The Exam from a Neurologist's Perspective

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Neuro Exam Goals

- The neurological exam can be overwhelming and time consuming. Break down into parts
- Think of the neuro exam as a tool to help localize
- The neuro exam actually starts with a good history. This can help focus the exam
Overview

• Brief neuro anatomy review

• History

• Neuro exam with common examples

• Clinical scenarios
Central vs Peripheral
Brain

- Cerebrum: lesions result in contralateral deficits of more than one territory. Aphasia, contralateral visual disturbance behavioral change

- Cerebellum: motor coordination/ balance can be ipsilateral

- Diencephalon: thalamus relay station for motor and sensory impulses and hypothalamus homeostasis. Clinical signs contralateral to lesion

- Brainstem: midbrain, medulla (can have mixed ipsilateral and contralateral signs), pons
Spinal cord

- Relay center for descending motor control and ascending sensory control
- Spinothalamic track: pain temp and touch
- Dorsal columns: position, proprioception, vibration and fine touch
Central Nervous System Signs on Exam

- Hyper-reflexia
- Spasticity
- Sensory or motor loss face, arm and leg
- Sensory or motor loss bilaterally or unilaterally from a certain level down with spinal cord lesions
- Cortical signs: Visual loss homonymous, language disturbance, neglect, memory/behavioral change
Peripheral Nervous System Signs on Exam

- Discrete nerve root territory
- Discrete peripheral nerve territory
- Hypo-reflexia
- Atrophy
- Fasciculation
Upper Motor Neuron (central) vs Lower Motor Neuron (peripheral)

- UMN increased DTR, LMN reduced DTR
- UMN muscle tone increased, LMN muscle tone decreased and atrophy
- UMN no fasciculations, LMN fasciculations
Myelopathy vs Radiculopathy

- **Myelopathy** = Spinal Cord Lesion = UMN. Weakness, sensory changes below the level of the lesion and hyper-reflexia

- L'Hermitte's sign cervical cord
  - Electrical pulsation through body with neck extension or flexion

- Radiculopathy follows distinct myotomal and dermatomal pattern, hypo-reflexia
Peripheral Nerve, Neuromuscular Junction and Muscle

- Peripheral nerve: follows motor/sensory territory for a specific nerve. In generalized neuropathies, typically follows a stocking/glove pattern. Absent to trace reflexes. Atrophy, fasciculations

- Neuromuscular junction: No sensory loss, proximal weakness in arms/legs. Fatigable

- Muscle: Proximal weakness in arms/legs. No sensory loss

- Above may be diagnosed with nerve conduction studies and EMG.
History

- Lateralization of symptoms
- Chronicity
- Paroxysmal?
- Associated symptoms help with localization
The Neuro Exam

- Mental status
- Cranial nerves
- Motor
- Sensory
- Coordination (not necessarily cerebellum) includes gait
- Reflexes
Mental Status

• Many different screening tests to choose (SLUMS, MMSE, MOCA)

• If a patient gives a very clear history and follows commands you know language function is intact and that they are attentive
Mini Cog Screening Test
Cranial nerves

- CN2 acuity and visual fields
- CN3 pupil and adduction, elevation and depression of eye
- CN4 In torsion of eye
- CN6 abduction of eye
- CNV facial sensation
- CNVII facial muscles
- CNVIII hearing/vestibular function
- CN11 trapezius
- CN12 tongue
Bell's Palsy

- Sudden paralysis one side of face
- Frontalis weakness
- Bell's phenomenon
- May present with pain behind ipsilateral ear
- May later develop hemi facial spasm
Bell’s Palsy in Hollywood
Stroke vs Bell's Palsy

- Ipsilateral frontalis muscle is spared when stroke causes facial weakness
- Look for other neighboring signs consistent with stroke
  - Arm/leg weakness
  - Numbness
  - Aphasia
  - Hyper-reflexia
Motor Exam

