Neurological Changes in the Geriatric Patient

OhioHealth Grant Medical Center
LifeLink Winter Update 2014

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Objectives

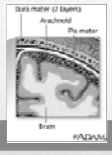
Neuro-Geriatric Review

- Review Neuro Anatomy
- Anatomic Changes in the Aging Patient
- Neuro Assessment Review
- Neurological Disorders
  - Stroke
  - Back Pain
  - Neuro Trauma
  - Cognitive Disorders
  - Other Neurological Disorders
- Neurologic Considerations in the Elderly

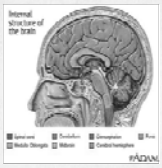
Neuro Anatomy

Brain Anatomy

- SCALP- **S**kin, Sub**C**utaneous Tissue, **A**dipose Tissue, Ligament (Galea), Periosteum
- Menningies- Dura Mater, Arachnoid, Pia Mater
- Neurons- Cell body, Axon, Dendrite
  Myelin sheath



Neuro Anatomy

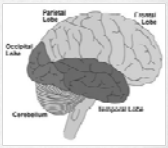


- Hemispheres
- Corpous callusom
- Cerebellum
- Diencephalon
- Midbrain
- Pons
- Medulla Oblongata
- Spinal Cord

Neuro Anatomy

- Frontal Lobe
  - Problem Solving, Emotion, Judgment, Creative Thought
  - Broca's Area (left frontal) Expressive language
- Parietal Lobes
  - Tactile Sensation, Proprioception
  - Academic Skills
  - Sensory Comprehension
- Occipital Lobe
  - Visual perception, Visual input, Reading
  - The perception and recognition of printed words.

- Temporal Lobes
  - Some hearing and vision
  - Auditory and Visual Memories
  - Wernicke's Area (left temporal) Receptive language
- Cerebellum
  - Balance, Equilibrium, Coordination of voluntary movement

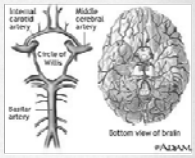


Cerebral Spinal Fluid

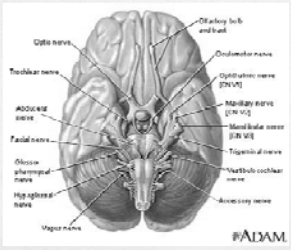
- The Ventricals- Lateral Ventricles, Third and Fourth Ventricle.
- Cerebrospinal fluid
  - CNS protection
  - Compensation
  - Nutrition

Cerebral Blood Supply

- Circle of Willis
- Vertebrobasilar Arteries
  - Supply posterior circulation
  - Through transverse processes of C5- C1
- Carotid Arteries



Cranial Nerves



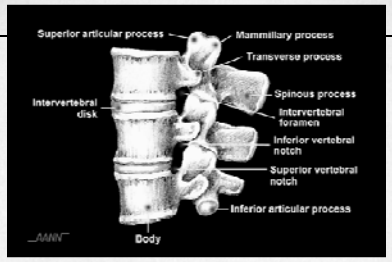
Neuro Anatomy

Spine

- Vertebral Column- 33 Vertebrae
  - 7 Cervical (C1-C7)
  - 12 Thoracic (T1-T12)
  - 5 Lumbar (L1-L5)
  - 5 Sacral (S1-S5)
  - 4 Coccygeal
- Anterior Longitudinal Ligament, Posterior Longitudinal Ligament

Spinal Cord

- Extends from base of medulla to conus medullaris (across from L1–L2)
- Surrounded by menningies
- CSF flows in the subarachnoid space
- Vascular supply Comes from branches of the Vertebral



Spinal nerves

- 31 pairs along the length of the cord
- First 7 cervical pairs exit above corresponding
- vertebrae, C8 exits below C7 vertebrae
- All thoracic, lumbar, and sacral nerves exit below corresponding vertebrae
- Part of the Peripheral Nervous System
- Plexus – bundle of nerves join together

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Neuro Assessment

- Mental Status
- Cranial Nerves
- Proprioception
- Cerebellar Function
- Motor Function
- Sensory Function
- Reflex function

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Neuro Assessment

- Start with the least amount of stimuli
- Assess head to toe
  - Except spine injuries, assess strength/sensation toe-to-head
- Proceed in a systematic approach
- Utilize standardized scales

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Mental Status

- Level of Consciousness-
  - One of the most sensitive parameters to neurologic changes
  - Large deferential for mental status changes
- Glasgow Coma Scale (3-15)
  - Traditional Terms
- Alert, awake, lethargic, stuporous, semi-comatose, and comatose
- Level of consciousness- Check to Verbal, Visual, Tactile, Noxious, Painful

