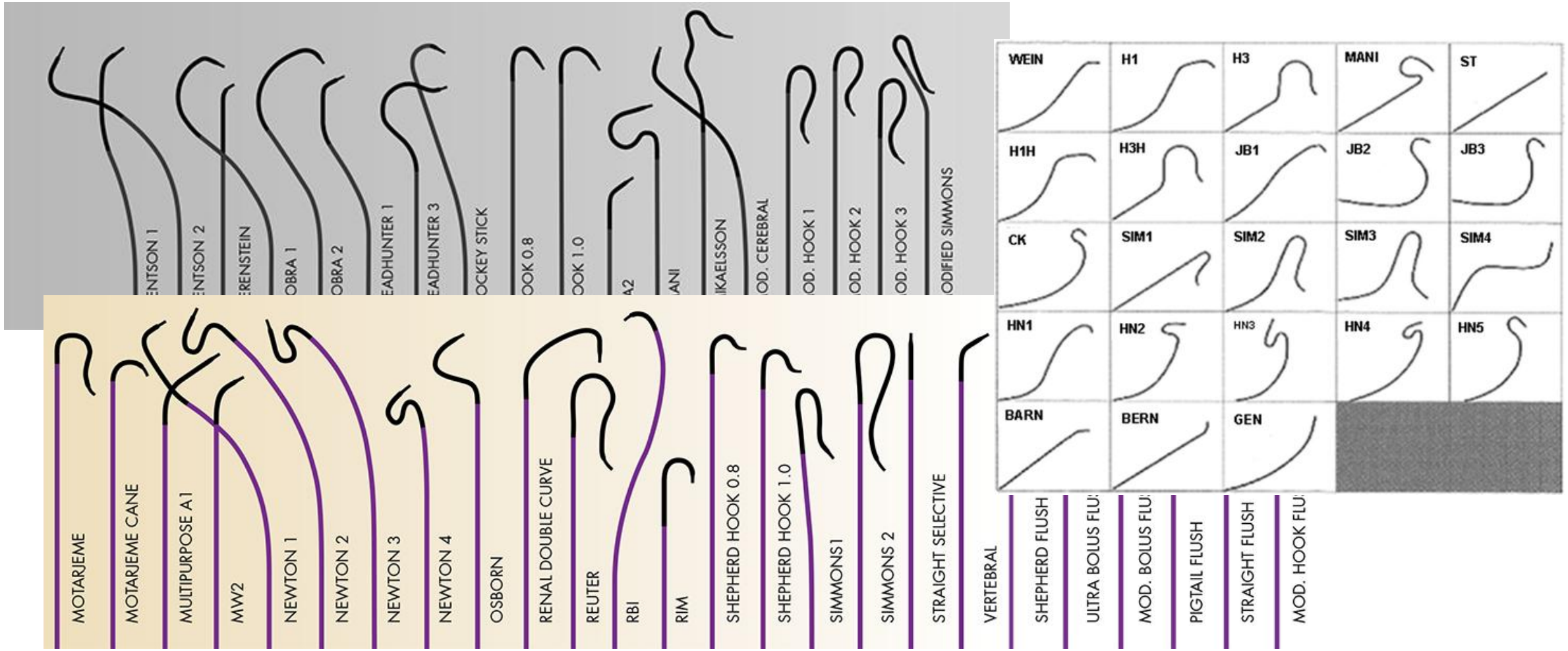


Type III

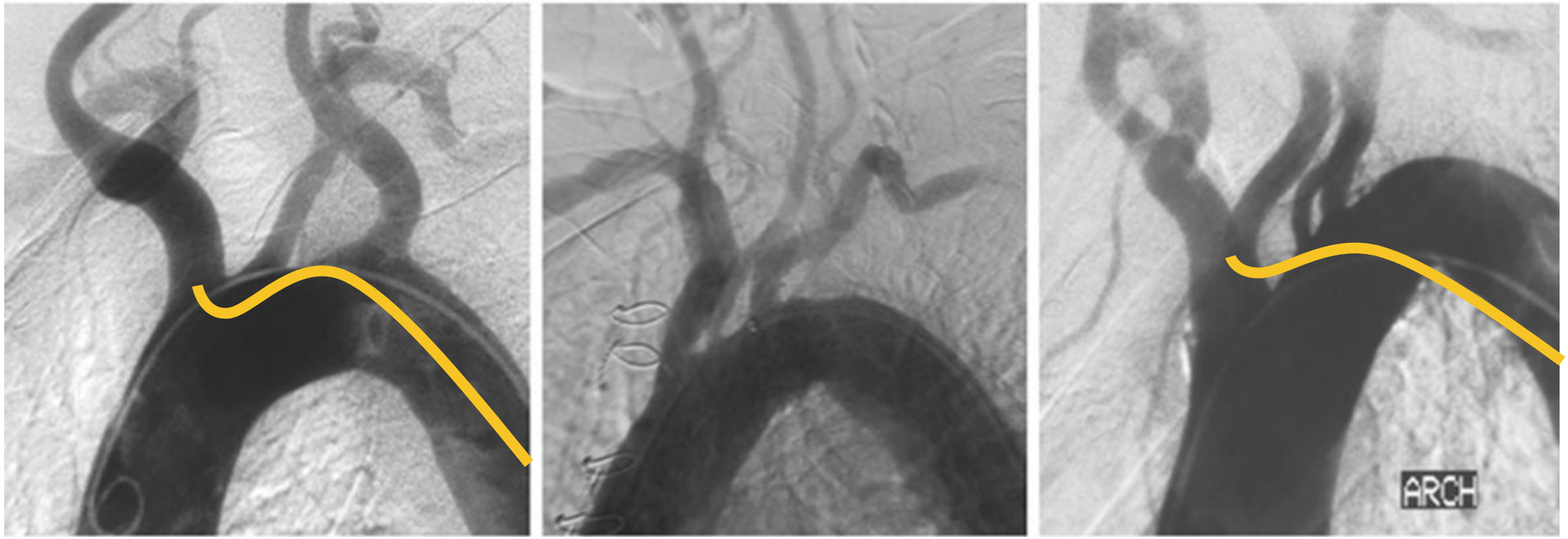
Intracranial access



Intracranial access



Intracranial access



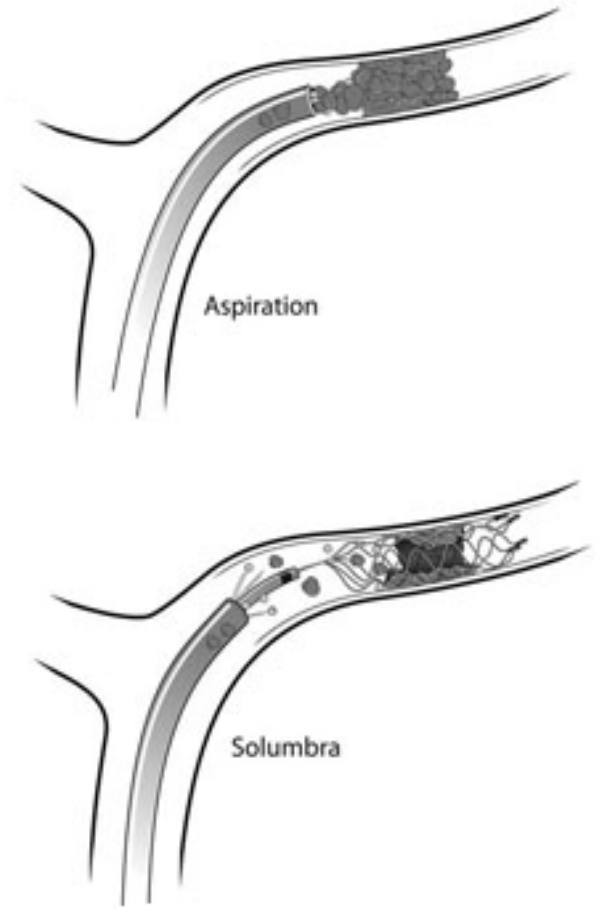
Type I

Type II

Type III

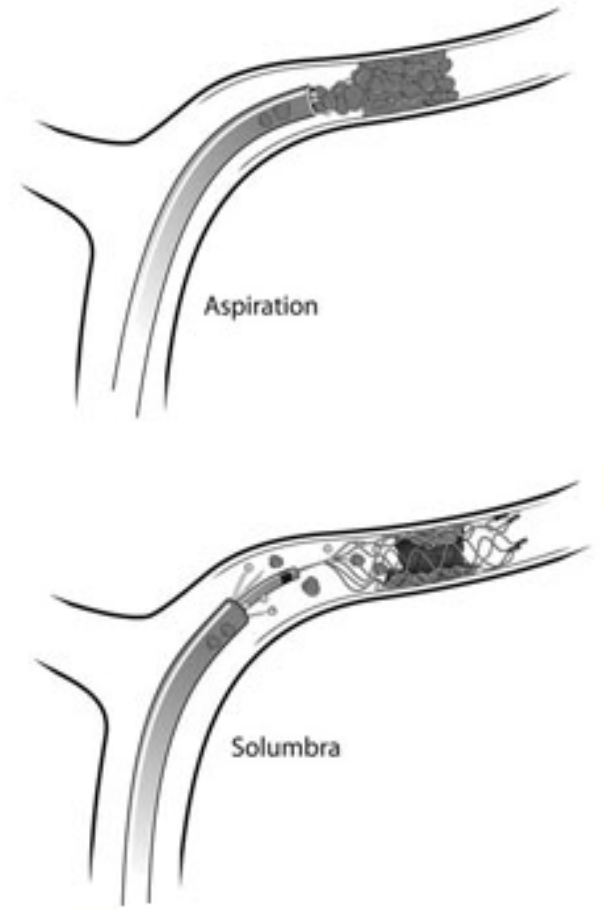
Technique

- ADAPT
  - “A Direct Aspiration, first Pass Technique”
  - Less equipment utilized
  - Faster time to device deployment
  - May or may not cross the clot



Technique

- Combined/Solumbra
  - Uses microsystem for deployment of stent-retriever
  - May increase time to device deployment
  - Crosses the clot



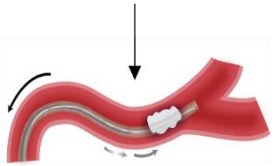
Stent-retriever

A guidewire is advanced to the site of the thrombus and passed through the clot

A guidewire is advanced to the site of the thrombus and passed through the clot

Stent-retriever

A guidewire is advanced to the site of the thrombus and passed through the clot

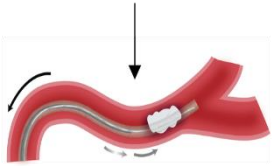


A microcatheter is advanced over the guidewire past the thrombus. The guidewire is removed, and the stent retriever is delivered through the microcatheter.

A microcatheter is advanced over the guidewire past the thrombus. The guidewire is removed, and the stent retriever is delivered through the microcatheter.