- Tone
- Strength
- Look for patterns
- Common UMN weakness patterns
  - Extensors of upper extremities vs flexors of lower extremities
  - Peripheral nerve vs myotomatal weakness
Myotome examples in lower extremity

Each joint movement consists of 4 consecutive spinal nerve

L2,3  L4,5  L3,4  L5,S1

L4,5  S1,2  L4  L5,S1
Wrist Drop

- Examine the hand supported
- In the wrist drop position, the other intrinsic hand muscles will appear weak
- Numbness in discrete radial territory
- Only radial nerve muscles affected
Stroke vs Radial Neuropathy

- This patient had wrist drop in addition to true weakness of the interossei and abductor pollicis brevis
- No sensory loss
- Subtle hyper-reflexia on affected side
- No obvious history of compression in the affected limb
Sensory

- Check different modalities
  - Pin/temp small fiber
  - Vibration/proprioception large fiber
- Distribution
- Stocking distribution not specific to neuropathy
Coordination

- Finger nose finger
- Heel to shin
- Fine movements
- Rapid alternating movements
- Gait regular tandem heel and toe
- Look at stride, initiation turning and arm swing
Reflexes

- Hyper-reflexia vs hypo-reflexia
- Look for symmetry vs asymmetry
- Pathological: Jaw jerk, Hoffmann's and Babinski
Clinical examples
Parkinson's

- History: Typically starts with UNILATERAL tremor
- Increased tone
- Small amplitude fine movements
- Gait small steps reduced arm swing turns en bloc
- Masked facies
- Review medications
Parkinson's Tremor
Essential Tremor
Astasia-Abasia
Approach to Patient Presenting with Increased Falling

- History
  - Light headed, loss of consciousness, dizzy, weak, numb, ???
  - Medications

- Exam
  - Orthostatics, mental status, strength, sensation, coordination and gait
Common Causes of Falls in the Elderly

Accident
Gait disturbance
Balance disorders or Weakness
Pain
Vertigo
Medications or Alcohol
Acute illness
Confusion
Postural hypotension
Visual disorder
Syncope, Epilepsy.
Evaluate Feet

- The feet can be a key to balance issues
  - Sensory loss
  - Abnormal reflexes
- Hygiene
- Callouses
Small Fiber Neuropathy

- History: burning feet
- Loss of pin and temp preserved reflexes
- Normal strength and gait
- Symmetric involvement
- Preserved reflexes helps to differentiate from spinal stenosis
Challenging Case
• 70 y.o. woman presents with a five year history of increase numbness and burning in her feet.

• Exam notable for stocking distribution sensory loss in the feet to the mid calf to pin and temp, reduced vibration in the toes.

• Reflexes 2 at knees, 0 at ankles and toes down going.
Labs revealed a low B12 of 189 and mild hyperglycemia.

Nerve tests showed mildly reduced sensory response amplitudes.

History, exam, nerve tests all consistent with a diagnosis of polyneuropathy likely due to low B12 and hyperglycemia.

She was treated with low dose Gabapentin and B12 supplements.
• About 6 months after her initial visit, she reported a rapid increase in symptoms
• She was falling at home
• She reported numbness to the upper thigh
• Her exam showed absent pin and temp to the upper thigh
• Reflexes were 2 at knees, 0 at ankles, toes down
• What happened?

• The tempo of her symptoms was not consistent with peripheral neuropathy

• Imaging of the entire spine was performed
Myelopathy
Challenging Case

- More than one neurologic problem occurring at the same time
- Neuropathy prevented typical signs of myelopathy (hyper-reflexia)
- The tempo of change in her symptoms was the clue
- Cord lesions can be falsely localizing
Take home points

• Unilateral, late onset tremor raises red flag for possible Parkinson's disease

• Review medications in patient with suspected Parkinson's disease

• Clock drawing can be a helpful screening test for memory loss

• Don't forget to look at the feet in a patient with unexplained falling

• Spinal cord lesions can be falsely localizing
Call your local neurologist when in doubt!

Thank you!