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Neuro Assessment

Mental Status

- Is the patient able to follow commands? Are they oriented to person, place, time and situation.
- Memory, intellectual performance, insight, problem solving.
- Affect and mood
- Communication- Aphasia, Receptive, Expressive, Dysarthria

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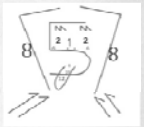
Neuro Assessment

Cranial Nerve Check

- Pupils- PERRLA, EOMI, Gaze
- Face symmetry and sensation
- Speech, taste, smell and hearing
- Tongue and palate movement
- Shoulder shrug

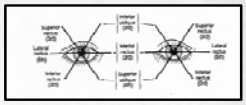


18 BELIEVE IN WE OhioHealth

Neuro Assessment

I - Olfactory nerve
II - Optic nerve
III - Oculomotor nerve
IV - Trochlear nerve
V - Trigeminal nerve/dentist nerve
VI - Abducens nerve
VII - Facial nerve
VIII - Vestibulocochlear nerve/Auditory nerve
IX - Glossopharyngeal nerve
X - Vagus nerve
XI - Accessory nerve/Spinal accessory nerve
XII - Hypoglossal nerve
* Mnemonic-

- **O**n **O**ld **O**lympus' **T**owering **T**op, **A** **F**riendly **V**iking **G**rew **V**ines **A**nd **H**ops



Neuro Assessment

Motor Exam

Muscle Strength
Drift
Ataxia
Gait

Rating	Observation
0	No muscle contraction is detected.
1	A trace contraction is noted in the muscle by palpating the muscle while the patient attempts to contract it.
2	The patient is able to actively move the muscle when gravity is eliminated.
3	The patient may move the muscle against gravity but not against resistance from the examiner.
4	The patient may move the muscle group against some resistance from the examiner.
5	The patient moves the muscle group and overcomes the resistance of the examiner. This is normal muscle strength.

Neuro Assessment

Sensation

- Light touch
- Deep pain
- Temperature
- Vibration
- Proprioception

Neuro Assessment

Reflexes

0 = no response
+1 = hypoactive
+2 = normal
+3 = brisk
+4 = hyperactive

Biceps (C5-6)
Triceps (C6-8)
Brachioradial
Quadriceps (L3-4)
Patellar (L3-4)
Achilles (S1-2)

Changes in the aging adult

- Hair loss on the scalp
- Eyes- decreased pupil size, presbyopia, cataract.
- Hearing loss.
- Diminished salivary secretions and taste. Tooth decay and loss.
- Brain atrophy
- Curve of the thoracic spine (kyphosis), loss of height, intervertebral disc thin and vertebral bodies shorten or collapse from OA.

Changes in the older adult

- Decreased skeletal muscle bulk.
- Brain volume due to atrophy and number of cortical cells decrease
- May develop benign essential tremors
- Decreased reflexes
- Elevation in systolic blood pressure- stiffening of the aorta and large arteries due to artherosclerosis
- Postural hypotension
- Pacemaker cells decline- increase abnormal heart rhythms

Neuro Disorders

Stroke

- Disruption in normal blood supply to the brain
- New terminology - "Brain Attack"
- Fourth most common cause of death in US
- Primary cause of adult disability in the US
- About 795,000 Americans each year suffer a new or recurrent stroke.
- On average, a stroke occurs every 40 seconds and every 4 minutes someone dies of stroke

Stroke

Ischemic Stroke

- 80% of strokes
- Diminished blood supply to the brain
- Most common cause is thromboembolism

Stroke Symptoms

- Left side stroke
  - Right visual field deficit
  - Right Hemiparesis
  - Right Hemisensory loss
  - Aphasia
- Right side stroke
  - Left Hemi-attention
  - Left Visual Field Deficit
  - Left Hemiparesis
  - Left Hemisensory loss

Stroke

Transient Ischemic Attack

- Brief interruption in blood flow by a clot
- Symptoms are the same as stroke but last usually less than five minutes (one minute on average).
- No permanent brain injury
- 10% of strokes are preceded by a TIA.
- Also referred to as a "Mini-Stroke" or "Warning Stroke"

Stroke

Hemorrhagic Stroke

- A weakened vessel ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surrounding brain tissue.
  - Intracerebral hemorrhage (within the brain): Most common cause is chronic hypertension.
  - Subarachnoid hemorrhage (bleeding around the brain): Most common cause is Aneurysm rupture
- Symptoms: Headache, N/V, Decreased LOC
  - SAH- stiff neck, light sensitivity
  - ICH- Focal Symptoms

Stroke Assessment Tools

- Act FAST
- Endorsed By the American Stroke Association
- Used by first responders
- Quick Assessment Tool- Easy to teach patients, families

Face Drooping – Does one side of the face droop or is it numb? Ask the person to smile. Is the person's smile uneven?

