Stroke School, Part 3: Syndromes

Objectives

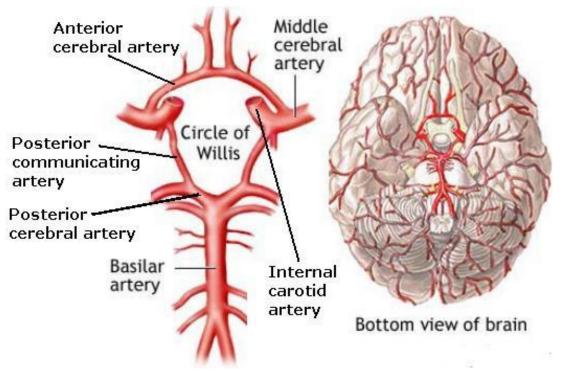
- Recognize clinical features of anterior circulation stroke involving:
 - Middle cerebral artery
 - Anterior cerebral artery
- Recognize features of posterior circulation stroke involving:
 - Posterior cerebral artery (occipital lobe, thalamus, medial temporal lobe)
 - Brainstem (midbrain, pons, medulla)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

Objectives

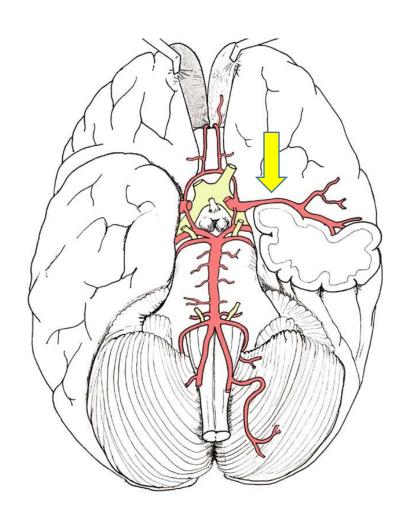
- Recognize four common lacunar stroke syndromes:
 - Pure motor stroke
 - Pure sensory stroke
 - Ataxic hemiparesis
 - Clumsy hand dysarthria

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

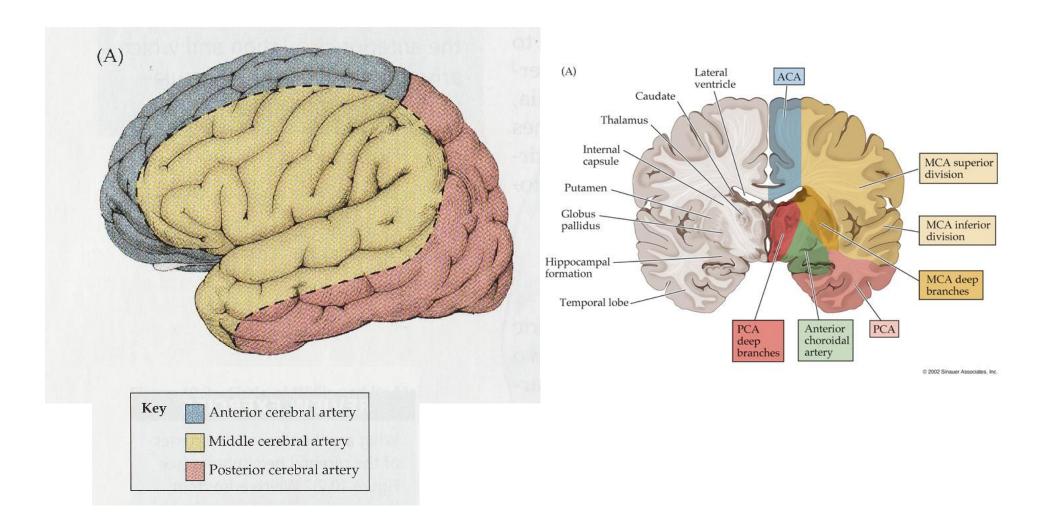


- About two-thirds of all ischemic stroke occurs in the middle cerebral artery territory
- MCA stroke can involve the frontal, temporal, and parietal lobes
- MCA stroke can also involve the basal ganglia through the lenticulostriate arteries

 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



MCA stroke syndromes

- Left hemisphere (ie, dominant)
- Presentation related to the left hemisphere of the brain includes the following:
- Right hemiparesis Variable involvement of face and upper and lower extremity
- Right-sided sensory loss in a pattern similar to that of the motor deficit - Usually involves all modalities, decreased stereognosis, and agraphesthesia, left-right confusion
- Right homonymous hemianopia
- Dysarthria
- Aphasia, fluent and nonfluent
- Alexia, Agraphia, Acalculia, Apraxia

