SMALL GROUP SESSION 21  
February 7th or 9th  

NEUROLOGIC EXAMINATION WORKSHOP AND CASE

**Readings:** Complete the neurologic exam web module before the session.

Readings: Mosby’s (4TH ed.) pp 81-88 and 771-790 or (5th ed.) pp.85-92 and 782-800, OR [http://medicine.ucsd.edu/clinicalmed/neuro2.htm](http://medicine.ucsd.edu/clinicalmed/neuro2.htm)


**Prepare by:**
- Bringing your tuning fork, reflex hammer, cotton swabs or other device to test sensation, and penlight.
- Bringing your hospital interview write-up to turn in and (if you haven’t already done so) the written patient narrative from your preceptor visit.
- Bringing neuroscience and neuroanatomy notes or book.

**Mentors should bring tongue blades and cotton swabs** (and any other supplies needed)

**Brief outline:**

**Section 1:** Touch base (15 minutes)

**Section 2:** Discuss a case (45 minutes)

**Section 3:** Neurologic Examination Workshop (1-2 hrs)

**Section 4:** Evaluate Session (10 minutes)
SMALL GROUP SESSION 21

Section 1: Touch Base (15 minutes)

Section 2: Case: A patient with weakness (45 minutes)
Objectives:
- to discuss the differential diagnosis of a set of neurologic symptoms
- to understand some of the implications of high blood pressure (hypertension)
- to correlate specific neurologic findings with areas of abnormality in the CNS
- to practice using the neurologic examination as a diagnostic tool

Section 3: Neurologic Examination Technique

Objectives: To practice the techniques of the screening neurologic examination, including:
- mental status
- cranial nerves II through XII
- sensation
- strength (done already in extremity exam)
- deep tendon reflexes
- coordination

Caveat: what we are practicing today is not a complete neurologic examination. What you will practice today is a screening neurologic exam - the one in your OSCE. If any of this were abnormal, you would use the additional techniques in your text - and quite likely others as well.
Logistics:

PART 1: MENTAL STATUS
Ask at least the basic orientation questions: place (city, county, building, floor) and time (month, day, year). Then, ask some of the other questions. For example:

- name three items; ask the person to remember them and say them back (registration)
- then: ask them to subtract 7 from 100, 7 from that answer, etc., down to 51 (calculation)
- ask them to spell "world" backwards (language)
- ask them to recall the three items (recall).

You will have received a copy of the mini-mental status examination by now in your lectures. Feel free to use other questions from the mini-mental status exam instead.

PART 2: CRANIAL NERVES

CN II: the optic nerve
1. **Pupils**: test pupil response to light and accommodation (done as part of the eye exam):
   - **Light**: shine penlight into one eye, bringing it in from lateral to the patient's eye. Check for equal constriction of same (direct) and other (consensual) pupil. Do not let patient look directly at the light.
   - **Accommodation**: Stand where you can see both patient's pupils, and hold your finger 2 to 4 inches from the patient's nose. Ask the patient to look far away (e.g. at the wall), then immediately at your finger. Watch pupil reaction.

2. **Visual fields**: test all four quadrants with wiggling fingers. Move your fingers in from arm's length away while patient looks at your nose. Ask patient to tell you when s/he sees your fingers move. Patient should see them at the same time you do (confrontation test).
CN III, IV and VI: the oculomotor, trochlear and abducens nerves

Test this with extraocular movements (part of the eye exam). Ask patient to follow your finger with his/her eyes. Move your finger in all six directions that muscles move the eye:

- laterally to each side: (the lateral rectus, CN VI, moves each eye laterally)
- down and to the patient’s right (the superior oblique, CN IV moves the patient’s left eye this way - medially and down)
- down and to the patient’s left (the right superior oblique/ CN IV)
- up and to the patient’s left and right. CN III, the oculomotor nerve, innervates the other four muscles, which move each eye medially (medial rectus), up and medially (inferior oblique), up and laterally (superior rectus) and down and laterally (inferior rectus).

