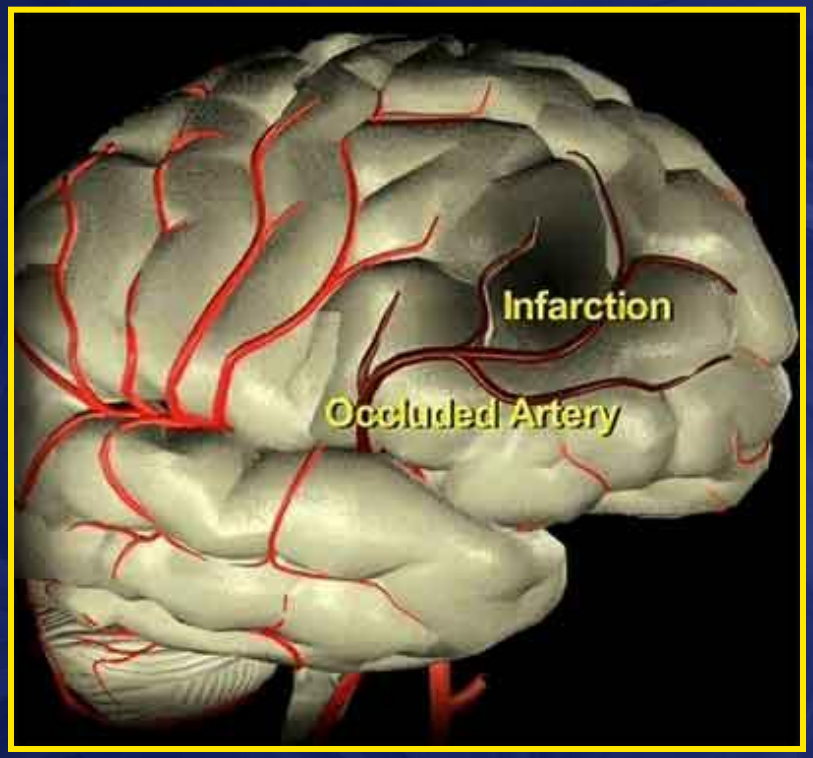
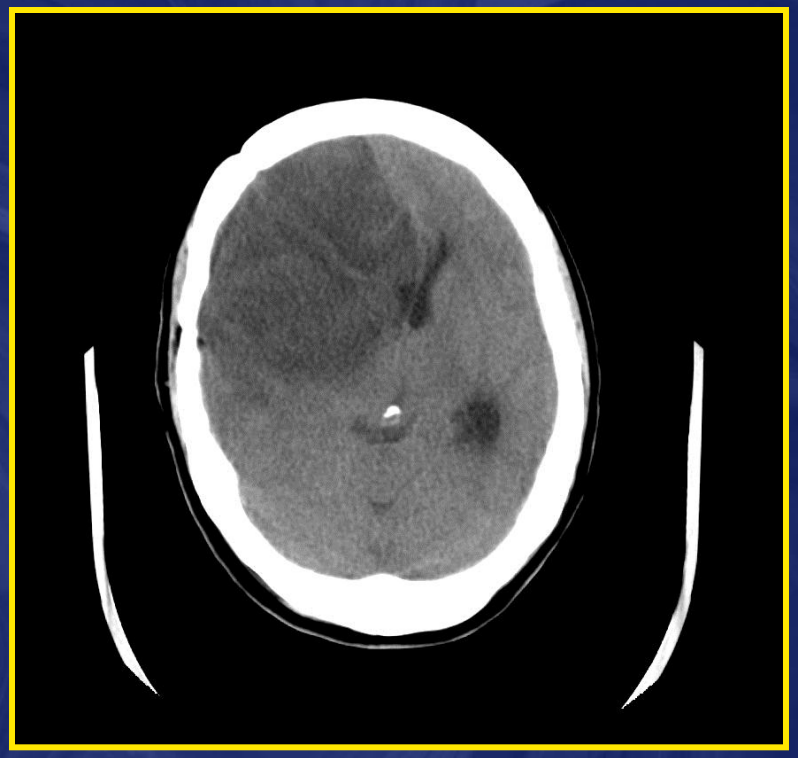
Acute Stroke Therapy: How To Train Non-Interventionist to Treat Acute Ischemic Stroke





Steve Ramee, MD
Ochsner Medical Center
New Orleans, LA

Disclosure

Consultant: Neurointerventions

Time is BRAIN!

Time Is Brain—Quantified

Jeffrey L. Saver, MD

Background and Purpose—The phrase "time is brain" emphasizes that human nervous tissue is rapidly lost as strok progresses and emergent evaluation and therapy are required. Recent advances in quantitative neurostereology and stroke neuroimaging permit calculation of just how much brain is lost per unit time in acute ischemic stroke.