- Right hemisphere (ie, nondominant)
- Presentation related to the right hemisphere of the brain includes the following:
- Left hemiparesis Same pattern as on right
- Left-sided sensory loss Similar pattern that of the motor deficit
- Left homonymous hemianopia Same pattern as on right
- Dysarthria
- Neglect of the left side of environment
- Anosognosia
- Asomatognosia
- Loss of prosody of speech
- Flat affect

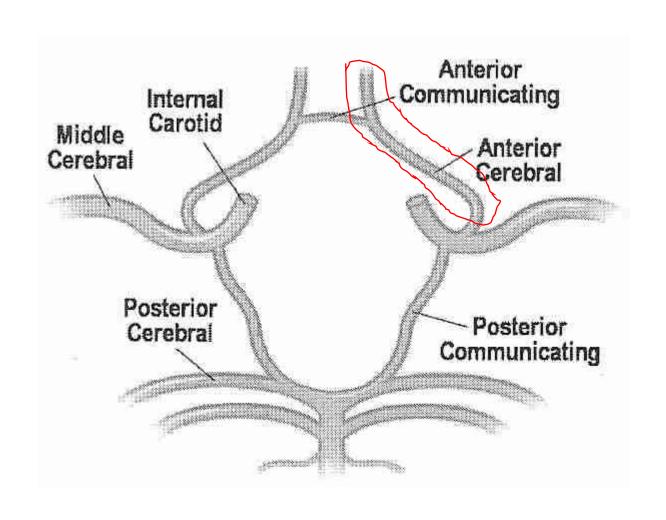
Case

- 55 yo R-handed accountant presents with confusion:
 - Speaks fluently
 - Claims she can't read well anymore
 - Having trouble doing arithmetic
 - Has been having trouble at work
 - Has had trouble driving but claims no visual defect
- What deficits does she have from history?

Case - continued

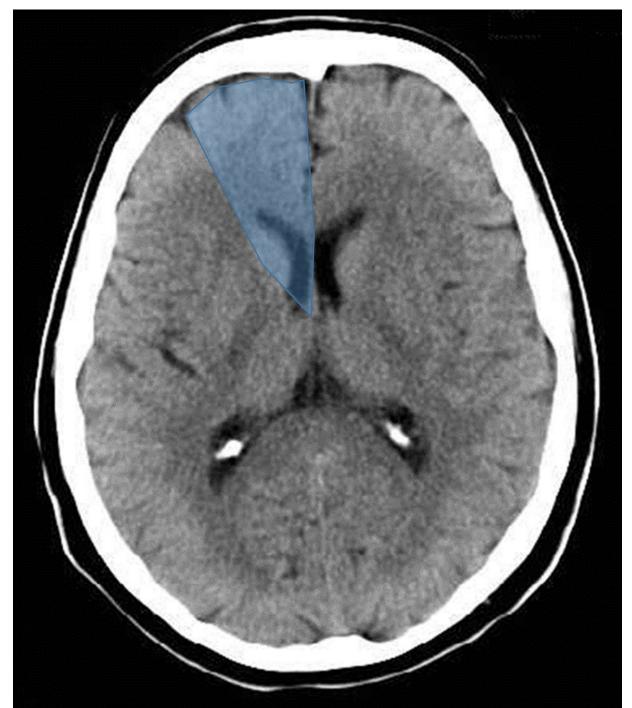
- Exam shows:
 - Mild decreased light touch right arm
 - Unable to distinguish left from right reliably
 - Unable to distinguish finger from thumb reliably
 - Can't write clearly, but speech is intact
 - No weakness
 - No visual field deficit
- Where is the lesion?

