Acute Stroke Management

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Objectives

- Define acute stroke and TIA. Describe the ischemic stroke subtypes including large artery, cardioembolic, small subcortical (lacunar), and cryptogenic causes.

- Distinguish the symptoms of anterior circulation versus posterior circulation stroke and describe the most common stroke mimics.

- Describe the evaluation of a patient with suspected acute ischemic stroke. Understand the sensitivity of a non-contrast CT scan for detection of ischemic stroke.

- List and briefly describe the indications and contraindications for IV-TPA in the management of an acute ischemic stroke.

- Know the appropriate management of a patient with large artery occlusion requiring endovascular therapy.

What is a Stroke?

A. Sudden attack to the nervous system causing focal neurological deficits.

B. Sudden onset of focal neurologic deficit in the brain due to occlusion or rupture of a cerebral or spinal artery.

C. Sudden onset of a focal neurologic deficit of the brain, spine or retina due to occlusion or rupture of a cerebral or spinal artery.

D. Sudden onset of a focal neurologic deficit, lasting longer than 24 hours , of the brain, spine or retina due to occlusion or rupture of a cerebral or spinal artery.

Then what is a TIA?

Mrs Smith

Mrs Smith is a 65 yo female who presented to the ED with back pain and urinary frequency. She was admitted to your service for UTI and pyelonephritis management. She has been doing well and should be discharged tomorrow.

You enter her room this am, she is resting in bed calmly. You wake her and notice she is slurring her speech. Immediately you complete a neurologic exam and notice she is weak on the left. You call the nurse and she said 30 minutes ago she was normal and took her morning medications.

What do you do?

A. Text my cell phone
B. Call a stroke alert and disappear… you don't want to be in the way
C. Call a stroke alert and stay with the patient, after all you known the patient best
D. Order MR brain and start an aspirin

STROKE ALERT

Why call the stroke alert?

What do we want to know?

What are we going to do?

Stroke Mimic

- Seizure
- Migraines
- Encephalopathy
- Conversion/ Psychiatric

CAUTION: DON'T BE FOOLED

NIH Stroke Scale

"It is a measurement of impairment not a measurement of disability"

(Dr. Harold P Adams Jr)

Mrs Smith

The stroke team arrives to your patient's room.

Mrs Smith vital signs: HR 103 BP 170/68 RR 15 Pulse Ox is 95% on RA

Blood sugar is 98

Current medication list: Aspirin and plavix, lovenox for DVT prophy, antibiotics for UTI and lisinopril.

She is taken emergently for a CT brain.

What are we looking for?

What is your next step for the treatment of Mrs Smith?

A. Continue her Aspirin therapy

B. Consider and deliver IV Alteplase

C. Thrombectomy (EVT)

D. MR brain

E. Carotid doppler US STAT

Indications for tPA (Alteplase)

Diagnosis of ischemic stroke causing measurable neurological deficit

Onset of symptoms <4.5 hours before beginning treatment

Normal head CT scan

Dose 0.9 mg/kg MAX dose of 90mg

(AHA/ASA Guidelines, Guidelines for the Early Management of Patients With Acute Ischemic Stroke

Mrs Smith

Alteplase is being administered based on the indications in the guidelines after verbal discussion/consent with her husband. Her vital signs have remained unchanged. Suddenly she starts complaining of a headache. What is your next step in the care for your patient?

A. Finish rounding on your other patients, you have more than one patient today.
B. Pause the tPA and order a STAT repeat non- contrast CT brain.
C. Headache is common side effect of tPA, reassure the patient.
D. Prescribe Percocet for pain.

Adverse events to tPA… oh no!

Hemorrhage

Table 8. Management of Symptomatic Intracranial Bleeding Occurring Within 24 Hours After Administration of IV Alteplase for Treatment of AIS

Class IIb, LOE C-EO
Stop alteplase infusion
CBC, PT (INR), aPTT, fibrinogen level, and type and cross-match
Emergent nonenhanced head CT
Cryoprecipitate (includes factor VIII): 10 U infused over 10–30 min (onset in 1 h, peaks in 12 h); administer additional dose for fibrinogen level of <200 mg/dL
Tranexamic acid 1000 mg IV infused over 10 min OR ε-aminocaproic acid 4–5 g over 1 h, followed by 1 g IV until bleeding is controlled (peak onset in 3 h)
Hematology and neurosurgery consultations
Supportive therapy, including BP management, ICP, CPP, MAP, temperature, and glucose control

