Neuroscience Small Group Exercise 1

Case 1

A 79-year old woman with uncontrolled hypertension is taken to the ER one summer afternoon because of the acute onset of nausea, vomiting, dizziness and blurred vision. She has a history of diabetes mellitus and depression.

While being examined in the ER, a physician notices that her left face becomes droopy, and her speech slurred. When you arrive to see her, she is alert, oriented and cooperative. She complains of double vision only when looking toward her left. You note incomplete abduction of her left eye, but other eye movements are full, and the pupils are equal and reactive to light. Her visual fields and optic discs appear normal. The upper and lower parts of the left face are weak. Other cranial nerves appear intact. (The left upper limb and distal right lower limb are weak, but these are the chronic residuals of previous trauma, according to the patient.) Reflexes in the right upper and lower limbs are increased (2-3+) compared to the left side (1-2+). There is no Babinski sign. The sensory examination is unremarkable.

1. Where is the lesion causing her diplopia?

2. Where is the lesion causing her left facial weakness?

3. What region of the brain or brainstem could include the lesions of (1) and (2) above, plus harbor another nearby lesion causing the right hyper-reflexia?

4. What is the likeliest pathology occurring at this region?

5. What diagnostic testing should be done?

6. What do you think happened to the patient?
Case 2

A 77-year-old woman notices hot and cold sensations in her lower limbs, especially on the left, over the past three months. On occasion she has some left inguinal pain, but no back or limb pain. At times her right knee would "give out" and she would stagger when walking. These symptoms have been gradually getting worse. She has a history of myocardial infarction, with permanent pacemaker for arrhythmia.

On examination, she is alert and oriented, with normal visual fields and cranial nerves. There is mild (4/5) weakness of right hip flexion (iliopsoas) and knee flexion (hamstrings) but the other muscles are strong. Upper limb reflexes are equal and 2+, but the knee reflexes are 3+ on the right, 1+ on the left. Both ankle reflexes are absent. There is a right Babinski sign. Pinprick (pain) and temperature sensation are decreased on the left side from the top of the scapula (posteriorly) and just below the nipple (anteriorly) on down. There is no sacral sparing. Proprioception seems to be decreased at the right toes.

1. Where could a lesion in the central nervous system cause the weakness in her right lower limb with its associated signs?

2. Where could a lesion cause her sensory deficit to pinprick (pain) and temperature?

3. Where could a lesion cause her deficit to proprioception?

4. Could any single region of the central nervous system contain all of the lesions discussed in (1), (2) and (3)?

5. What is the likeliest pathology occurring here?

6. What diagnostic testing is indicated here? (Note that she has a pacemaker.)

7. What do you think happened to the patient?
Case 3

A 63-year old man is employed as an equipment transporter and truck driver at a local school. Along with a coworker, he rolls up a large gym mat, carrying it over his shoulder down a stairway. Suddenly, he feels a sharp, painful sensation of heat from his neck to the interscapular area accompanied by shoulder achiness. Although the pain spontaneously disappears, he still feels some “pushing down pressure” at times in the neck and shoulders. Although his strength remains intact, ever since this incident he does not readily feel lacerations or the temperature of the shower water over his arms. His past history includes hypertension, elevated cholesterol, heart disease requiring coronary bypass surgery, and peripheral vascular disease requiring stenting of the aorta and right lower limb. He has a 90-pack year smoking history.

On examination, cotton, pinprick and temperature sensation were absent or reduced over both upper limbs, over the torso anteriorly, from the jaw line to just between the nipples and umbilicus, and over the torso posteriorly, from the occiput to just below the inferior angle of both scapulae. Sensation over the top of the scalp, face and lower body was normal. Vibration and proprioception were normal throughout. Triceps, knee and ankle reflexes were 2+ and equal, but reflexes were 0 to 1+ at the biceps and brachioradialis. Strength, gait, cerebellar testing, visual fields and cranial nerves were all normal.

1. Where could a lesion cause his sensory deficit to pinprick (pain) and temperature?

2. Is sacral sparing present? If so, why?

3. Why is sensation to vibration and proprioception unaffected?

4. Why are the biceps and brachioradialis reflexes absent or reduced, yet there is no clinical weakness present?

5. What is the likeliest pathology here?

6. What diagnostic testing would be most helpful to confirm your clinical diagnosis?