Anterior cerebral artery

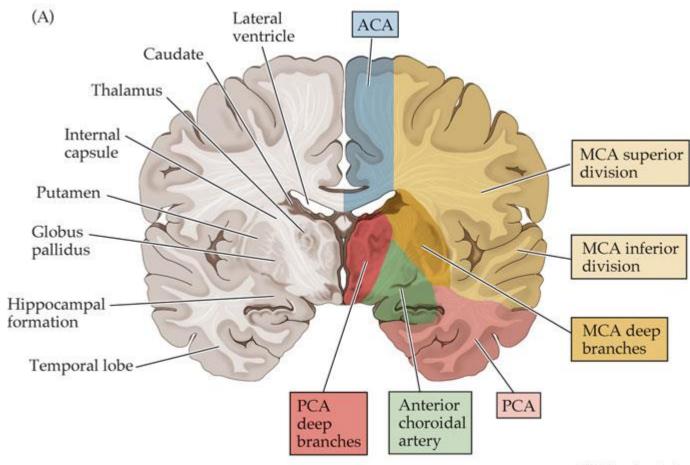


ACA territory





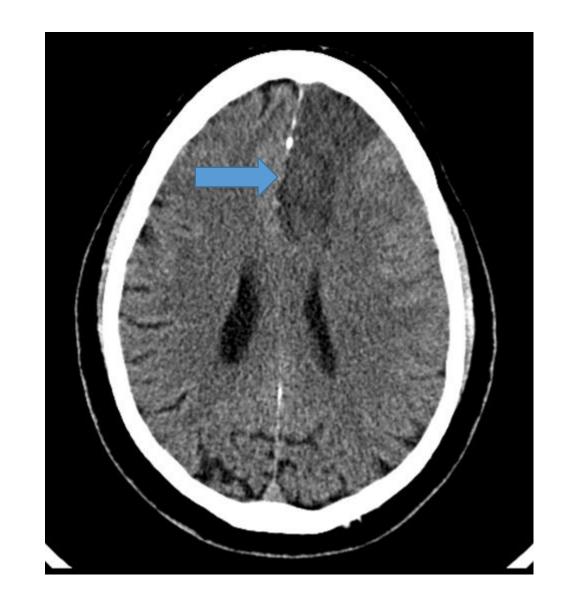
ACA covers the medial portion of the brain



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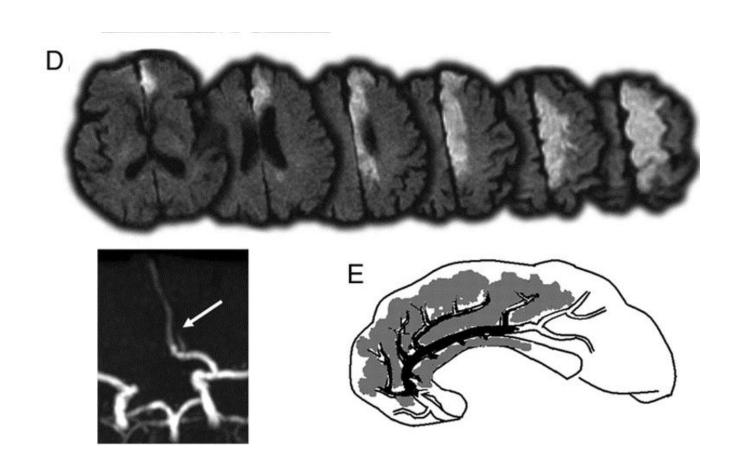
ACA stroke syndrome

- 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



Anterior cerebral artery infarction

• 60 yo M (RHD) with severe right leg weakness, mild right arm weakness and hypobulia



Case 2

- 45 yo R-handed M high school teacher
 - Family notes change in mood for two weeks
 - Seems to be depressed, doesn't seem to be as lively or enthused as before
 - Patient doesn't seem to be aware of any change and insists that he is normal
 - No weakness or sensory change
 - Recent minor collision in parking lot

Case 2 - continued

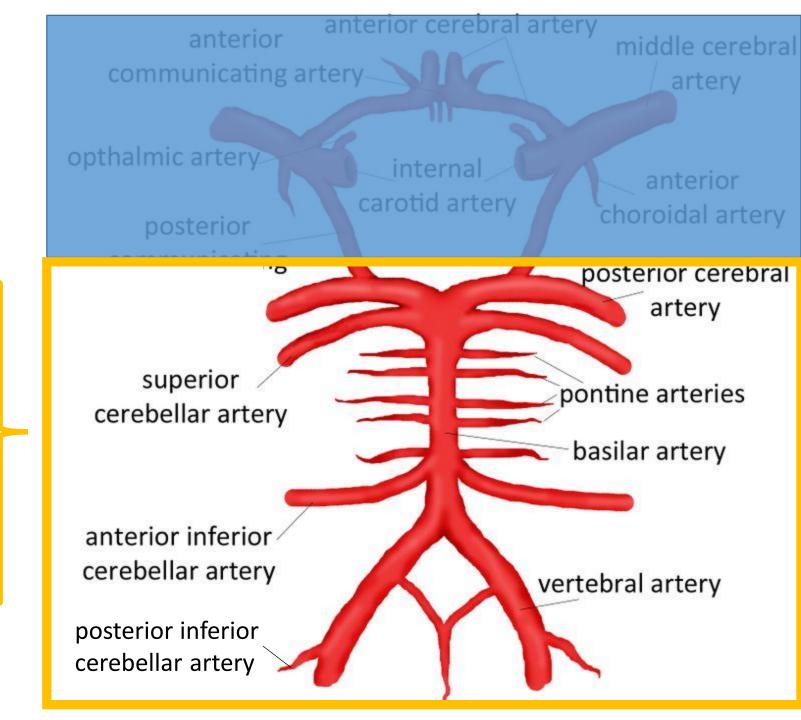
- Based on history alone, where might the lesion be?
- What findings will you be looking for on exam?