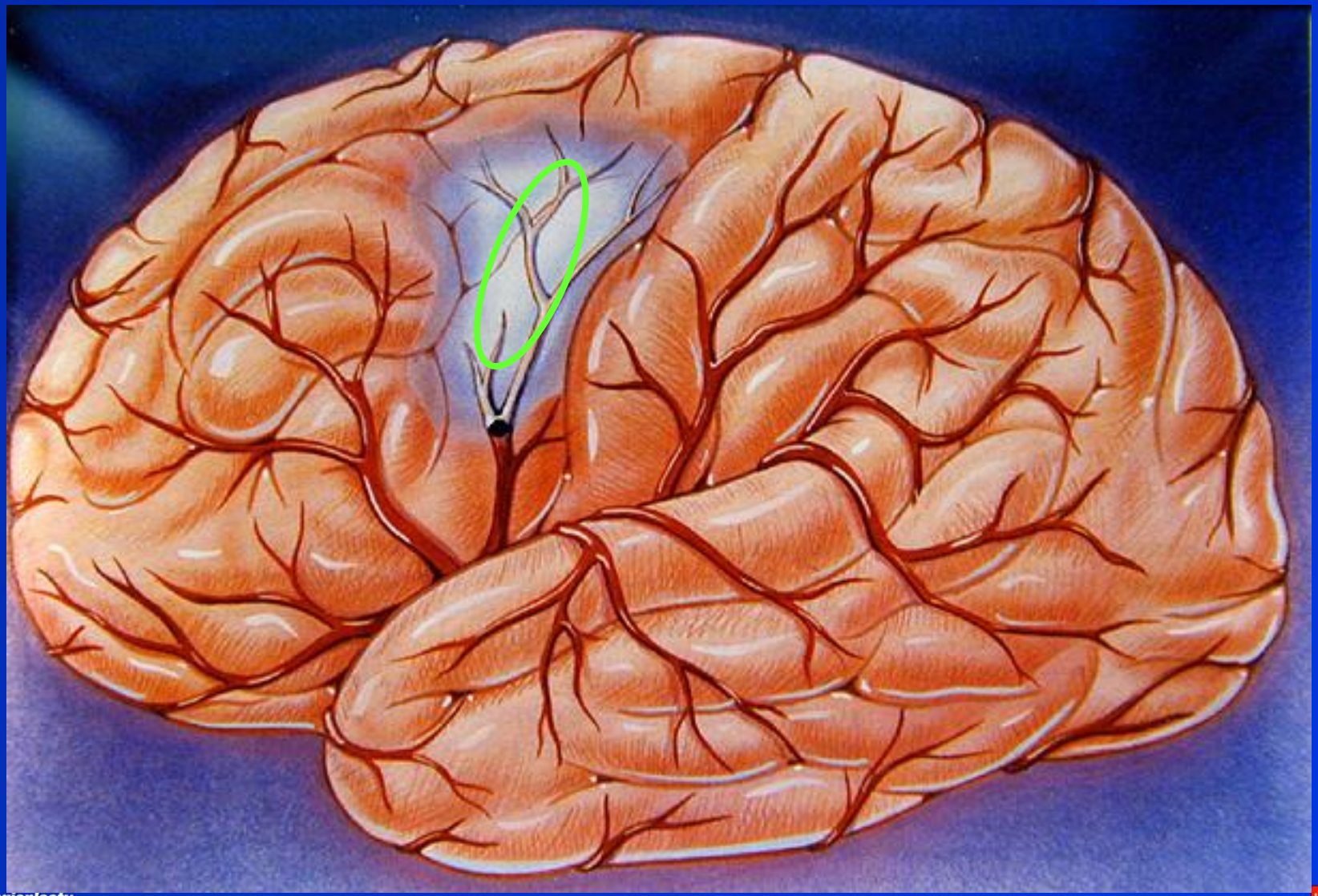
Methods—Systematic literature-review identified consensus estimates of number of neurons, synapses, and myelinated fibers in the human forebrain; volume of large vessel, supratentorial ischemic stroke; and interval from onset to completion of large vessel, supratentorial ischemic stroke.

Results—The typical final volume of large vessel, supratentorial ischemic stroke is 54 mL (varied in sensitivity analysis from 19 to 100 mL). The average duration of nonlacunar stroke evolution is 10 hours (range 6 to 18 hours), and the average number of neurons in the human forebrain is 22 billion. 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. Altering single input variables in sensitivity analyses modestly affected the estimated point values but not order of magnitude.

Conclusions—Quantitative estimates of the pace of neural circuitry loss in human ischemic stroke emphasize the time urgency of stroke care. The typical patient loses 1.9 million neurons each minute in which stroke is untreated. (***Stroke*.** **2006;37:263-266.**)

"The typical (stroke) patient loses 1.9 MILLION neurons each minute in which stroke is untreated."

Ischemic Penumbra



So....we want to SAFELY restore brain perfusion as quickly as possible

"Get the Damn Artery Open"

- Treatment options
- Intra-arterial thromboysis
- Balloon angioplasty
- Clot retrieval
- Stenting

Stroke Treatment

What about IV tPA ??????

- Less than 5% get treated at all
- Doesn't get to the clot in major stroke
- Success rate is low

PS: Didn't work for STEMI either!