Stent-retriever

A guidewire is advanced to the site of the thrombus and passed through the clot



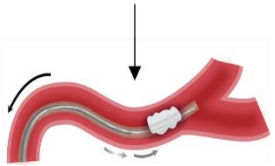
A microcatheter is advanced over the guidewire past the thrombus. The guidewire is removed, and the stent retriever is delivered through the microcatheter.

The microcatheter is removed, allowing the stent retriever to expand and engage the thrombus.

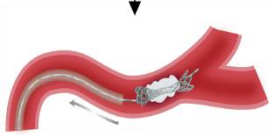
The microcatheter is removed, allowing the stent retriever to expand and engage the thrombus.

Stent-retriever

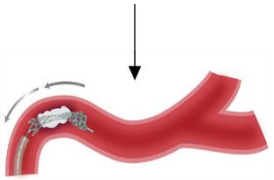
A guidewire is advanced to the site of the thrombus and passed through the clot



A microcatheter is advanced over the guidewire past the thrombus. The guidewire is removed, and the stent retriever is delivered through the microcatheter.



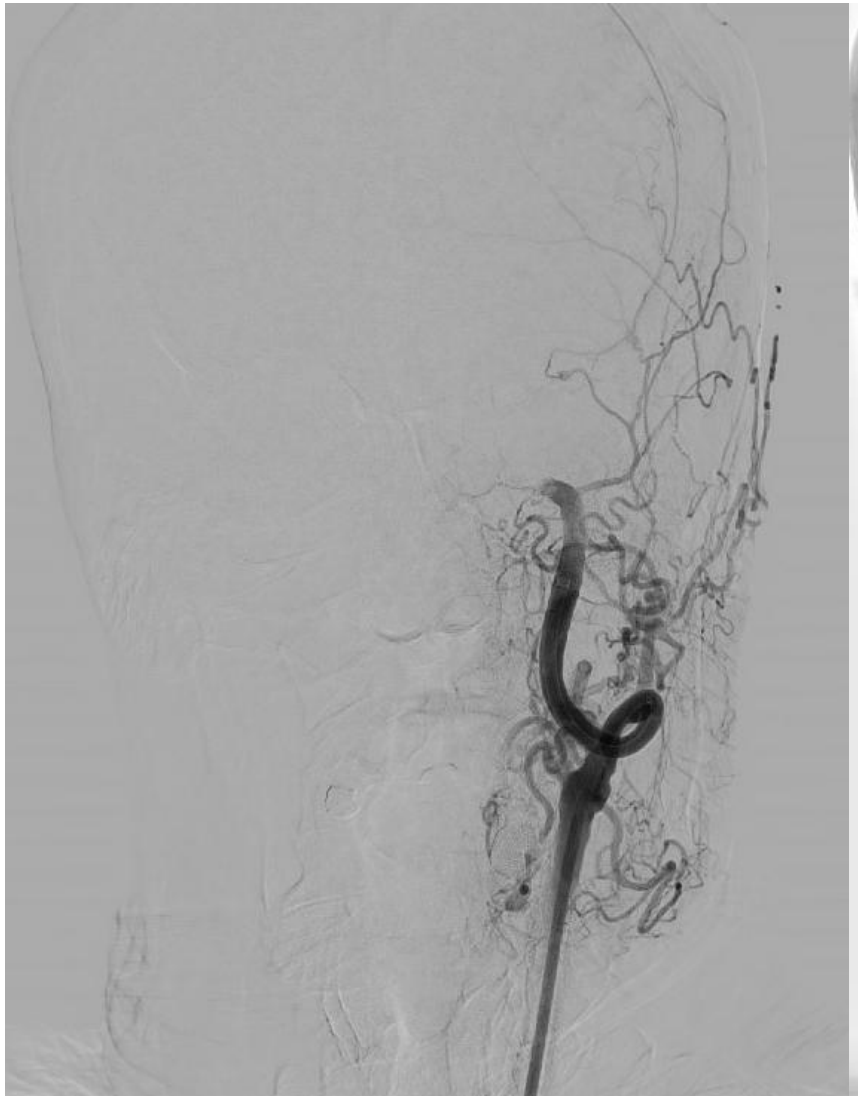
The microcatheter is removed, allowing the stent retriever to expand and engage the thrombus.