Angioedema

Table 9. Management of Orolingual Angioedema Associated With IV Alteplase Administration for AIS

Class IIb, LOE C-EO
Maintain airway
Endotracheal intubation may not be necessary if edema is limited to anterior tongue and lips.
Edema involving larynx, palate, floor of mouth, or oropharynx with rapid progression (within 30 min) poses higher risk of requiring intubation.
Awake fiberoptic intubation is optimal. Nasal-tracheal intubation may be required but poses risk of epistaxis post-IV alteplase. Cricothyroidotomy is rarely needed and also problematic after IV alteplase.
Discontinue IV alteplase infusion and hold ACEIs
Administer IV methylprednisolone 125 mg
Administer IV diphenhydramine 50 mg
Administer ranitidine 50 mg IV or famotidine 20 mg IV
If there is further increase in angioedema, administer epinephrine (0.1%) 0.3 mL subcutaneously or by nebulizer 0.5 mL
Icatibant, a selective bradykinin B_2 receptor antagonist, 3 mL (30 mg) subcutaneously in abdominal area; additional injection of 30 mg may be administered at intervals of 6 h not to exceed total of 3 injections in 24 h; and plasma-derived C1 esterase inhibitor (20 IU/kg) has been successfully used in hereditary angioedema and ACEI-related angioedema
Supportive care

Mrs Smith

The repeat CT brain is normal. You have resumed the tPA.

You reexamine your patient and find that Mrs Smith is sleepy, slurring her speech and only looking to the R. She is not moving her left side much but states she feels fine and denies any symptoms. Her NIHSS is 18.

What stroke syndrome do you think Mrs Smith is having?

A. A large vessel occlusion, as she has cortical symptoms, L MCA
B. A large vessel occlusion as she has cortical symptoms, R MCA
C. A small vessel syndrome as she has known hypertension and she smokes
D. She has a UTI and this is probably delirium as her head CT is normal

Mrs Smith

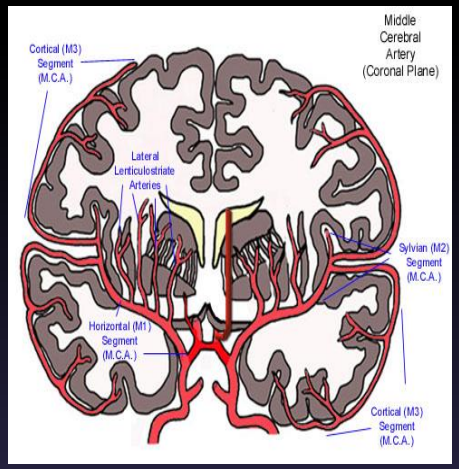
You have now resumed the tPA. What is your next diagnostic test?

A. MR of the brain
B. MR angiogram of the brain
C. Carotid Ultrasound and transcranial doppler
D. CT angiogram of the brain and neck

Large Vessel Occlusion Syndromes

LMCA stroke

- Decrease mental status
- L gaze preference
- R vision loss
- Aphasia
- R hemiparesis



RMCA stroke

- Decrease mental status
- R gaze preference
- L vision loss
- Neglect
- L hemiparesis

Large Vessel Occlusion Syndromes

ACA

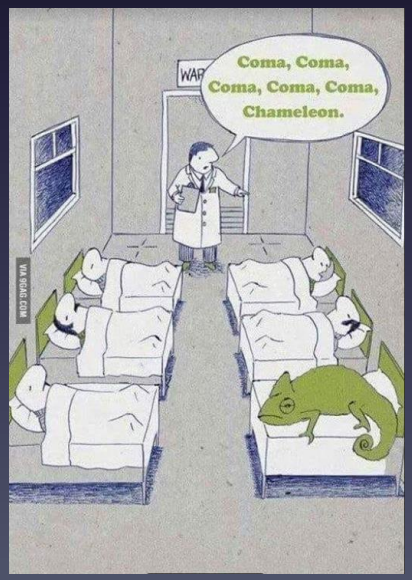
- Contralateral leg weakness
- Occasional changes in executive function

PCA

- Contralateral vision loss
  - May be partial
- Sensory change (thalamic)
- Memory change
- Weakness (occasional)
- Language change (L)