CN V: The trigeminal nerve

1. **Masseter strength**: Ask patient to clench his/her jaw. Palpate the jaw muscles (masseters).

2. **Facial sensation**: Test facial sensation to light touch and sharp sensation (e.g. sterile needle or broken-off end of wooden sterile cotton swab) on the forehead, cheeks and chin bilaterally

CN VII: The facial nerve

Ask patient to squeeze his/her eyes shut, wrinkle his/her forehead, frown, whistle, grimace. Look for differences between the two sides of the face.

CN VIII: The acoustic nerve

Hold your fingers 3 feet from patient’s ear and rub them together; move them slowly toward the patient. Ask patient to tell you when s/he hears finger rubbing.

OR

Hold one of patient's ears shut while whispering very softly in the other ear; ask patient what you said.

CN IX and X: Glossopharyngeal and Vagus

Press the tongue blade firmly on the posterior third of the patient’s tongue to elicit the gag reflex. The uvula should move symmetrically up.
**CN XI: The spinal accessory nerve**
Place your hand on the patient’s lower face (from chin to ear). Ask patient to push his/her head sideways against your hand (sternocleidomastoid muscle). Do this on both sides.

OR

Place both hands on the patient’s shoulders and ask patient to shrug (trapezius muscle).

**CN XII: The hypoglossal nerve**
Ask patient to stick his/her tongue out and move it from side to side.

**PART 3: SENSATION**

Ask patient to close his/ her eyes for the sensory examination. For each, check on both arms/ hands and both feet/legs, alternating sides.

1. **Sharp and dull:** Test sharp with a sterile needle or broken-off end of a sterile cotton swab stick. Test dull sensation with a cotton swab or similar soft item. Alternate sharp and dull sensation, asking patient to identify whether it is sharp or dull when you touch him/her. Compare both forearms and hands and both calves, ankles and feet.

2. **Position:** Hold finger on each side and move up and down; ask patient to identify when you are moving it up or down. Do this for one finger on each side. Do this also for each great toe.

3. **Vibration:** Patient can open eyes for this. Place a vibrating tuning fork on patient’s finger; ask patient if s/he can feel vibration; if so, ask when it goes away. Compare fingers on both sides and toes on both sides (OR compare wrists on both sides and ankles on both sides).

**PART 4: STRENGTH**
You already tested strength while examining the upper and lower extremities. No need to repeat here.
PART 5: DEEP TENDON REFLEXES
In most cases, tap with the pointed end of the reflex hammer. The flat end may work better for some reflexes (e.g. the brachioradialis). Use a light tap, letting the weight of the rubber hammer do the work. Test on each side, comparing the two sides:

- **the biceps**: where the tendon crosses the front of the elbow
- **the triceps**: proximal to the elbow on the extensor side. For this, hold the patient’s arm straight out from the body and have him/her drop the arm’s weight entirely on you – or have patient’s elbow flexed and forearm resting on patient’s leg or your arm.
- **the brachioradialis**: tap on the radius, a few centimeters proximal to the wrist, while the patient sits with elbow bent, forearm resting and radius/ thumb up.
- **the patellar**: tap on the tendon just below the patella, with the patient sitting.
- **the Achilles**: tap on the Achilles tendon several centimeters above its attachment to the calcaneus
- **the Babinski (plantar) reflex**: Use the pointed metal end of your reflex hammer. Stroke firmly on the sole of the foot, starting from the lateral heel, up to the lateral ball of foot and curving to the medial ball of foot.

PART 6: COORDINATION
1. **Finger to nose**: have patient touch your index finger and his/her nose alternately with his/her index finger, going back and forth quickly several times as you move your finger. Do with each of patient’s hands.

2. **Fine motor**: Ask patient to touch thumb of one hand rapidly to each finger of that hand and repeat. Do with both hands.

3. **Heel to shin**: Ask patient to run the heel of one foot up and down the shin of the other leg. Repeat with the other foot.

4. **Tandem gait**: Ask patient to walk in a straight line heel-to-toe (“the drunk test”).

