Clinical Examination

Matthew Shun-Shin

matthew.shunshin@gmail.com

Cardiovascular Examination

WIPE	**Wash hands**: **Introduce**: + Explanation of procedure + Consent. **Position**: In bed at 45 degrees. **Exposure**: Chest Exposed.
Environment	Monitors? Oxygen? TED Stockings? Infusions? Insulin pen? Cigarettes? Etc...
Peripheral stigmata of disease: Look at the whole patient, hands, arms, face, eyes, mouth...	**Impression:** Sick or well? Sitting up, SOB, or comfortable? Thin and wasted? Obese (risk factor). Syndromic appearance. **Respiratory distress**: Breathless, increased **respiratory rate**, cyanosis (peripheral and central). **Anaemia**: Pallor of hands, creases, under eyelids. **Shock**: Cold, clammy, pale, tachycardia, capillary refill > 2s. **Smoker**: Nicotine stains. **Clubbing**: Congenital cyanotic heart disease, infective endocarditis. **Infective endocarditis**: Splinter haemorrhages; Osler nodes (tender subcutaneous papules); Janeway lesions (painless erythematous macules); poor dentition, needle marks (source of infection). **Hyperlipidaemia**: Xanthoma, xanthelasma (yellow plaques, eyelids), corneal arcus. **Thyrotoxicosis**: Hot, tremor. **Malar flush**: Mitral stenosis.
Pulse	Radial and carotid (auscultate for bruits). **Rate**: Brady or tachycardia? (40-100). **Rhythm**: Is it regular? Irregularly irregular - atrial fibrillation. **Volume**: Thready – shock **Character**: Normal; slow rising – aortic stenosis; collapsing – aortic regurgitation. **Radial-radial/femoral delay**: Coarctation of the aorta.
Venous pulsation	**JVP**: Not usually palpable, obliterated by pressure, double pulsation, rises with pressure on abdomen. Measure height (not distance) from sternal notch. **Raised**: Fluid overload / RVF.
Chest: Inspection	**Scars**: Median sternotomy (+ those of harvested vessels) – CABG, valve replacement. Pacemaker.

Chest: Palpation	**Apex beat:** Normally in the 5th intercostal space in the mid-clavicular line, with small impulse area. Laterally displaced, and diffuse impulse – LVF, dilated cardiomyopathy. **Parasternal heave**: RV enlargement. **Thrills**: Transmitted murmurs, feel over the ausculattion areas.
Auscultation sites	Mitral - Apex; Tricuspid - 4th ICS Left; Aortic - 2nd ICS Right; Pulmonary - 2nd ICS Left;.
Heart Sounds	**Listen in all four areas**: Identify the 1st (synchronous with carotid pulsation) and 2nd heart sounds. **Added sounds**: S3 (Ken-tucky); S4 (Tenne-ssee). Mechanical sounds of prosthetic heart valves.
Murmurs	**Timing**: Systole – Aortic stenosis, or mitral regurgitation. **Character**: Ejection systolic – aortic stenosis; pansystolic – mitral regurgitation. **Loudness**: Grade out of 6; 1 – very soft, 2 – soft, 3 – clearly audibly, no thrill; 4 - palpable thrill; 5 - audible with stethoscope partially touching chest, 6 – can be heard without stethoscope. **Area where loudest**: E.g. Aortic stenosis is heard best in the right 2nd intercostal space. **Radiation**: Listen at the carotids (aortic incompetence), and in the axilla (mitral stenosis). **Accentuating manoeuvres**: **Inspiration** – right sided murmurs; **expiration** – left sided murmurs. **Lean forward –** aortic incompetence**; left lateral position –** mitral stenosis**.**
Lungs	**Basal coarse crackles / stony dullness**: Pulmonary oedema / effusion – LVF, CCF.
Oedema	**Pitting oedema**: Ankles, legs, sacrum (press down and note depression) - RVF, CCF.
Abdomen	**Hepatomegaly and ascities**: RHF, CCF
Finish up	**BP, Pulse ox, dipstick, ECG, CXR.**

