An Illustrated Guide For Peripheral Nerve Examination

Bedside Teaching for 2nd year medical Students

Prepared by:

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Clinical Teacher (Hon)

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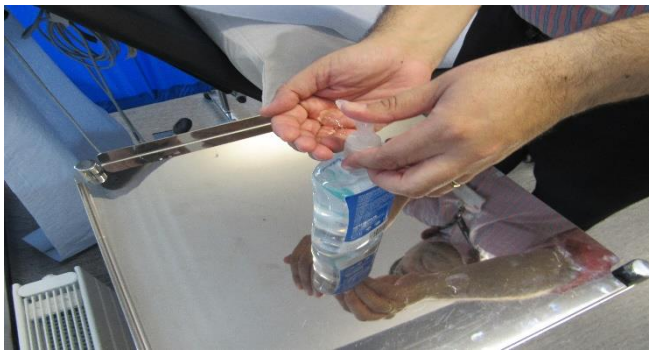
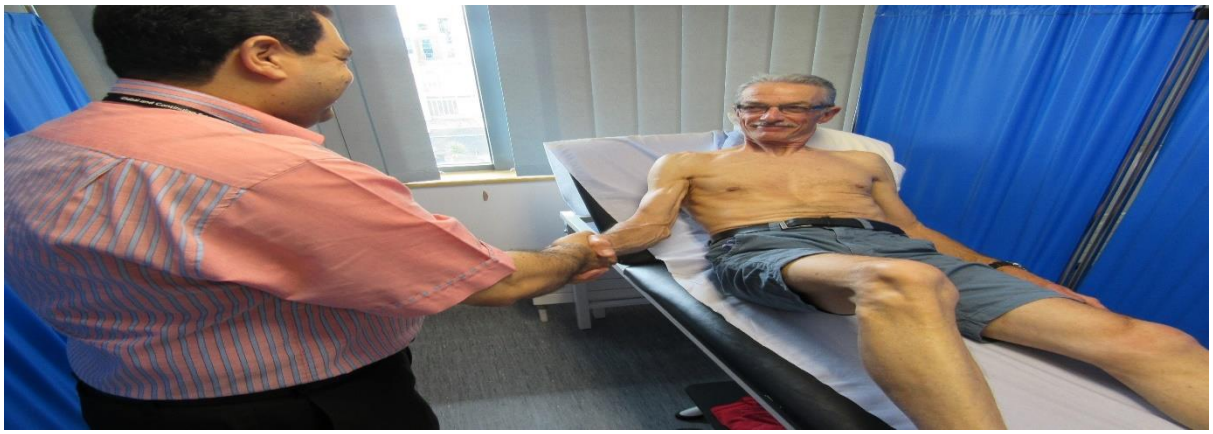
Before Examination :



Wash hands
Introduce yourself
Confirm patient details – *name / DOB*
Explain the examination
Gain consent
Ask patient if they have pain anywhere before you begin!



Peripheral Nerve Examination (upper limb)

Motor System Examination

Patient can be sitting or lying.

Observe the patient's general condition – aids (e.g., frame, wheelchair) at the bedside.

Look for wasting, asymmetry, fixed position (contractures), fasciculations, abnormal movements, scars.

Examine drift (cerebellar or pyramidal) ask patient to hold both arms out in front of them at shoulder height and close eyes; if one arm drifts down or pronates test is positive and indicates an upper motor neurone lesion

Tone – by passive movement assess in multiple joints (elbow, wrist) bilaterally. Pronate/supinate forearm

Power - Examine systematically (proximal to distal or distal to proximal). Side to side comparison.
Examination of different movements are in details in the following pages

COMMONLY TESTED MOVEMENTS

Movement	UMN	Root	Reflex	Nerve	Muscle
Upper limb					
Shoulder abduction	++	C5		Axillary	Deltoid
Elbow flexion		C5/6	+	Musculocutaneous	Biceps
		C6	+	Radial	Brachioradialis
Elbow extension	+	C7	+	Radial	Triceps
Radial wrist extension	+	C6		Radial	Extensor carpi radialis longus
Finger extension	+	C7		Posterior interosseus nerve	Extensor digitorum communis
Finger flexion		C8	+	Anterior interosseus nerve	Flexor pollicis longus + Flexor digitorum profundus (index)
				Ulnar	Flexor digitorum profundus (ring + little)
Finger abduction	++	T1		Ulnar	First dorsal interosseous
		T1		Median	Abductor pollicis brevis

The table shows some commonly tested movements, the principal muscle involved with its roots and nerve supply. The column headed UMN indicates those movements which are preferentially weak in upper motor neuron lesions.