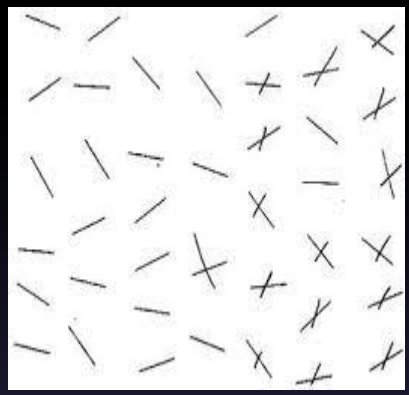
Large Vessel Occlusion Syndromes

Basilar Artery



- CN deficits with contralateral weakness
- Alternating hemiparesis and posturing
- *Locked – In- Syndrome*
- Acute changes in LOC
- Myoclonic jerks (may be confused with seizure or even status)
- SUDDEN COMA

What does a LVO stroke look like?



VAN

Table 1 Vision, aphasia, neglect emergent large vessel occlusion screening tool

Stroke VAN	
How weak is the patient? Raise both arms up	☐ Mild (minor drift) ☐ Moderate (severe drift—touches or nearly touches ground) ☐ Severe (flaccid or no antigravity) ☐ Patient shows no weakness. Patient is VAN negative (exceptions are confused or comatose patients with dizziness, focal findings, or no reason for their altered mental status then basilar artery thrombus must be considered; CTA is warranted)
Visual disturbance	☐ Field cut (which side) (4 quadrants) ☐ Double vision (ask patient to look to right then left; evaluate for uneven eyes) ☐ Blind new onset ☐ None
Aphasia	☐ Expressive (inability to speak or paraphasic errors); do not count slurring of words (repeat and name 2 objects) ☐ Receptive (not understanding or following commands) (close eyes, make fist) ☐ Mixed ☐ None
Neglect	☐ Forced gaze or inability to track to one side ☐ Unable to feel both sides at the same time, or unable to identify own arm ☐ Ignoring one side ☐ None

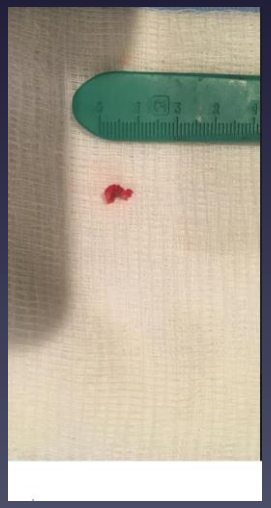
Patient must have weakness plus one or all of the V, A, or N to be VAN positive. VAN positive patients had 100% sensitivity, 90% specificity, positive predictive value 74%, and negative predictive value 100% for detecting large vessel occlusion.
CTA, CT angiography; VAN, vision, aphasia, and neglect.

Mrs smith

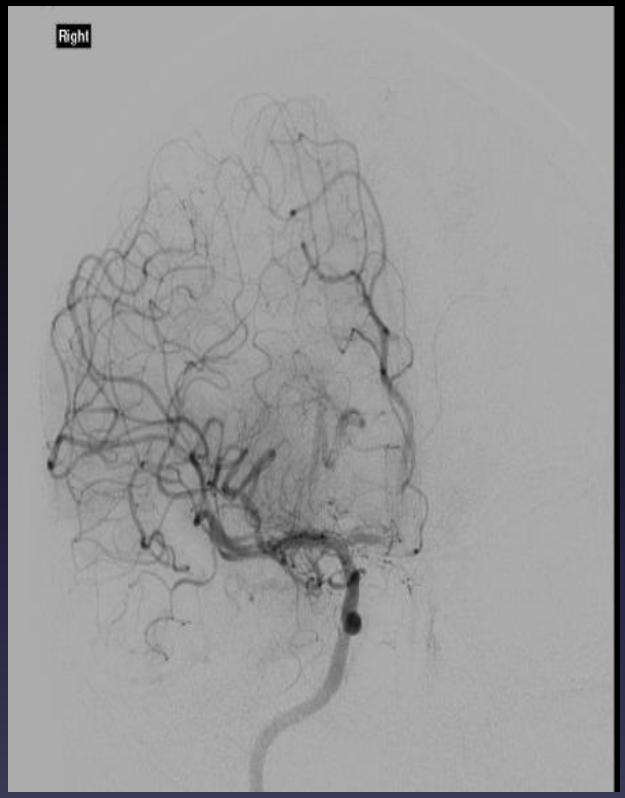
She is taken emergently to IR for a thrombectomy!

