

Peripheral Neurological Examination

This neurological examination is relatively straight forward to remember. The issue is that it is very easy to see when someone has not practised the examination and has not seen others perform it. Even as a more senior student, you can tell if a colleague has performed this examination many times or not. You must practice this examination – go onto the neurology wards regularly as finals approach.

This is usually a 10 minute station, and you may be asked to examine only the upper or lower limb, or both. Time is tight when examining both upper and lower in 10 minutes, so this is something to practice!

The hardest thing about the neurological examination is interpreting the findings and revision of this examination will involve thinking about the differentials of the potential signs. Always remember that you will pass if you perform a good examination and detect the signs, even if you are unsure of their significance.

Before you begin the actual examination of the limbs:

- Look at the patient globally before you start the examination. Is the patient sitting comfortably, any suggestive facial features such as mask like facies etc. This can often lead to clues and is regularly skipped
- Ensure adequate exposure of the limbs to be examined. If male take off shirt for upper limb for example.
- In the upper limb, inspect the posterior neck for any scars (e.g., repair of Arnold Chiari malformation scar was seen in my ENRO OSCE); in lower limb ideally inspect lumbar spine. The reason is that spinal surgery/trauma can lead to neurological signs in the respective limbs.
- **Upper limb** – ask the patient to put out their arms in front of them supinated and close their eyes. Look for pronator drift (pyramidal sign), pseudoathetosis (finger writhing suggesting loss of proprioception) or arms rising (cerebellar)
- **Lower limb** – inspect the patient walking to assess the gait: antalgic, spastic, ataxic, shuffling etc. Again, gives important clues

Now you are ready to go on to the examination – but by now you may have clues as to what you are likely to find.

Inspection

- Look at the position of the limbs for clues e.g. flexed arm / extended leg – stroke
- Muscle wasting
- Involuntary movements and describe: choreiform, ballismus
- Skin changes – e.g., scars, neurofibromas
- Fasciculations – differential includes MND, peripheral neuropathy, thyrotoxicosis, motor root compression, electrolyte disturbances

Tone

- Move the joints of the limb through their range, slowly.
- Ensure that the patient is distracted adequately. One way to achieve this is to ask the patient to count back from 20.
- Test wrist and elbow movements in the UL
- Test knee and ankle movements in the LL
- In the LL remember to test for clonus – more than a few beats is abnormal
- Possible findings include: reduced tone (lower motor neurone injury), clasp-knife rigidity (CVA), lead pipe / cog wheel rigidity (extrapyramidal – Parkinsons)

Power

- Assess the force of the muscles against the MRC scale:
 - 0 – no movement
 - 1 – flicker of movement
 - 2 – moves with gravity eliminated
 - 3 – moves against gravity but not resistance
 - 4 – reduction of movement against resistance
 - 5 – full power
- Ask the patient about their handedness as this gives important information
- Describe the pattern of reduced power e.g. symmetrical
- Motor nerve roots vary depending on the text used, but an easy way of remembering is as follows:
- **Upper limb**
 - Shoulder abduction – C5
 - Elbow flexion – C5, C6
 - Elbow extension – C7, C8
 - Wrist flexion – C7
 - Wrist extension – C7
 - Intrinsic muscles of hand e.g. finger ab/adduction – T1
 - One piece of advice is to compare the movements of the wrist, hand and fingers to the same movement in yourself, as this is the best comparison. For example you may easily overcome thumb abduction if you don't use your own thumb abduction to compare it against.
- **Lower limb**
 - Hip flexion – L2, L3
 - Hip extension – L4, L5
 - Knee extension – L3, L4
 - Knee flexion – L5, S1
 - Ankle dorsiflexion – L4, L5
 - Ankle plantarflexion – S1, S2
 - Note how each joint involves 4 sequential roots, and each joint starts one level lower than the previous, hence making it easier to remember.

Reflexes

- Ensure that you are able to elicit the reflexes in a slick sequence. This is one of the areas where an examiner can see if you have practiced the examination or not. You can elicit all reflexes of the upper limb without the patient needing to

move their arm. Watch a neurologist eliciting the reflexes and then practice on as many patients as possible

- **Upper limb**
 - Biceps – C5, C6
 - Supinator – C6
 - Triceps – C7, C8
- **Lower limb**
 - Knee – L3, L4
 - Ankle – S1, S2 – practice this many times as you should be able to elicit the reflex by striking the Achilles tendon.
- Remember to use distraction and manoeuvres such as jendrassic if you are having difficulty eliciting the reflexes.
- Measure like with like because it is important to compare reflexes on either side, as the patient may have reflexes that are hard to elicit though out. Indeed patients can have absent reflexes so don't be phased if you can't elicit them.

Coordination

- **Upper limb**
 - Test finger – nose coordination. Remember, your finger should be far enough that the patient is at full elbow extension to reach. Also, don't move your finger once the patients finger is approaching
 - Test for disidiadokokinesis with alternating hand movements
- **Lower limb**
 - Ask the patient to run their heel along the shin of the opposite leg. The way I found easiest to do this was to touch the patients heel, and ask them to move this heel, up and down their shin, and I would indicate the movement with my finger up and down their shin, as this was the easiest way to achieve this.

Sensation

- This is often a feared part of the examination because of lack of confidence and opportunity to practice with a neurologist watching to critique.
- To interpret your findings, you need to be confident about the Neuroanatomy of the dorsal columns and spinothalamic tract. Remember that fine touch is not a useful modality to test as this is carried in both tracts and is therefore not useful in identifying disassociated sensory loss as in syringomyelia.
- **Dorsal columns**
 - Proprioception – using the terminal phalanx of the little finger move it up and down with the patient watching. Then ask the patient to close their eyes. VERY small movements can be detected accurately usually – test it on yourselves. If the patient is inconsistent suggesting impairment, test at the wrist, then elbow. Loss is distal to proximal usually. Repeat on the other side to assess for symmetrical nature of lesion. In the lower limb test the great toe, then ankle.
 - Vibration – use a 128Hz tuning fork. It is important to place the fork on bony points. 'calibrate' the patient by placing on sternum to ensure the patient can detect the vibration. Then place on bony points distal to

proximal UL – thumbs MCP joint, radial styloid, epicondyle of humerus, clavicle. LL – side of great toe MTP, medial malleolus, tibial tuberosity, iliac crest.

- **Spinothalamic tract**

- Pain – using a neurotip which has a sharp end and blunt. Again, ‘calibrate’ the patient by demonstrating on the sternum the sharp and blunt sides. Ask the patient to close their eyes and report whether the feeling is sharp or blunt, as you proceed along the dermatomes with an unpredictable pattern of blunt/sharp touches.
 - Temperature – unlikely to need to perform this in an exam, but could describe that you would do it using hot and cold test tubes, starting distally and proceeding proximally if necessary.
- Soft touch can be tested using cotton wool, but as mentioned is carried in both tracts, but can be used to assess gross sensation. Usually move in a dermatomal pattern.
 - The aim of the sensation examination is to decide if the sensation is normal, or if a deficit, if this is dissociated / complete, and if it is dermatomal, named nerve or a peripheral neuropathy.

Cerebellar examination

Cerebellar signs include:

- Past-pointing
- Intention tremor
- Disdiadokokinesis
- Rebound
- Ataxia
- Nystagmus
- Staccato speech
- Hypotonia

This can be remembered as the mnemonic: PIDRANSH!

When revising for the peripheral neurological examination, think about the type of patients that may be readily available for coming to examination with signs. Know about: Parkinsons, Motor Neurone Disease, Multiple Sclerosis, Guillain-Barre syndrome etc.