

L&ACGH Physician Stroke Update

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Al Jin MD FRCPC

Stroke Network of Southeastern
Ontario

Part 1

- Managing stroke and TIA at L&ACGH:
 - Stroke Protocol or consult?
 - When to refer to Stroke Clinic?

Part 2

- Endovascular therapy for acute ischemic stroke
 - What is it?
 - How does the process work in Kingston?
 - Results so far

Part 3

- Neurological examination
 - Things which don't make sense
 - “Left side weakness and aphasia”, or encephalopathic?
 - Is it “neglect” or are they just not paying attention to you?
 - Do they have a visual field deficit and can't tell you?
 - Is the arm ataxic or weak?

Part 4

- How to recognize stroke syndromes
- Stroke mimics

Part 5

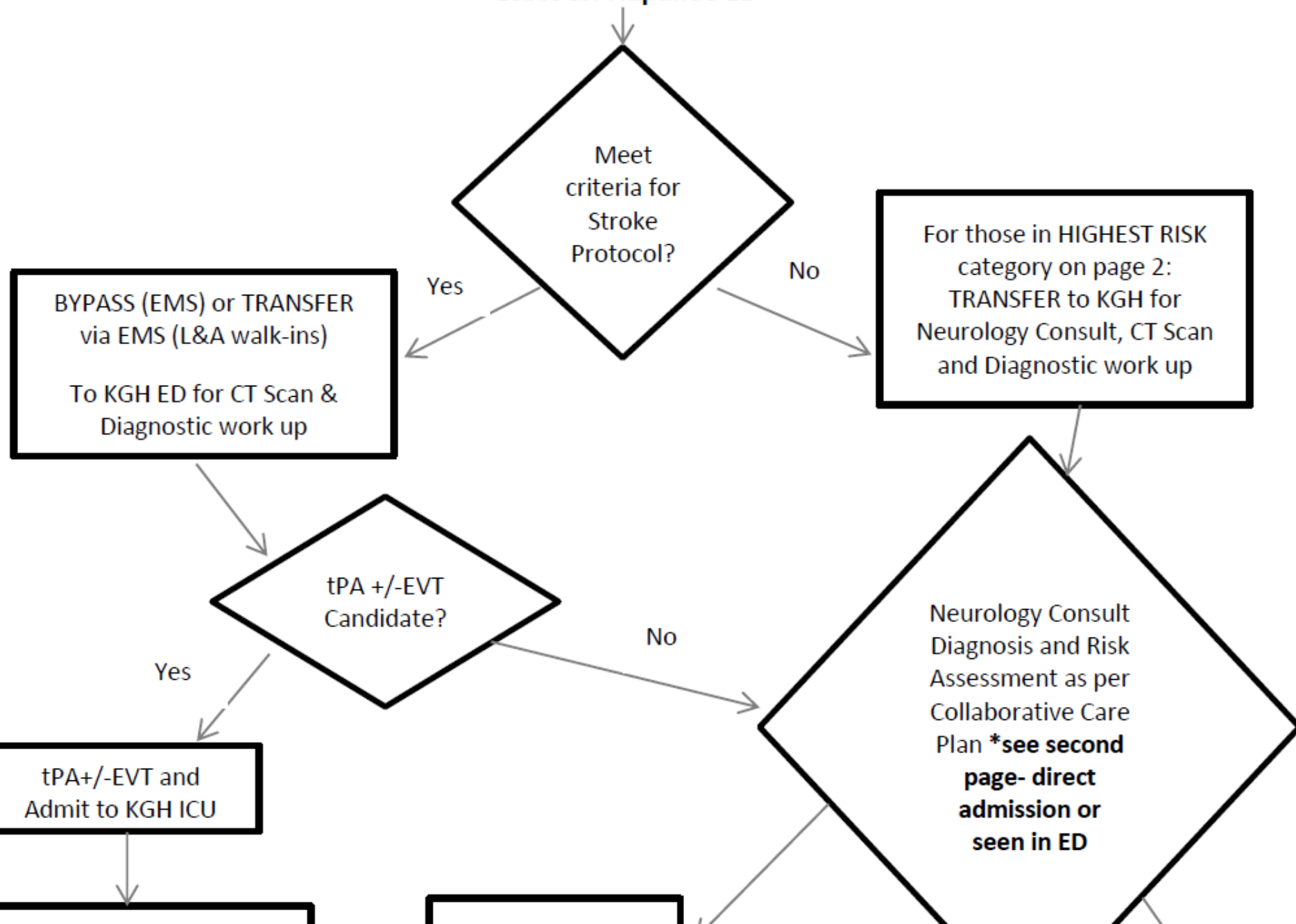
- Miscellaneous topics
 - When to anticoagulate?
 - What about PFO?
 - “Minor” non-disabling stroke: when should you worry?

Part 1: Managing Stroke and TIA at L&ACGH

Stroke and TIA Algorithm for L&ACGH

- Stroke protocol:
 - The only rule is when in doubt, activate stroke protocol if the patient is within **six hours of onset**
 - Face, Arm, Speech
 - But also consider: new visual field deficit, new limb ataxia, hemisensory loss over two contiguous parts of the body (e.g. face and arm, or arm and leg)

Stroke / TIA Signs & Symptoms
L&ACGH Napanee ED



What is HIGH RISK?

- Enduring symptoms OR symptoms within the last 48 hours
- Persistent or fluctuating symptoms
- Motor weakness on one side of body
- Speech or language difficulties
- Hemi-body sensory loss
- Visual disturbance (amaurosis fugax or homonymous hemianopsia)
- Symptoms typically are sudden in onset and reach peak severity within a few seconds

High risk needs to be investigated quickly

- If the symptoms are less than 48 hours old and deficits are persistent, consult Neurology for assessment in KGH ER
 - During the day, there is a Stroke Service and a separate Non-stroke Neurology Service; ask for Stroke Service
 - At night, there is just one Neurologist on call who covers both Stroke and Non-stroke cases

What is Increased Risk?

- Patient presents between 48 hours and 2 weeks from symptom onset
- Does not have persistent or fluctuating motor or speech symptoms
- No symptoms within the past 48 hours but symptoms have occurred within the last 2 weeks
- ACTION: can be DC from L&ACGH ED with arrangement for outpatient CT+ Carotid Doppler or CTA within 24 hours and follow up in SPC
- ED physician at L&ACGH will need to arrange for urgent outpatient imaging and refer to SPC for work-up clearly indicating urgency on referral
- SPC will do their best to get these people into clinic ASAP and by next day if possible

What about Low Risk?

- These are usually patients who come in with a non-stroke complaint but a stroke or TIA history emerges during the workup
- NO symptoms within the last 2 weeks
- ACTION: can be DC from L&ACGH ED with outpatient referral to SPC
- Will be worked-up within one month