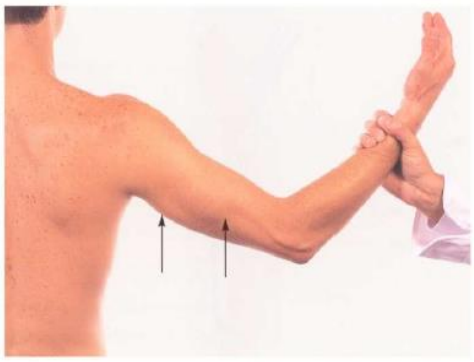
Shoulder abduction (C5)

Abduct arms against resistance

Shoulder Flexion (C5 &C6)

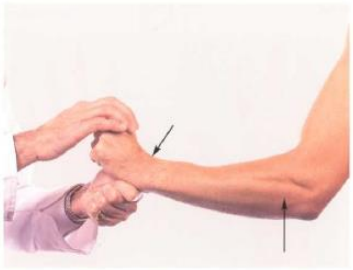
Elbow flexion (C5,6) and extension (C7)

Biceps (Musculocutaneous nerve; C5, C6)
The patient is flexing the supinated forearm against resistance.
Arrow: the muscle belly can be seen and felt.



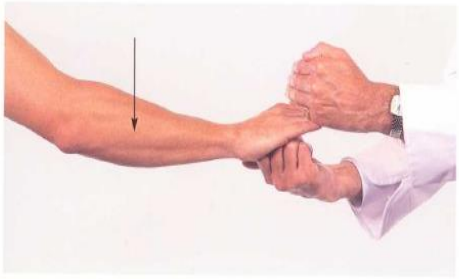
Triceps (Radial nerve; C6, C7, C8)
The patient is extending the forearm at the elbow against resistance.
Arrows: the long and lateral heads of the muscle can be seen and felt.

Wrist extension (C6)



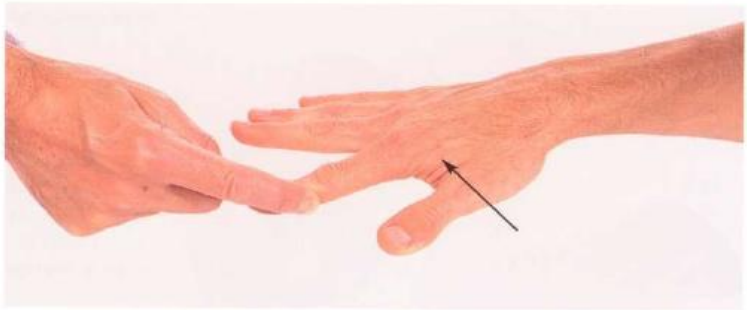
Extensor Carpi Radialis Longus (Radial nerve; C5, **C6**)
The patient is extending and abducting the hand at the wrist against resistance.
Arrows: the muscle belly and tendon can be felt and usually seen.

Finger extension (C7, radial nerve)



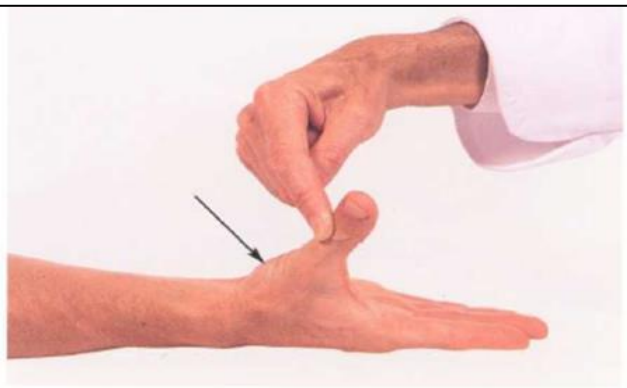
Extensor Digitorum (Posterior interosseous nerve; **C7**, C8)
The patient's hand is firmly supported by the examiner's right hand. Extension at the metacarpophalangeal joints is maintained against the resistance of the fingers of the examiner's left hand. *Arrow*: the muscle belly can be seen and felt.

Finger abduction (T1, ulnar nerve)



First Dorsal Interosseous Muscle (Ulnar nerve; C8, **T1**)
The patient is abducting the index finger against resistance.
Arrow: the muscle belly can be felt and usually seen.

Thumb abduction (T1, median nerve) – with palms upwards, point thumbs to ceiling



Abductor Pollicis Brevis (Median nerve; C8, T1)
The patient is abducting the thumb at right angles to the palm against resistance.
Arrow: the muscle can be seen and felt.

Finger Flexion (C8 , Anterior interosseous nerve)

Flexor Digitorum Profundus I and II (Anterior interosseous nerve; C7, C8)
The patient is flexing the distal phalanx of the index finger against resistance with the middle phalanx fixed.

Flexor Pollicis Longus (Anterior interosseous nerve; C7, C8)
The patient is flexing the distal phalanx of the thumb against resistance while the proximal phalanx is fixed.