Respiratory Examination

WIPE	**Wash hands**: **Introduction**: **Position**: 45 degrees at first. **Exposure**: Chest and abdomen exposed.
Environment	Inhalers, cigarettes, pancreatic enzymes, nebulisers, on oxygen? **Sputum pot**: Look and smell.
Peripheral stigmata of disease: Look at the whole patient, hands, arms, face, eyes, mouth...	**Appearance**: SVC obstruction, systemic sclerosis, lupus pernio. **Respiratory distress**: Rate; pattern; use of accessory muscles, wheezing, stridor, hoarse voice, cough. **Hypoxia:** central cyanosis **Hypercapnia**: drowsiness, confusion, papilloedema, warm, bounding pulse, hand flap. **Anaemia**: Pallor of hands, creases, and eyelids. **Smoker**: Nicotine stains **Clubbing**: NSCLC, mesothelioma, fibrosis, UIP, bronchiectasis, cystic fibrosis, lung abscess, empyema. **Horner syndrome**: Ptosis, miosis, anhydrosis.
Pulse and BP	**Tachycardia**: Hypoxia, anxiety.
Venous pulsation	**Raised JVP**: Fluid overload / RVF.
Lymph nodes	**Nodes**: Infection, neoplasm, sarcoid.
Trachea	Place index and ring finger either side of sternomastoid with middle finger assessing relationship to trachea. **Trachea towards**: fibrosis, collapse. **Trachea away from**: pneumothorax, effusion. **Tracheal tug**: With ventilation – severe airflow limitation, COPD; with systole – aortic arch aneurysm.
Chest: inspection	**Scars, drains.** **Radiotherapy marks**: Skin damage, alignment tattoo. **Barral chest** – emphysema; **Pidgeon** – rickets; **Funnel** – congenital. **Spine curvature**:

Chest: palpation	**Tender**: Rib fracture, musculoskeletal. **Decreased expansion** - <5cm: Effusion, consolidation, collapse, pneumothorax, fibrosis. **Tactile vocal fremitus**: Increased – consolidation; Decreased – pneumothorax, effusion.
Chest: Percussion	**Increased resonance**: Pneumothorax, hyperinflation (COPD). **Decreased resonance**: Consolidation, pulmonary oedema, pleural effusion ("stony dull"). Also, liver and cardiac.
Chest: auscultation	Auscultate apices of lung - supraclavicula fossa. **Prolonged expiratory phase:** asthma, COPD. Quality, intensity, added sounds. **Diminished breath sounds**: pleural effusion, pleural thickening, pneumothorax, bronchial obstruction, asthma, COPD. **Bronchial** – normal if over bronchial tree, otherwise – consolidation, cavitation, atelectasis, tension pneumothorax, over the top of a pleural effusion. **Inspiratory crackles:** Pulmonary oedema, consolidation, fibrosis (fine, end inspiratory). **Expiratory wheeze**: Obstructive disease – asthma and COPD (polyphonic); tumour (monophonic). **Pleural rub**: Pneumonia, infarction… **Vocal resonance** – whisper 99 whilst listening: Increased – consolidation; Decreased – pneumothorax, effusion. **Whispering pectoriloquy** - positive sign of increased quality and loudness of whispers that are heard with a stethoscope: lung consolidation.
Chest, heart, abdomen	**Impalpable apex beat**: COPD. **Pemberton sign** – raise both arms, development of facial plethora, cyanosis, distension of neck veins: Thoracic inlet obstruction – retrosternal goitre, lung tumour, lymphoma, thymoma, dermoid cyst, aortic aneurysm. **Right ventricular failure** – peripheral oedema, raised JVP, large tender liver, ascities: Lung fibrosis, increased pulmonary resistance.
Legs	**Oedema**: RVF. **DVT** – hot, swollen, leg, tender calf: Possible PE.
Finish	CXR, peak flow, lung function, sputum.