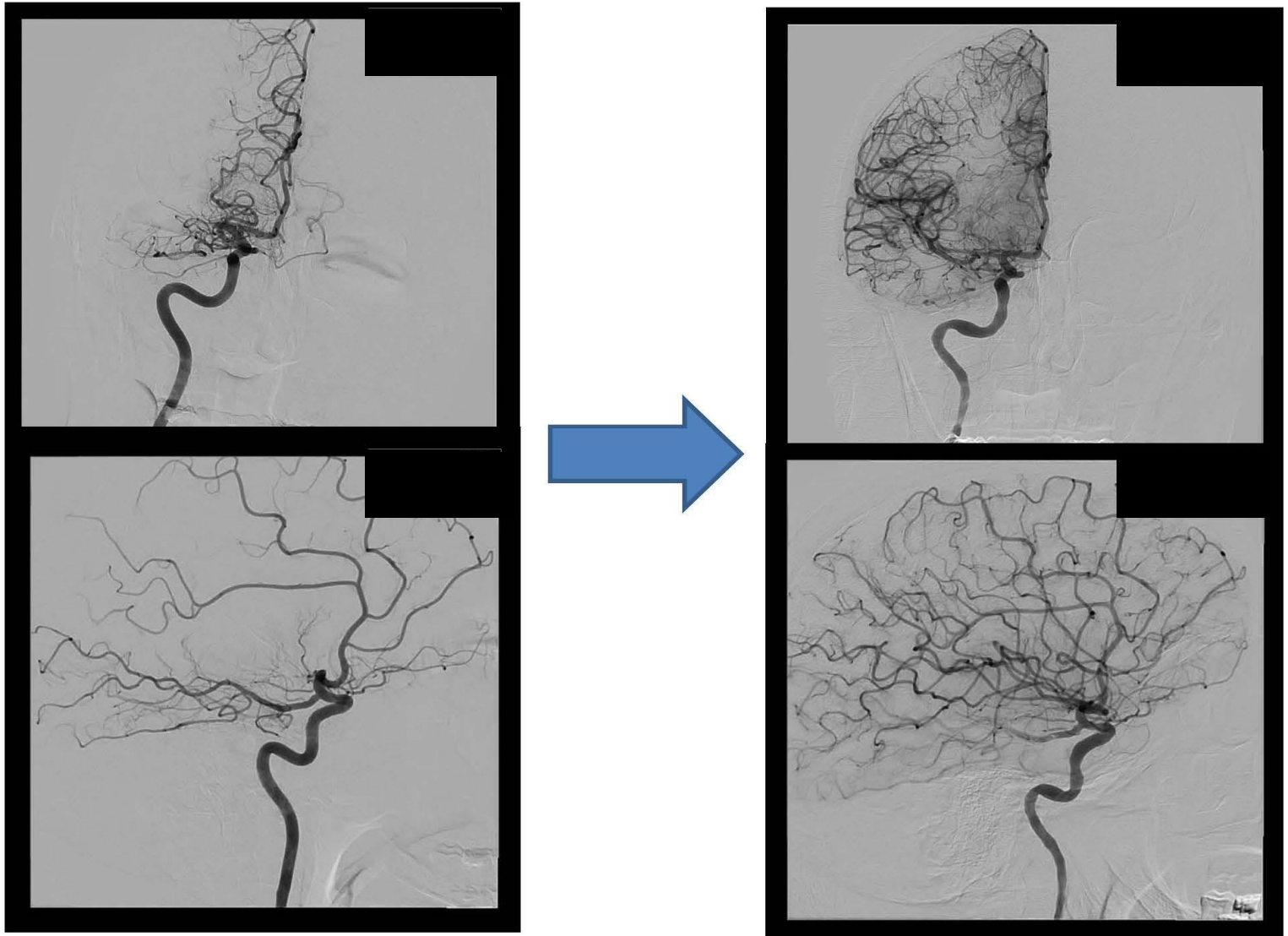
Part 2: Endovascular Therapy at KGH

Removing clots from the brain with a wire mesh “stent”



- <https://youtu.be/pXMmI xv7IQ8>

EVT: A Revolution in Stroke Care



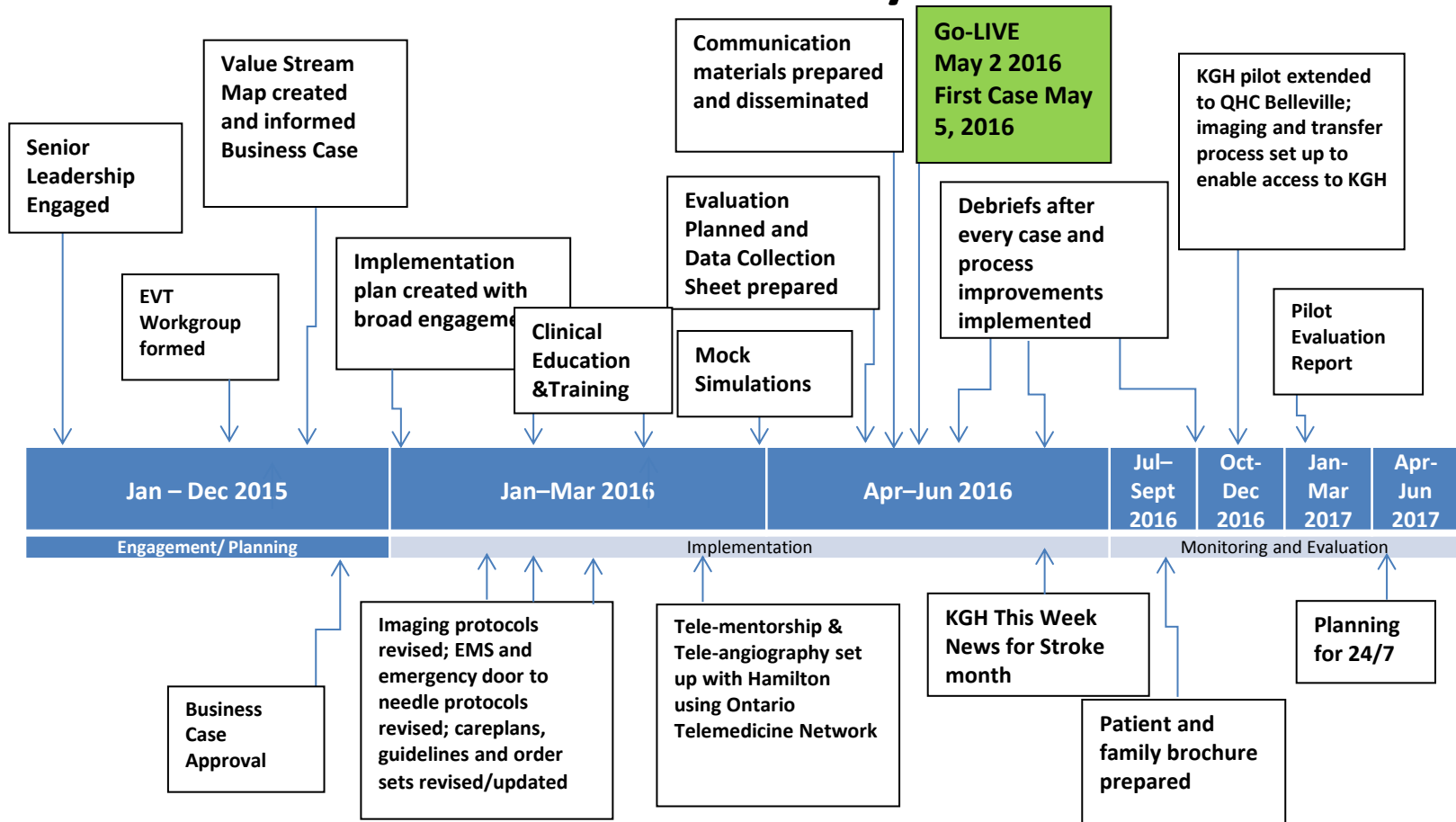
WHO? Endovascular Workgroup

- Multidisciplinary Workgroup: Neurology, ED, Neuroradiology, Interventional Radiology, Critical Care, Anesthesiology, Neurosciences unit, EMS