Mechanical Approach

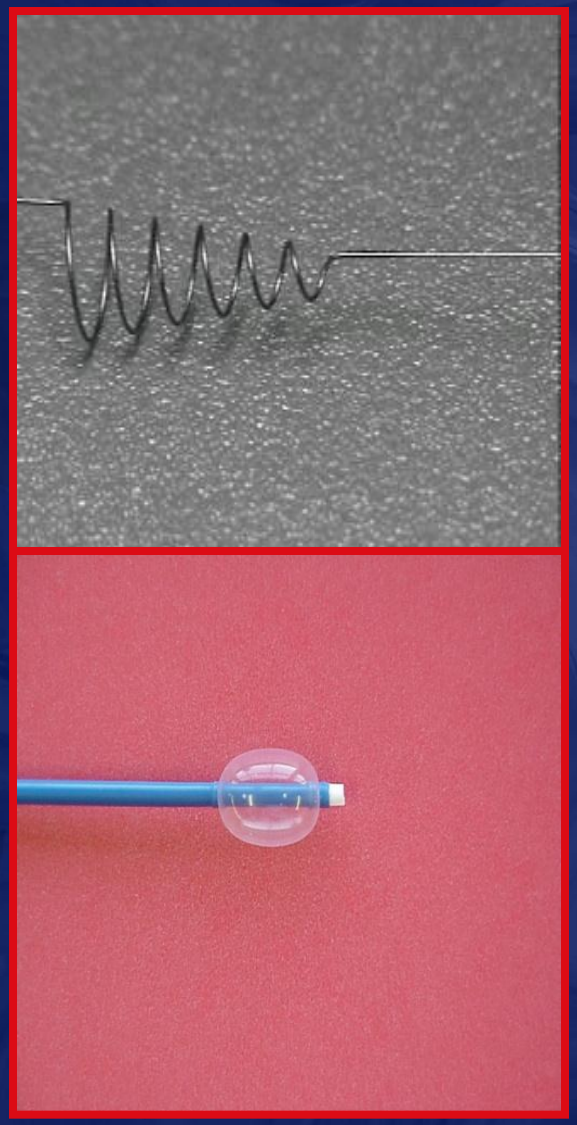
- **Why is it our first choice?**
- Higher recanalization rates
- Low SICH rates
- 17% re-occlusion rates after IAT

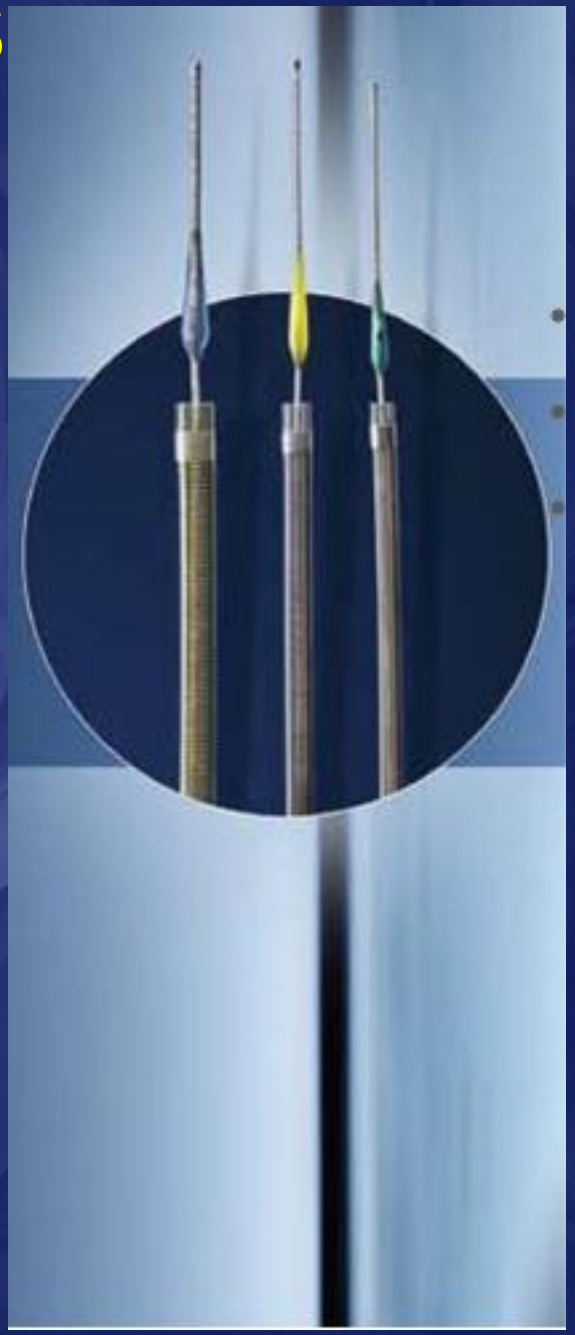
Catheter Based Options

- Penumbra*
- Merci*
- Solitaire*
- Thrombus disruption
- Wire manipulation
- Balloon angioplasty
- Intracranial Stents