Gastrointestinal Examination

WIPE	**Wash hands**: **Introduciton**: **Position**: Lying flat, one pillow, arms by side. **Exposure**: Exposed nipple-to-knee (but never done).
Environment	NG tube, PEG, special foods.
Peripheral stigmata of disease	**Appearance**: Jauniced, confused, dehydrated, malnourished. **Anaemia**: Haemorrhage, Iron malabsorption, CA. **Liver disease**: ***Jaundice*** (icterus), scratching; **Asterixis**; **Bruising**; foetur hepaticus; **confusion**; **Leuconychia** - Muehrke's lines (hypoalbuminaemia), **spider naevus**, **telangiectasia;** Dupuytren's contracute; parotid enlargement; testicular atrophy; **gynaecomastia** (breasts in men, feel for glandular tissue). **Liver cirrhosis**: Palmer erythema; Dupuytren's contracture. **Iron deficiency**: Koilonychia, smooth tongue, angular stomatitis. **Clubbing**: Ulcerative colitis, Crohn's, primary biliary cirrhosis, chronic active hepatitis, coeliac, polyposis coli. B12 / folate deficience: Large smooth tongue. **Hyperpigmentation**: Haemochromatosis. **Xanthoma / Xanthelasma**: Hypercholesterolaemia. **Telangiectasia** – dilated capillary vessels: Osler-Weber-Rendu. **Spider naevus** – bright red with a small central red papule surrounded by several distinct vessels, fill from central arteriole. Normal <6. **Asterixis**: Stretch out hands in policeman's stop position, fingers spread out. Asymmetrical flaping tremor. **Brown freckles**: Peutz-Jehers. Polyps in the small bowel can bleed, obstruct, or intersuscept. **Wilson's disease**: Corneal rings. **Iritis**: Inflammatory bowel disease.
Abdomen: Inspection	Inspect from end, and level with abdomen. Symmetrical, flat. **Scars**: **Distension**: Fat, foetus, faeces, flatus, fluid, fucking big tumour. **Local swellings**: Enlarged organs, hernia. **Pulsations**: AAA
Abdomen: General palpation	**Is there any pain?** Light then deep palpation over all nine quadrants. **Soft**, **tender**, **rigid**, **rebound tenderness** (peritonitis), involuntary guarding.

Abdomen: Liver palpation	**Find edge**: Starting at the right lower quadrant, patient breaths slowly, feel for edge with inspiration, move hand with expiration. • Hard vs. Soft. • Regular vs. irregular. • Tender vs. not. • Pulsatile (tricuspid incompetence) vs. not.
Abdomen: Spleen palpation	**Bimanual technique**. Left hand posterolaterally, below patients left ribs, compressing on the rib cage. Advance from the right lower quadrant with right hand. Spleen vs. kidney. • **Size**. • **Shape**: The spleen has a notch. • **Percussion note**: The spleen is dull, polycystic kidneys are resonant). • **Movement with ventilation**: The spleen moves.
Abdomen: Gallbladder palpation	Place fingers perpendicular to right costal margin near midline, then move medial to lateral to palpate. **Murphy's sign**: Cessation of inspiration upon palpation of Murphy's point (costal margin in midclavicular line). Must be negative in the left upper quadrant.
Abdomen: Kidney palpation	**Ballot kidneys between hands**. R hand in right upper quadrant, left in renal angle. Right hand feels strike as kidneys float anteriorly. Repeat for other side. **Large**: Tumour, polycystic kidneys, hydronephrosis. **Tender**: Infection.
Abdomen: Aorta	Palpate in midline, superior to umbilicus. Fingers on outer margins of aorta, watch if fingers diverge.
Abdomen: Percussion	Confirm **liver** size. Confirm **spleen** size. **Bladder** for retention. **Masses**.
Abdomen: Ascities	**Shifting dullness**. Fluid thrills – patient places medial edge of both hands along midline. Ascities unlikely if no reported increase in abdominal girth, or no ankle swelling.
Abdomen: Auscultation	**Bowel sounds**: **Absence** of bowel sounds after listening in all four quadrants for 30 sec: ileus; **Rushing** sound – borborygmi (diarrhea); **Tinkling** sound (obstructed bowel). **Bruits**: Above umbilicus for **AAA**; Right and left above umbilicus for **renal artery stenosis**.
Groin, hernais, rectal	Palpate **lymph nodes**. **Virchow's node** - Left sternoclavicular joint: Abdominal neoplasm. Look and palpate for **hernias**. **Femoral pulses**.
Legs	Oedema, Bruising, Xanthomata.
To finish	**Urine dip, PR, external genitalia.**