STROKE NETWORK
of Southeastern Ontario

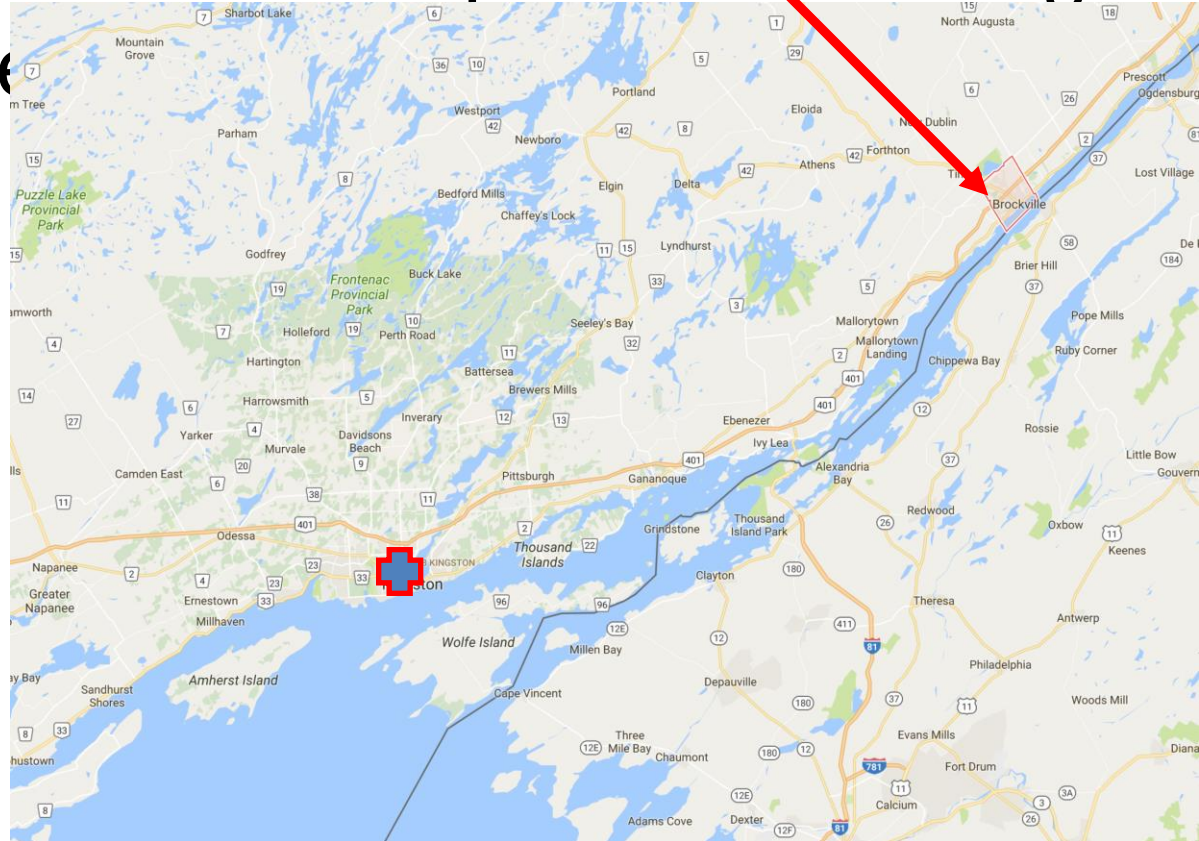
Project Implementation Summary





One person's story...

- 9h15 am
- 75 y.o. woman develops immediate right arm and leg



- 10h55 am (1h40 min after onset of symptoms)
- Ambulance arrives at KGH ER



How many people does it take to treat one stroke in the first 10 minutes?



Patient



Two Paramedics
and Dispatch



ER physician, charge
nurse, bedside nurse



Hospital operator,
ER registration clerk, ER
Unit clerk



CT Technologist,
Neuroradiologist



Stroke
neurologist,
resident

Hyperacute stroke care kind of looks like this...





The brain is dying...

- Every minute of stroke results in the loss of...
- **2 million neurons**
- **12 km myelinated fibre**
- **14 billion synapses**
- For every hour of ischemia, the brain loses as many neurons as it does over 3.6 years of normal life

- 11h00 am (1h45 min after onset of symptoms)
- Patient immediately brought to CT
- Non contrast head CT and multiphase CTA performed.







Search Participants

Participants: 2

Brian van Adel

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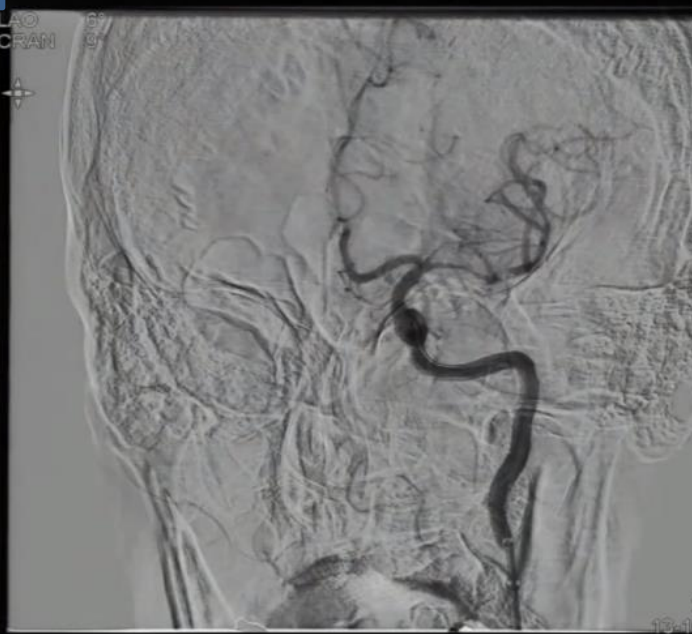
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LEFT

Leaving KGH on your own two feet

- Vision and strength returned almost to normal within 2 days
- Walked independently by day 3
- Transferred to Brockville General Hospital Acute Stroke Unit
- Went home from BGH within another 2 days

KGH Results: Outcomes

- **Over 50% of our patients have been able to return to independent living**
 - **Without EVT, we would have seen less than 20% return to the community**
- **EVT has been used over 60 times at KGH since we started the program**
 - **The need is far greater than anyone anticipated**

Part 3: Neurological Examination

- When assessing face weakness, ask the patient to smile or show all of their teeth, then ask them to squeeze their eyes shut as tightly as they can
- When assessing limb strength, test proximally at the shoulders and hip flexors, then test distally at the wrist extensors and ankle dorsiflexion

Neurological Examination

- To test attention, note if the patient focuses on the task. Or, ask the patient to count out loud clearly to 20.
 - If attention is impaired, e.g. like it often is in a right MCA stroke, then what appears to be “aphasia” might just be impaired attention
 - This is often why it appears that a patient has left side weakness and aphasia, when in fact their attention is impaired.

Neurological Examination

- Inattention and neglect assessed in 4 steps:
 1. Make sure they can see, feel and hear unilateral stimuli on both their left and right.
 2. Then hold both of your hands up and ask them to identify which of your hands is wiggling when you wiggle both hands simultaneously.
 3. Ask them to close their eyes and tell you which side of their forehead or which arm you are touching when you touch both sides simultaneously.
 4. Ask them to close their eyes and tell you which side they hear your fingers snapping when you snap your fingers on both sides simultaneously.

- For right hemisphere strokes, they may not notice the stimulus on their **left side**
- For left hemisphere strokes, inattention or neglect is **very uncommon**

Neurological Examination

- If the patient is aphasic then visual fields can be assessed by visual threat.
- Use just your thumb or finger rather than your whole hand so that you don't make them blink by pushing air in to their face

Neurological Examination

- Limb ataxia can be hard to assess if there is limb weakness.
- If limb weakness is severe, i.e. can barely lift the arm against gravity, you can't reliably assess for limb ataxia.
- If limb weakness is mild, i.e. they can resist you strongly when you are trying hard to move the limb, then the limb is ataxic if it starts to wobble right away at the beginning of the movement on finger-nose or heel-shin testing.

Neurological Examination

- Demonstration and practice!
- The NIHSS is useful because it's quick and covers many systems, but it also has limitations:
 - You can miss radiculopathies
 - You can underestimate weakness
 - You can have a low NIHSS score but the patient can be significantly disabled

