Localize the Lesion Interactive Session

Presented By:
Michael Moore, MS, PA-C
Clinical Assistant Professor
University of Michigan-Flint

Disclosures

- I have no relevant relationships with ineligible companies to disclose within the past 24 months. (Note: Ineligible companies are defined as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.)

Educational Objectives

At the conclusion of the session participants should be able to:

1. Discuss how the physical examination relates to the central and peripheral nervous system
2. Identify abnormal reflexes and demonstrate how to illicit their response
3. Identify incidental neurological findings and describe their significance as they relate to underlying disease

Neurological Screening Exam

Busy primary care PAs and NPs likely do not have time to do a full neuro exam on every patient

If no neuro complaints, a brief examination focusing on these areas is usually sufficient

1. Mental status
2. Cranial nerves
3. Motor system
4. Reflexes
5. Sensation

Neurological Screening Exam

1. **Mental status**
   - Orientation to person, place, time; follow 1+ complicated commands
2. **Cranial nerves**
   - Visual fields, pupillary responses to light, EOMs, facial strength, hearing to finger rub
3. **Motor system**
   - Strength of deltoids, triceps, wrist extensors, hand interossei, iliopsoas, hamstrings, ankle dorsiflexors; Pronator drift; Finger tapping, finger-to-nose, and heel-knee-shin performance; Tandem gait and heel walk
4. **Reflexes**
   - Biceps, triceps, patellar, plantar responses, ankle reflexes
5. **Sensation**
   - Light touch sensation in distal extremities, including double simultaneous stimulation; Vibration sense of great toes

Mental Status Exam

- Level of consciousness (arousal)
- Attention and concentration
- Memory (immediate, recent, and remote)
- Language
- Visual spatial perception
- Executive functioning
- Mood and thought content
- Praxis
- Calculations

Cranial Nerve Exam

I. **Olfactory** (Olfaction)
II. **Optic** (Vision)
III. **Oculomotor** (Eye movements, pupillary constriction, upper lid)
IV. **Trochlear** (Eye movements [intorsion, downward gaze])
V. **Trigeminal** (Face/mouth/cornea, mastication)
VI. **Abducens** (Eye movements [abduction])
VII. **Facial** (Facial muscles, ant. taste, glands)
VIII. **Vestibulocochlear** (Hearing, balance)
IX. **Glossopharyngeal** (Post. taste/sensation, pharynx, baro/chemo receptors, salivary gland)
X. **Vagus** (autonomic gut, cardiac inhibition, larynx/pharynx, vocal cords, swallow)
XI. **Accessory** (Shoulder, neck muscles)
XII. **Hypoglossal** (Tongue movement)

Abnormal Ocular Findings

- Anisocoria
- Afferent pupillary defect
- Gaze palsy
- Internuclear ophthalmoplegia

Localization Issues

- Facial weakness
- Hearing loss
- Weakness of palate, pharynx, larynx
- Dysarthria
- Neck weakness
- Tongue weakness

Motor Exam

- Gait
- Coordination
- Finger tapping
- Rapid alternating movements
- Finger-to-nose testing
- Heel-to-shin testing
- Involuntary movements
- Pronator drift
- Strength testing

Motor Exam

Involuntary movements

- **Tremor**
- **Myoclonus**: rapid, shock-like muscle jerks
- **Chorea**: rapid, jerky twitches, similar to myoclonus but more random in location and more likely to blend into one another
- **Athetosis**: slow, writhing movements of the limbs
- **Ballismus**: large amplitude flinging limb movements
- **Tics**: abrupt, stereotyped, coordinated movements or vocalizations
- **Dystonia**: maintenance of an abnormal posture or repetitive twisting movements

Weakness

- Monoparesis: weakness of a single limb
- Hemiparesis: unilateral UE/LE weakness
- Paraparesis: bilateral LE weakness
- Quadriparesis: weakness of all four limbs
- Mono/hemi/para/quadriplegia: complete or nearly complete paralysis of the involved limbs