Case 2 - continued

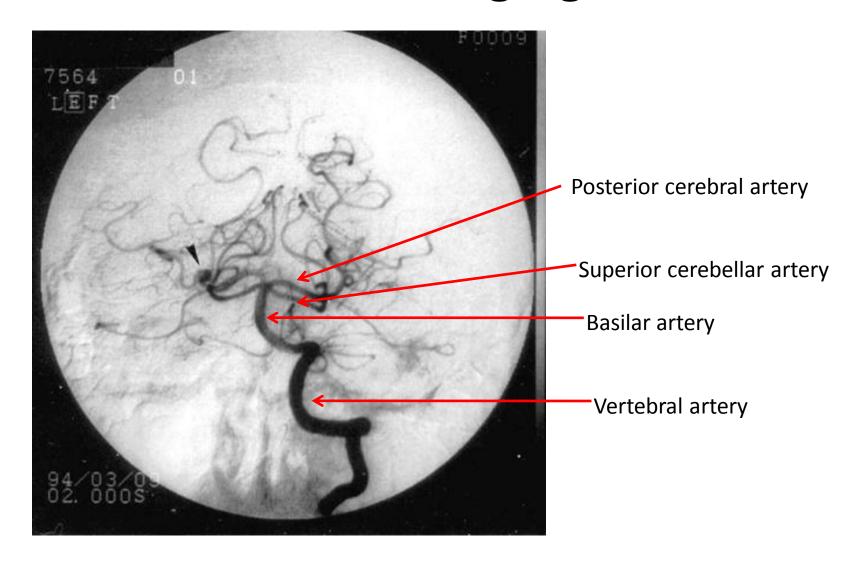
- Exam shows:
 - No visual field defect
 - No facial weakness
 - No limb weakness
 - No sensory loss to light touch
 - No limb dysmetria
 - Tandem gait is normal

Posterior Circulation

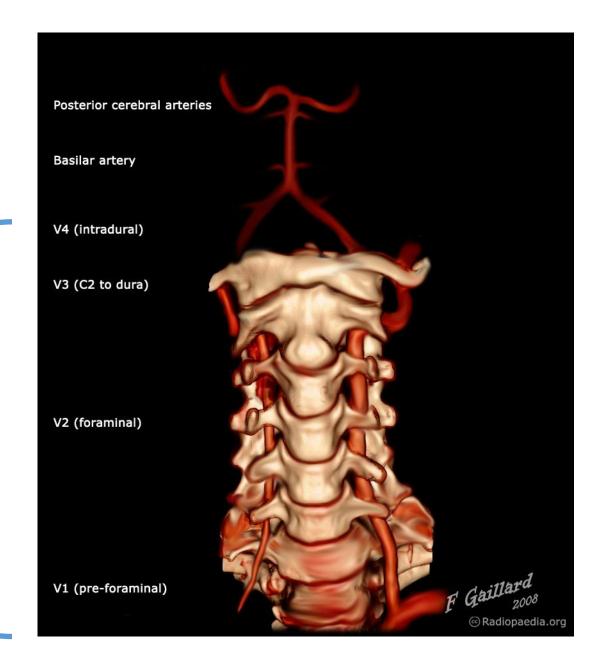
- This includes:
 - Vertebral arteries
 - Posterior and anterior inferior cerebellar artery
 - Basilar artery
 - Pontine arteries
 - Superior cerebellar artery
 - Posterior cerebral artery