Flexor Digitorum Profundus III and IV (Ulnar nerve; C7, **C8**)
The patient is flexing the distal interphalangeal joint against resistance while the middle phalanx is fixed.

Opponens pollicis

Thumb Adduction (T1, ulnar nerve)

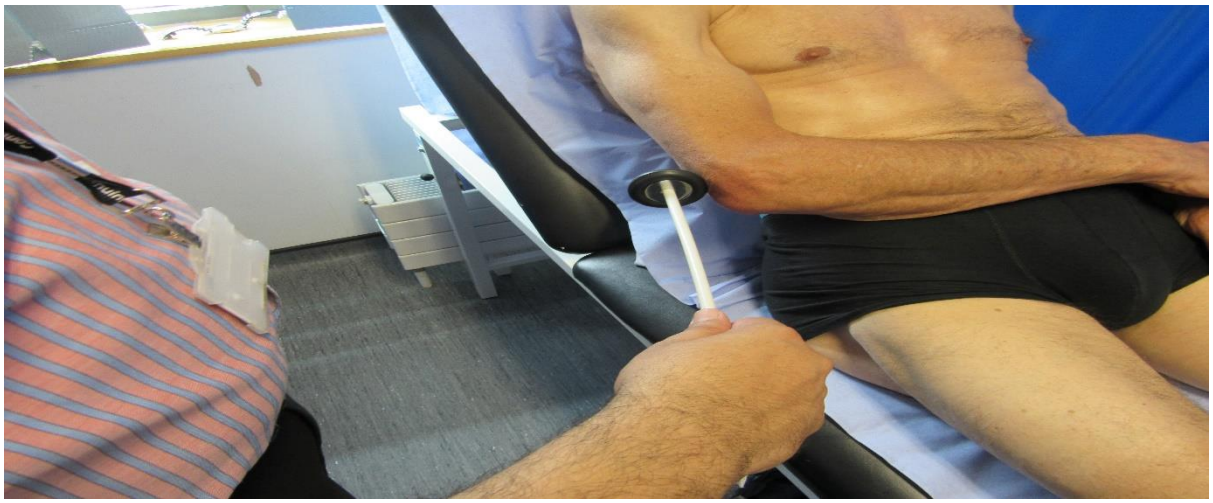
Adductor Pollicis (Ulnar nerve; C8, T1)
The patient is adducting the thumb at right angles to the palm against the resistance of the examiner's finger.

MRC Power Grading 0-5

0	no movement
1	brief muscle contraction but no movement
2	movement with gravity eliminated
3	movement against gravity
4	movement against gravity/some resistance
5	full and normal power

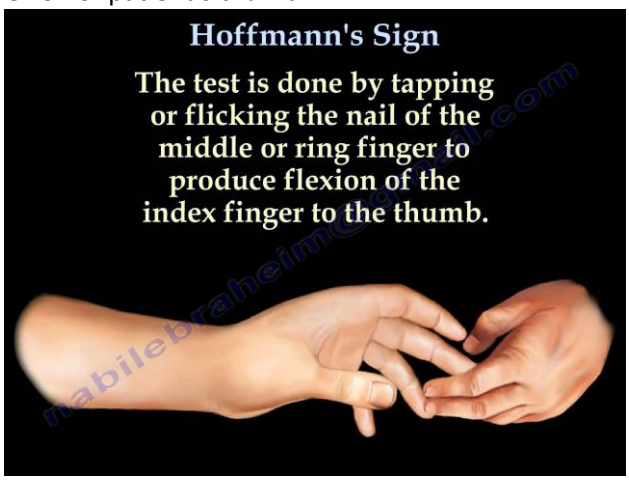
Reflexes - examine in upper limbs side to side
Biceps (C5, 6) – flex elbow across lap, put your finger on biceps tendon, strike finger and watch biceps contract

Triceps (C7) – flex elbow across lap, strike triceps tendon just above olecranon, watch triceps contract



Supinator (C5, 6) – flex elbow across lap, lower arm with thumb upwards, either strike extensor aspect of wrist directly or rest finger on extensor aspect of wrist and strike finger, watch brachioradialis contract