5. **Romberg**: Ask patient to stand with feet touching each other, arms stretched straight forward but not touching, palms up. Ask patient to close his/her eyes and stay there

6. **Gait**: Ask patient to walk several strides, turn around and come back to you.

Section 4: Evaluate Session (10 minutes)
## Physical Examination
### Objective Structured Clinical Examination (OSCE)

#### Neurological Examination Checklist

<table>
<thead>
<tr>
<th>Procedure</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MENTAL STATUS: Ex asks Pt questions pertaining to his/her orientation (person, place, time, situation). Ex asks a minimum of 3 questions.</td>
<td></td>
<td></td>
<td></td>
<td>(NOTE: CNs II, III, IV AND VI ARE ASSESSED IN HNE OSCE)</td>
</tr>
<tr>
<td>2-8. CRANIAL NERVES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. V – Trigeminal. Ex asks Pt to clench teeth while he/she palpates the muscles of Pt’s jaw. Ex asks Pt to close his/her eyes and identify bilateral facial touch as soft or sharp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. VII – Facial. Ex examines Pt’s facial muscles while asking him/her to squeeze eyes shut, raise eyebrows, wrinkle forehead, frown, whistle, etc. At least one of the above expressions must be requested.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. VIII – Acoustic. Ex asks Pt to tell him/her when Pt begins to hear the ticking of Ex’s watch or rubbing of fingers. Ex begins with watch or fingers approx. 3 feet from the side of Pt’s head and moves in closer until patient hears sound. Alternatively, Ex may ask Pt to distinguish whisper in each ear. Ex tests each ear and covers pt’s other ear while testing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. IX and X – Glossopharyngeal. Ex presses down on or near the posterior wall of the throat with a tongue depressor to elicit the gag reflex.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. XI – Spinal Accessory. Ex asks Pt to push his/her head against Ex’s hand in a sideways fashion OR asks Pt to shrug shoulders up against Ex’s hands.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. XII – Hypoglossal. Ex asks Pt to stick his/her tongue out of the mouth and move it from side to side.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 - 9. SENSORY FUNCTIONS: Ex tests sensory functions by touching Pt bilaterally with alternating soft and sharp OR warm and cold objects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Arms/hands – forearms and hands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Legs/feet – calves, ankles, feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. POSITION SENSE: Ex holds sides of Pt’s finger with his/her two fingers. Ex then moves the finger up or down and asks Pt to say which way it is being moved. REPEATS with the big toe.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. VIBRATION SENSE: Ex places a vibrating tuning fork against the bony prominence of Pt’s WRIST AND ANKLE OR FINGER AND TOE and asks Pt to state when the vibration stops.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**STATION 5: Neurological Examination Checklist (continued)**

A = Attempted Satisfactory  B = Attempted Below Satisfactory  C = Did Not Attempt

<table>
<thead>
<tr>
<th>Procedure</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NOTE: STRENGTH IS TESTED IN THE EXTREMITIES SECTION)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. REFLEX TECHNIQUE: The movement of the hammer should be a rapid downward snap of the wrist. The hammer should not be held too firmly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 - 18. REFLEXES: Ex tests each of the following reflexes bilaterally:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Biceps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Triceps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Brachioradialis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Patellar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Achilles Tendon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Plantar (Babinski)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. COORDINATION OF UPPER EXTREMITIES: Ex asks Pt to alternately touch Ex’s index finger and Pt’s nose. Ex places his/her index finger 18 inches from Pt while changing the location of his/her finger several times. This procedure should be repeated with the Pt’s other hand. AND / OR The Ex asks Pt to rapidly and repeatedly touch his/her thumb with each finger on the same hand. Repeats with Pt’s other hand.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. COORDINATION OF LOWER EXTREMITIES: Ex asks Pt to run the heel of one foot up and down the shin of the opposite leg. Repeats with opposite leg. AND / OR Ex asks Pt to walk a straight line in a heel-to-toe fashion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. ROMBERG SIGN: Ex observes Pt standing with his/her arms stretched out in front or beside him/her with eyes closed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. GAIT: Ex observes Pt walk, turn, and return.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>