

Stroke Syndromes



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Stroke Syndromes

- Anterior circulation
- Lacunar syndromes
- Posterior circulation

Clinical anatomy of the brain

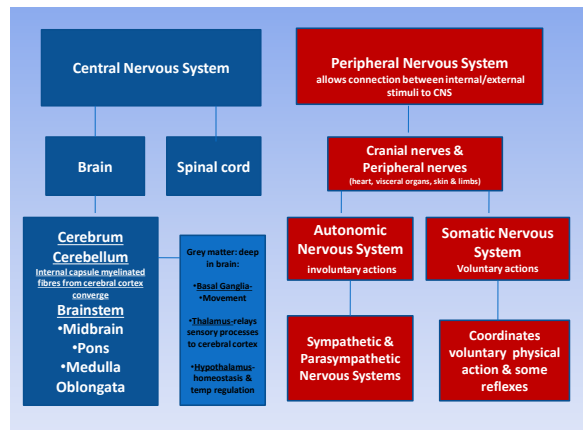
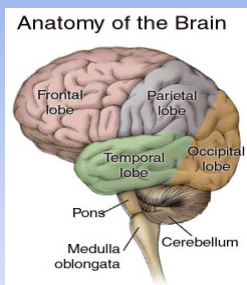
Cerebrum

- Frontal
- Temporal
- Parietal
- Occipital lobes

Cerebellum

Brainstem

- Midbrain
- Pons
- Medulla



Principal Motor Pathways

Corticospinal tract:

Voluntary movement and fine/delicate movement

Motor commands are delivered by: **Somatic nervous system** – directs contraction of skeletal muscles. **Autonomic nervous system** -directs the activity of glands ,smooth muscle and cardiac muscle

Basal ganglia system:

maintenance of muscle tone , controlling movement

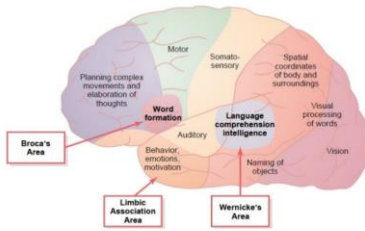
Cerebellar system:

coordinates motor activity

Three major sensory tracts

- **The posterior column tract** – fine touch proprioception ,vibration.
Primary sensory cortex on side opposite stimulus
- **The spinothalamic tract** (lateral and anterior) pain, temperature, crude touch and pressure sensations
Primary sensory cortex on side opposite stimulus
- **The spinocerebellar tract** (anterior and posterior) Cerebellar cortex primarily on side of stimulus

Specific Functional Areas



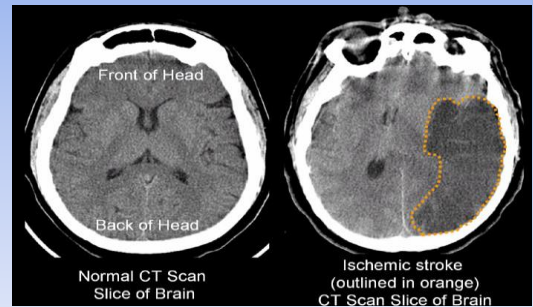
Frontal lobe - speech

Type	Area involved	Clinical picture
Broca's aphasia (expressive)	Frontal lobe *Majority of Right handed Speech produced in left frontal lobe	Non fluent speech. Cannot repeat or write. Can understand well
Wernicke's aphasia (receptive)	Temporal /parietal lobe	Fluent speech but nonsensical. Cannot repeat, write or understand
Global aphasia	Frontal/temporal/parietal lobes	Non fluent speech Cannot write, repeat/understand

Handedness and dominance

- Right handed - dominant left cerebral hemisphere (>90%) Dominant hemisphere control language & mathematical functions
- Left handed- 50/50 dominant right/left hemisphere