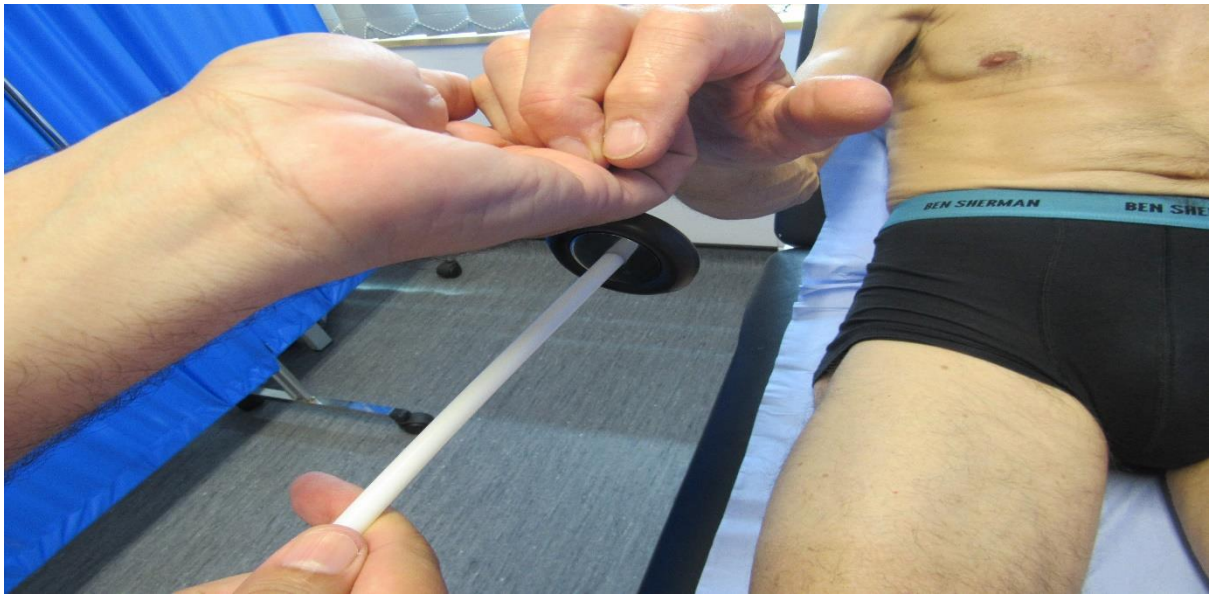
Hoffmann's reflex – put right index finger underneath distal interphalangeal joint of patient's middle finger; flick finger down with thumb, watch if reflex flexion of patient's thumb



Pathological Reflexes :

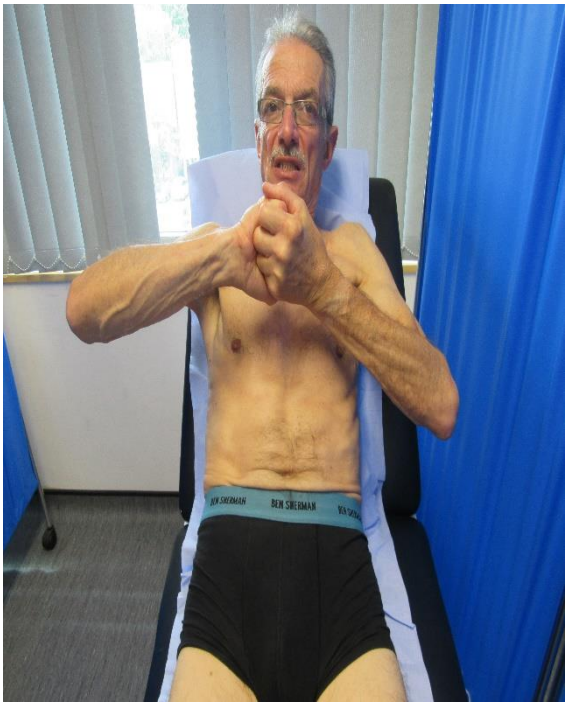
1- **Supraspinatus reflex: Present only in UMNL (Upper Motor Neurone Lesion)**

2- **Finger Reflex :** tap the palmar surface of the middle 3 fingers while they are slightly flexed,if positive flexion of fingers occur. Normally it is absent . It is present in UMNL



Important Remarks about reflexes :

1- **In absent reflex, repeat after "reinforcement" or Jenderassik`s manoeuvre.Ask the patient to clench his teach or clutch his hands together.**



2- **In hyperreflexia elicit clonus**

Ankle Clonus

Patellar clonus

Co-ordination

- Examine finger-nose coordination (intention tremor)
Examine rapid-alternating movements (dysdiadochokinesis) – supinate/pronate one hand rapidly on the other

Dysdiadocokinesia

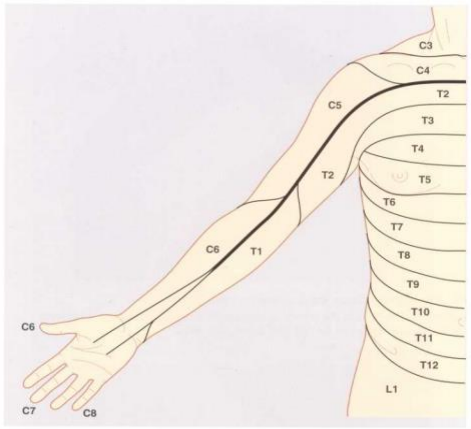
Finger to doctor`s finger

Finger to nose

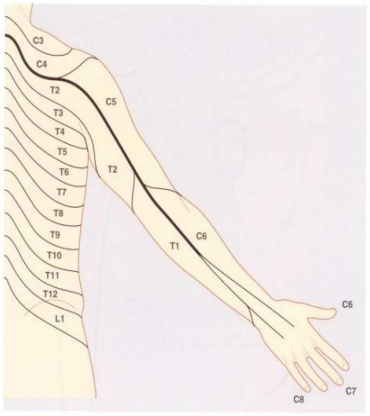
Sensory System Examination

Examine light touch comparing limbs systematically in dermatomal pattern (**cotton wool**, tissue paper; touch not stroke; patient closes eyes), **pin sensation** (as light touch but ask patient to report if feels blunter or sharper) (or length dependent if so instructed) (See ASIA chart on Learning Central)