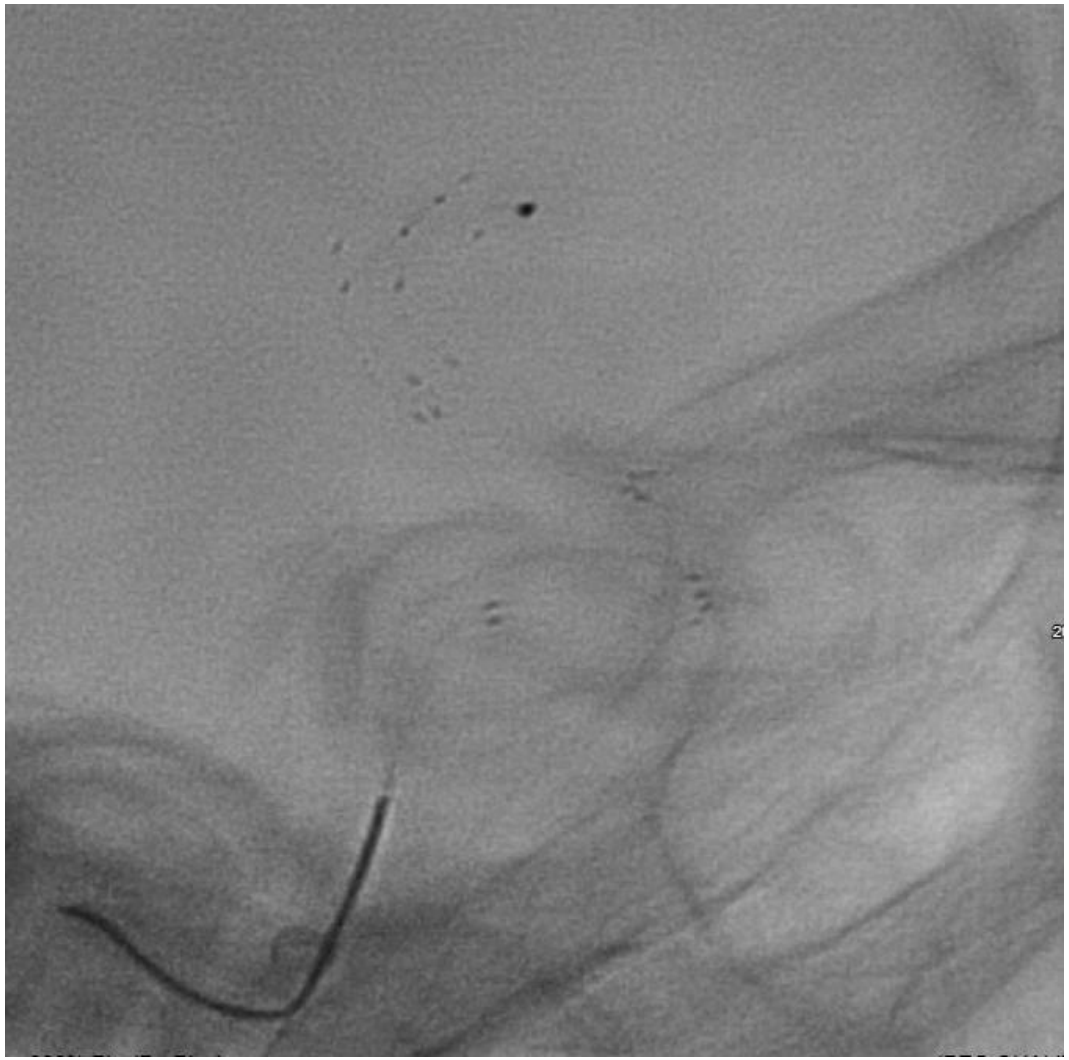
The stent retriever is either pulled directly into the distal access/aspiration catheter or both are withdrawn together.

The stent retriever is either pulled directly into the distal access/aspiration catheter or both are withdrawn together.

Stent-retriever



Stent-retriever



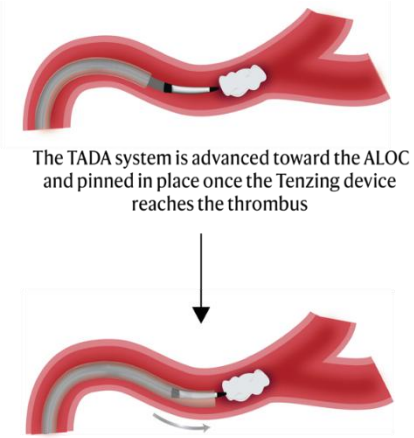
Stent-retriever

Direct aspiration

The TADA system is advanced toward the ALOC and pinned in place once the Tenzing device reaches the thrombus

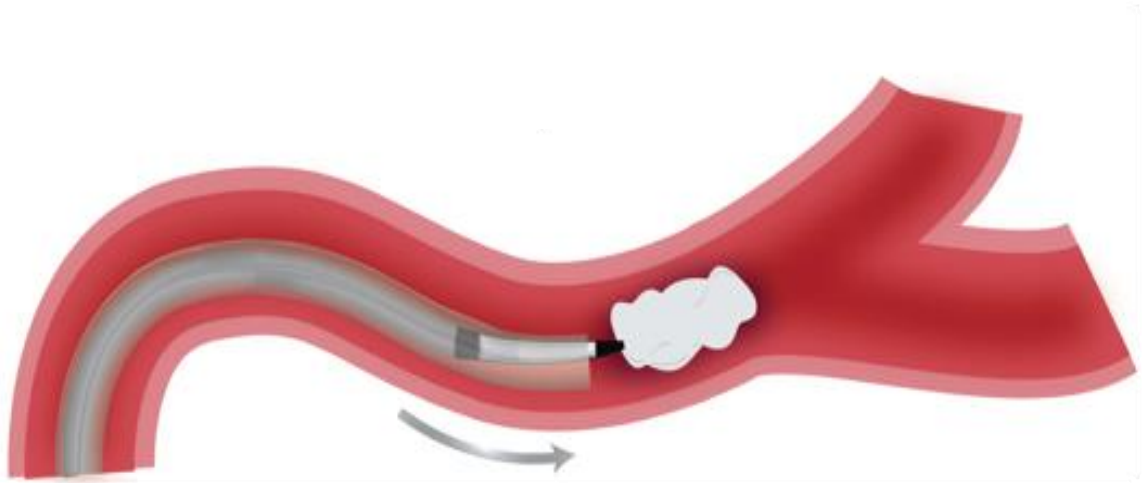
The TADA system is advanced toward the ALOC and pinned in place once the Tenzing device reaches the thrombus

Direct aspiration



The TADA system is advanced toward the ALOC and pinned in place once the Tenzing device reaches the thrombus

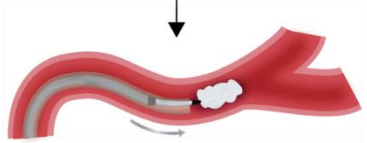
The FreeClimb aspiration catheter is then advanced over the Tenzing device towards the clot