Posterior circulation on angiogram

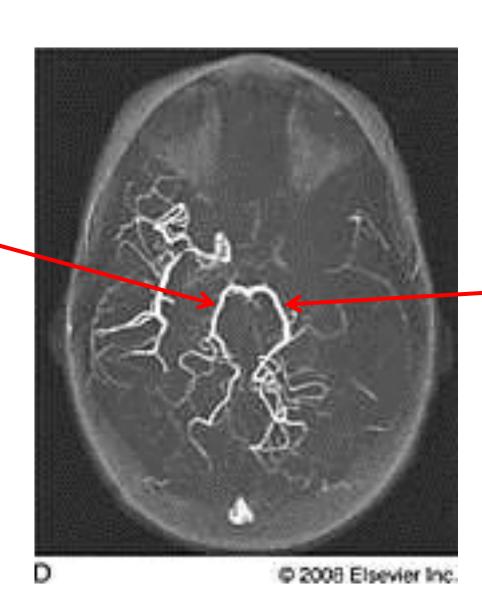


Vertebral arteries ascend within the narrow confines of the vertebral canal



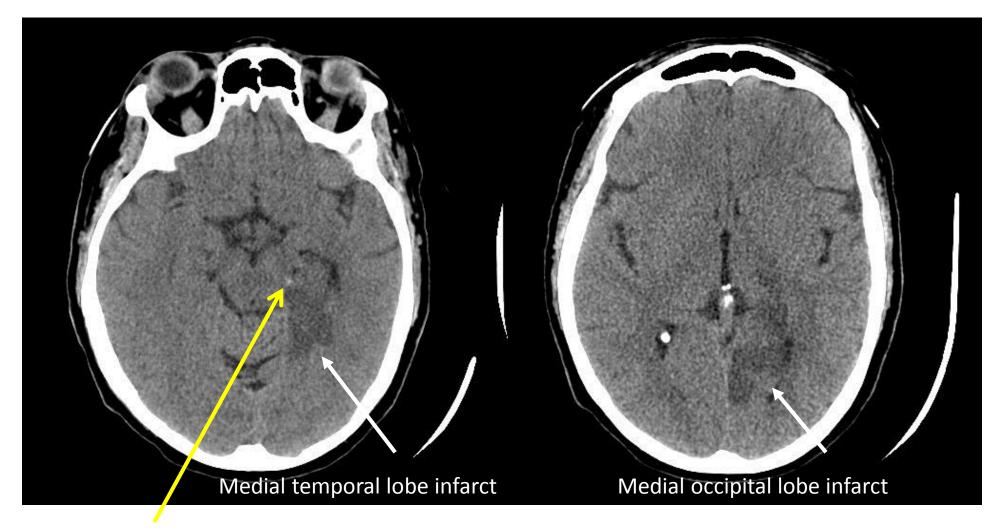
PCA territory

Right PCA



Left PCA

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



Case 3

- 35 yo R-handed F with 2 week hx of neck pain
- Visits chiropractor and has neck manipulation
- Within 24 hours of last visit, experiences acute onset nausea, vertigo, ataxia for thirty minutes, resolves
- At 48 hours family members note that she is forgetting things, seems really tired, can't find things in the fridge

Case 3 - continued

• What are some of the things you might look for on exam?

Case 3 - continued

- Exam shows:
 - Right homonymous hemianopia
 - 3 minute recall: 0/3 words
 - No face/limb weakness
 - No sensory loss
 - Gait intact
- Where is the lesion?

Brainstem stroke syndromes

- There are many 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
 - 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)

Midbrain stroke

• Ipsilateral 3rd nerve palsy

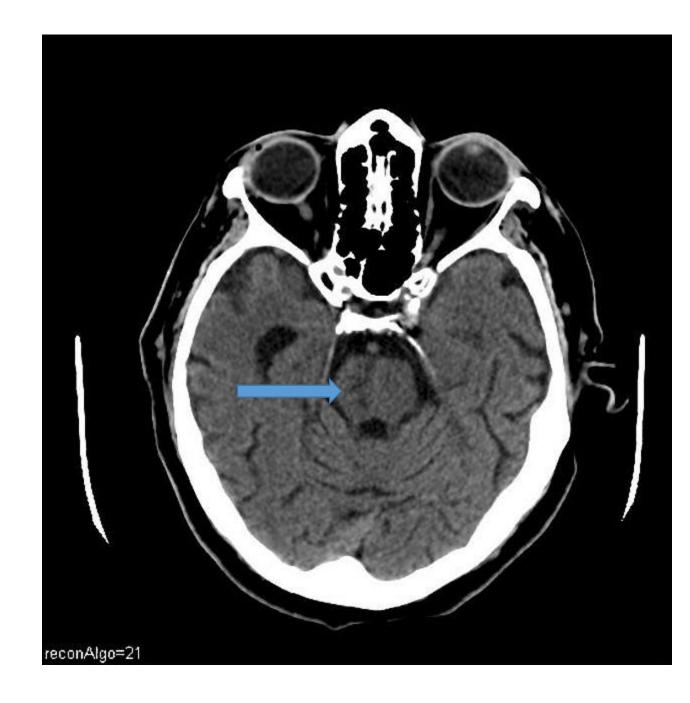
 Contralateral hemiparesis of the arm and leg, sometimes with hemiplegia of the face