DERMATOMES



Approximate distribution of dermatomes on the anterior aspect of the upper limb.



Approximate distribution of dermatomes on the posterior aspect of the upper limb.

Examine **vibration** distally, moving proximally only if abnormal. Use 128 Hz tuning fork. Ask patient to tell you when vibration stops.

Examine **proprioception** distally, moving proximally only if abnormal. Start with first finger

Peripheral Nerve Examination (lower limb)

Motor System Examination

Patient is generally lying flat.

Observe the **patient's general condition** – aids (e.g., frame, wheelchair) at the bedside.

Look for wasting, asymmetry, fixed position (contractures), fasciculations, abnormal movements, scars, sores, note if patient catheterised.

Tone - assess tone in multiple joints (knee, ankle) bilaterally.
Check for **ankle clonus** – bend leg at knee and quickly dorsiflex foot

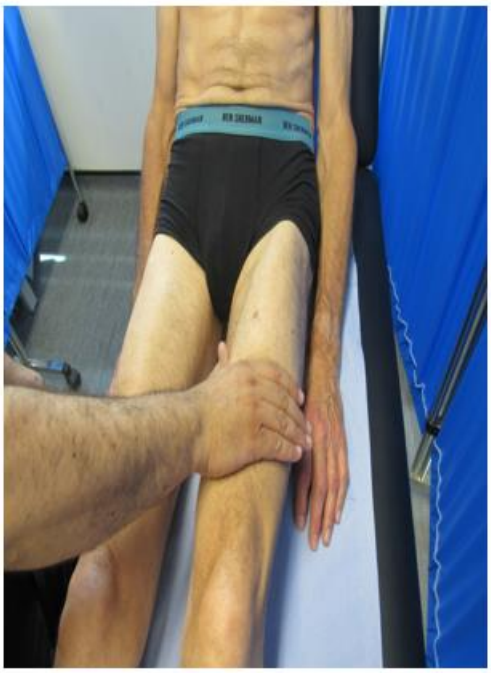
Power - Examine systematically (proximal to distal or distal to proximal). Side to side comparison.

COMMONLY TESTED MOVEMENTS

Lower limb					
Hip flexion	++	L1/2			Iliopsoas
Hip adduction		L2/3	+	Obturator	Adductors
Hip extension		L5/S1		Sciatic	Gluteus maximus
Knee flexion	+	S1		Sciatic	Hamstrings
Knee extension		L3/4	+	Femoral	Quadriceps
Ankle dorsiflexion	++	L4		Deep peroneal	Tibialis anterior
Ankle eversion		L5/S1		Superficial peroneal	Peronei
Ankle plantarflexion		S1/S2	+	Tibial	Gastrocnemius, soleus
Big toe extension		L5		Deep peroneal	Extensor hallucis longus

The table shows some commonly tested movements, the principal muscle involved with its roots and nerve supply. The column headed UMN indicates those movements which are preferentially weak in upper motor neuron lesions.

Hip flexion (L1,2) – 'lift your leg – don't let me push it down'
Hip extension – 'now push down with your whole leg'



Knee extension (L3,4) – with bent knee 'kick me away'

Adductors (L2/3)

Hip Abductors (L4/5)

Hip Extesion (L5/S1) (Push my hand)

Knee flexion (L5,S1) – ‘bend your knee , don’t let me straighten it’

Ankle plantar flexion (S1) – ‘push foot down’ (against resistance)

Soleus (Tibial nerve; S1, S2)

The patient lies on his back with the limb flexed at the hip and knee and is plantar-flexing the foot against resistance. The muscle belly can be felt and sometimes seen.
Arrow: the Achilles tendon.