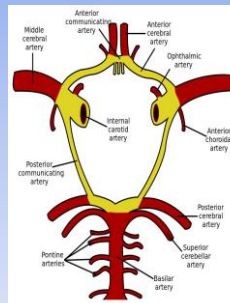
CT Brain – Ischaemic Changes



Haemorrhagic Stroke



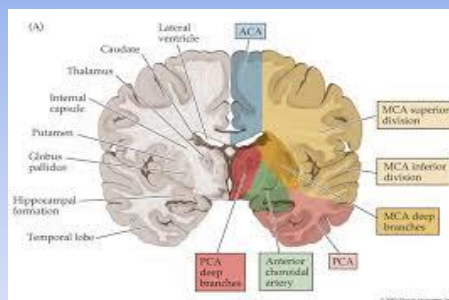
Brain vasculature



Cerebral artery stroke syndromes

Anterior circulation

Artery	Area affected	
ACA	Medial frontal, medial parietal	Contralateral weakness (hip and leg) Abulia Incontinence
MCA	Frontal, parietal, temporal	Aphasia, gaze deviation hemiplegia (face/arm), Sensory loss, neglect, visual field deficits
PCA	Medial temporal lobe, occipital lobe, much of the thalamus	Memory loss confusion homonymous hemianopia



MCA

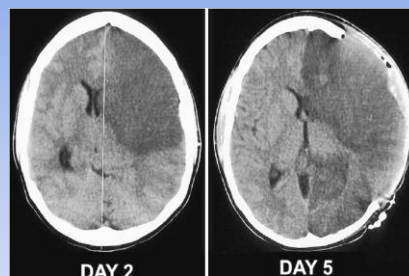
- Occlusion of the MCA +/- ICA can result in ischaemia in both MCA and ACA territories.
- Approx 2/3 Ischaemic stroke occur in mca territory
- MCA can involve the frontal, temporal and parietal lobes... can also include the basal ganglia

Dominant MCA Syndrome

- If dominant left -
- Right hemiparesis
- Right sensory loss
- Stereognosis, agraphesthesia, left right disorientation
- Right HH
- Dysarthria
- Global aphasia
- Alexia, agraphia, acalulia, apraxia

Apraxia

- normal strength and sensation but unable to produce a motor pattern correctly .. Including oral apraxia
- Can occur with damage to either frontal lobe
- Prefrontal cortex- MCA territory



Neurological Motor exam

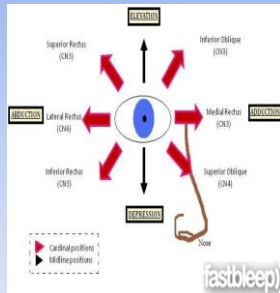
- Systematically examine all of the major muscle groups
- Note the appearance i.e. wasted, highly developed, normal
- Feel the tone of the muscle i.e. flaccid, clonic, normal
- Test the strength
- Note body positioning
- Note involuntary movements

Cranial Nerve II

- CNII- Optic carries visual impulses from the eye to the optical cortex via the optic tracts.
- Examine eye and surrounds
 - Acuity
 - Visual field Testing by confrontation.
 - Near response -Pupillary constriction, convergence & accommodation of the lens (CN II & III)
 - Fundoscopy

Cranial Nerves III,IV,VI

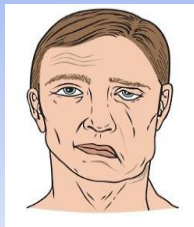
- CNIII, CN IV,CN VI- Extraocular movements in the 6 cardinal directions of gaze.
- Observe for loss of conjugate movements, nystagmus, & diplopia (monocular/binocular) (ptosis...drooping eye lid)



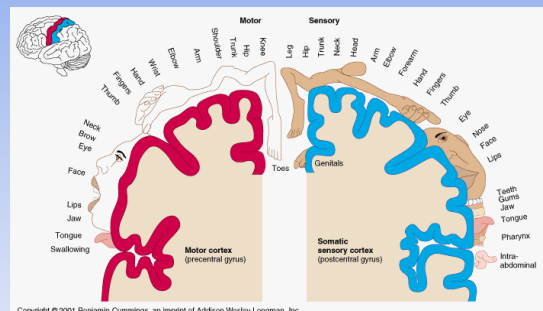
CN III – pulls the eye in toward the nose and up towards the forehead and constricts the pupil
large poorly reactive pupil that cannot pull in toward the nose or look up, double vision