Contralateral hemiataxia



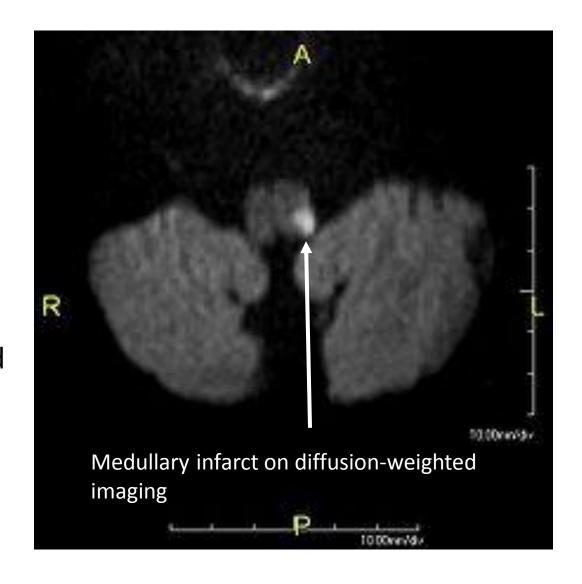
Pontine stroke

- Ipsilateral signs:
 - Horner's syndrome
 - 6th or 7th nerve palsy (diplopia, whole side of face is weak)
 - Hearing loss (rare)
 - Loss of pain and temperature sense
- Contralateral signs:
 - Weakness in leg and arm
 - Loss of sensation in arm and leg
- Nystagmus, nausea



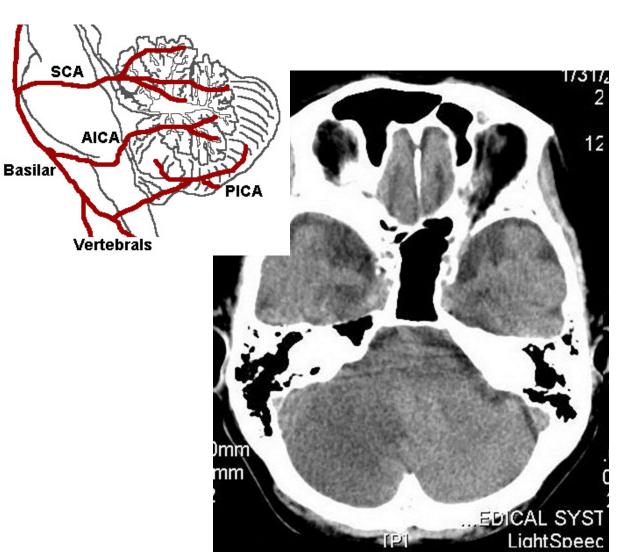
Medullary stroke

- Ipsilateral signs:
 - Tongue weakness
 - Sensory loss in face
 - Horner's syndrome
 - Ataxia
 - Palate weakness (dysphagia)
- Contralateral signs:
 - Weakness, sensory loss in arm and leg
- Nausea, nystagmus, dysphagia, dysarthria



Cerebellar stroke

- Ischemia involving:
 - Superior cerebellar artery (SCA)
 - Anterior or posterior inferior cerebellar artery (AICA or PICA)
- 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



 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





- 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



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



- 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



Summary

- Remember that the hallmark of all stroke syndromes is SUDDEN ONSET reaching maximal severity of symptoms usually very quickly (seconds to a few minutes)
- MCA stroke can cause contralateral hemiparesis, sensory loss, hemianopia, and either aphasia or neglect
- ACA stroke can cause contralateral leg weakness and executive dysfunction
- PCA stroke can cause hemianopia, pure sensory infarct (thalamus), memory impairment, decreased level of consciousness
- Brainstem strokes can cause crossed sensory or motor findings, nystagmus, diplopia, vertigo, Horner's syndrome
- Cerebellar strokes can cause ataxia, nystagmus, vertigo, nausea, headache and rapid deterioration in consciousness
- Lacunar strokes often have a characteristic pattern: pure motor, pure sensory, sensorimotor, ataxic hemiparesis, clumsy hand-dysarthria