Cranial Nerve Examination

WIPE	Patient sitting over edge of the bed.
Inspection	**Asymmetry**, drooping, loss of forehead wrinkles, evidence of zoster infection, etc...
I: Olfactory	Not usually tested. Test each nostril with coffee, orange, vanilla, etc. Taste is VII, IX. **I**: Trauma, respiratory infection, frontal lob tumour, meningitis.
II: Optic	**Acuity**: Test each eye separately. “Can you see my face clearly?”. **Snellen chart**. **Peripheral visual fields**: “Tell me when you see my finger move”. Repeat in all four quadrants. **Central sctoma**: “Can you see the head of the pin? What colour is it? Tell me if it disappears or changes colour”. Attempt to line up blind spot and assess size relative to your own. **Inattention**: **Pupils**: Inspect – may see cataract or evidence of iridotomy. **Reactive** to **light** and **accomodation**. **Ophthalmoscopy**: **Optic neuritis**: Pain on moving eye, loss of central vision, afferent pupillary defect, disc swelling – MS, syphilis, collagen vascular disorders. **Papilloedema**: Increased ICP, retro-orbital lesion (cavernous sinus thrombosis).
III: Occulomotor IV: Trochlear VI: Abducens	**Movements**: “Follow my finger, tell me if you get any nystagmus” Move in H like If so, how is the image displaced. Where is it worst. Move in an H-pattern. Look for nystagmus. **Ptosis**: III and sympathetic. **Pupil:** Fibres to the ciliary body is on the outside of the III nerve, compressive lesions cause a dilated pupil “medical” lesions don't. **III**: Diabetess, giant cell arteritis, syphilis, posterior communicating artery aneurysm, raised ICP (uncal herniation). **IV**: Traume of orbit. **VI**: MS, Wernicke encehalopathy, false localising sign in raise ICP, pontine stroke (fixed small pupils ± quadriparesis).

V: Trigeminal	**Motor**: “Clench your teeth” – feel masseters and temporalis. “Open your mouth, stop me closing it”. **Sensory**: Check for **corneal** loss first, then all **three divisions**. V Sensory: Trigeminal neuralgia, herpes zoster, nasopharyngeal cancer, acoustic neuroma.
VII: Facial	**Motor**: “Raise your eyebrows”, “Screw your eyes up tight”, “Puff your cheeks out”, “Whistle”, “Show me your teeth”. VII LMN: Bell's palsy, polio, otitis media, CPA tumours, parotid tumours, Herpes-Zoster (Ramsay Hunt). VII UMN: Spares the forehead (bilateral innervation). Stroke, tumour.
VIII: Vestibulocochlear	Ask a patient to repeat a number whispered in an ear while mask the other ear with rustling fingers. **Rinne's test**: Rinne positive – normal ears or sensorinural hearing loss. Negative – conductive hearing loss > 20dB. Using 256 or 512 Hz tuning fork compare loudness between air conduction and bone (placed on mastoid). If severe SNHL then false -ve. **Weber's test**: Place on vertex. “Which ear the sound is heard in?”. Sound localised to the affected ear with conductive deafness >10dB, and to the contalateral ear in SNHL. **Unterbergers**: March up and down on the spot with arms stretched out in front and eyes closed. **VIII**: Noise, Paget's disease, Meniere's disease, herpes zoster, acoustic neuroma, brainstem CVA, drugs (aminoglycosides).
IX: Glossopharyngeal X: Vagus	“Open mouth and say ahhhh”. Palate is pulled to the normal side. **Gag reflex**: Afferent IX, efferent X. **IX, X, XII**: Trauma, brainstem lesions, neck tumours.
XI: Spinal accessory	**Trapezii**: “Shrug your shoulders” against resistance. **Sternomastois**; “Turn your head to the left/right” against resistance.
XII: Hypoglossal	“Stick out your tongue” - deviates to the side of the lesion **XII**: Rare. Polio, syringomyelia, tumours near jugular foramen, stroke, bulbar palsy, TB.