Endovascular treatment:

- Who
  - Large artery occlusion
  - Functional good baseline
- When
  - Up to 24 hours in patients who meet criteria – as soon as possible
- Why
  - Reduce stroke volume – save the penumbra
  - Decrease complications from large stroke
  - Improve patient outcome
  - Twice as likely to have a good outcome
  - Decreased disability
    - About 44% reduction in disability rate




Right

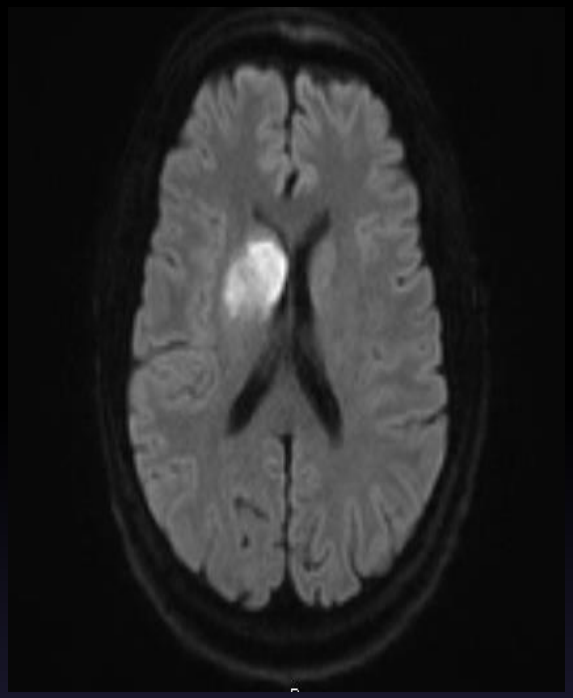

Right

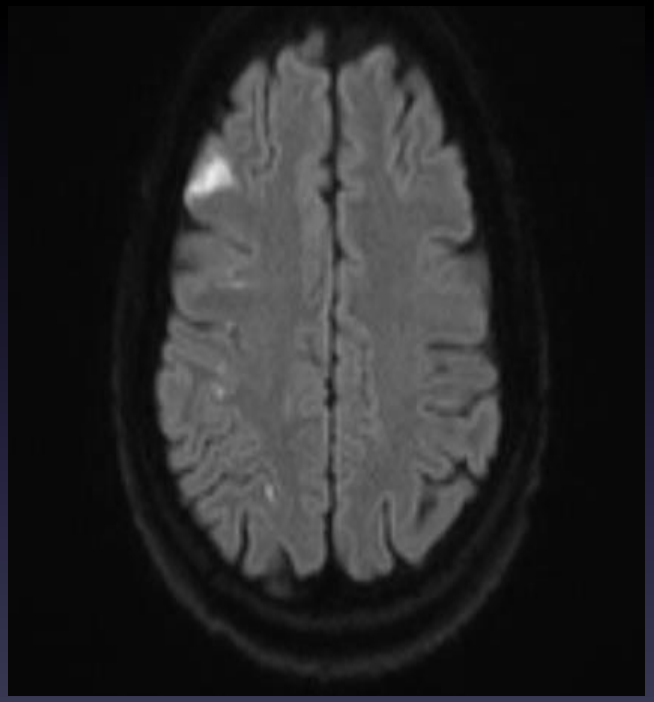
NSICU

- Post tPA
- Post IR
- Hemodynamic instability
- Hemorrhagic stroke

Diagnostic testing

- Goal is to identify etiology as well as for risks for stroke
- Imaging
  - MR brain WITHOUT contrast
  - CT angiogram (MRA only if contraindication to CTA)
    - Last resort carotid doppler
  - Echocardiogram
- Labs
  - A1C
  - Lipid profile
- Tele monitoring
- Use our order sets!