NeuroSpecific Devices

Clot Retrieval






NIKE

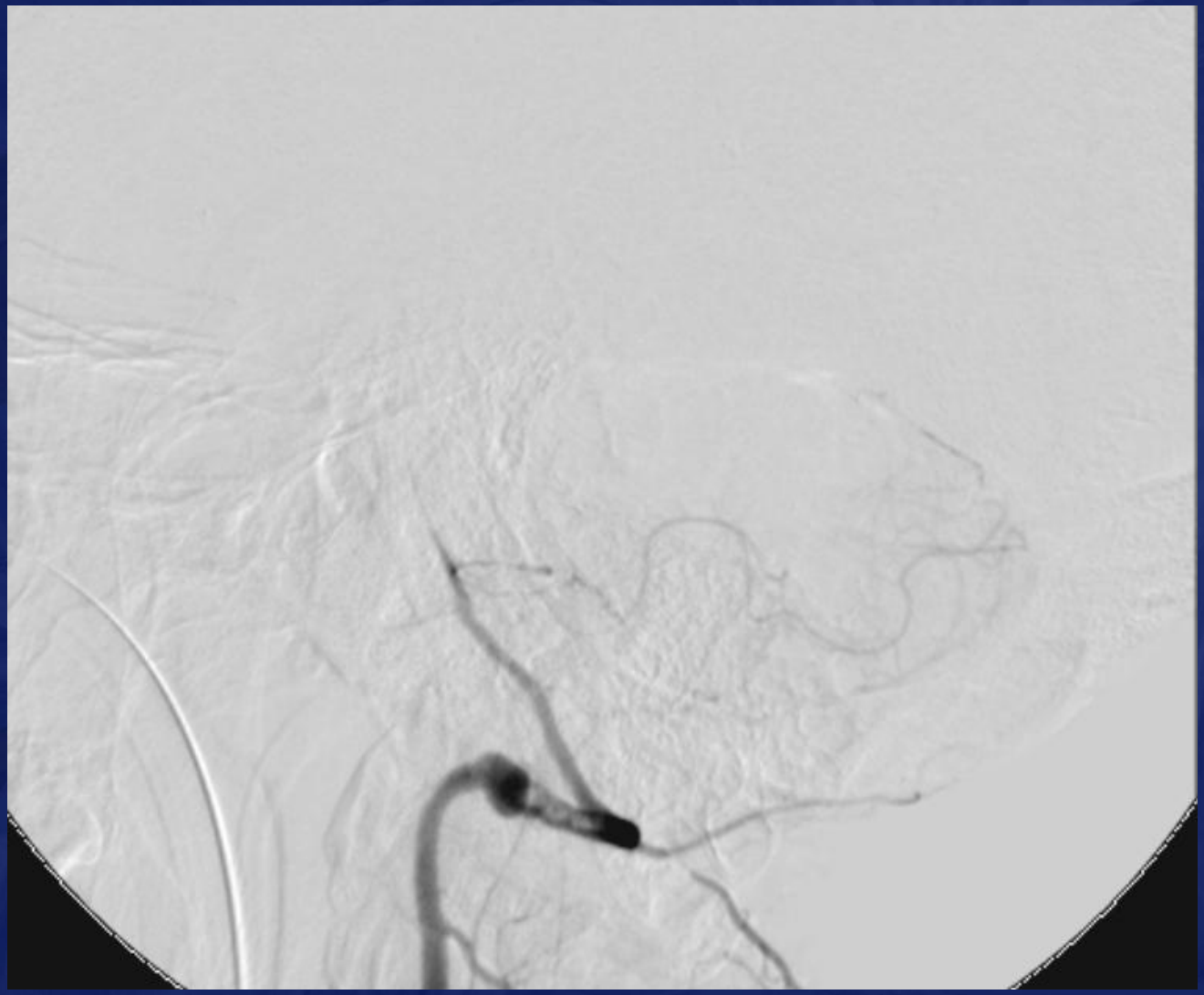
Doctors don’t know where to send stroke patients!

- 15 yo A+ athlete
- Had a stroke before practice and couldn’t see well. Coach told mom.
- Mom took him to a neurologist who confirmed the stroke and recommended he see a stroke specialist.
- First appointment: 2 weeks.