Cranial nerve VII

- CN VII Facial nerve supplies motor branches to the muscles of facial expression.
- Upper and lower CNVIIth
- Frown
- Open eyes wide
- Smile
- Puff out cheeks



Motor & Sensory cortex



Sensory System

- Pain & Temp (spinothalamic tracts)
- Position & vibration (Posterior columns)
- Light touch (both of the above)
- Discriminative Sensations (depend on touch & position)
 - Point Localization
 - Two point discrimination
 - Recognition of size, weight, shapes and form of objects (stereognosis).
 - Graphaesthesia
 - Extinction phenomenon

Cranial Nerve V

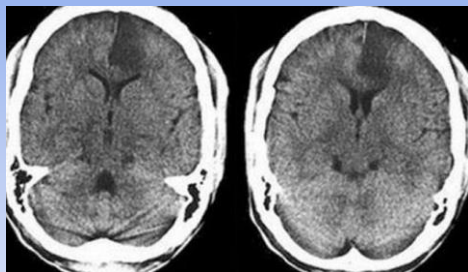
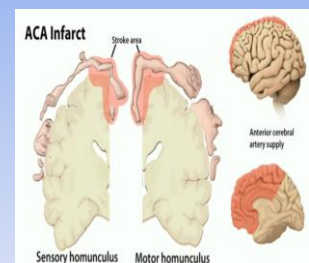
- **CN V-Trigeminal nerve** sensory supply to the face and motor supply to the muscles of mastication. 3 sensory branches of the trigeminal nerve: **ophthalmic, maxillary and mandibular.**
- Test sensory branches by lightly touching the face with a piece of cotton wool followed by a blunt pin in three places on each side of the face:
 - around the jawline,
 - on the cheek and,
 - on the forehead.
- Motor testing – temporal & Masseter muscles
 - Clench teeth
 - Move jaw from side to side
 - note feeling & bulk of muscles
- **Corneal reflex**- not usually carried out

Non Dominant MCA Syndrome

- If R Dominant:
 - Left hemiparesis & sensory loss
 - L HH
 - Dysarthria
 - Neglect
 - Spatial disorientation
 - Apraxia

ACA stroke syndrome

- Contralateral leg > arm paresis
- Or bilateral leg weakness if both ACAs are involved
- Abulia, disinhibition, executive dysfunction

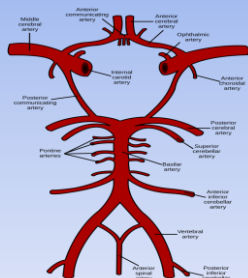


PCA stroke syndromes

- Mainly involves the occipital, medial temporal lobe of thalamus
- Occipital lobe: Contralateral HH, Cortical blindness (bilateral lesions)
- Medial temporal lobe: deficits in long and short term memory, behaviour alteration (anger, agitation, paranoia)

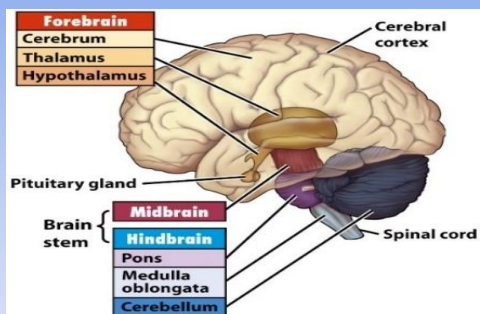
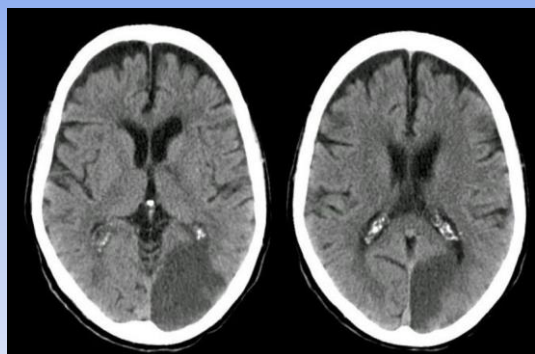
Posterior circulation syndromes