Weakness

- Muscle bulk
- Muscle tone
- Spasticity
- Rigidity
- Paratonia

Upper vs Lower Motor Neuron Lesions

Upper Motor Neuron

- Reflexes
  - Hyperreflexia, (Babinski, clonus)
- Muscle bulk
  - Normal muscle bulk
- Muscle tone
  - Spasticity
- Spastic paralysis

Lower Motor Neuron

- Reflexes
  - Hyporeflexia
- Muscle bulk
  - Atrophy
- Muscle tone
  - Normal or reduced
- Flaccid paralysis
- Fasciculations

Reflex Exam

- Tendon Reflexes
  - Biceps — just anterior to the elbow
  - Triceps — just posterior to the elbow
  - Brachioradialis — about 10 cm above the wrist on the radial aspect of the forearm
  - Knee — just below the patella
  - Ankle — just behind the ankle
- Distraction or reinforcement may be necessary
- Clonus
- Plantar response

Sensory Exam

- Light touch
- Pain/temp
- Joint position sense
- Vibration
- Graphesthesia
- Stereognosis
- Two-point discrimination

A 60-year-old Caucasian male presents with a twelve-month history of progressive difficulty in walking. He mentions increasing spasticity in his legs, frequent falls, and noticeable muscle atrophy in the bilateral thenar eminences. Additionally, he reports trouble with his speech, often slurring words, and has faced difficulty swallowing. The patient also describes intermittent muscle twitching in his arms and shoulders. He denies any sensory disturbances, changes in bowel or bladder control, diplopia, or ptosis. On physical examination, overall muscle tone is increased with exaggerated deep tendon reflexes in both lower and upper limbs. Fasciculations are noted in his upper extremities. Babinski's sign is present bilaterally.

Given the patient's clinical presentation and findings on the physical examination, what is the most likely diagnosis?

A. Multiple Sclerosis
B. Guillain-Barre Syndrome
C. Amyotrophic Lateral Sclerosis
D. Myasthenia Gravis
E. Peripheral Neuropathy

A 32-year-old Caucasian female presents to your clinic with a three-month history of intermittent double vision and temporary loss of vision in her right eye. She also complains of pins-and-needles sensations in her legs and feet, fatigue, and has recently noticed some difficulties with her balance. In the past week, the patient reports having difficulty controlling her bladder, with episodes of urinary urgency and frequency. Her medical history is unremarkable. She denies having any systemic illness. On physical examination, you note an intention tremor and dysmetria on finger-to-nose test. There is decreased sensation to light touch in both lower limbs. Her visual acuity is reduced in the right eye.

Given the patient's history and physical examination findings, what is the most likely diagnosis?

A. Guillain-Barre Syndrome
B. Amyotrophic Lateral Sclerosis
C. Multiple Sclerosis
D. Myasthenia Gravis
E. Peripheral Neuropathy

A 72-year-old male with history of HTN, HLD, and obesity presents to the emergency department with a sudden onset of weakness in his right arm and leg and difficulty speaking, which began an hour ago while he was having breakfast. His wife confirms that his speech is difficult to understand, different from his usual speech. There is no history of head trauma and his blood pressure has been well-controlled. Vital signs are stable. POC glucose is normal. On physical exam, he has right-sided facial droop with forehead sparing, right-sided hemiparesis and decreased sensation, dysarthria, and left-sided gaze deviation.

Given the patient's history and physical examination findings, what is the most likely diagnosis?

A. Hemorrhagic Stroke
B. Ischemic Stroke
C. Subdural hematoma
D. Bell’s palsy

Reference

1. Gelb D. The detailed neurologic examination in adults. In: Aminoff MJ ed., Wilterdink JL ed. *UpToDate.* UpToDate; 2023. Accessed December 5, 2023. https://www.uptodate.com

Questions?