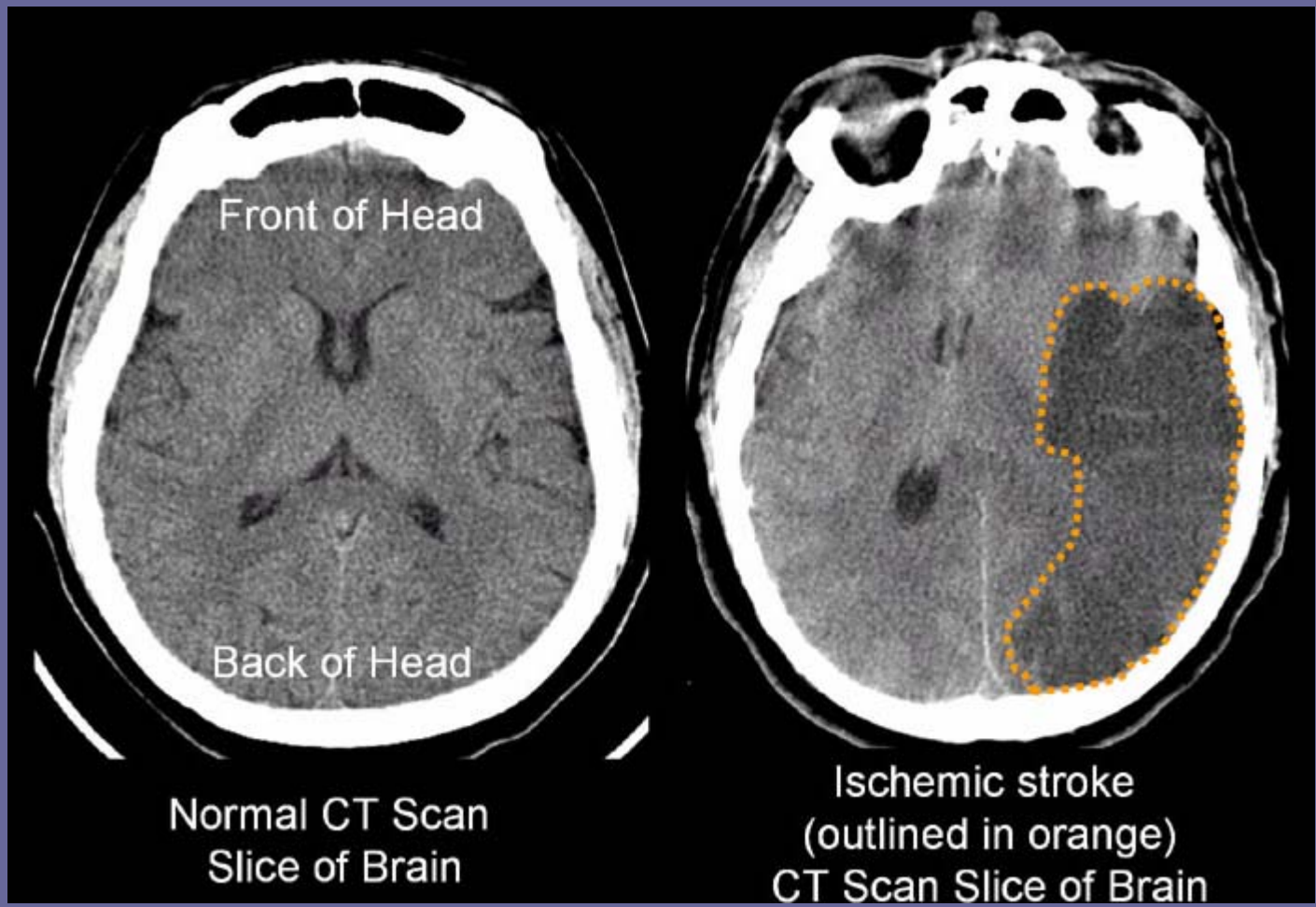
CVA

Alison Atwater PA-C

Types of CVAs

- Ischemic strokes
  - 80% of strokes
    - 2/3 are thrombotic
    - 1/3 are embolic
      - emboli from the heart or arteries feeding the brain such as carotids, vertebral and basilar etc
    - Lacunar
      - Infarct from small vessel disease, occurring deep in the gray matter of the brain
    - Vasculitic
      - Arteritis, SLE, others
    - Hematologic (Sickle cell, polycythemia, hyperviscosity syndromes)
    - Others (fibromuscular dysplasia, subclavian steal)
- Hemorrhagic strokes
  - 20% of all strokes