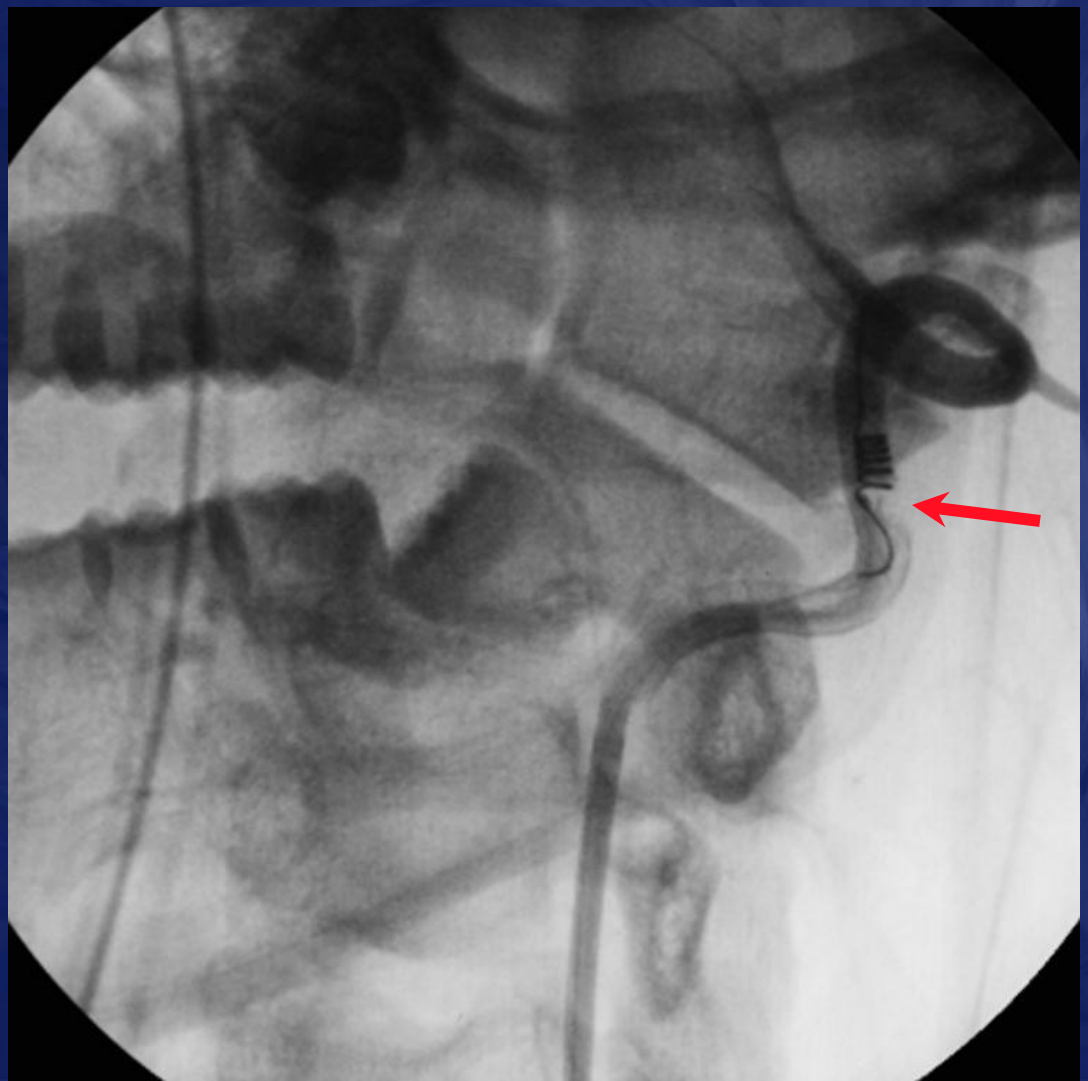
3 days later...

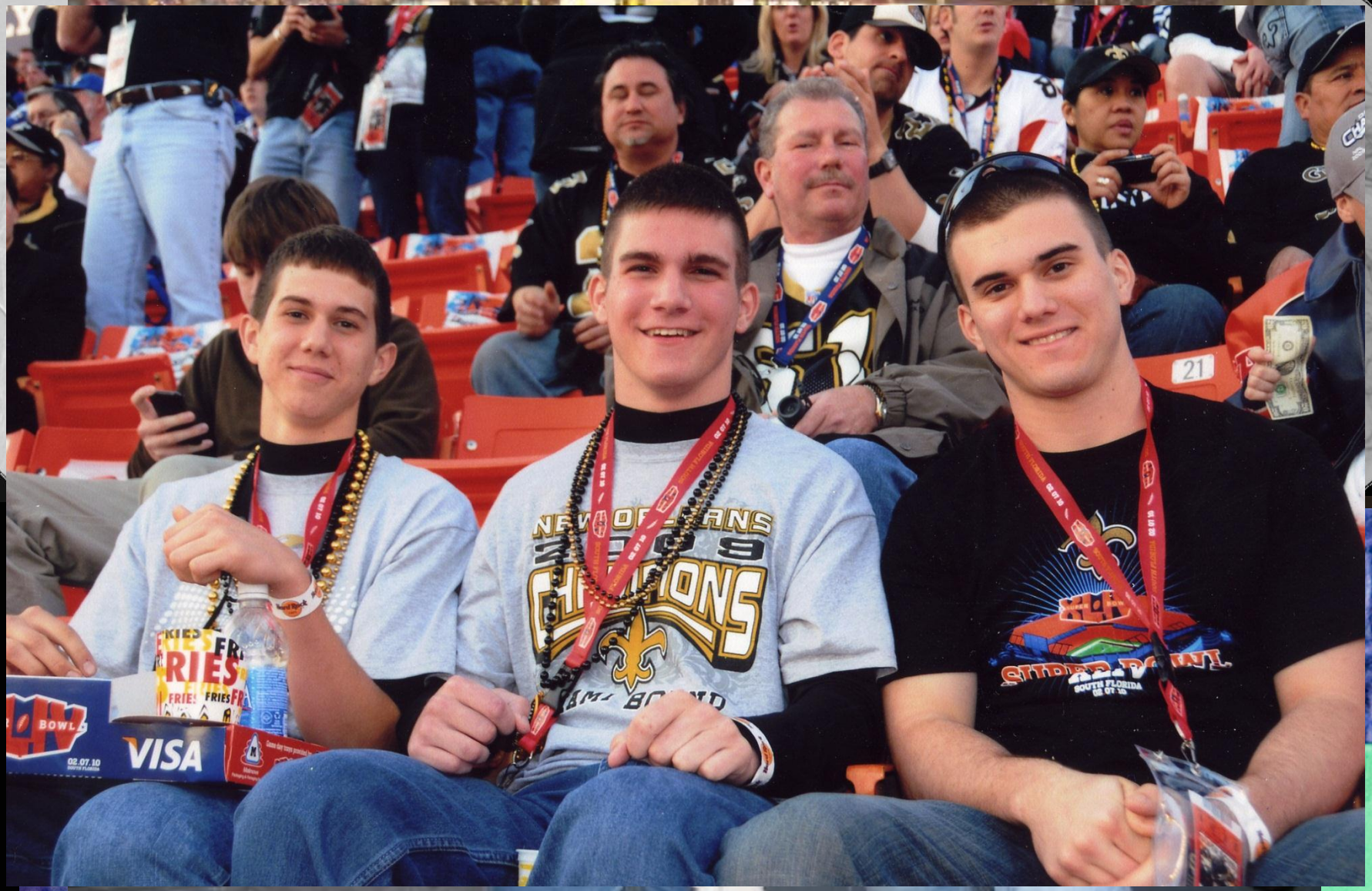
- Brother found him on floor.
- Mother brought him to ER #1 with locked-in syndrome. MRA confirmed the problem.
- Transferred to Hospital #2 after 3 hours.
- Called us (hospital #3) 42 hours after stroke.
- When he arrived, all he could move were his eyes.