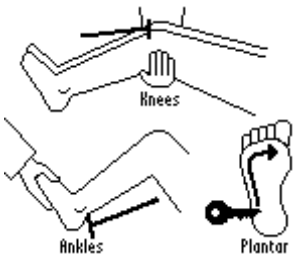
Ankle dorsiflexion (L4,5) – ‘now push foot up/stop me pushing foot down’

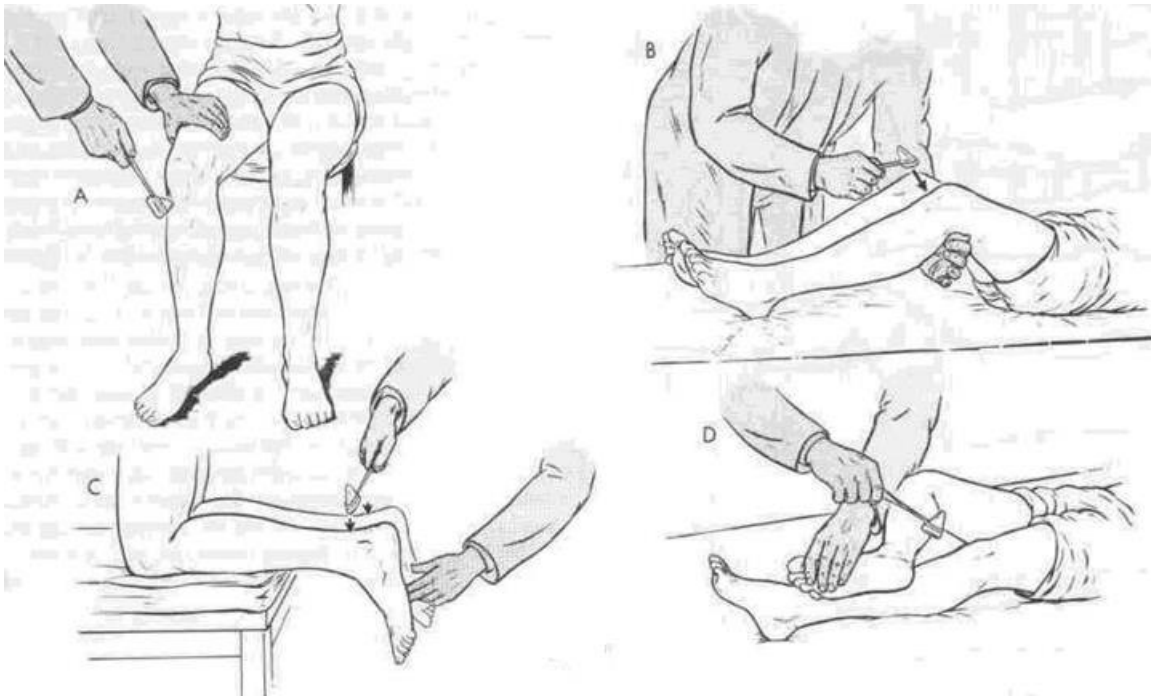
Great toe extensor (L5) – ‘push your big toe up towards your face’

Extensor Hallucis Longus (Deep peroneal nerve; L5, S1)
The patient is dorsiflexing the distal phalanx of the big toe against resistance.
Arrow: the tendon can be seen and felt.

Grade 0-5 as for upper limb

Reflexes - examine in lower limbs side to side



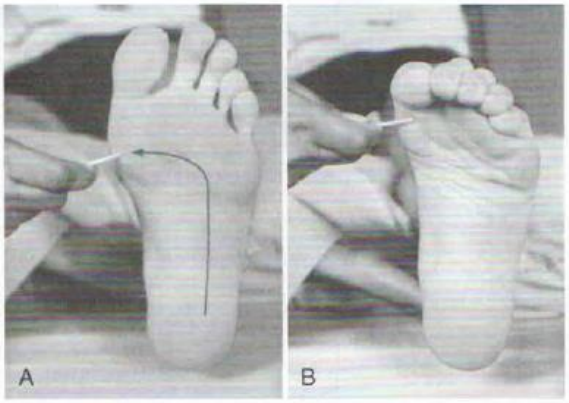


Knee/Patellar (L3,4)

Ankle (S1)

Plantar – firm stroke blunt instrument along lateral border of foot, starting at heel, if normal first movement of great toe is plantar flexion (moving downwards)

Plantar response examination. **A,** To elicit the plantar reflex, the examiner applies firm, constant pressure along the lateral surface of the sole, starting at the heel and moving along the ball of the foot, ending beneath the great toe. **B,** The normal response to plantar stimulation is flexion of all the toes. (From Barkauskas VH, Baumann LC, Darling-Fisher CS. *Health and Physical Assessment.* 3rd ed. St. Louis: Mosby; 2008 [p. 484, Figures 19-42, 19-43].)



