Stroke Neuroanatomy
A Whirlwind Tour

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Outline

Focussed introduction to anatomy of...

Language
Motor Power
Sensation
Vision
Gaze
Coordination
Localization: How and Why

Loss of function predicts location of lesion

... suggests vessels and cause

... informs treatment

... impacts prognosis
Language

The Aphascias
Aphasia

Disruption in language function

NON-FLUENT (BROCA’S)

FLUENT (WERNICKE’S)

GLOBAL

TRANSCORTICAL

CONDUCTION
Approach to Aphasia

Break language down into 2 parts

Output (speech)

Input (comprehension)
Output (Broca’s)

Inferior Frontal
Frontal Operculum

Middle Cerebral Artery (MCA)

Halting
Effortful
Agrammatic
Input (Wernicke’s)

Posterior Temporal

Middle Cerebral Artery (MCA)

Well-woven
Effortless
Melodic
Output + Input (Global)

Broca’s + Wernicke’s

LARGE Middle Cerebral Artery (MCA)

All speech affected Mute
“Output” (Transcortical Motor)

Superior Frontal

Middle Cerebral Artery (MCA)

Like Broca
Less Severe
Can Repeat and Name
“Input” (Transcortical Sensory)

Posterior Temporal

Middle Cerebral Artery (MCA)

Like Wernicke
Less Severe
Can Repeat and Name
Disconnection (Conduction)

- Posterior Perisylvian
- Subcortical

**SMALL Middle Cerebral Artery (MCA)**

- Poor repetition
- Poor naming
- Good speech & understanding
Summary of Aphasias

Broca

Wernicke
Summary of Aphasias
Summary of Aphasias

Broca

Wernicke
Summary of Aphasias

Broca

Wernicke
Summary of Aphasias
## Summary of Aphasias

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Rule of Aphasias

Middle Cerebral Artery

**LEFT** sided usually

• In left handed individuals, 25% have language on the **RIGHT** or **BILATERAL**
Motor Power

Hemiparesis
Rule for Weakness

Weakness is always on the opposite side of the stroke

... except in brainstem strokes
Lobes of the cerebrum
Lobes of the cerebrum

- Somatomotor cortex
- Somatosensory cortex
- Frontal lobe
- Parietal lobe
- Occipital lobe
- Temporal lobe
- Medulla oblongata
- Cerebellum
- Spinal cord
Somatotopic Representation

“Hand knob”

High MCA branch

ACA Stroke
Cortical Versus Subcortical

Cortical: Destruction of neurons

Sub-Cortical: Destruction of neuronal connections
Cortical Versus Subcortical

Cortical: Multiple functions affected

Sub-Cortical: Targeted function loss

“Pure motor stroke”
Pure motor stroke…

… likely smaller

… could be lacunar

… if lacunar, then tPA is useless
Sensation

Motor Power Anatomy Revisited
Cardinal Rule for Sensory Loss

Loss of sensation is always on the opposite side of the stroke
Lobes of the cerebrum

- Frontal lobe
- Somatomotor cortex
- Somatosensory cortex
- Parietal lobe
- Occipital lobe
- Temporal lobe
- Medulla oblongata
- Cerebellum
- Spinal cord
MCA Stroke

Small Subcortical Stroke

Sensation Spared

Output: Motor cortex (Left hemisphere section controls the body’s right side)

Input: Sensory cortex (Left hemisphere section receives input from the body’s right side)
Vision

Posterior Cerebral Artery... usually
Vision

Damage to the **visual cortex** (occipital lobe)

OR

Damage to the **visual pathways** (subcortical)
Lobes of the cerebrum
Posterior Cerebral Artery Stroke

Choroidal Artery Stroke
Gaze

The Frontal Eye Fields
Rule of Gaze

The patient will look **TOWARDS**

the side of the stroke
Frontal Eye Field

Lobes of the cerebrum
Frontal Eye Field

The frontal eye field drives gaze to the opposite side

When damaged, the frontal eye field on the opposite, healthy side, drives the eyes towards the stroked side
Coordination

Posterior Circulation
Vertebral and Basilar Arteries
Coordination

Damage to the *cerebellum*

Clumsiness is on the *same side* as the stroke

Posterior circulation strokes can be exceedingly dangerous
Summary

• Neuroanatomy allows for localization, which allows us to
  
  Locate the stroke
  Predict the likely type of stroke
  Reconstruct the likely cause of stroke
  Determine acute treatment
  Project likely prognosis