    - Usually secondary to HTN

CT Head


Front of Head
Back of Head
Normal CT Scan
Slice of Brain
Ischemic stroke
(outlined in orange)
CT Scan Slice of Brain

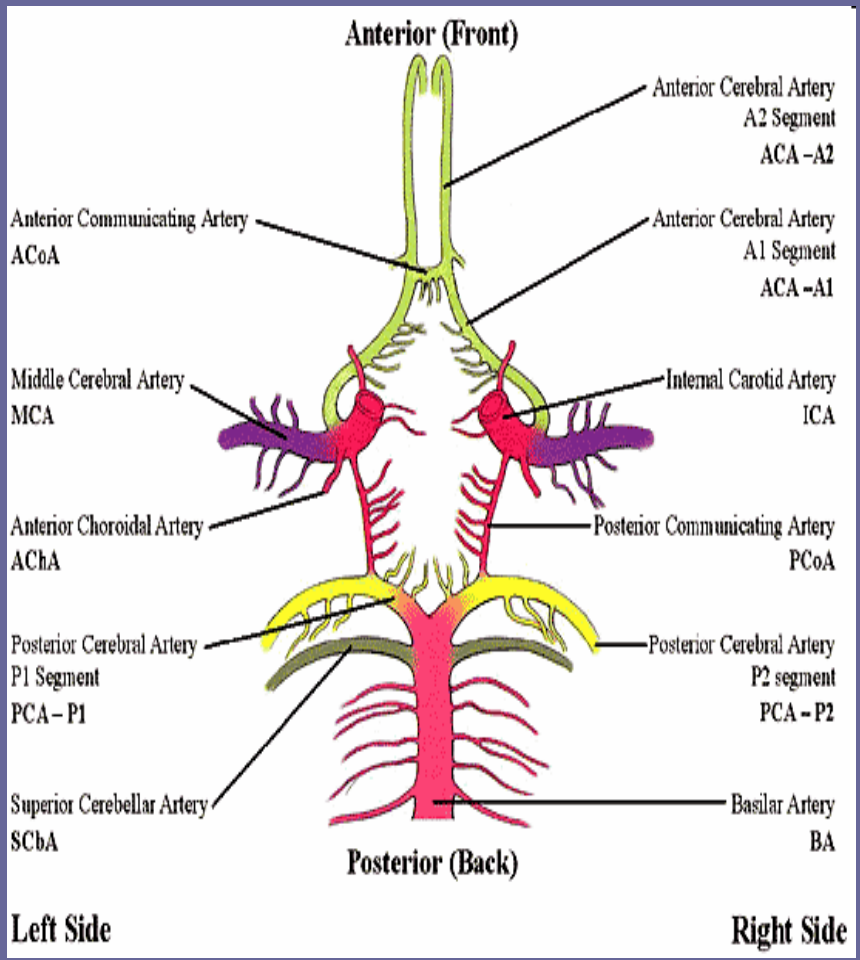
Anterior Circulation Involvement

- Anterior vessels include
  - R and L Carotids (R&L Ophthalmic arteries, Middle Cerebral arteries, R&L Anterior Cerebral Arteries)
- Supplies the
  - Cortex, subcortical white matter, basal ganglia, internal capsule
  - Associated with Hemispheric signs and symptoms
    - Aphasia, apraxia (inability to make purposeful movements), hemiparesis, hemisensory losses and visual field defects.