Pathological Reflexes :

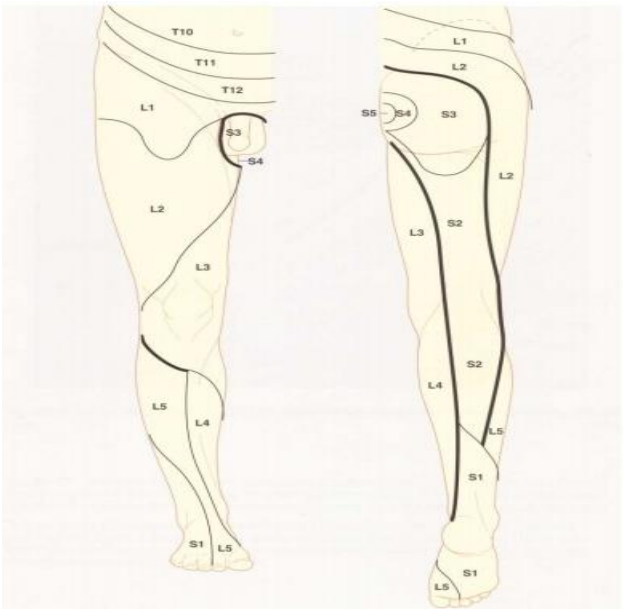
1- **Adductor Reflex:**

Co-ordination

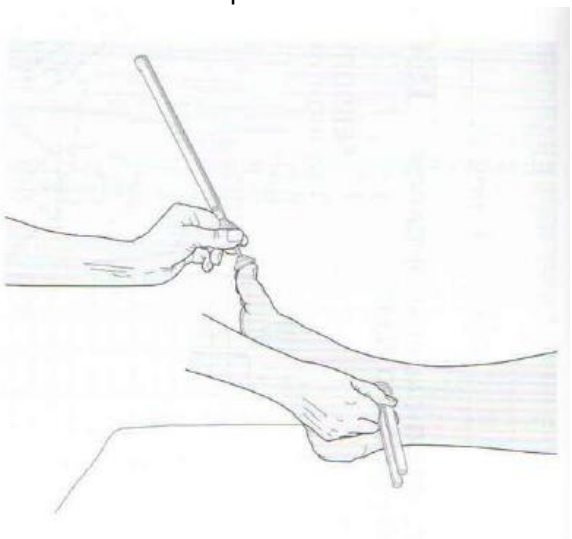
Examine heel-knee-shin coordination – ask patient to slide one heel in straight line down other shin and repeat other side

Sensory System Examination

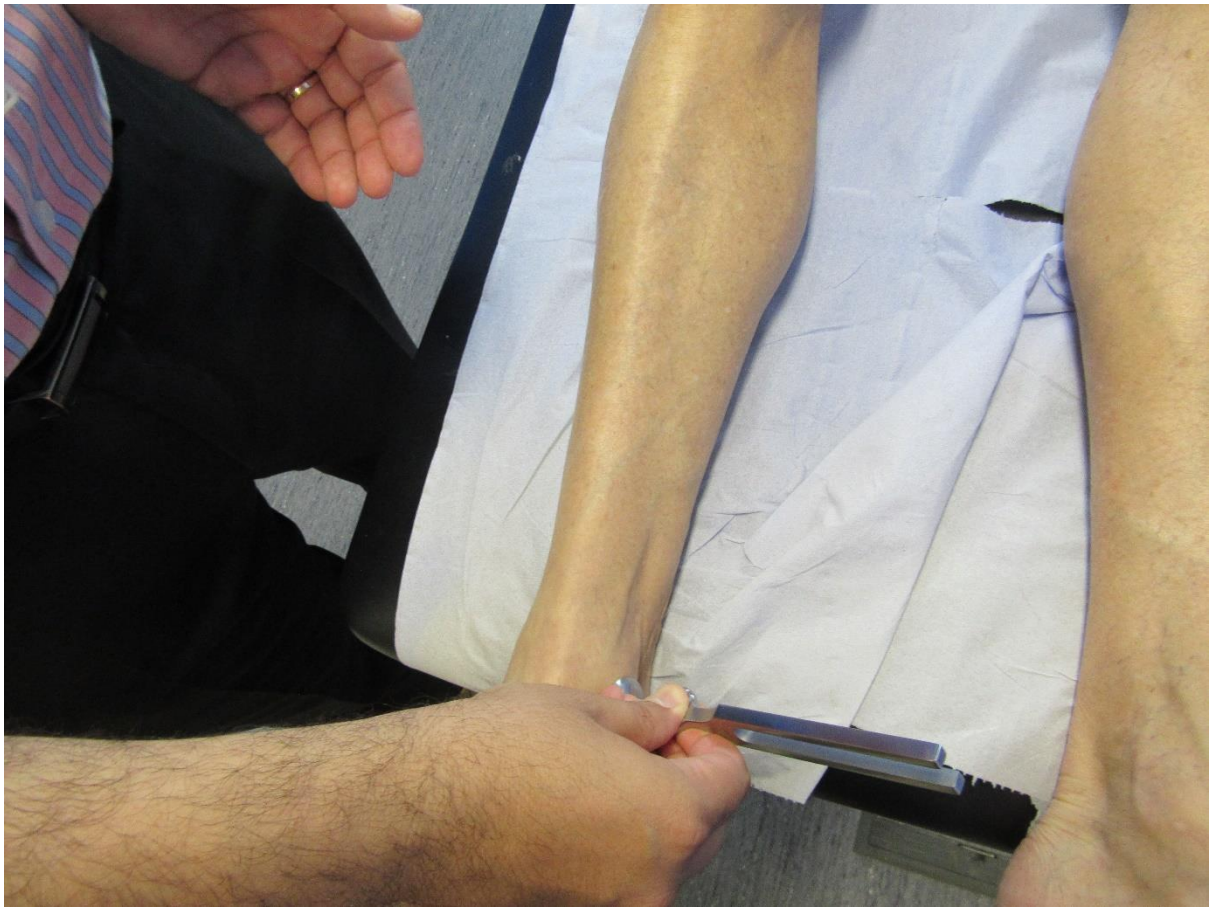
Examine light touch comparing limbs systematically in dermatomal pattern (cotton wool, tissue paper; touch not stroke; patient closes eyes), pin sensation (as light touch but ask patient to report if feels blunter or sharper) (or length dependent if so instructed) (See ASIA chart on learning Central)