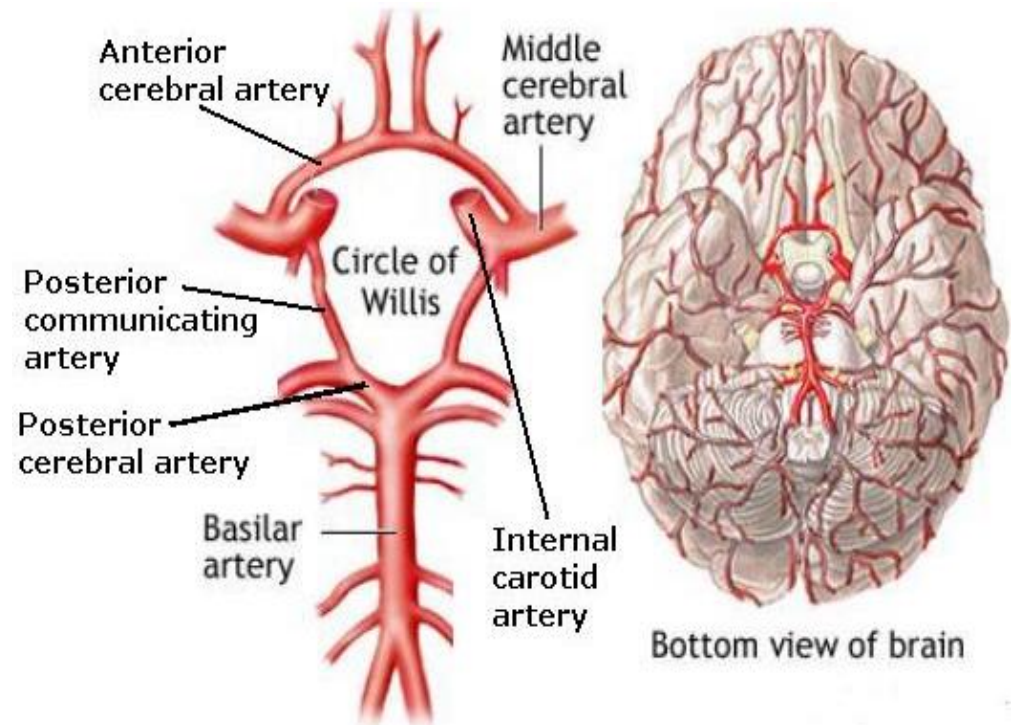
Part 4: Stroke Syndromes

Objectives

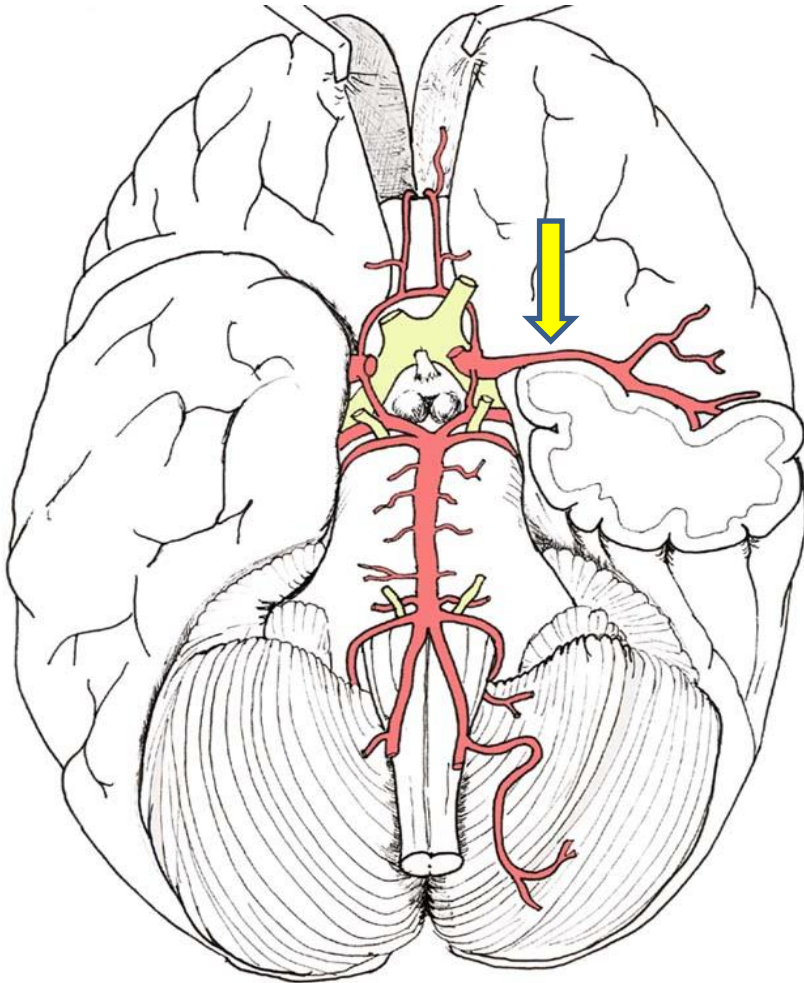
- Recognize clinical features of anterior circulation stroke involving:
 - Middle cerebral artery
 - Anterior cerebral artery
- Recognize features of posterior circulation stroke involving:
 - Posterior cerebral artery (occipital lobe, thalamus, medial temporal lobe)
 - Brainstem (midbrain, pons, medulla)
 - Cerebellum
- Recognize four common lacunar stroke syndromes
 - Pure motor stroke
 - Pure sensory stroke
 - Sensorimotor stroke
 - Ataxic hemiparesis
 - Clumsy hand-dysarthria

Anterior Circulation Stroke

- MCA and/or ACA
- Occlusion of the ICA can result in ischemia in both MCA and ACA territory simultaneously



Middle cerebral artery

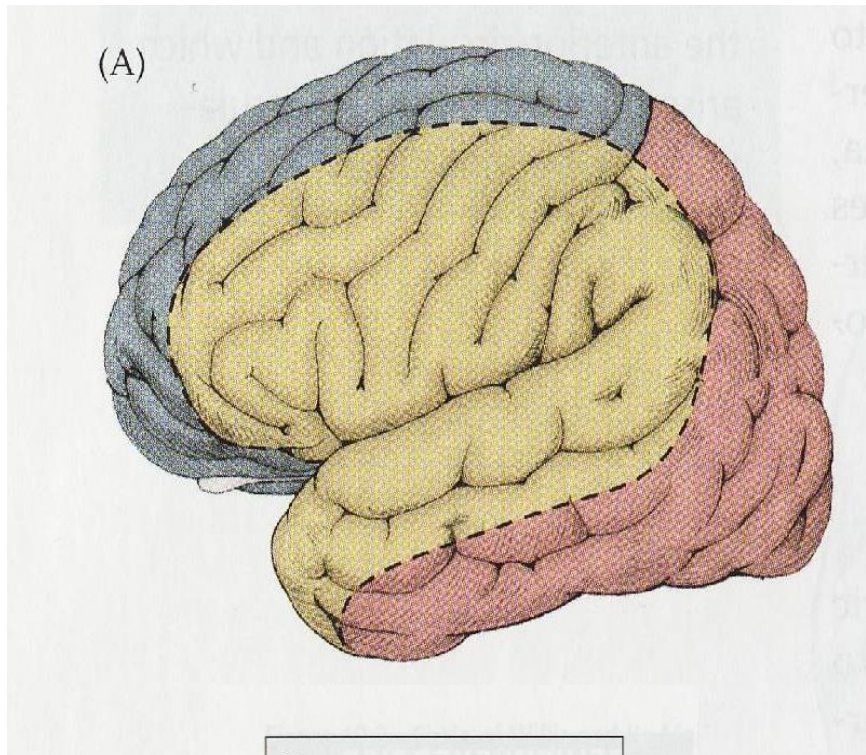


- About two-thirds of all ischemic stroke occurs in the middle cerebral artery territory
- MCA stroke can involve the frontal, temporal, and parietal lobes
- MCA stroke can also involve the basal ganglia through the *lenticulostriate arteries*

- The MCA covers a large territory shown in blue on this CT scan image taken at the basal ganglionic level