Upper Limb Nervous System Examination

WIPE	Wash hands. Introduce: Ask if any pain anywhere. Position: In bed, 45 degrees, but can do in chair. Exposure: Must remove shirt or trousers so can inspect muscle bulk / fasciculation.
Environment	Walking aids, wheelchair, hoist, NG tube, ventilator, soft mattress, etc...
General appearance	**Age** of patient (Parkinson's usually 45+). **Chorea** (Huntington's, rheumatic fever, drugs). Ballisma, dystonis, noticeable tremor. Posture: Leaning to one side (hemiplegia); stooped forward (Parkinson's).
Inspection: Upper Limb	UMN lesion: **Wasting** - Guttering of dorsal aspects of the hands, contour of the deltoid. **Fasiculations**. **Tremor**: Fine, coarse, resting, intention. **Abnormal posture**: Fixed flexion, extension posturing.
Tone	Ask if pain in arms. Move wrist, elbow, and shoulder in all directions of movement. Lead pipe rigidity - Parkinson's; cog-wheel rigidity – lead pipe + tremor; clasp-knife – UMN lesion. Hypotonia (difficult) – LMN, cerebellar lesion.
Power grading	0 - No visible or palpable movement; 1 - Flicker or movement on voluntary contraction; 2 - Active movement, but not...; 3 - Active movement against gravity; 4 - + some resistance; 5 - Normal power.
Power	**Shoulder** - “Arms up like a chicken” **Abduction**: Deltoid, axillary nerve, C5. **Adduction**: C6,7,8. **Elbow** - “Arms up like a boxer”. **Flexion**: Biceps, musculocutaneous nerve, C5+C6. **Extension**: Triceps, radial nerve, C7. **Wrist -** “Hold out hand, clench fist”. **Flexion** and **extension**: C6, C7. **Flexion**: Flexors digitorum profundus and superficialis, median and ulnar nerves, C8. **Radial nerve:** “Hold fingers out straight, stop me bending them” - C7. Lesion – **Wrist drop**.

	Ulnar nerve: “Hold your fingers apart, stop me pushing them together” - **Dorsal interossei**; “Hold this piece of paper between your fingers, stop me pulling it out” - **Palmar interossei**. Lesion – hyperextended metacarpophalangeal joints – clawed hand. **Median nerve**: “Point your thumb at the ceiling, stop me pushing it down into your palm” - **abductor pollicus brevis**; “Put your thumb and little finger together, stop me pulling them apart” - **opponens pollicis**. Lesion – wasting of thenar eminence, and weak pincer grip.
Reflex	**Biceps**: C5 (C6). **Supinator**: (C5) C6. **Triceps**: C7.
Sensory	Test, light touch, pain, temperature over dermatomes. **C4**: Skin over shoulder tip. **C5**: Radial side of upper arm. **C6**: Radial side of forearm. **C7**: Middle finger. **C8**: Ulnar side of forearm. **T1**: Ulnar side of upper arm. **T2**: Axilla. **Median**: **Index finger pulp.** Thenar eminence and flexor aspects of the radial 3 ½ digits, extending over the tips of the digits to the nail beds. Affected by carpal tunnel. **Ulnar**: **Little finger pulp**. Loss of sensation over the palmar and dorsal aspects of the ulnar 1 ½ fingers. **Radial**: **Dorsum of the first intermetacarpal space.** Proprioception and vibration sense
Co-ordination	**Finger-nose**. **Displacement**. **Dysdidochokinesis**. **Fine movements**.

Radial nerve: “**Crutch palsy**” “Saturday night palsy”. Wrist drop.

Ulnar nerve: Behind **medial epicondyle of humerus**. Clawing of little and ring finger.

Median nerve: Greatest danger in **lacerations of the wrist**. Occasionally damaged in supracondylar fractures. Loss of opposition movement. Loss of sensation prevents delicate movements. If divided at elbow loss of pronation, wrist flexion is weak, with ulnar deviation.

Lower Limb Nervous System Examination

WIPE	**W**ash hands. **I**ntroduce: Ask if any pain anywhere. **P**osition: In bed lying flat, but can do in chair. **E**xposure: Must remove trousers so can inspect muscle bulk / fasciculation.
Environment	Walking aids, wheelchair, hoist, NG tube, ventilator, soft mattress, etc…
General	Age of patient, Signs of Parkinson's Disease:
Walking	**Trendelenberg gait**, broad-based gait with a duck like waddle, pelvis drops to side of leg raised, marked body swing, forward curvature of spine, “Squat then stand”: Proximal myopathy. **Parkinson's**: Slow, shuffling, festinant gait. **High-stepping gait** (foot drop) “Walk on your heels”. **Hemiplegic gait** - Swinging one leg out: Stroke. Ask the patient to walk “**Heel-to-toe”**: Cerebellar ataxia.
Rhomberg Sign	Patient stands with feet together, arms out. “Close your eyes, I will catch you if you fall”. If patient then (and only then) the patient falls then is Rhomberg's sign positive.
Inspection: Lower limb	**Wasting**: “Tighten your kneecaps”. Assess vastis medialis of quads. **Fasiculations**: **Abnormal posture**: Fixed extension. **Trophic changes** – ulcers, burns, Charcot's joints: Peripheral neuropathy.
Tone	“Do you have any pain in your legs?” **Roll legs**. Pull up under knee and drop – should fall flat. Check for **clonus** by suddenly stretching the Achillies tendon by suddenly dorsiflexing the ankle. More than 6 beats suggests UML.