R vertebral artery



Thombus Snared on Third Attempt





Stephen Ramee, MD

VIVA 10

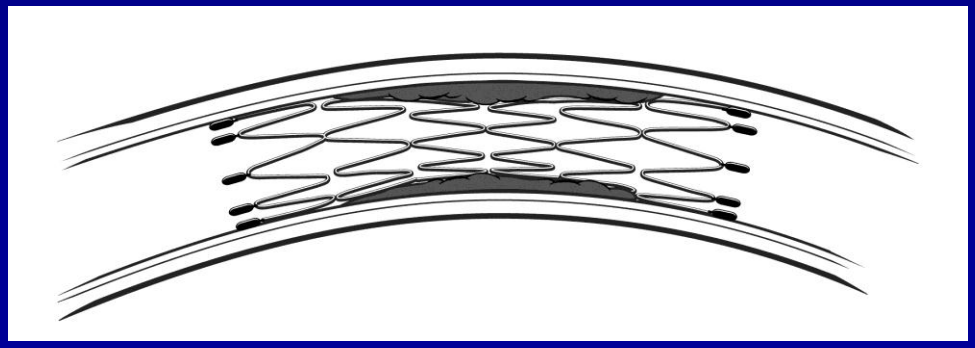
What Does This Patient Teach Us?

- Stroke is a 911 Emergency!
- There is a real need Comprehensive Regional Stroke Centers.
  - Telemedicine, Neuro-ICU, Stroke Neurology, 24/7 MRI and CT Perfusion, Angioplasty, Rehab.
  - *MOST hospitals offer only very limited stroke treatment.*
- *<u>Every</u> ER, hospital, EMS service and physician's office should have a plan if they diagnose acute stroke.*
- *Interventional Cardiologists can assist in this effort.*

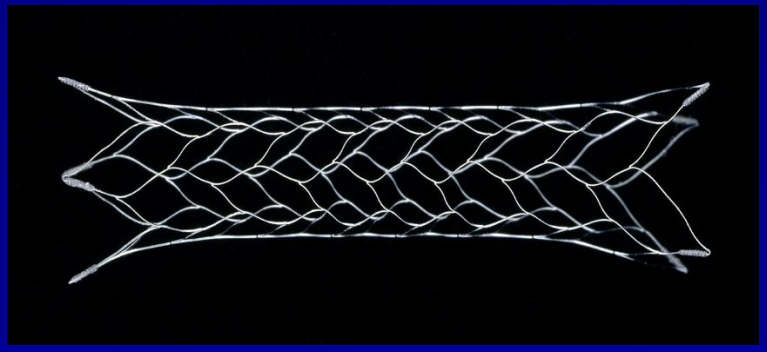
Self-Expanding Neuro Stents

- More flexibility with open cell design
- Low radial force during deployment…no post dilitation
- Increased safety profile …No vessel rupture
- Designed specifically for the cerebrovasculature
- Delivered to target area - success rate of > 95%

