

Neurological Assessment

Anatomy of Nervous System

- Central
 - Brain
 - Spinal cord
- Peripheral
 - Cranial Nerves
 - Spinal Nerves

Brain

- Cerebral cortex (“rind”) – gray matter
 - Frontal
 - Parietal
 - Temporal
 - Occipital
 - Wernicke’s area – receptive aphasia
 - Broca’s area – expressive aphasia

Brain

- Basal ganglia: motor function
- Thalamus: relay station
- Hypothalamus: HR, BP, sleep, etc.
- Cerebellum: motor coordination
- Brain stem
 - Midbrain
 - Pons
 - Medulla: respiration, heart, GI function, CN 8
 - 12

Spinal Cord

- Nerve cell bodies arranged in “horns”
- Nerve pathways cross in the spinal cord
 - Eg. Sensation of the left side of the body enters the left dorsal horn, and crosses to the right ventral horn and travels to right hemisphere
- Sensation
 - Spinothalamic tract: pain, temperature, crude and light touch
 - Posterior columns: does not cross sides; position, vibration, finely localized touch

Spinal Cord

- Motor pathways
 - Corticospinal (Pyramidal) tract:
 - All go through the medulla’s pyramid
 - Crossed
 - Uncrossed
 - Finer body movements
 - Extrapyramidal
 - Cruder movement (walking)
 - Upper vs Lower motor neurons

Peripheral Nervous System

- Reflex arc
 - Deep tendon reflexes: requires
 - Intact sensory nerve
 - Functional synapse
 - Motor Nerve
 - Competent Muscle
 - Superficial
 - corneal, abdominal
 - Visceral
 - Pupillary light, accommodation
 - Pathologic

Cranial Nerves

- Mnemonic: "Oh Oh Oh, To Taste And Feel Very Good Veal Simply Heaven"

Spinal Nerves

- Cervical 8
- Thoracic 12
- Lumbar 5
- Sacral 5
- 1 Coccygeal

- Sensory in dorsal horns; motor in ventral
- Dermatome

Functional Divisions

- Autonomic vs. Somatic Nervous System
- Sympathetic vs. Parasympathetic
 - Primary sympathetic neurotransmitter is Norepinephrine, so sympathetic system is called "**adrenergic**"
 - Primary parasympathetic neurotransmitter is Acetylcholine, so parasympathetic system is called "**cholinergic**"

History

- Headache
- Head injury
- Dizziness/Vertigo
- Seizures
- Tremors
- Weakness
- Incoordination

History Cont

- Numbness or tingling
- Difficulty Swallowing
- Difficulty Speaking
- Environmental/occupational hazards
- Past Medical History
- Social History: smoking, drugs, alcohol
- Medications

Anticholinergic Symptoms

- Mydriasis
- Dry, flushed skin
- Hallucinations
- Agitation
- Hyperthermia
- Urinary retention
- Delayed intestinal motility (constipation)
- Tachycardia
- Seizure

Anticholinergic Mnemonic

- Blind as a bat
- Dry as a bone
- Red as a beet
- Mad as a hatter
- Hot as a hare

Drugs with Anticholinergic Effects

- | | |
|---|------------------------|
| • Atropine (100% of maximal anticholinergic effect) | • Phenobarbital |
| • Scopolamine | • Oxybutynin (20%) |
| • Tolterodine | • Isosorbide dinitrate |
| • Hyoscyamine | • Hydroxyzine |
| • Cholinergic Parkinsonism agents | • Warfarin |
| • Prednisone (55%) | • Dipyrindamole |
| • Diphenhydramine (Benadryl) | • Codeine |
| • Amitriptyline (Elavil) | • Ranitidine (10%) |
| • Digoxin | • Dyazide |
| • Nifedipine | • Furosemide (Lasix) |
| | • Nortriptyline (3%) |

Physical Exam

- Mental Status, Pyschiatric
- Cranial Nerves
- Sensory exam
- Motor exam

Mental Status

- | | |
|-------------------------------|-----------------------|
| • Level of Consciousness | • Emotional responses |
| • Speech | • Memory |
| • Orientation | • Calculation ability |
| • Knowledge of Current events | • Object recognition |
| • Judgment | • Praxis |
| • Abstraction | |
| • Vocabulary | |

Cranial Nerves

1. Olfactory – have patient identify smell
2. Optic – Eye chart, visual fields, fundus
- 3,4,6. Oculomotor, Trochlear, Abducens – PERRLA, positions of gaze, nystagmus
5. Trigeminal Nerve: chewing muscles, facial sensation, corneal reflex
7. Facial nerve: smile, frown, close eyes, puff cheeks

Cranial Nerves

- 8. Test hearing, Weber, Rinne tests
- 9, 10. Glossopharyngeal and Vagus Nerves - Soft palate and uvula movement; gag reflex
- 11. Spinal Accessory Nerve: head movement; shrug shoulders
- 12. Hypoglossal - Tongue movement; "light, tight, dynamite"

Sensation

- Eyes closed
- Avoid leading questions
- In general, if distal is intact, proximal will also be intact
- Spinothalamic tract
 - Pain: sharp or dull
 - Temperature
 - Light touch

Sensation

- Posterior Column Tract
 - Vibration sense
 - Position
 - Tactile discrimination
 - Stereognosis
 - Graphesthesia
 - Two point discrimination
 - Extinction
 - Point location

Motor

- Muscle
 - Size
 - Strength
 - Tone
 - Involuntary Movement
- Cerebellar
 - Balance:
 - Gait,
 - Tandem walking
 - Romberg,
 - One legged squat

Motor

- Cerebellar
 - Coordination
 - Rapid alternating movement
 - Knee slapping
 - Finger to thumb
 - Finger to finger
 - Finger to nose
 - Heel to shin

Deep Tendon Reflexes

- Tests sensory and motor function
 - Biceps
 - Brachioradialis
 - Triceps
 - Quadriceps (patellar)
 - Achilles

Additional Tests

- Clonus
- Superficial reflexes
 - Abdominal
 - Cremasteric
 - Plantar reflexes