



## **Systematic Workup for Acute Weakness**

The acute or semiacute onset of weakness is a common complaint of patients presenting to the emergency department. The lecturer will focus on neurologic causes of acute weakness. Key elements of the neurologic examination and diagnostic tests that are helpful in identifying weakness syndromes will be discussed.

- Identify severe or life-threatening weakness syndromes.
- Discuss the essential elements of the neurologic examination for diagnosing etiologies of acute peripheral weakness.
- Discuss the diagnostic workup and treatment of life-threatening causes of weakness syndromes.

WE-119  
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8:00 AM - 8:55 AM  
Room # N250  
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## **FACULTY**

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## ACUTE WEAKNESS

- I. History
  - A. Pace of the illness
    1. Truly sudden (apoplectic)
      - a. embolic stroke
      - b. TIA
    2. Very rapid (minutes)
      - a. intracerebral hemorrhages
      - b. thrombotic stroke
    3. Suddenly noticed (prior symptoms preceded weakness complaint)
      - a. motor neuron diseases
      - b. neuropathies
      - c. tumors
      - d. entrapment neuropathies (e.g. radical nerve palsy, femoral neuropathy)
    4. Subacute (hours to days)
      - a. severe, rapidly progressive neuropathies (e.g. AIDP; porphyria)
      - b. rapidly expanded space occupying lesions (e.g. anaplastic tumors; infections)
      - c. mononeuropathies (e.g. Bell palsy)
      - d. acute myopathies (e.g. rhabdomyolysis)
    5. Chronic (weeks to months)
      - a. chronic neuropathies (e.g. diabetic, nutritional)
      - b. most myopathies (e.g. thyroid, polymyositis)
      - c. most tumors
      - d. chronic fatigue syndromes
    6. Episodic
      - a. myasthenia gravis
      - b. periodic paralysis syndromes
      - c. metabolic myopathies
      - d. seizures
      - e. migraine
  - B. How does it interfere with activities of daily living?
    1. walking stairs suggests proximal preponderance
    2. double vision and ptosis affect vision
    3. getting out of chairs or off toilet suggests proximal preponderance
    4. combing and/or brushing hair suggest proximal preponderance
    5. holding a coffee cup or writing suggests distal preponderance
    6. tired when walking - must distinguish cardiopulmonary from neurological causes

7. shortness of breath - must distinguish cardiopulmonary from neurological causes
8. tripping over curbs - must reflect difficulty looking down or distal weakness
9. weak everywhere (patternless weakness) suggests psychogenic cause

## II. Examination

### A. Mental status

1. thought affect and mood
2. attention and level of consciousness
3. language
4. memory
5. visuospatial skills

### B. Cranial nerves

1. extraocular muscles including lids (III, IV, VI)
2. muscles of mastication (V) - fatigue suggests giant cell arteritis
3. facial expression (VII) - also test taste and hearing when face is weak
4. palatal strength (IX, X) nasal speech and coughing suggests weakness
5. sternocleidomastoid and trapezius (XI) - often weak with myopathies
6. tongue (XII) - listen for lingual dysarthria

### C. Motor examination

1. screen with gait (also tests sensory and coordination)
2. look for asymmetry
3. look for a pattern
  - a. proximal greater than distal suggests myopathy or radiculopathy. Most myopathies are worse proximally (exception is myotonic dystrophy).
  - b. distal greater than proximal suggests neuropathy or motor neuron diseases. Most neuropathies and motor neuron diseases are distal greater than proximal (exceptions are short fiber neuropathies such as porphyria, some radiculopathies, such as AIDP and some motor neuron diseases, such as Kugelberg Weller disease)
4. look for fatiguing, particularly in the lids
5. look at the bulk of muscles - preserved bulk in face of weakness suggests demyelinating neuropathy or CNS problem
6. check tone - increased tone suggests a CNS problem
7. Palpate and percuss the muscle - loss of direct muscle excitability suggests myopathy, whereas sparing of direct muscle excitability in the face of weakness suggests neuropathy or CNS problem. Myoedema suggest hypothyroidism. Myotonia suggests a channelopathy
8. estimate respiratory power (number counting)

#### D. Sensory examination

1. primary modalities: pain/temperature; vibration, touch, position sense
2. cortical (parietal) modalities, such as two point discrimination, graphesthesia and stereognosis are useful only when primary modalities are reasonably intact.
3. Look for a sensory loss pattern
  - a. axonal neuropathies produce a dying-back pattern (i.e. longest nerves are affected the most)
  - b. demyelinating neuropathies do not respect length
  - c. mononeuropathies are asymmetrical
  - d. autonomic dysfunction (loss of sweating or excessive sweating, hair and nail atrophy) suggest axonal neuropathy
  - e. radiculopathies often produce sensory loss and pain in an asymmetrical pattern
4. Test gait
5. Do Romberg's test - abnormal suggests a proprioceptive problem which may be peripheral (e.g. neuropathy) or central (e.g. myelopathy)

#### E. Coordination

1. test gait - wide base suggests cerebellar trouble
2. finger-nose-finger and heel-knee-shin are tested with eyes open and closed. Worse performance with eyes closed suggests a proprioceptive problem.

#### F. Reflexes

1. proprioceptive reflexes - loss suggest peripheral problem
  - a. biceps
  - b. triceps
  - c. brachioradialis
  - d. quadriceps (knee jerk)
  - e. gastrocnemius (ankle jerk)
2. nociceptive reflexes
  - a. plantar (Babinski sign suggests CNS problem)
  - b. anal wink - suggests peripheral problem in lower sacral roots or nerves
  - c. cremasteric - absence suggests peripheral problem in lumbar roots or nerves
3. antigravity - presence suggests a brainstem or diencephalic problem
  - a. decerebration - suggests brainstem
  - b. decortication - suggests diencephalon

4. release reflexes - prominence suggest a CNS problem
  - a. snout
  - b. suck
  - c. grasp
  - d. root
  - e. palmomental

### III. Ancillary tests

#### A. Clinical neurophysiologic testing

1. nerve conduction velocities - major abnormalities suggest a demyelinating neuropathy
2. electromyogram - takes about three weeks to become positive in denervating diseases
  - a. small polyphasic motor units suggest myopathy
  - b. large polyphasic motor units suggest re-innervation
  - c. fibrillations and positive sharp waves suggest denervation
  - d. repetitive stimulation and single fiber studies show N-M junction problems
  - e. specialized tests (e.g. ischemic exercise test for metabolic myopathy) determined by situation

#### B. Muscle enzymes (CK, aldolase)

1. major elevations suggest myopathy
2. minor elevations or normal suggest neuropathy or CNS problem

#### C. Brain or spinal cord imaging for CNS problems

1. MRI generally superior
2. CT may be adequate and often more practical in the ED

#### D. Nerve and Muscle biopsy have limited usefulness

1. inflammatory myopathy
2. vasculitis neuropathy
3. amyloid neuropathy
4. sarcoid myopathy and neuropathy
5. neurolymphomatosis

#### E. Skin biopsy may help in small fiber and autonomic neuropathies

### **Suggested reading:**

Sabin TD, Bergethon PR. Weakness in Hospitalist Neurology, Samuels MA, editor. Boston: Butterworth-Heinemann, 1999. Chapter 3, pp. 45-62.