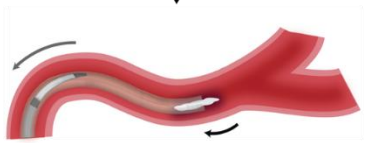
The FreeClimb aspiration catheter is then advanced over the Tenzing device towards the clot

Direct aspiration

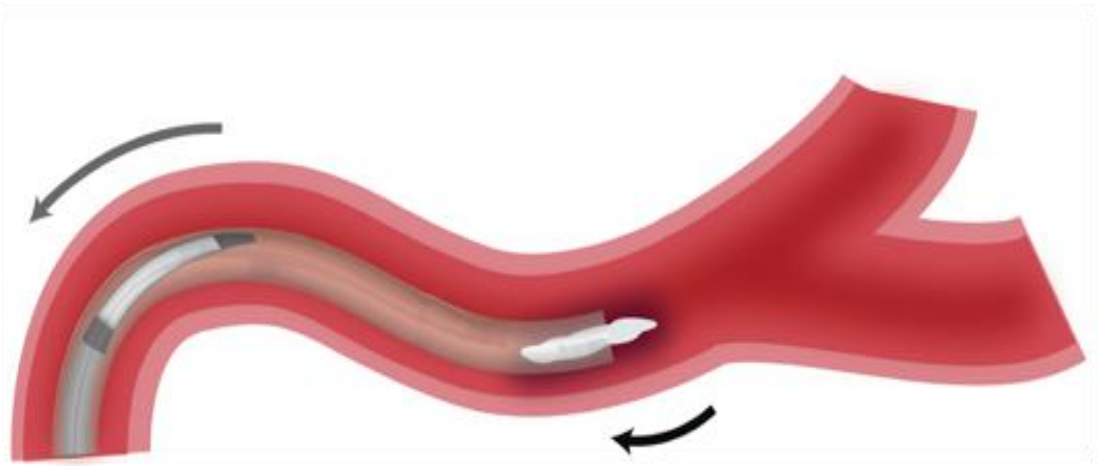
The TADA system is advanced toward the ALOC and pinned in place once the Tenzing device reaches the thrombus



The FreeClimb aspiration catheter is then advanced over the Tenzing device towards the clot



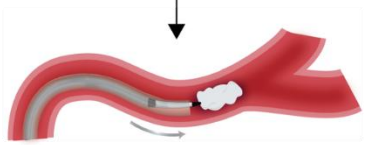
The Tenzing device is withdrawn, which may allow the aspiration catheter to passively move forward and begin engaging the clot. Aspiration of the clot is initiated at this point



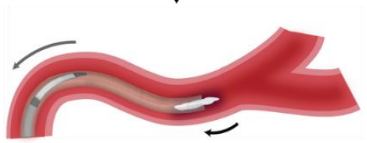
The Tenzing device is withdrawn, which may allow the aspiration catheter to passively move forward and begin engaging the clot. Aspiration of the clot is initiated at this point

Direct aspiration

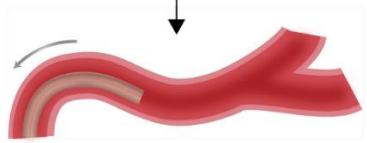
The TADA system is advanced toward the ALOC and pinned in place once the Tenzing device reaches the thrombus



The FreeClimb aspiration catheter is then advanced over the Tenzing device towards the clot



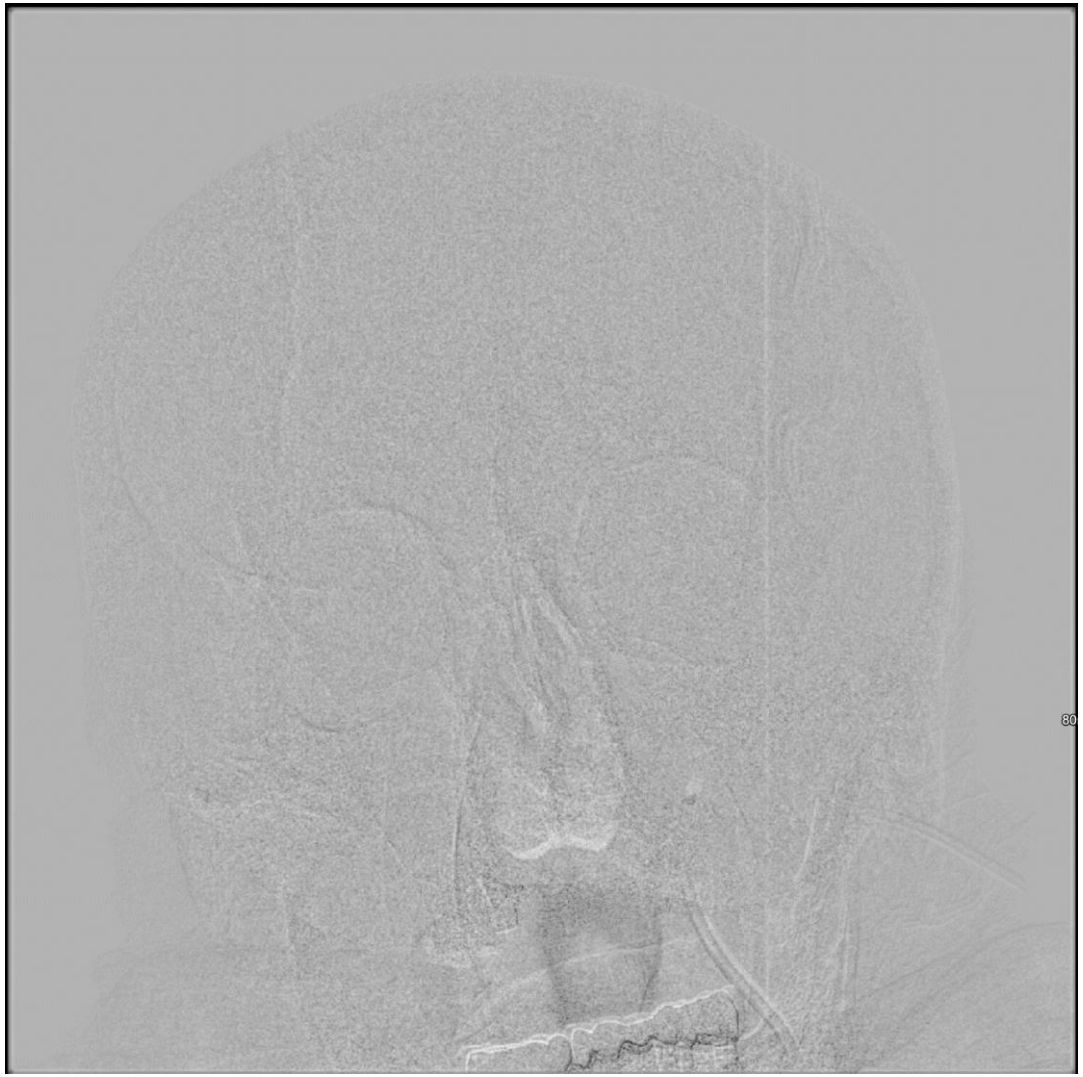
The Tenzing device is withdrawn, which may allow the aspiration catheter to passively move forward and begin engaging the clot. Aspiration of the clot is initiated at this point

