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
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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 agraphesthesias, 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
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 hypobulbia
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 artery
- Basilar artery
- Superior cerebellar artery
- Posterior cerebral artery
- Vertebral artery
Vertebral arteries ascend within the narrow confines of the vertebral canal.
PCA territory
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

Medullary infarct on diffusion-weighted imaging
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
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
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.