Wingspan- open cell



Enterprise- closed cell

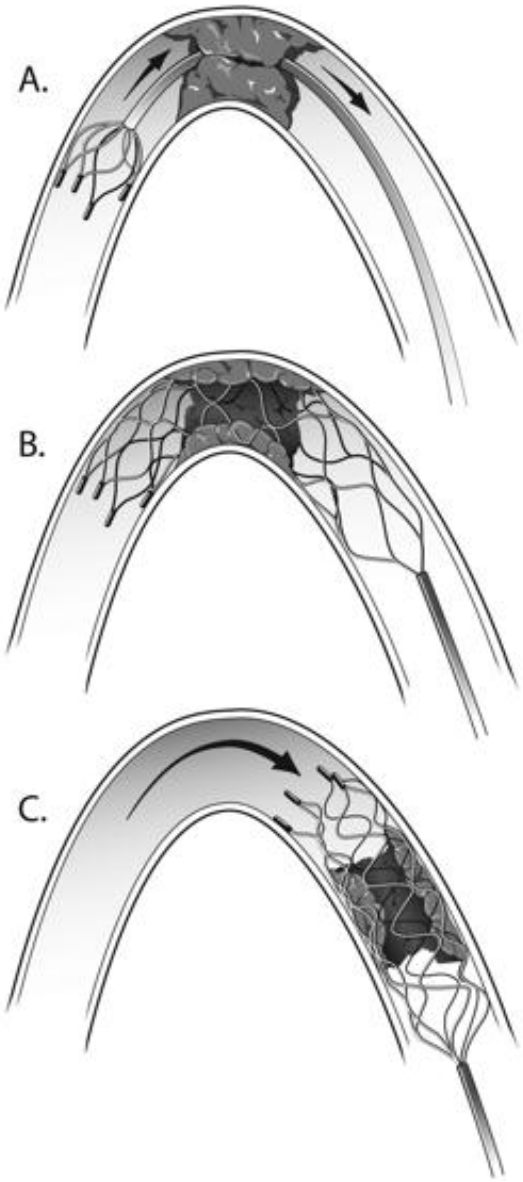


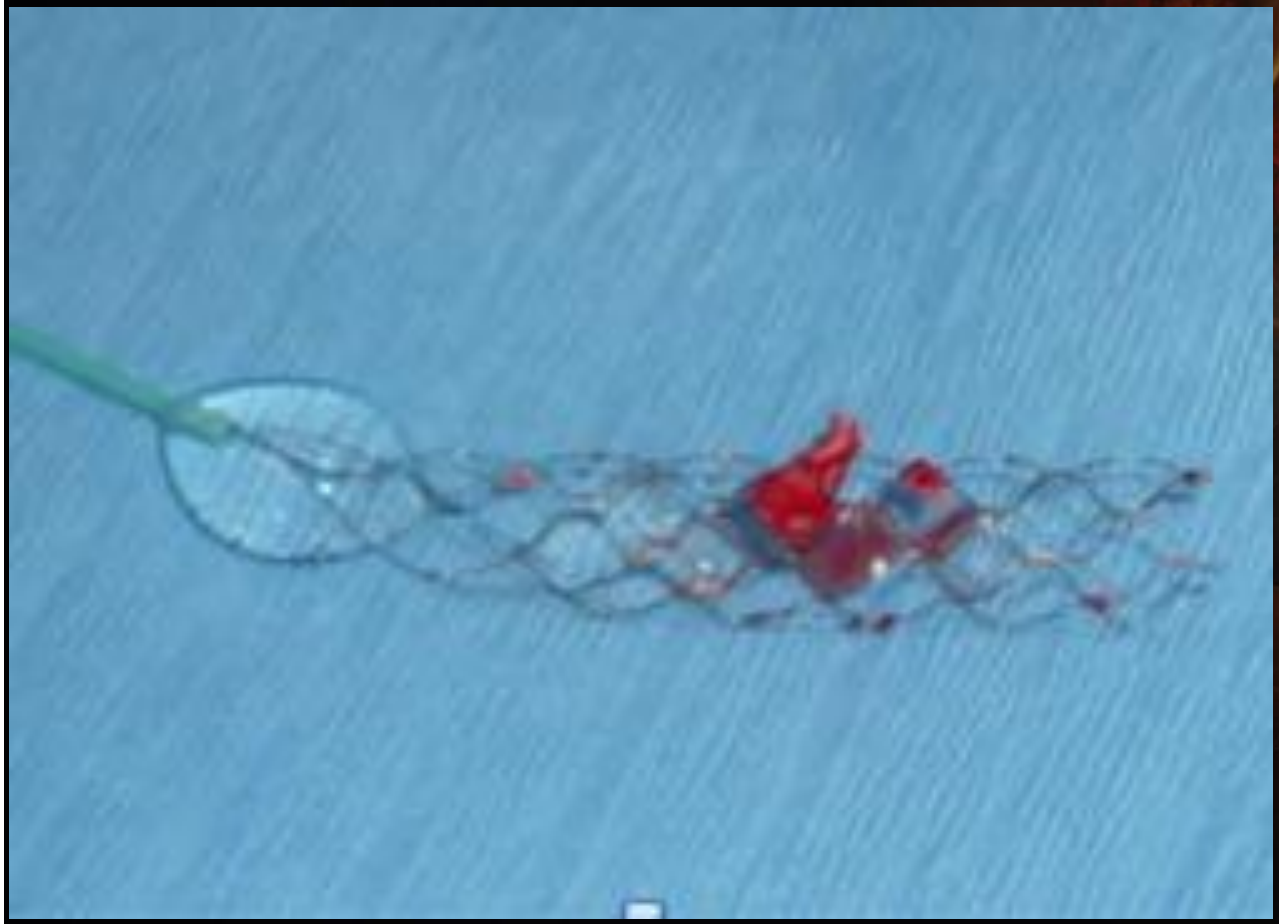
Henkes H, Miloslavski E, Lowens S, et al. **Neuroradiology.** *2005;47:222–228.*

Hospital Course

- Dense hemiparesis persisted for 48 hrs, followed by a rapid resolution.
- At one month, had complete recovery of language and only mild fine motor deficit.
- At two years back in school with his classmates. Wears a brace on his L leg because of mild foot drop.