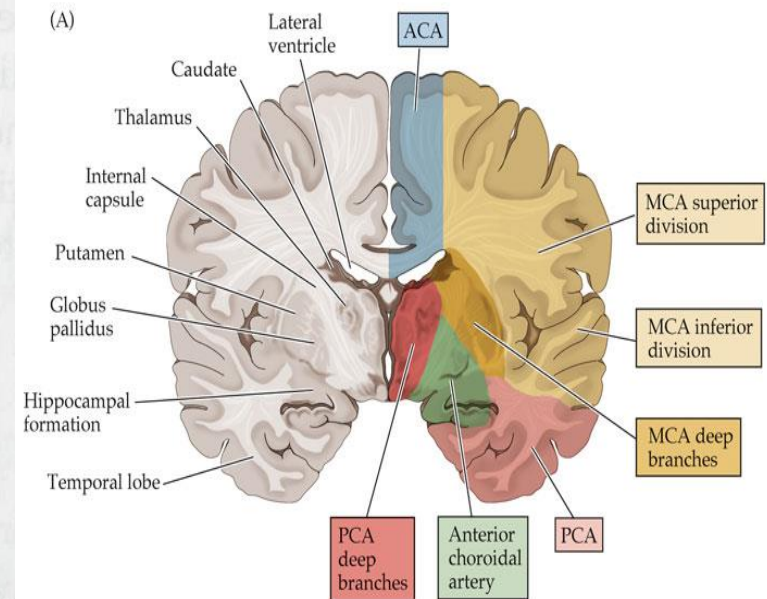


MCA covers a large portion of the hemisphere



Key

- Anterior cerebral artery
- Middle cerebral artery
- Posterior cerebral artery

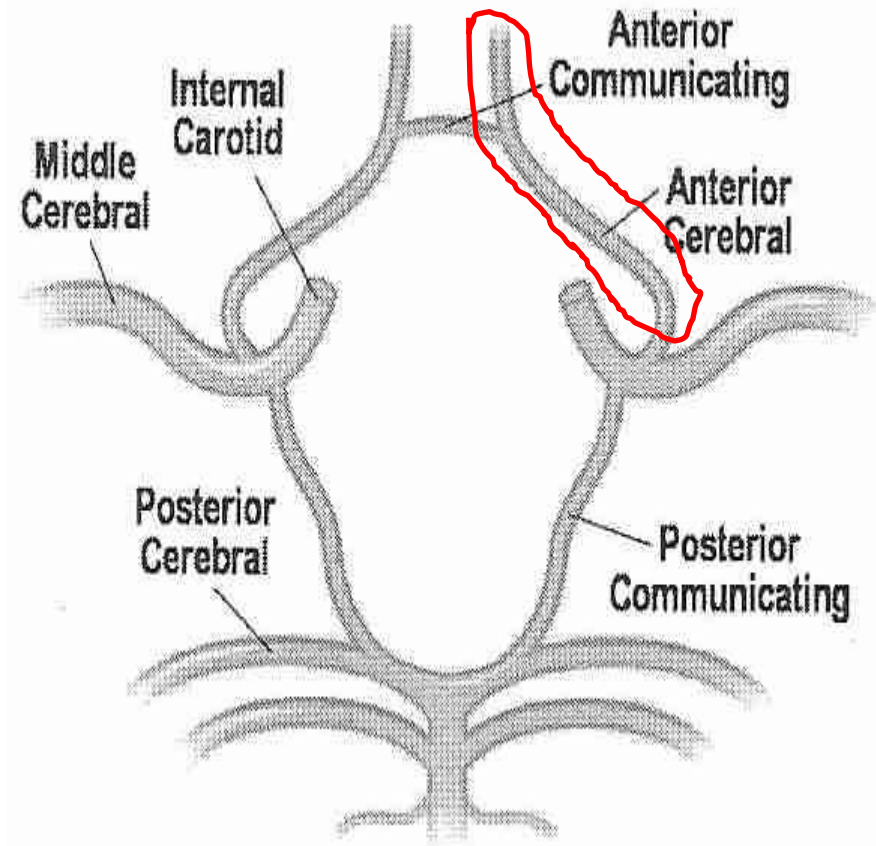


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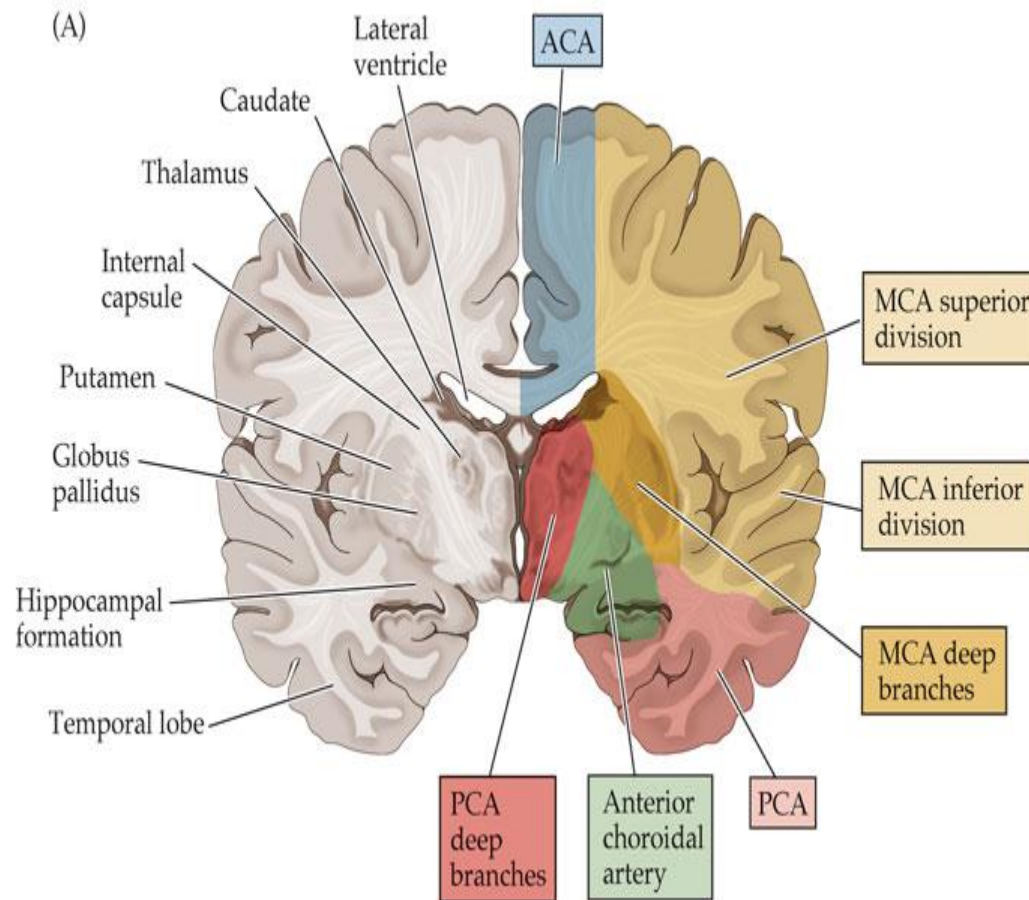
MCA stroke syndromes

- **Left hemisphere (ie, dominant)**
 - Right hemiparesis
 - Right-sided sensory loss
 - Right homonymous hemianopia
 - Dysarthria
 - **Aphasia**
- **Right hemisphere (ie, nondominant)**
 - Left hemiparesis
 - Left-sided sensory loss
 - Left homonymous hemianopia
 - Dysarthria
 - **Neglect of the left side of environment**

Anterior cerebral artery



ACA covers the medial portion of the brain

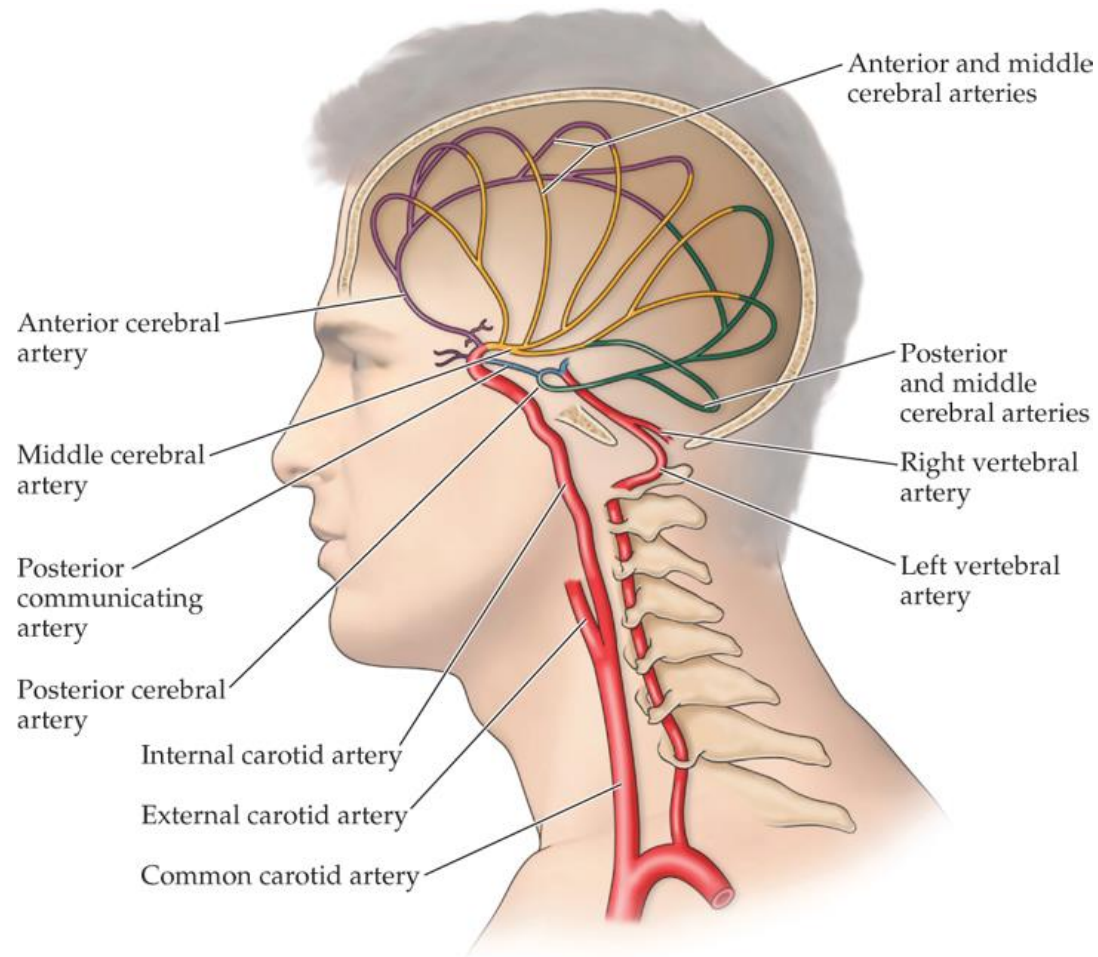


ACA stroke syndrome

- Contralateral leg paresis > arm paresis
- Or, bilateral leg weakness if both ACAs are involved
- Abulia, disinhibition, executive dysfunction
- In some cases, akinetic mutism if bilateral caudate head infarction