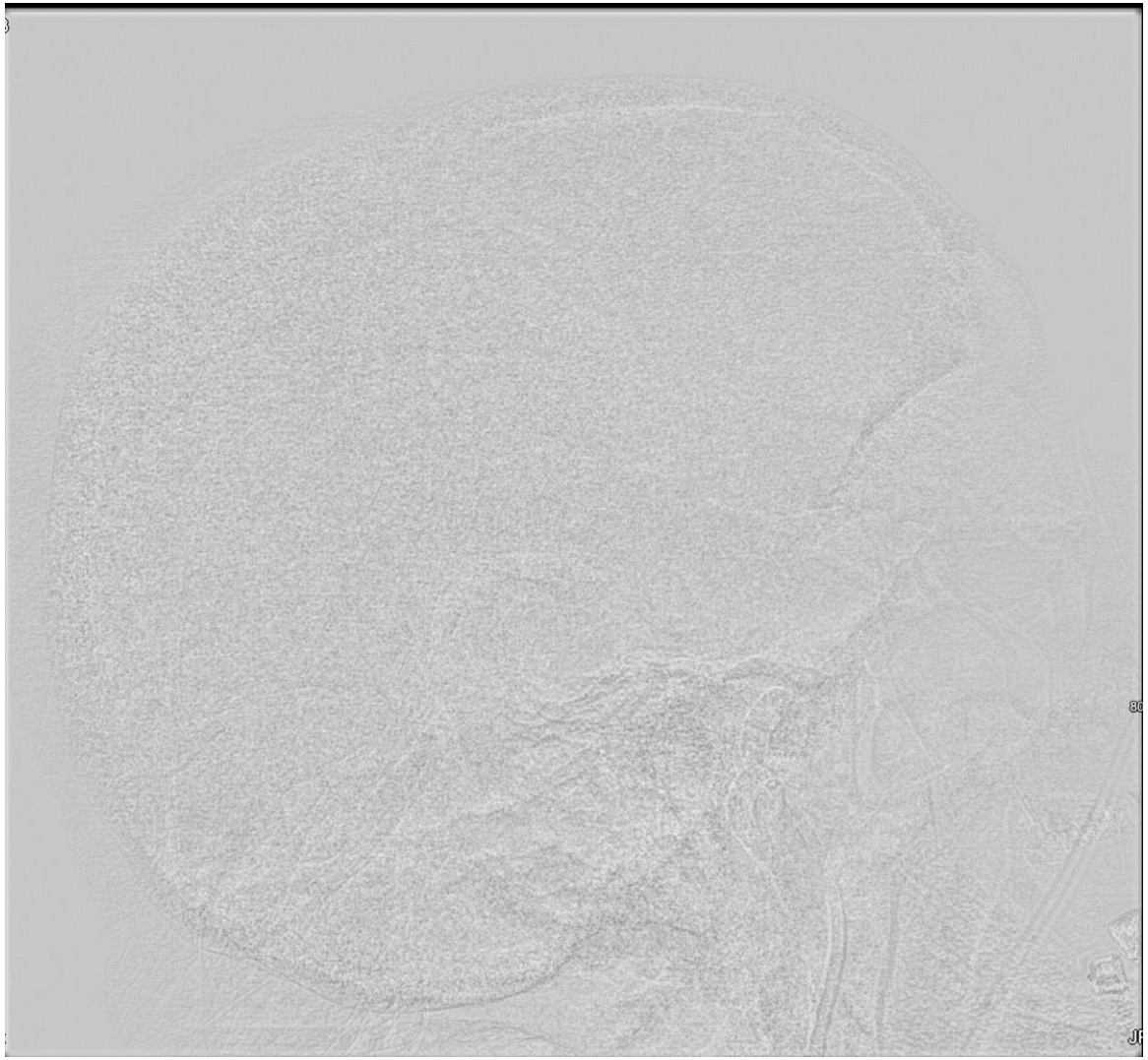


Once the clot has been fully aspirated, the catheter is removed.

