THE NEUROLOGIC EXAMINATION

HISTORY
Common neurologic presentations: headache, altered mental status, seizures, paresthesia (altered sensation), gait disturbance

24 year old woman with visual changes followed by new onset, severe right sided headache.

What do you want to know?

FIVE PARTS OF NEUROLOGIC EXAMINATION:

Mental Status
Cranial Nerves
Sensation
Strength
Deep Tendon Reflexes
Coordination

MENTAL STATUS EXAMINATION

1. Mini-Mental Status Exam (will discuss with geriatric evaluation)
   Quick evaluation of mental status
   Often used in older patients with suspected dementia
   Score less than 20 of 30 suggests dementia (sensitivity: 87%)

2. Alertness
   “Alert and Oriented” means, at least:
   Opens eyes spontaneously
   Converses appropriately
   Follows verbal “command”/request
   Oriented to Person (self and others)
   Place (location – e.g. town and building)
   Time (Month, day, year)

CRANIAL NERVES

1. Olfactory
   Test with: odorous things, one nostril at a time
   Abnormal in: trauma to cribriform plate
                 frontal lobe mass or stroke
                 nasal problems (e.g. allergic or viral)
CRANIAL NERVES (cont)

II. Optic
Test with: field of vision, visual acuity
Abnormal in: eye disease or injury (all or part of one eye affected)
- optic chiasm mass (e.g. pituitary tumors; affects both temporal visual fields)
- occipital lobe mass or stroke (contralateral visual field affected in both eyes; can lose half or one quarter of visual field)

III, IV, VI. Oculomotor, trochlear and abducens nerves
Test with: extraocular movements; diplopia (double vision); pupils (CN III)
Abnormal in: brain stem injury or compression (e.g. by tumor or bleeding)
- temporary palsy, e.g. due to diabetes

V. Trigeminal nerve
Test with: facial sensation; masseter muscles
Abnormal in: stroke in contralateral sensory cortex

VII. Facial nerve
Test with: raise eyebrows, show teeth, puff out cheeks, whistle
Abnormal in: stroke causing unilateral weakness (forehead is spared)
- Bell’s palsy (includes forehead)
- Lyme disease (can cause bilateral Bell’s-like palsy)

VIII: Acoustic nerve
Test with: hearing to finger rub or whisper; tuning fork; positional maneuvers for patient with dizziness/vertigo
Abnormal in: tumors at cerebellopontine angle
- acoustic neuroma

IX and X: Glossopharyngeal nerve and Vagus nerve
Test with: gag reflex
Abnormal in: larger strokes (uvula retracts to the normal side)

XI: Accessory nerve
Test with: shoulder shrug, head turn
Abnormal in: neck injuries

XII: Hypoglossal nerve
Test with: tongue protrusion
Abnormal in: stroke (tongue points toward the weak side)
SENSORY EXAMINATION

**Touch**: light touch with cotton swab or filament
   Extinction: touch both sides with eyes closed; patient feels normal side only

**Pin**: broken-off cotton swab stick or other sterile object
   Patient should distinguish sharp and dull
   Two-point: distinguish points 2 to 10 mm apart (on fingers and hands)
      (can be 75 mm apart on thigh and back) – compare sides

**Vibration**: to tuning fork
   Tests: peripheral nerve function

**Proprioception**: with eyes closed, tell if finger and toe are moved up or down
   Tests: posterior columns

**Stereognosis**: with eyes closed, identify pen, coin, paper clip placed on hand
   Tests: parietal-area sensory cortex and posterior columns

**Graphesthesia**: with eyes closed, identify numbers “written” onto palm
   Tests: sensory cortex and integration

STRENGTH TESTING

Test resisted motions: hand grasp, biceps, triceps, hip flexion, knee extension, foot dorsiflexion and plantarflexion

Subtle sign: Pronator drift: close eyes and hold arms horizontally with palms up
   Weak arm will drift down, with palm turning medially

GRADES: 0 TO 5

0/5: No motion
1/5: Slight muscle motion, but minimal motion at joint
2/5: Full motion parallel to ground (can’t move against gravity)
3/5: Full motion against gravity, but not against resistance
4/5: Full motion against some resistance
5/5: Full motion against full resistance; normal
DEEP TENDON REFLEXES

**Biceps**: C5-C6: Elbow supported & flexed; strike your thumb on biceps tendon

**Brachioradialis**: C5-C6: Tap forearm just proximal to radial styloid

**Triceps**: C7-C8: Elbow relaxed at 90 degrees: tap proximal to olecranon

**Quadriceps** (Knee jerk): L2-L4: Sit up w/leg dangling; tap patella tendon

**Achilles** (Ankle jerk): L5-S2): Dorsiflex ankle lightly, tap achilles tendon

**GRADES**: 0 to 4+
0: nothing
1+: slight movement, less than normal
2+: normal
3+: more brisk than normal
4+: brisk, with clonus

**Babinski’s sign:**
Stroke sole with back of reflex hammer, from lateral heel to lateral ball of foot, then medially to medial ball of foot
Normal response: great toe goes down (unless ticklish)
Abnormal response: great toe goes up; other toes fan up; ankle may dorsiflex
Abnormal in: pyramidal tract disease (upper motor neuron disease)
Oppenheim’s sign: similar reaction with pressure on tibia, stroking down to ankle
COORDINATION

Gait: can be normal, or (some examples):

Ataxic (cerebellar disease): wide base; staggering
Spastic hemiplegia (e.g. old stroke): foot inverted, leg too straight and swung out, arm held flexed and close to body
Antalgic (pain-avoiding): minimal time on painful leg/side
Parkinsonian: shuffling, rapid, with little arm swing; turn “en bloc”

Tandem gait (heel to toe):
Abnormal in: ataxia, posterior column disease

Finger to nose: patient touches his/her nose, then examiner’s finger, and repeats rapidly
Abnormal in: cerebellar disease - intention tremor
Variant: repeat with eyes closed (tests position sense in arm and labyrinth)

Heel to shin: patient moves one heel down his/her other shin
Abnormal in: cerebellar disease - jerky motion

Rapid alternating movements: rapidly pronate and supinate hands
Abnormal in: cerebellar disease (Dysdiadochokinesia)

Fine motor: Thumb rapidly touches each finger

Romberg’s test: Patient stands with feet together and closes eyes (+/- arms forward)
Abnormal in: posterior column disease, labyrinthine/vestibular disease

SIGNS OF MENINGEAL IRRITATION:

Nuchal rigidity: Patient can’t flex neck to touch chin to chest, due to pain and spasm

Kernig’s sign: Patient resists straightening knee when hip is flexed to 90 degrees, due to hamstring pain (also seen in spinal disc disease - then called straight leg raising)

Brudzinski’s sign: Examiner flexes neck of supine patient. Patient tries to reduce neck pain by flexing hip.