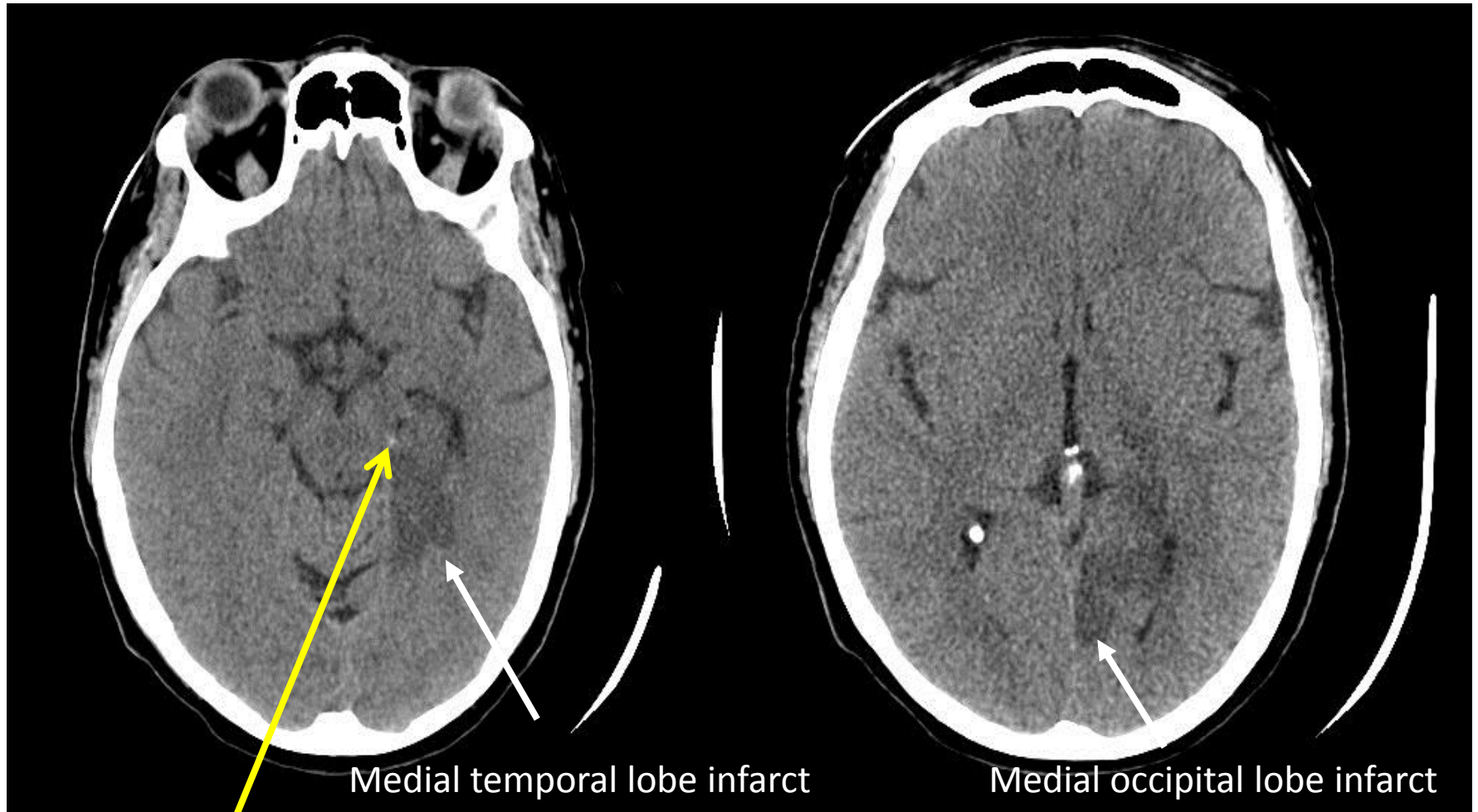


Posterior Circulation



Source: John H. Martin:
Neuroanatomy Text and Atlas, Fourth Edition,
<http://neurology.mhmedical.com>
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Left PCA infarction on CT



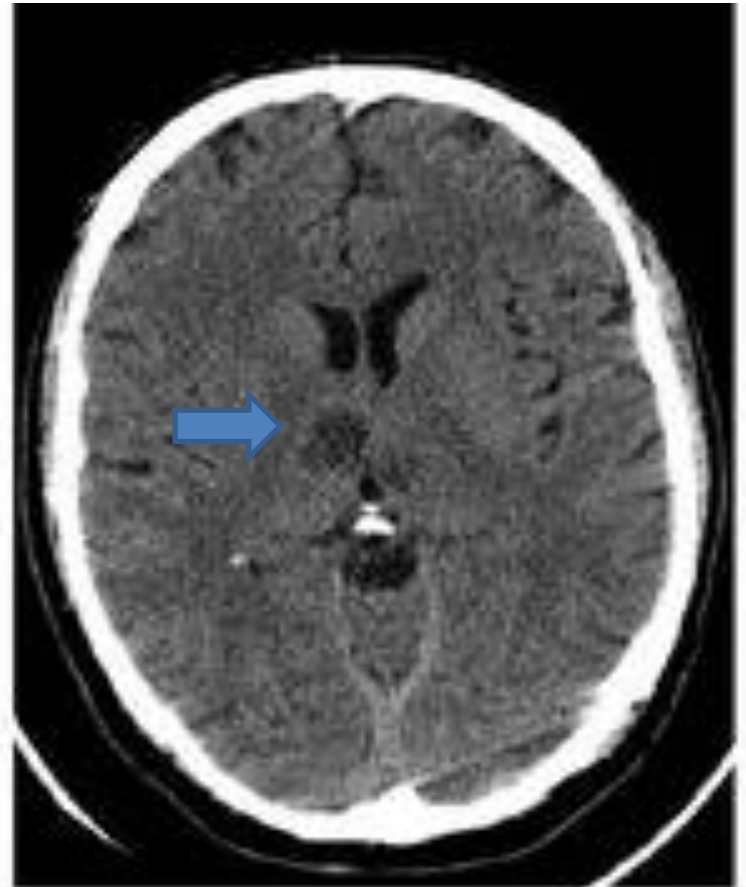
This is a thrombus in the left PCA

PCA stroke syndromes

- The most common syndromes involve the occipital lobe, the medial temporal lobe or the thalamus
- Occipital lobe:
 - Contralateral homonymous hemianopia
 - Cortical blindness (bilateral lesions)
- Medial temporal lobe:
 - Deficits in long-term and short-term memory
 - Behaviour alteration (agitation, anger, paranoia)

PCA stroke syndromes, cont'd

- Thalamic infarct
 - Contralateral sensory loss
 - Aphasia (if dominant side involvement)
 - Executive dysfunction
 - Decreased level of consciousness
 - Memory impairment