Posterior cerebral artery	Occipital lobe, thalamus, medial temporal lobe
Brainstem	Midbrain, Pons, Medulla
Cerebellum	



Cerebellar stroke

- Vascular territory: Superior cerebellar artery, Anterior posterior inferior cerebellar artery
- Ataxia, vertigo, nausea, vomiting & dysarthria
- Dysidiadokinesia & Dysmetria
- Intention tremor.
- Gait disturbance and balance issues
- Often headache & nystagmus
- Can also have rapid deterioration in level of consciousness



Brainstem stroke syndromes

- Many
- Some clinical findings ... crossed sensory findings i.e. 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 and dysphagia, tongue deviation, deafness (rare) locked in syndrome

Lateral medullary syndrome

sensory deficits affecting the trunk & extremities on the opposite side of the infarction and

sensory deficits affecting the face and cranial nerves on the same side with the infarct.

loss of pain and temperature sensation on the contralateral side of the body and ipsilateral (same) side of the face.

Clinical symptoms include or dysphagia, dysarthria, ataxia, facial pain, vertigo nystagmus Horner's syndrome & hiccups

Horner's syndrome

- Partial **ptosis** (upper eyelid drooping).
- **Miosis** (pupillary constriction) leading to anisocoria (difference in size of the pupils).
- Hemifacial **anhidrosis** (absence of sweating).



Common Lacunar Syndromes

- **Pure Motor stroke** - most common type 30-35% contralateral weakness /power loss typically affects the face, arm, or leg of the side of the body opposite the location of the infarct. Dysarthria, dysphagia and transient sensory symptoms can also be present
- **Pure Sensory stroke** loss of sensation on one side of the body- can later develop tingling, pain, burning
- **Sensimotor stroke** hemiparesis or hemiplegia with sensory impairment on the same side
- **Ataxic hemiparesis** combination of cerebellar & motor symptoms, including weakness and clumsiness, on the ipsilateral side of the body.¹¹ It usually affects the leg more than it does the arm; symptoms are often over hours or days.
- **Clumsy hand, dysarthria**

Lacunar Syndromes

- Symptoms may occur suddenly, progressively, or fluctuating.
- Unusually results from small vessel disease
- Deep white matter. Basal ganglia/pons
- Not benign
- but true cortical signs (aphasia, visuospatial neglect, gaze deviation, and visual field defects) are always absent in lacunar strokes
- Cause likely hypertension/diabetes but not always



Area	function	Clinical findings
Frontal lobe	Higher cortical function	Contralateral weakness ↑ Tone, reflexes, plantars ↑
Parietal lobe	Prim somatosensory cortex. Spatial awareness	Sensory loss, neglect, visual field loss, wernickes aphasia
Temporal lobe	Medial- memory, emotions Lateral- hearing, vision	Memory impairment Hearing and visual loss
Occipital lobe	Primary visual cortex, visual spatial awareness, colour, perception	H Homianopia, Visual hallucinations, alexia without agraphia
Cerebellum	Coordination of smooth muscle movements	Ataxia, vertigo, nausea, vomiting * risk of obstructive hydrocephalus in acute setting

brainstem	Relays info from peripheries to higher centres Receives direct input from cranial nerves
midbrain	Nucleus of CNIII & CNIV .Top of reticular activating system (mediates wakefulness) Motor sensory and coordination tracts Largely poorly reactive pupil that cannot pull in toward the nose or look up, double vision
Pons	Contra lateral weakness and sensation issues CN VI lesion (diplopia , cannot adduct eye) CN VII facial weakness
Medulla Lateral medullary syndrome (stroke)	characterized by sensory deficits affecting the trunk & extremities on the opposite side of the infarction and sensory deficits affecting the face and cranial nerves on the same side with the infarct. loss of pain and temperature sensation on the <i>contralateral</i> side of the body and <i>ipsilateral</i> (same) side of the face. Clinical symptoms include or dysphagia, dysarthria, ataxia, facial pain, vertigo nystagmus Horner's syndrome & hiccups

Thank You

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