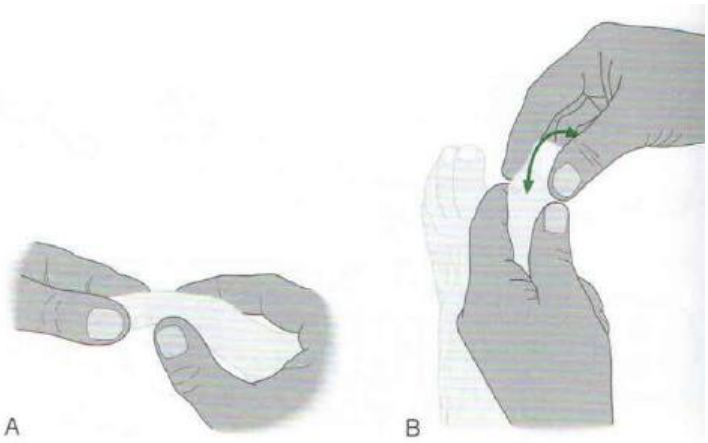
Examine vibration, start distally and move proximally if negative (big toe then bony malleolus of ankle). Use 128 Hz tuning fork. Ask patient to tell you when vibration stops.



Examination of vibration sense. (From Hall T. *PACES for the MRCP with 250 Clinical Cases*. 2nd ed. Philadelphia: Elsevier; 2008 [p. 397, Figure 3.32].)



Examination of proprioception in a finger **(A)** and toe **(B).** (From Hall T. *PACES for the MRCP with 250 Clinical Cases.* 2nd ed. Philadelphia: Elsevier; 2008 [p. 397, Figure 3.31].)



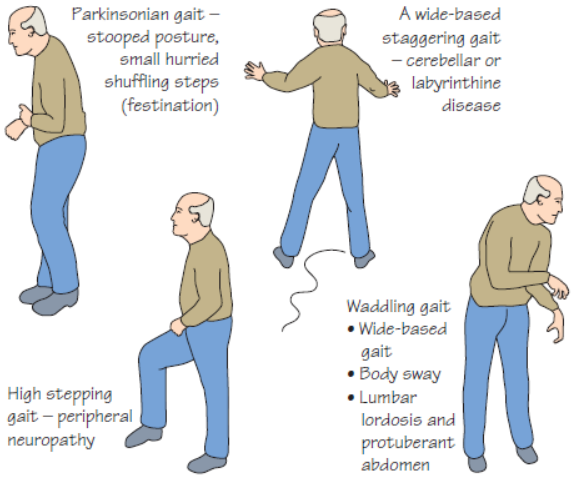
Romberg's Test – ask patient to stand with feet together, then ask them to close eyes - watch if they wobble (don't let them fall!!)

Examine gait

Station 92: Gait

Routine
General inspection
If appropriate ask the patient if they can stand/walk without assistance
Let them use their walking aid if present
Ask them to stand first
Ask the patient to walk for a few metres, turn around and walk back
Walk heel to toe/walk on heels/walk on toes
Completion

Gait disorders
Apraxic = frontal lobe problem = feet glued to floor
Cerebellar ataxia
Hemiplegic
Marche à petits pas (widespread cerebrovascular disease)
Myopathic = waddling = proximal muscle weakness
Neuropathic = foot drop = high stepping
Parkinsonian
Sensory ataxia = posterior column loss = stamping of feet
Spastic paraparesis = scissoring



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3- http://geekymedics.com/eye-examination-osce-guide/

4- Tim Hall: PACES for the MRCP with 250 cases .Third edition.

5- Aids to the examination of peripheral nervous system, fourth edition .2000

5- Google images