Posterior Circulation Involvement

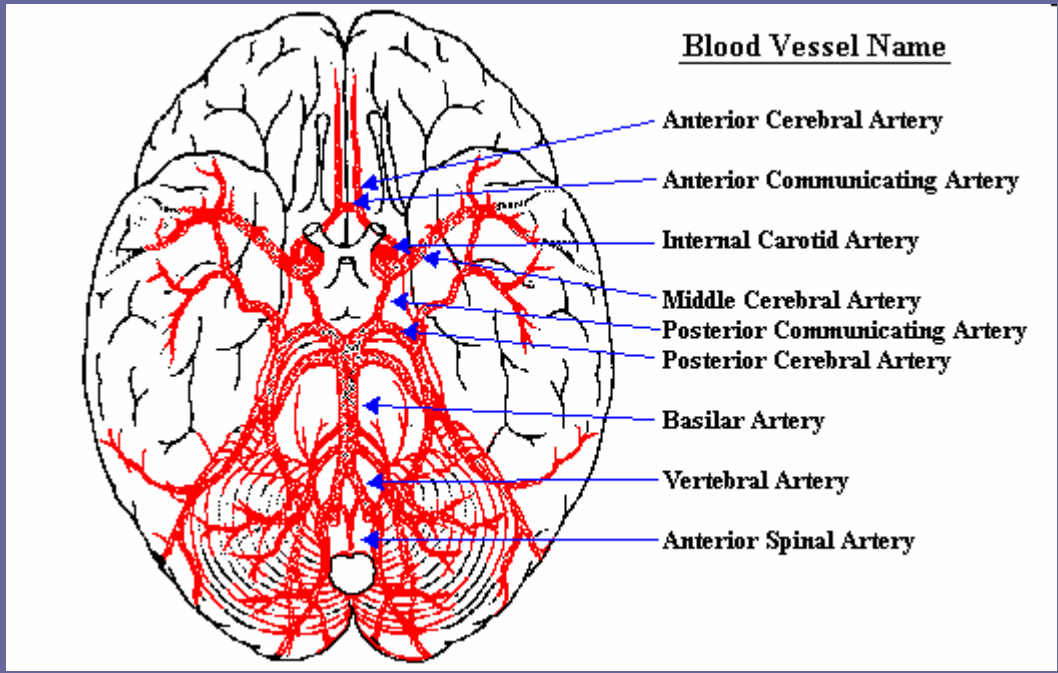
- Posterior vessels include
  - R & L Vertebral Arteries (basilar artery, R&L Posterior Cerebral Arteries)
- Supplies
  - The brain stem, cerebellum, thalamus, and portions of the temporal and occipital lobes
  - Associated with evidence of brain stem dysfunction
    - Coma, drop attacks, vertigo, nausea, vomiting and ataxia.