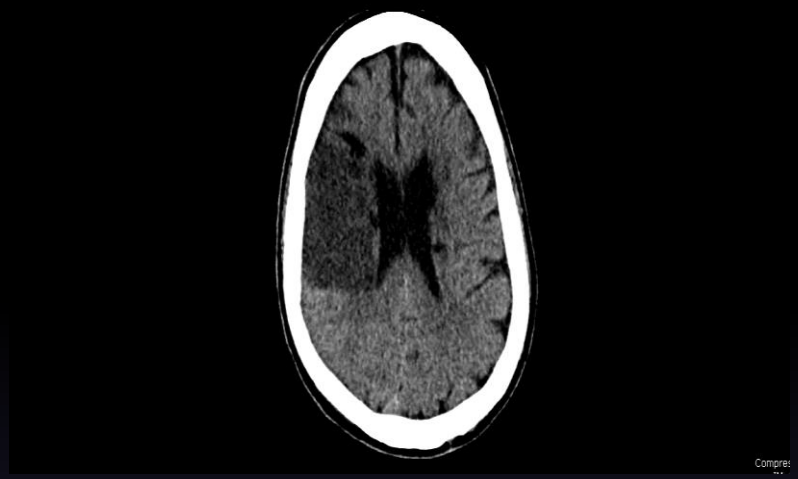


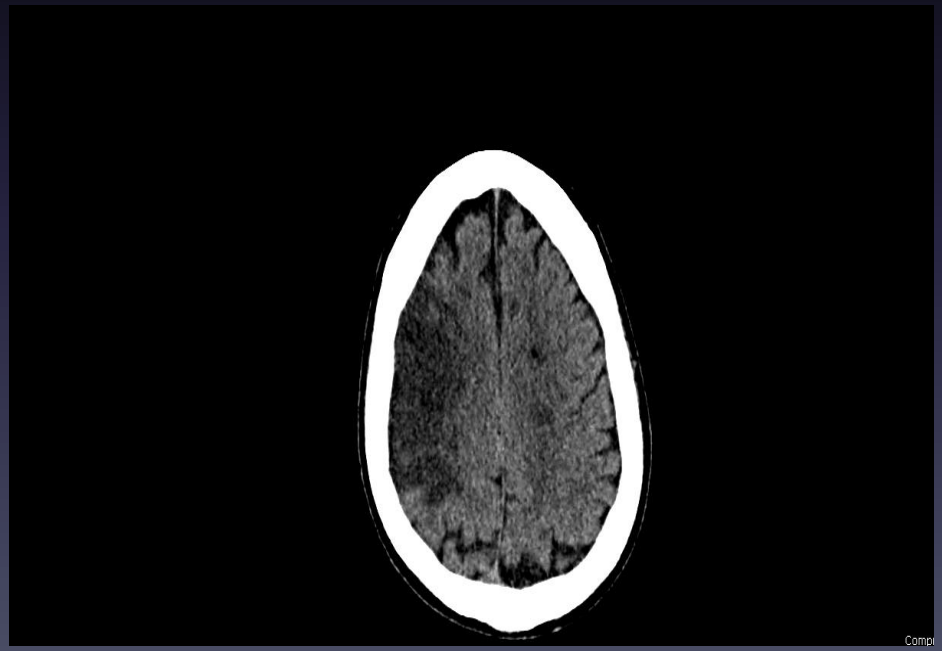

OH YEAH!!!

Cardioembolic Stroke

- Atrial fibrillation
  - ASA for ~2weeks, then transition to oral anticoagulation
    - May be longer (or shorter) depending on imaging
  - If have acute LA/LV thrombus – heparin gtts **without** bolus
  - Rate management for hemodynamic stability

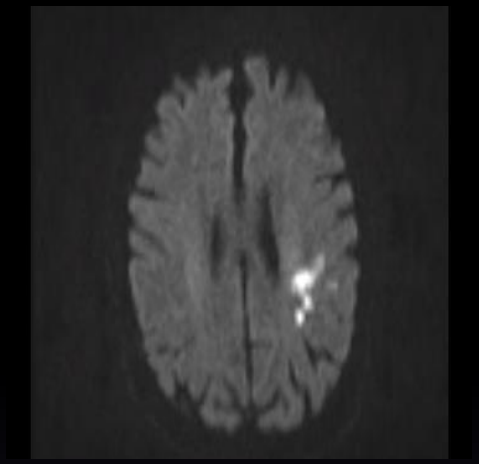
- Endocarditis, arch atheroma, cardiomyopathy, valve disease, PFO