Once the clot has been fully aspirated, the catheter is removed.

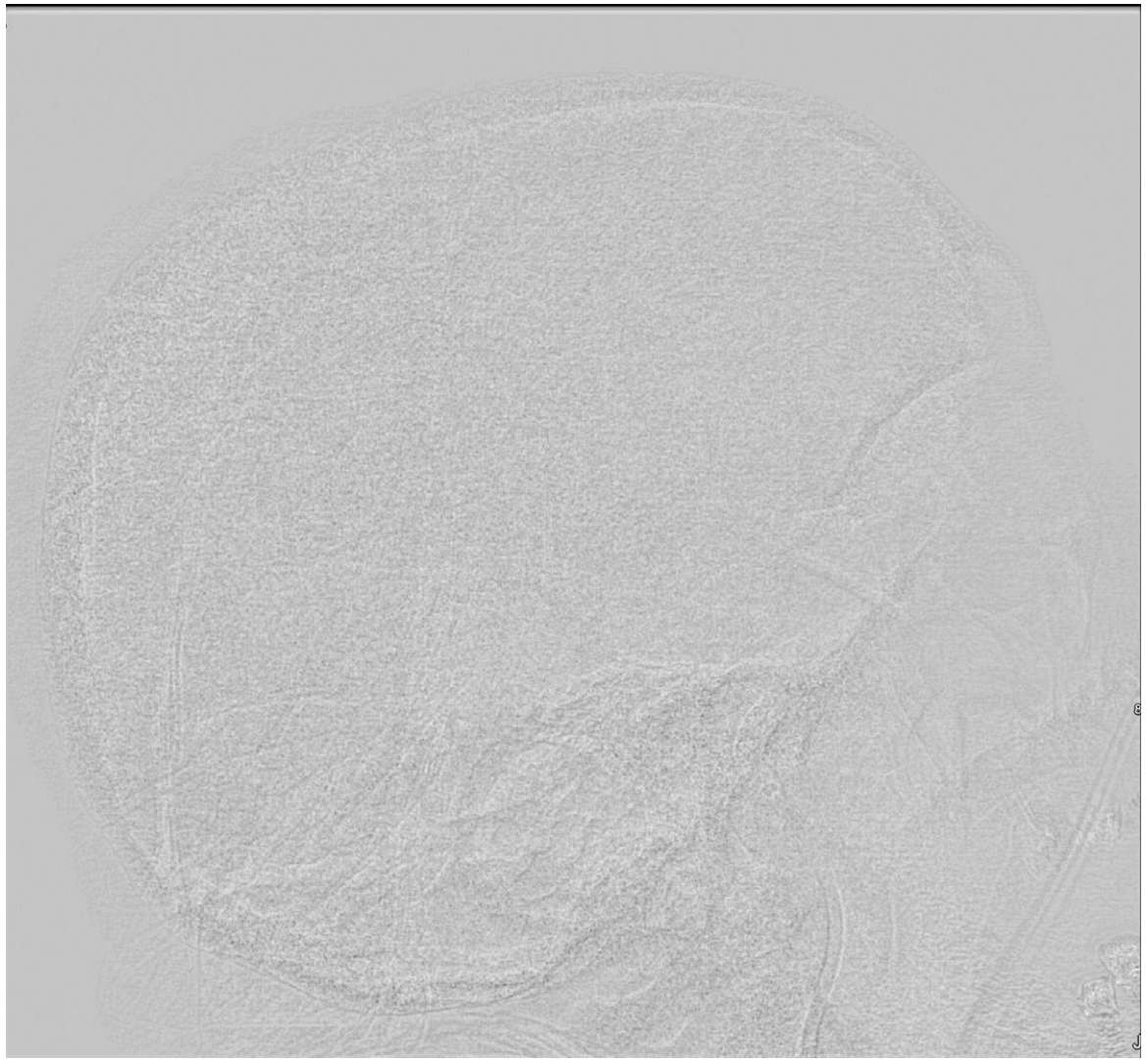
Techniques





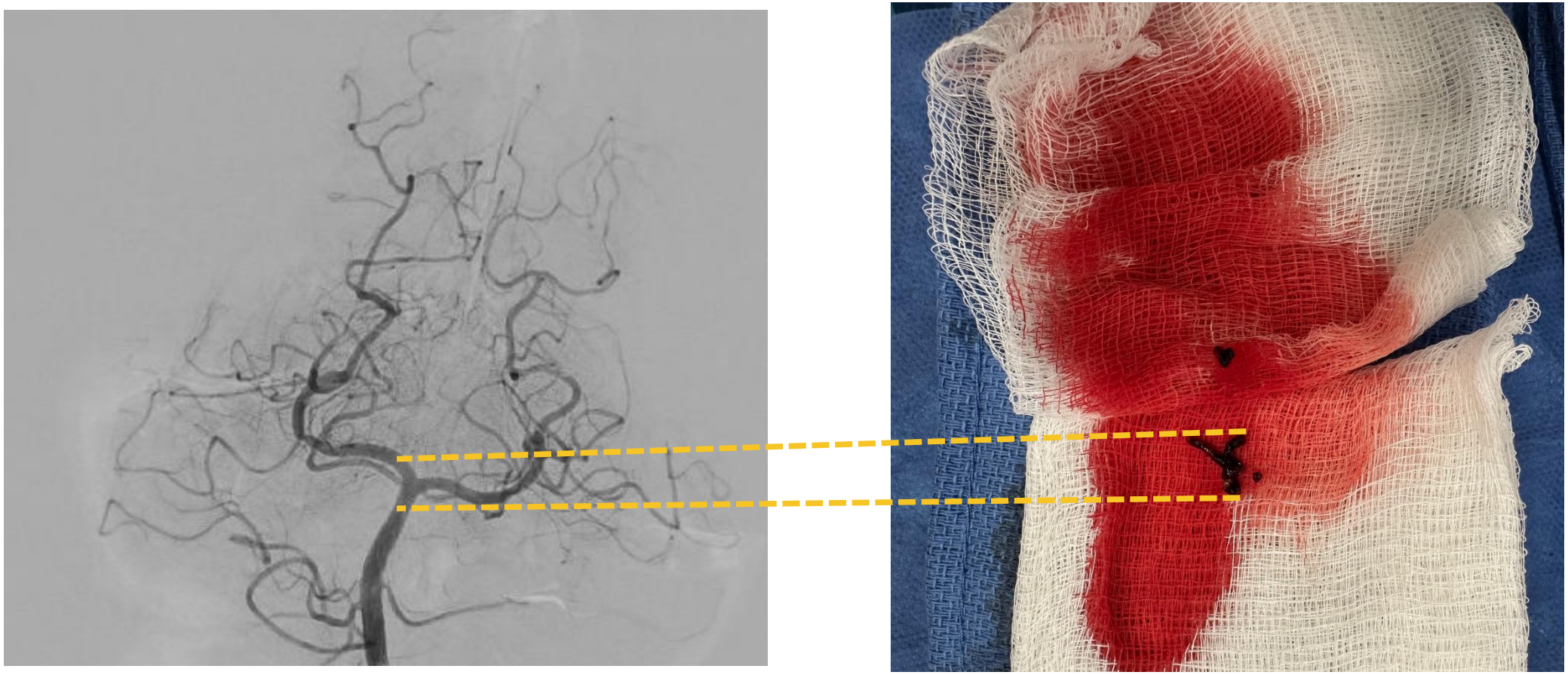
Techniques

Techniques



Clot retrieval

Clot retrieval

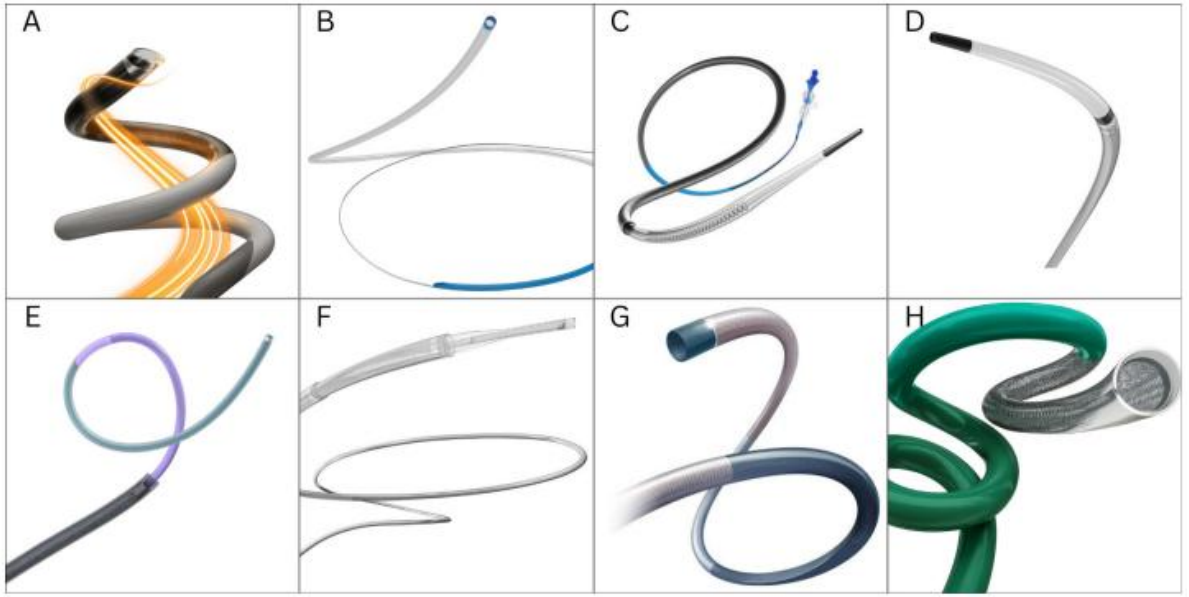


On the Horizon

Is bigger really better?

- “SLACs represent a technological evolution in aspiration thrombectomy, leveraging fundamental fluid dynamic principles to improve aspiration performance while maintaining acceptable safety and deliverability in complex anatomy.”

- “In this large multicenter analysis, the use of SLB aspiration catheters demonstrated comparable safety and efficacy to standard LB catheters for MT in AIS. Despite theoretical advantages in aspiration dynamics, SLB devices did not confer significant procedural or clinical benefit over LB catheters.”



Jablonska *JNIS*, 2026.
Chacon *S:VIN*, 2025.

Future of stroke care

- Systems improvement
  - <10% eligible patients receive treatment
  - Early recognition, diagnosis, transport
- Large core
- Low NIHSS
- Neuroprotective agents
- Neuroprognostication
- Role of SLBC

Thank you!

Justin Granstein, MD, MPH

jgranste@bidmc.harvard.edu