Anatomy of vessels

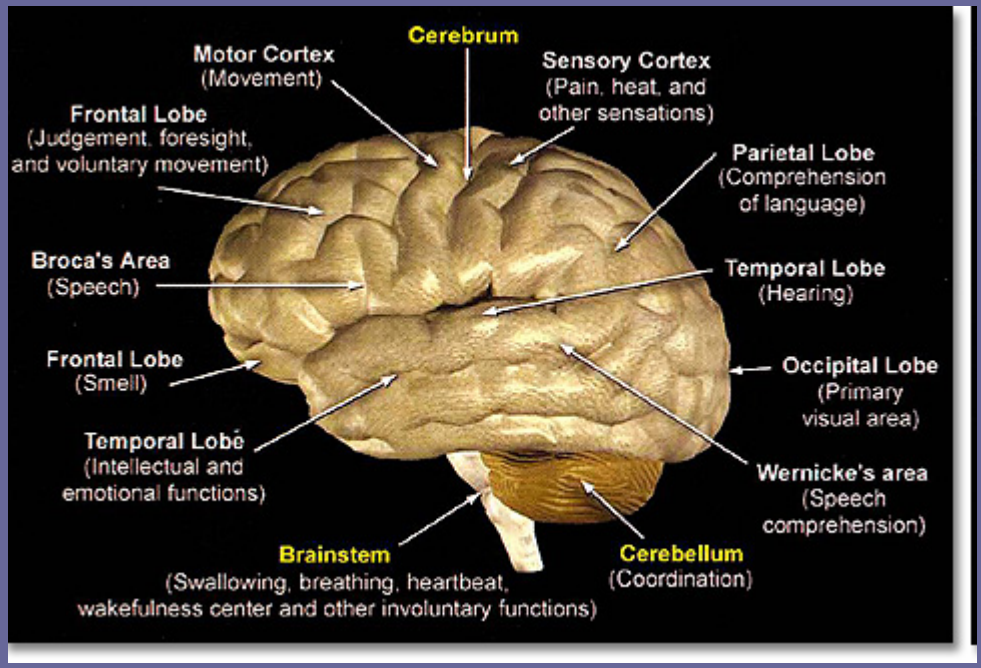


- Circle of Willis connects that anterior and posterior circulation

Blood Vessels of the brain



Anatomy of the Brain



Localizing Neurologic Pathology

- Prefrontal cortex
  - emotions, affect, drive, awareness of self
- Motor Cortex (precentral gyrus) frontal lobe
  - Broca's area of speech formation (expressive aphasia)
  - Motor cortex problems result in weakness on the opposite side of body
- Sensory Cortex (Postcentral gyrus) in parietal lobe
  - Where sensory data is processed (temp, pressure, pain, size shape, texture, 2pt discrimination, visual, taste and auditory)
  - Results in decreased pain sensation or parasethsias on the opposite side

Localizing Neurologic Pathology cont

- Occipital lobe
  - Primary vision center
  - Visual hallucinations occur with defects in the area
- Temporal lobe
  - Wernicke's area for comprehension of speech
    - Problems with receptive aphasia
- Internal capsule (white myelinated nerves in the center of the brain)
  - Motor and sensory areas from face, arms and legs

Localizing Neurologic Pathology cont

- The Extra-pyramidal system
  - Cerebellum
    - Coordination center
    - Lesions in the cerebellum produce symptoms on the **same side** b/c the motor fibers already crossed above this area of the medulla.
  - Basal ganglia
- Brainstem
  - Controls all Cranial Nerves

Neurologic Signs Associated with CVA by Location

- Internal Carotid Artery
  - Unilateral blindness
  - Severe Contralateral hemiplegia and hemianesthsia
  - **Profound Aphasia**
- Middle Cerebral Artery
  - Alterations in communication, cognition, mobility and sensation
  - Homonymous Hemianopia (partial blindness resulting in a loss of vision in the same visual field of both eyes)
  - Contralateral Hemiplegia (full paralysis) and hemiparesis (partial paralysis)

Neurologic Signs Associated with CVA by Location cont

- Anterior Cerebral Artery
  - **Emotional Lability, confusion, amnesia, personality changes, urinary incontinence**, Impaired mobility, with sensation greater in the LE than in the UE, **Contralateral hemiplegia and hemiparesis**

Neurologic Signs Associated with CVA by Location cont

- Lacunar Infarcts
  - These are from ischemic events located in the small penetrating branches of the middle cerebral, anterior cerebral, posterior cerebral arteries, basilar and anterior choroidal arteries
- There are 5 major lacunar syndromes:
- 1.Pure motor hemiparesis
- 2. Ataxic hemiparesis
- 3. Pure sensory syndrome
- 4.Mixed sensorimotor syndrome
- 5. Dysarthria-clumsy hand syndrome