Power	Hip Flexion: Iliopsoas, lumbar plexus, and femoral nerve, L1,2. Hip Extension: Gluteus maximus, inferior gluteal nerve, L5, S1, S2. Knee Flexion: Hamstrings, sciatic nerve, L5, S1, S2. Knee Extension: Quadriceps femoris, femoral nerve, L3, L4. Ankle Dorsiflexion: Tibialis anterior, deep peroneal nerve, L4, L5. Ankle Plantar flexion: Gastrocnemius and soleus, sciatic nerve, S1, S2. Ankle Inversion: Tibialis posterior, tibial nerve, L4, L5. Ankle Exersion: Peronei, superficial peroneal nerbe, L5, S1. Dorsiflexion of great toe: Extensor hallucis longus, deep peroneal nerve, L5.
Reflex	**Knee**: L3, L4. **Ankle**: S1, S2.
Sensory	Test, light touch over dermatomes. **L2**: Outer thigh. **L3**: Inner thigh. **L4**: Inner calf. **L5**: Outer calf, medial foot. **S1**: Lateral foot...L5 supplies the 1st toe, and S1 supplies the 5th toe. **S2**: Posterior thigh. **S3,4,5**: Perianal sensation. Must test + sphincter tone if suspect cord compression. Then test **spinothalamic** (pain and temperature), and proprioception.
Co-ordination	**Heel-Shin**: “Put your right heel on you left knee. Run it down your leg. Touch my hand (held over left foot). Repeat”.

Sciatic nerve: Penetrating injuries, **posterior dislocation of the hip. Loss** of all **movements** in the lower limb **below the knee joint** with foot drop deformity. **Sensory loss** is complete **below the knee** except for an area along the medial side of the leg.

Common peroneal nerve: **Winds** around the **head of the fibula**. Damaged by pressure of a **tight bandage or plaster cast**. Leads to **foot drop** (paralysis of the ankle and foot extensors), and i**nversion of the foot** (due to paralysis of the peroneal muscles with unopposed action of the foot flexors and invertors). **Sensory loss** over the **anterior and lateral aspects** of the leg and foot, medial side escapes.

Inguinal Hernia Examination

WIPE	Position: “STAND UP” Exposure: Always examine both inguinal regions.
Inspect from the front	Inguinal hernia: Bulges into the corner of the mons veneris, above the crease of the groin. Femoral hernia: Bulges into the medial end of the groin crease. Scrotal involvement.
Palpate from the front	Examine the scrotum and its contents. Can you get above it? If so it is not a hernia. NB an infantile hydrocele extends up the cord. Do not start jabbing.
Palpate from the side	Stand at the side of the patient, on the same side as the hernia. Place one hand in the small of the patient's back to support him, and your examining hand on the lump with your fingers and arm roughly parallel to the inguinal ligament.
Lump	Position, Temperature, Tenderness, Shape, Size, Tension, Composition.
Expansile	Compress the lump firmly with your fingers, “Cough”. Movement of the swelling without expansion or an increase in tension is not a cough impulse. Cough impulse – hernia. Absence may be due to adhesions.
Reducible?	“Can you reduce it?” Use flat hand from below the lump, lifting the lower end upward and backwards, press firmly to relieve the tension. Squeeze towards the deep inguinal ring. Reduces to...Above and mediat to the PT – Inguinal hernia; elow and lateral to PT – femoral hernia.
Direct or indirect?	**No correlation** with surgical findings: If controlled by pressure over internal ring – direct; not - indirect.
Release and watch	Indirect hernia - slide obliquely through the canal. Direct hernia - project directly forward.
Finishing	Percuss and Auscultate for bowel gas and sounds.
Complete	Other inguinal region. Abdominal examination.

Inguinal Anatomy

The inguinal ligament	Rolled under the inferior margin of the aponeurosis of the external oblique muscle and runs between the anterior superior iliac spine, and the pubic tubercle.
Inguinal canal	Lies above the medial half of the inguinal ligament, between the deep and superficial rings.
Internal inguinal ring	Spermatic cord pushes through the transversalis fascia, demarcated medially by the inferior epigastric vessels. **1-2cm above the point where the femoral artery passes under the inguinal ligament (i.e. The femoral pulse).**
External inguinal ring	Inverted V-shaped defect in the external oblique aponeurosis and lies **immediately above and medial to the pubic tubercle**.