Arm Weakness – Is one arm weak or numb? Ask the person to raise both arms. Does one arm drift downward?

Speech Difficulty – Is speech slurred? Is the person unable to speak or hard to understand? Ask the person to repeat a simple sentence, like "The sky is blue." Is the sentence repeated correctly?

Time to call 9-1-1 – If someone shows any of these symptoms, even if the symptoms go away, call 9-1-1 and get the person to the hospital immediately. Check the time so you'll know when the first symptoms appeared

TIME IS BRAIN

Stroke Treatment Goals

- Restore blood flow to the penumbra
- Stroke Prevention
  - Antiplatelet agent (ASA, clopidogrel, asa/dipyridamole XR), Anticoagulant if indicated (warfarin)
- Reduce modifiable risk factors
  - Hypertension, Smoking, Cholesterol, Glucose control, CAD, Atrial Fibrillation, Obesity, Diet Control, Hypercoagulability
- Improve function- Physical, Occupational, Speech therapy. Physical Medicine and rehab

Neuro Disorders

Head Trauma

- Scalp Lacerations
- Subdural Hematoma
- Skull/ Facial Fractures

Spine injuries

- Dislocation- vertabra overrides another- spinal cord may or may not be involved.
- Subluxation- partial or complete dislocation of one vertebra over another. Damage to the cord and supporting ligaments may be present.
- Hyperflexion- Forward movement- wedge or compression fracture
- Hyperextension- Backward downward movement- whiplash. May see contusionj and ischemia of the cord. Stress at C4 and C5
- Compression Injury- Burst fracture, Wedge

Spine Injuries

Back Pain

- Conditions causing back pain
  - Scoliosis/kyphosis
  - Neoplasms
  - Infections
  - Spondylosis
  - Osteoarthritis
  - Inflammation

Degenerative disc disease

- Aging process- Decreased fluid content of nucleus pulposus
- Nucleus pulposus less elastic – tears
- Less effective shock absorbers
- Degeneration of posterior spinal ligaments
- Symptoms: Back pain with radiation to buttocks or thighs, often positional. Progressive, gradually onset.

Lumbar Spondylolithesis

- Slipping or sliding associated with degenerative changes of the facet joints
- Anterior subluxation most common at L4/5
- Low back pain, vague, dull, achy. Often asymptomatic
- Positive straight leg raising (SLR)

Lumbar Stenosis

- Narrowing of the lumbar spinal canal
- Pain, numbness, or weakness with ambulation
- Walks farther with forward flexion support
- Bowel or bladder dysfunction

Vetebral Compression Fracture

- Due to bone weakened by osteoporosis, trauma, tumors
- Sudden onset, severe pain, reproducible on palpation

Neuro Disorders

Spine Injuries

- Spinal cord injuries-
  - Concussion- spinal shock or jarring causing temporary loss of function
  - Contusion- bruising of the cord, can cause bleeding, edema, necrosis, deficit depends on severity
  - Laceration- Tear in the cord, can be complete of incomplete
  - Transection: Severing of the cord
  - Hemorrhage: Bleeding into or around the cord

Cognitive Disorders

Delirium

Confused/perception disorder
Acute onset
Reversible with treatment

D- drugs
E-electrolytes
L-Low Oxygen
I- Injury
R- relapsing fever
I-infection
U- uremia
M-metabolic

Cognitive Disorders

Dementia

Failing memory, personality changes
Chronic progression
Affects 7% of the population over the age of 65

D- Drugs
E- Endocrine
M- Metabolic
E- Epilepsy
N- Nutrition
T- Tumor/Trauma
I- Infection
A- Arterial

- Alzheimer disease
- Non-Alzheimer-related
- Parkinson disease with dementia
- Dementia with Lewy bodies
  - Fluctuating cognition, visual hallucinations, bradykinesia or rigidity, sleep disturbances, frequent falls, syncope, orthostatic hypotension, urinary incontinence

Neuro Disorders

Other

- Movement Disorder
- Neuromuscular disorders
- CNS infections
- Tumors
- Migraine
- Seizures

Other Geriatric Considerations

- Pharmocokinetic changes
  - Muscle mass, %of body fat, kidney, liver function, GI absorption
- Anatomic Changes
- Polypharmacology
- Living Will, Power of Attorney, Code Status
- Social Services

Questions

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