Brainstem stroke syndromes

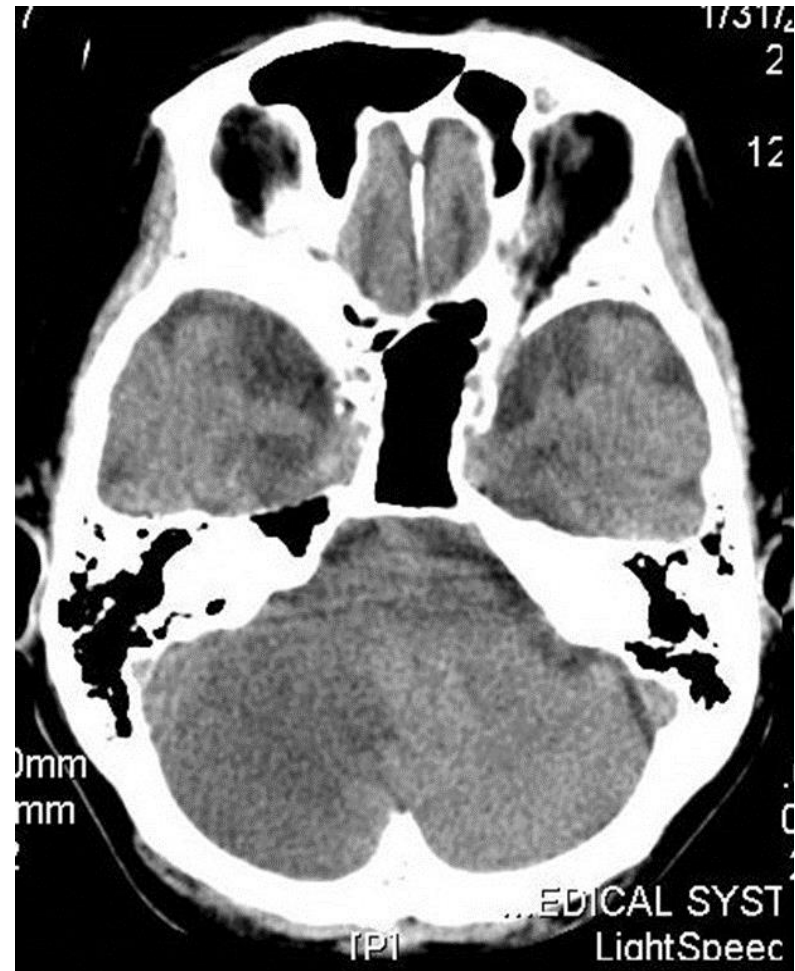
- Some of the clinical features seen are:
 - Crossed sensory findings (e.g. ipsilateral face and contralateral body numbness)
 - Crossed motor findings (ipsilateral face, contralateral body)
 - Gaze-evoked nystagmus

Other findings in brainstem stroke

- Ataxia and vertigo, limb dysmetria
- Diplopia and eye movement abnormalities
- Dysarthria, dysphagia
- Tongue deviation
- Deafness (very rare)
- Locked-in syndrome (can't move any limb, can't speak, can sometimes blink)

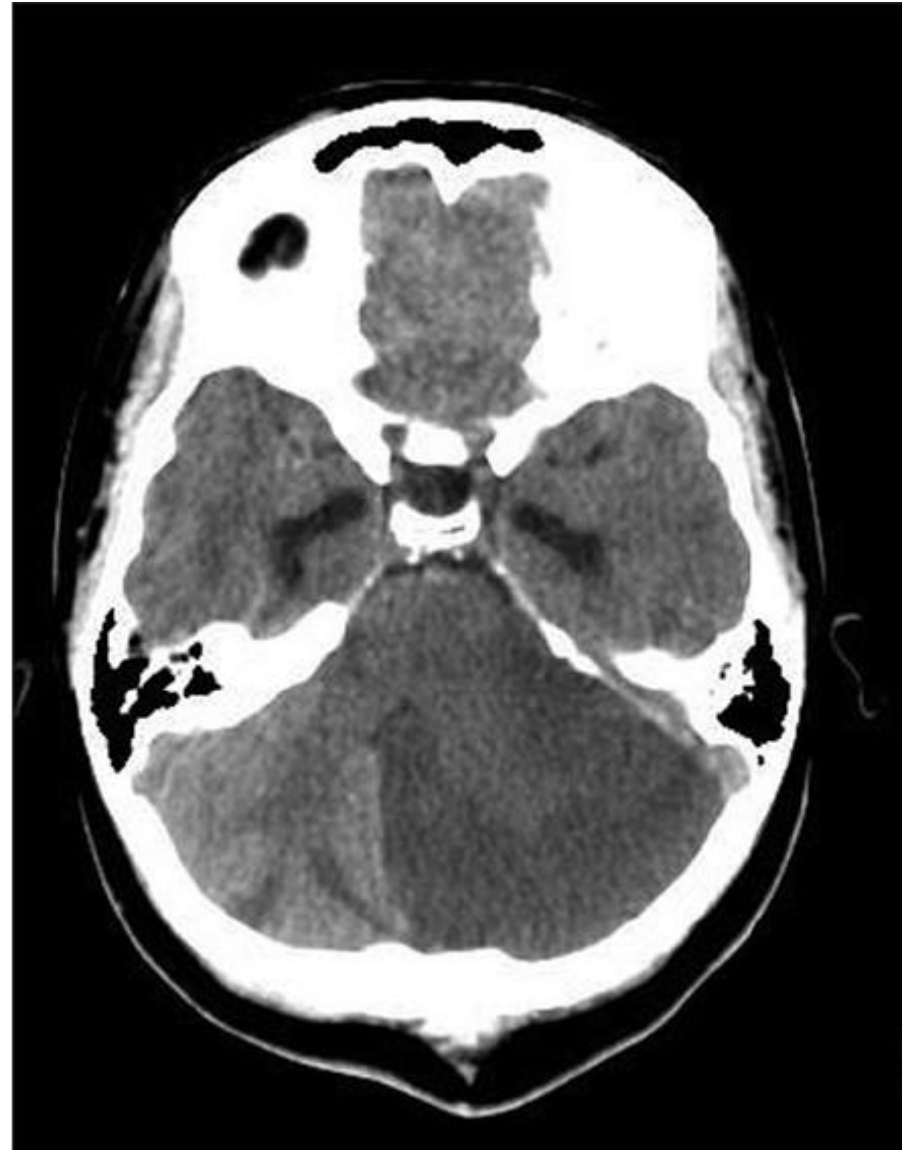
Cerebellar stroke

- Ataxia, vertigo, nausea, vomiting, dysarthria
- Often headache and nystagmus
- Can also have rapid deterioration in level of consciousness



Cerebellar infarction

- Infarction causes edema resulting in mass effect, herniation and compression of the fourth ventricle
- This can lead to rapid deterioration in level of consciousness
- Surgical decompression is often necessary in these circumstances



Lacunar stroke syndromes

- The key thing about lacunar stroke is what you *don't* find on the exam
- **There is usually no aphasia**
- **There is no visual field deficit**
- **There is no neglect**

Lacunar stroke syndromes

- **Pure motor stroke** usually arises from infarction in the posterior limb of the internal capsule; course is often stuttering over hours to days:
- **Pure sensory stroke** usually arises from thalamic infarction



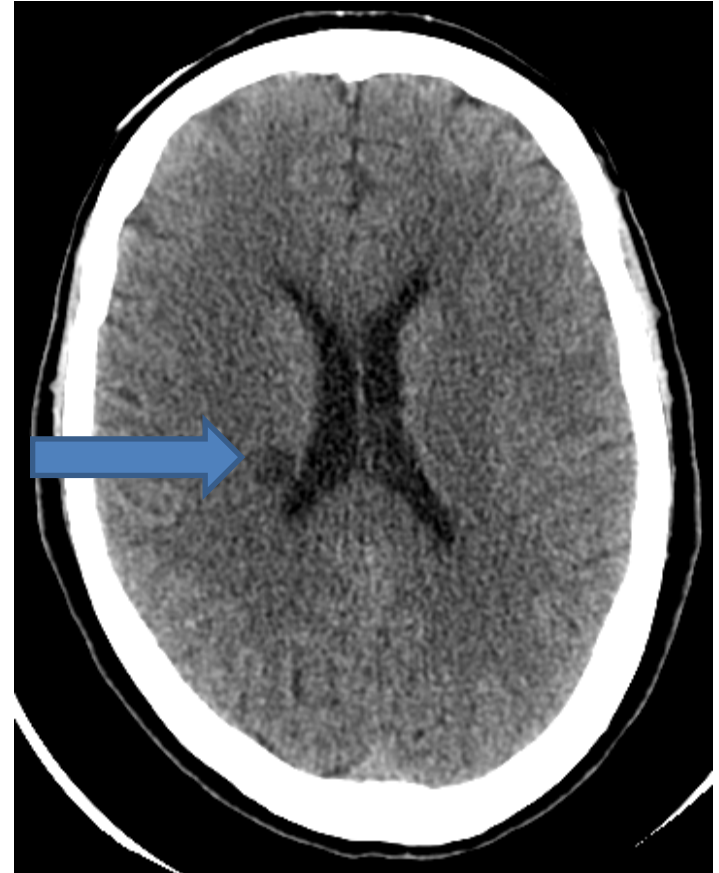
Lacunar stroke syndromes

- **Sensorimotor stroke** can arise from infarcts at the junction between the thalamus and the internal capsule
- As the name implies, the symptoms consist of weakness and sensory loss with no visual field deficit, aphasia, neglect or other symptoms