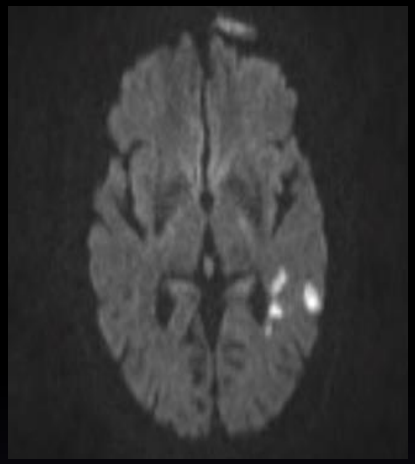


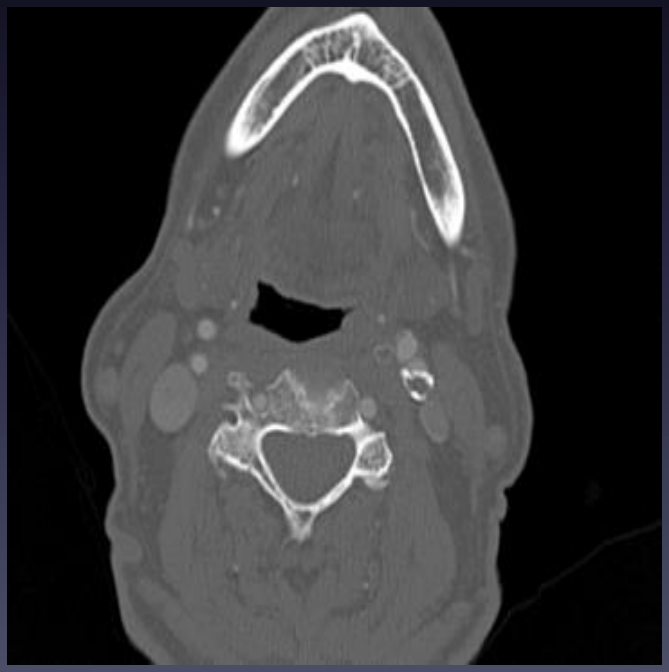


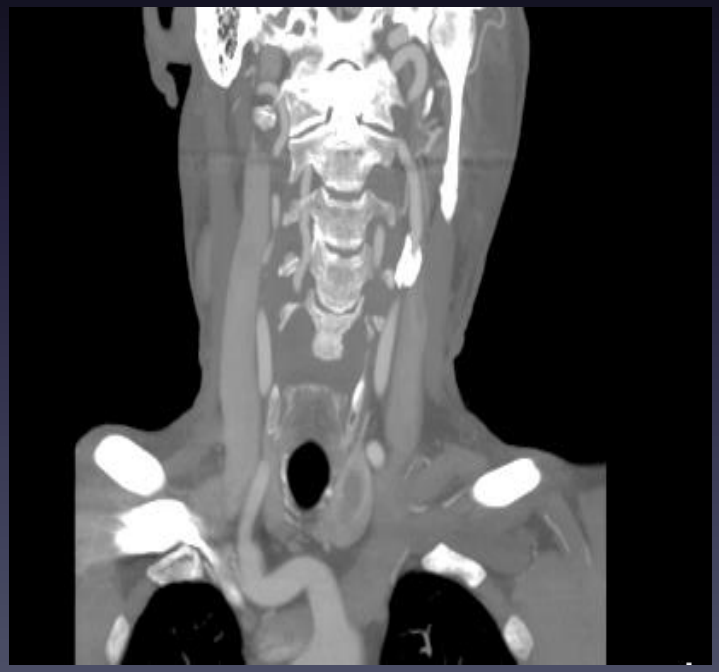
Large Artery Atherosclerosis

- Carotid artery disease
  - Revascularization
    - Now is the time – within 2 weeks, depends on stroke and risks
    - Moderate to severe stenosis
    - No intervention if occluded.
    - Stent, TCAR or CEA
- Intracranial stenosis
  - SAMMPRIS
    - MAXIMAL medical management
      - ASA 325mg +plavix for 3 months
      - High intensity statin
      - BP management
      - Lifestyle