Solitaire Temporary Stent





Stephen Ramee, MD

VIVA 10

TREVO device

Soft radiopaque tip

Distal tapered transition

Cell geometry –
for integration of clot in curved vessels

Proximal tapered section –
for smooth withdrawal and easy re-sheathing

Radiopaque proximal marker

Cryotherapy: Can we prolong the window for stroke Rx?

ThermoSuit™ System

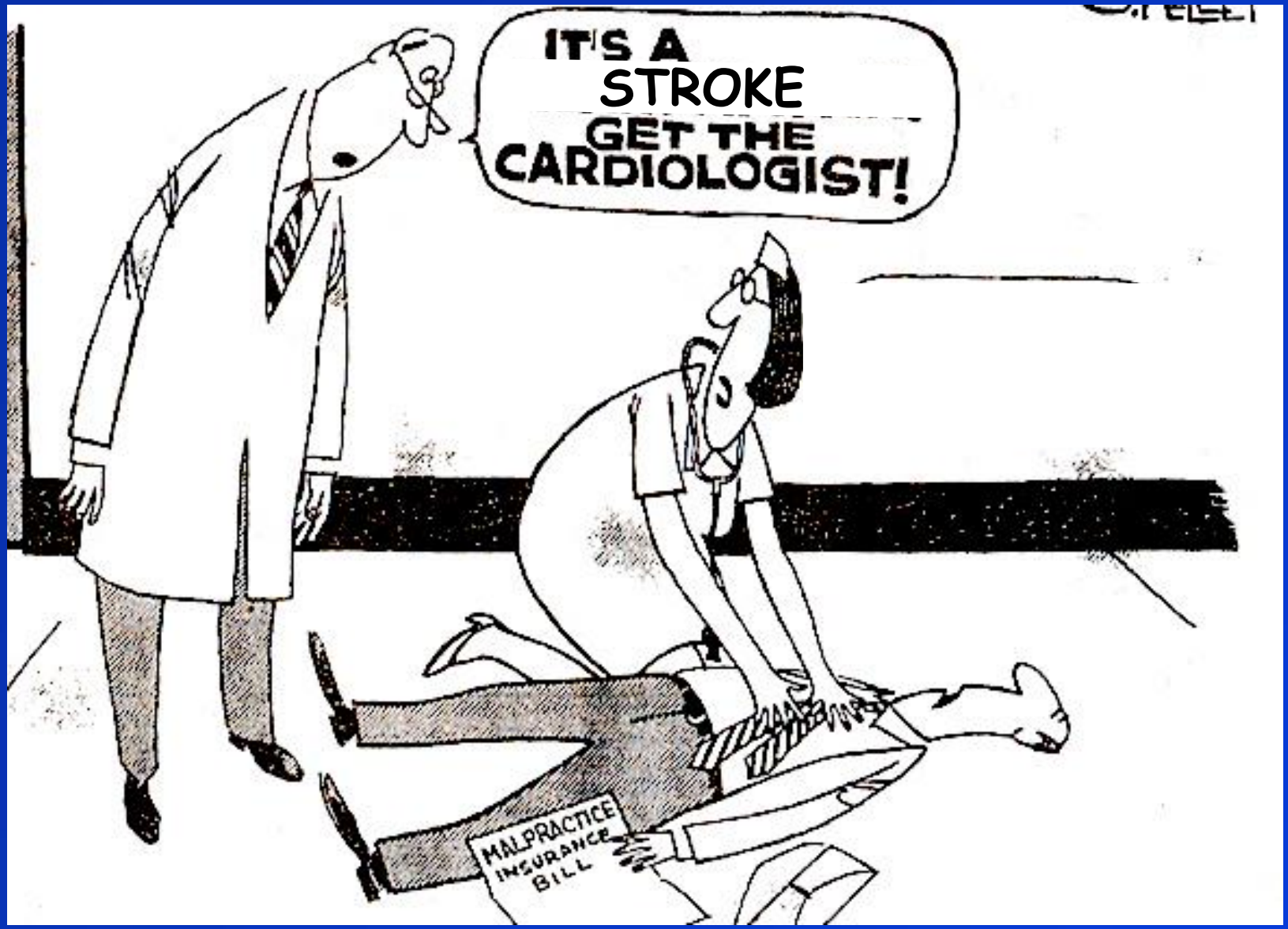
Level 2b indication for OOH arrest

SUMMARY: Stroke Technique

- Stroke is a medical emergency
  - Time is Brain!
- If CT/CT perfusion shows brain viability, open the artery as quickly and safely as possible.
  - Lysis, balloon, clot retrieval, stenting
- Avoid guidewire perforation and vessel rupture.

Conclusion: How can we make stroke treatment more effective?

- Educate our citizens about the signs and symptoms of stroke: TIME IS BRAIN!!!
- Develop regional stroke centers and educate EMS and health care providers how to access this network emergently: BRAIN ATTACK/911!
- Now that Stentrievers are available in the USA, Interventional Cardiology Manpower can assist in getting Rapid Door to Patency.


IT'S A STROKE
GET THE CARDIOLOGIST!
MALPRACTICE INSURANCE BILL