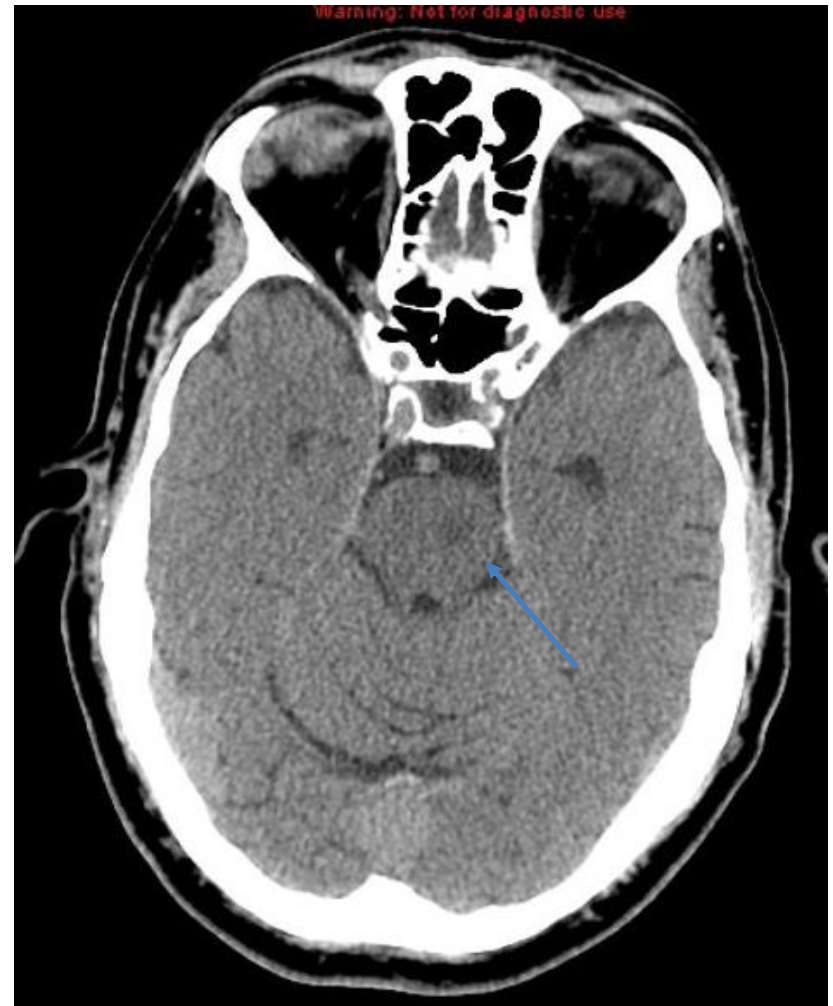
Lacunar stroke syndromes

- **Ataxic hemiparesis** often arises from infarction in the corona radiata
- Ataxia is unilateral and is in excess of the mild weakness found on exam



Lacunar stroke syndromes

- **Clumsy hand-dysarthria** is caused by infarction in the pons, but can also occur in corona radiata and the internal capsule
- Contralateral facial weakness with dysarthria and dysphagia occurs with contralateral hand weakness/ataxia, and sometimes weakness in the arm or leg

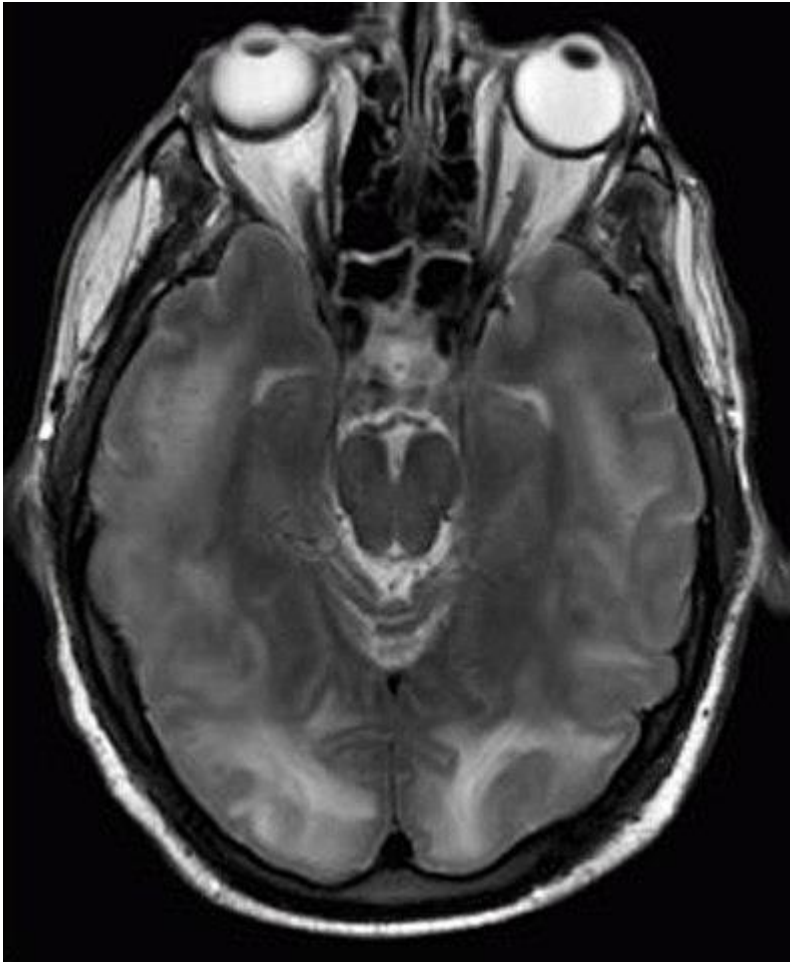


Stroke Mimics

- Migraine
 - The four most common aura symptoms in order of frequency:
 - Scintillating scotoma
 - Paresthesia or dysesthesia
 - Aphasia
 - Weakness
 - The key feature on history is slow evolution of symptoms

Stroke Mimics

- Posterior reversible encephalopathy syndrome



Headache, confusion, seizure,
visual impairment.
Can sometimes appear to have
aphasia, hemianopia.

By Rashmi Chawla, Daniel Smith and Paul E Marik - Near fatal posterior reversible encephalopathy syndrome complicating chronic liver failure and treated by induced hypothermia and dialysis: a case report. J Medical Case Reports 2009, 3:6623. doi: 10.1186/1752-1947-3-6623, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=6834041>

PRES

- Blood pressure is often high (sBP > 200) but patients can have only mild hypertension or normotension in special situations:
 - Immunocompromised
 - Recent administration of IVIG
 - Renal or liver disease
 - Eclampsia
 - SLE

Other Stroke Mimics

- Hyperglycemia or hypoglycemia
- Seizure and post-ictal aphasia or Todd's paresis
- Drug intoxication
- Brain tumor
- Metabolic abnormalities
 - Hyponatremia (weakness, seizure, confusion), hypercalcemia (confusion, aphasia), hypomagnesemia (weakness, numbness, nystagmus, ataxia)
- CNS infections
 - HSV encephalitis
 - CNS abscess
 - Meningitis
- Multiple sclerosis

Part 5: Miscellaneous Topics

- When to anticoagulate after TIA or minor non-disabling stroke?
 - If atrial fibrillation is a new diagnosis, the CT shows no blood or infarction, then anticoagulate with a DOAC or warfarin and ask Stroke Clinic to follow up, noting that anticoagulation has been started

- What about PFO?
 - For cryptogenic stroke 60 yo and younger, there is now evidence that PFO closure is superior to antiplatelet therapy for preventing stroke recurrence
 - When compared against anticoagulation, the data is less clear

- <https://www.bmj.com/content/362/bmj.k2515>
- **Practice Rapid Recommendations Patent foramen ovale closure, antiplatelet therapy or anticoagulation therapy alone for management of cryptogenic stroke? A clinical practice guideline**
- *BMJ* 2018; 362 (Published 25 July 2018)

- When to worry about mild non-disabling stroke?
 - If symptoms have been fluctuating between mild and greater severity
 - Patient can have good limb strength but still be unsteady walking
 - If no carotid imaging has been done

Thanks for listening!

- You can reach me at:
albert.jin@kingstonhsc.ca