Neurologic Signs Associated with CVA by Location cont

- Posterior Cerebral Artery
  - Hemianesthsia
  - Contralateral hemiplegia, **greater in the face and UE** than in LE
  - Homonymous hemianopia
  - **Receptive Aphasia**
  - **Cortical blindness** (due to occipital damage)
  - Memory deficits

Neurologic Signs Associated with CVA by Location cont

- Vertebral or Basilar Arteries (incomplete occlusion)
  - TIA
  - Unilateral and bilat weakness of the extremities
  - Diplopia, homonymous hemianopia
  - **Nausea, vertigo, tinnitus and syncope**
  - Dysphagia
  - Dysarthria
  - **Sometimes confusion and drowsiness**

Vertebral or Basilar Arteries cont

- Anterior portion of pons
  - "locked-in" syndrome- no movement except eyelids; sensation and consciousness preserved
- Complete occlusion or hemorrhage
  - Coma
  - Miotic pupil
  - Decerebrate rigidity
  - Respiratory and Circulatory abnormalites
  - death

Neurologic Signs Associated with CVA by Location cont

- Posterior Inferior Cerebellar Artery
- Signs found in all patients on affected side of face include ptosis (drooping upper eyelid from loss of sympathetic innervation,upside-down ptosis (slight elevation of the lower lid), and miosis (constricted pupil) and dilation lag. Enophthalmos (the impression that the eye is sunk in) and anhidrosis (decreased sweating) on the affected side of the face, loss of ciliospinal reflex and blood shot conjunctiva may occur depending on the site of lesion. Also flushing of the face is common on the affected side of the face due to dilation of blood vessels under the skin.
  - Wallenberg syndrome

(difficulty swallowing and hoarseness due to paralysis of the ipsilateral vocal cords)

  - Dysphagia, dysphonia
  - Ipsilateral anesthesia of face and cornea for pain and temperature (touch preserved)
  - Ipsilateral Horners syndrome
  - Contralateral loss of pain and temperature sensation in trunk and extremities
  - Ipslateral decompensation of movement

Neurologic Signs Associated with CVA by Location cont

- Anterior, Inferior, and Superior Cerebellar Arteries
  - Difficulty in articulation, swallowing, gross movements of limbs
  - Nystagmus
- Anterior Spinal Artery
  - Flaccid paralysis, below the level of the lesion
  - Loss of pain, touch, temperature sensation (proprioception preserved)
- Posterior Spinal artery
  - Sensory loss, particularly proprioception, vibration, touch, and pressure (movements preserved)

Work-Up for Stroke Patient

- CT
  - Best for acute hemorrhage, but misses acute infarcts
- MRI
  - Best for acute infarcts but misses acute hemorrhages
- Labs: CBC, BMG, Lipid panel, sed rate (for vasculitis cause), CXR, PT/PTT, ABG

Ways to Determine Source of Emboli

- EKG
  - Looking for AFIb
- Duplex (ultrasound) scan of Carotid Arteries
  - Look for thrombus and plaque
- Echocardiogram
  - Look for mural (wall) thrombus in heart, valve vegetation, atrial myxoma
- CT-angiography or MR-Angiography
- Cerebral Arteriogram
  - The gold standard for imaging the cerebral circulation

Treatment for Acute Infarct

- Thrombolytics (administered within 3 hours of stroke onset)
- Anticoagulant Therapy
  - If hemorrhagic stroke is r/o by CT, consider Heparin/Warfarin
- Manage increased ICP
  - Mannitol
  - Corticosteriods to reduce cerebral edema
- Surgical Treatment
  - Thrombectomy if carotid thrombus

Differentiating CVA from Bells Palsy

- Central facial weakness from a stroke should be differentiated from the peripheral weakness of Bell palsy. With peripheral lesions (Bell palsy), the patient is unable to lift the eyebrows or wrinkle the forehead.