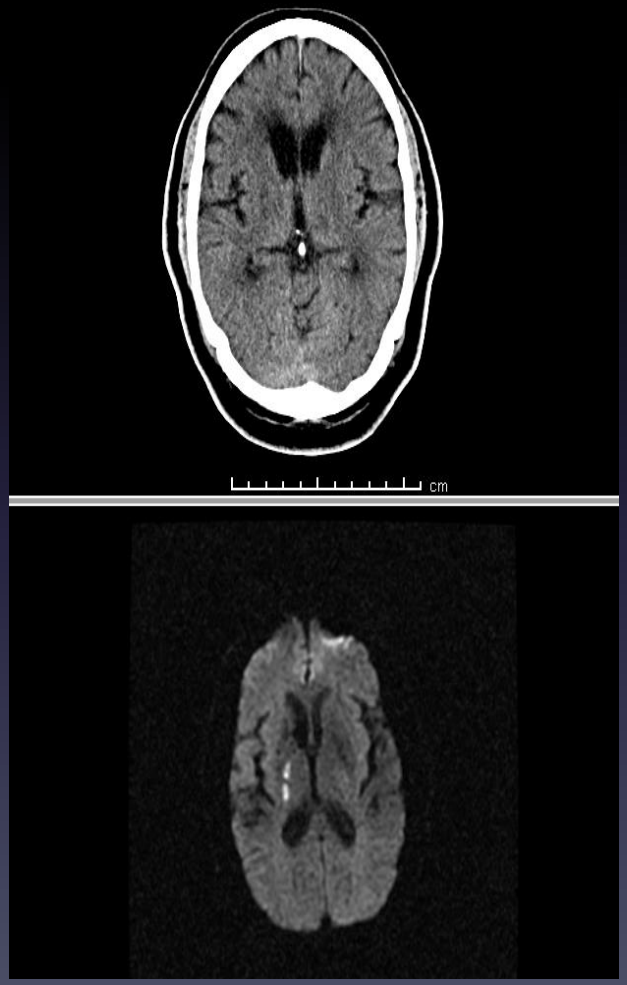




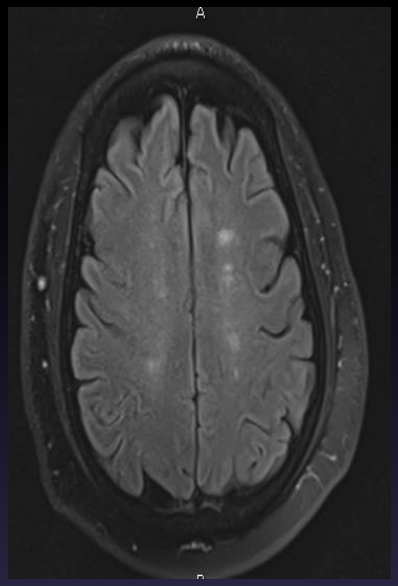


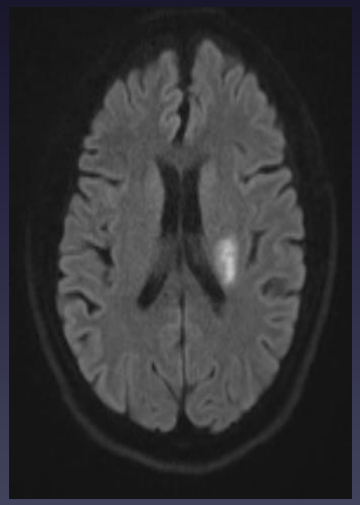
Small Vessel Disease

- **Hypertension**
- Diabetes
- Smoking



Small Vessel Syndrome





- Pure motor
  - Face, arm and leg involvement
- Pure sensory
  - Face, arm and leg involvement
- Sensorimotor
  - Face, arm and leg numbness and weakness

- These syndromes do NOT have cortical symptoms

Other

- Trauma: dissection
- CVST

Cryptogenic

- TEE and long-term cardiac monitoring.
- Hypercoag panel ?
- Angiogram

Figure 2: Reveal LINQ insertable cardiac monitor.

Understanding the patient's personal risks for stroke

Sleep apnea

Hypertension

Heavy alcohol use

Drug use

Age

Family history

Obesity

STROKE

Coronary Artery Disease

Smoking

High Cholesterol

Inactivity

Peripheral vascular disease

Prior stroke

Atrial Fibrillation

Diabetes

COVID

Assessing the damage

- Physical therapy
- Occupational therapy
- Speech therapy
- Music therapy
- Pet therapy
- Dispo:
  - Home
  - Acute Rehab
  - SNF

Mrs Smith

Mrs Smith was noted to have atrial fibrillation on tele monitoring with normal rate and stable vital signs.

Now is day of discharge and Mrs Smith does not have any acute rehab needs. She will go home with outpatient therapy. They are very pleased with the care provide and you want to make sure your discharge is perfect!

What do you include in your discharge information?

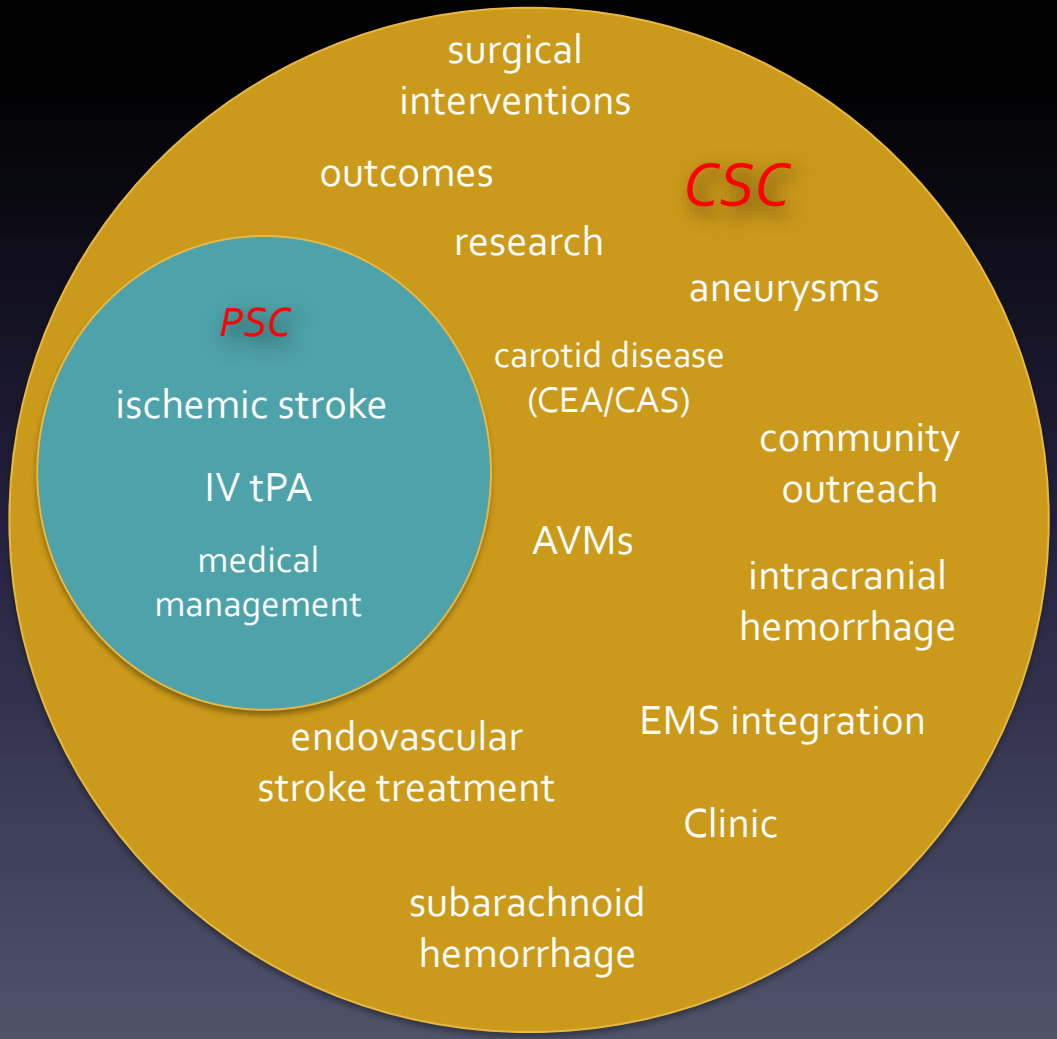
A. Aspirin therapy and anticoagulation with a start date and prescription (with directions when to stop asa)
B. High intensity statin therapy to address her hyperlipidemia
C. Blood pressure medications to address her hypertension
D. Stroke education information
E. Follow up appointment with neurology (in a couple of months)
F. A,B, C and D
G. All the above

Follow up plan

- Typically in our clinic in 2-3 months – outcome measurements evaluated.
- Needs a PCP!
- Sleep studies
- Outpatient cardiac evaluations or follow up
- Dispo medications –
  - Antiplatelet (or OAC)
  - Statin
  - BP medications
  - DM management

Stroke Nurse Navigator – Tiana Madrid

Primary vs Comprehensive Stroke Centers



Questions


WHEN ONE DOOR CLOSES
ANOTHER ONE OPENS
OTHER THAN THAT
ITS A PRETTY GOOD
CAR