	Indirect	Direct
Origin	Through internal ring, **lateral** to inferior epigastric vessels.	Through posterior wall of the inguinal canal, **medial** to inferior epigastric vessels.
Congenital or acquired	May be congenital	Always acquired. Rare in childhood.
Control by pressure over inguinal ring.	Yes	No.
Strangulates	Commonly	Rarely.
Scrotum extension?	Often	Rarely
Reduces on lying	Not readily	Spontaneously.
Recurrence after surgery	Uncommon	Common.

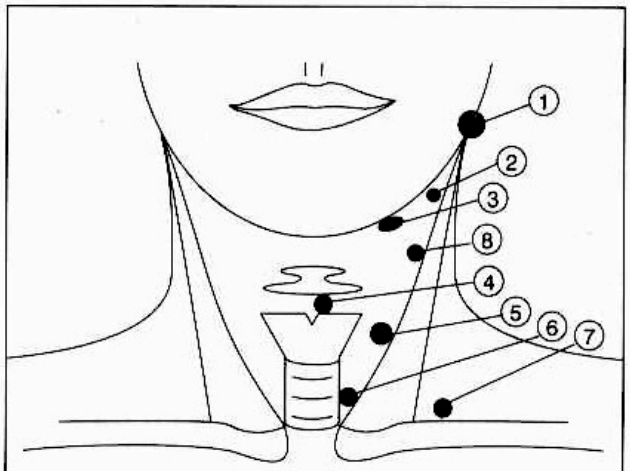
Speech Examination

Diagnosis	Spot diagnosis; Dysarthria; Dysphasia; Higher Mental Function.
General inspection	Evidence of spot diagnosis: Raynaud's; CREST; hypo/hyper-thyroid, Crohn's. Hemiplegia or other evidence of conditions associated with Dysphasia. Nystagmus, intention tremor, Parkinsonian features: Dysarthria.
Specific questions	To confirm a spot diagnosis. Elucidate risk factors.
General questions	My name is…Please could you tell me your name. What is your address. Could you please tell me all the things you had for lunch.
Articulation	“British Constitution”; “West Register Street”; “Artillery”
Conduction dysphasia	Repetition as above.
Spastic Dysarthria.	Cerebellar: Slurred, jerky, explosive. Pseudobulbar palsy: Indistinct, suppressed, without modulations, “hot potato”, “Donald duck”. Parkinson's disease: Monotonous without accents or emphasis, somewhat slurred. Myotonic dystrophy: Slurred and suppressed. Huntingtons Chorea: Slurred and monotonous.
Flaccid dsyarthria	Bulbar palsy: Nasal, decreased modulation, slurring of labial and lingual consonants “pa, la”. Paralysis of VII, IX, X, XII.
Myopathic dysarthria.	Myasthenia gravis: Weak hoarse voice with a nasal quality, pitch unsustained, soft accents.
Veriegated dysarthria.	Hypothyroidism: Low-pitched, catarrhal, hoarse, croaking, gutteral voice as if the tongue is too large for the mouth. Amyloidosis: Large tongue. Multiple ulcers or thrush in the mouth: Some parts of the speech indistinct. Parotitis or temporomandibular arthritis; Monotonous, suppressed, badly modulated.

Comprehension	Do not gesture… “Please put your tongue out”, “Shut your eyes”, “Touch your nose” Good: Expressive dysphasia. Bad: Receptive dysphasia.
Nominal dysphasia	Hold up keys. “What is this?”, “Is it a spoon”, “Is it a pen”, “Is it keys?” - yes. Then test ability to form sentences “Where do you live and how would you get home from here”.
Orofacial dyspraxia.	Ask patient to perform various orofacial movements, assuming there is no receptive dysphasia. Test first without gesture, e.g. “Show me your teeth”, “Move your tongue from side to side”. Then do it with a gesture. Ideational or ideomotor dyspraxia (lesions in the operculum).
Higher mental function.	1) Age 2) Time (to nearest hour). 3) Address for recall at end. 4) Year 5) Name of this place. 6) Recognition of two persons. 7) Date of birth. 8) Year of WW1 9) Name of present Monarch. 10) Count backwards from 20 to 1.

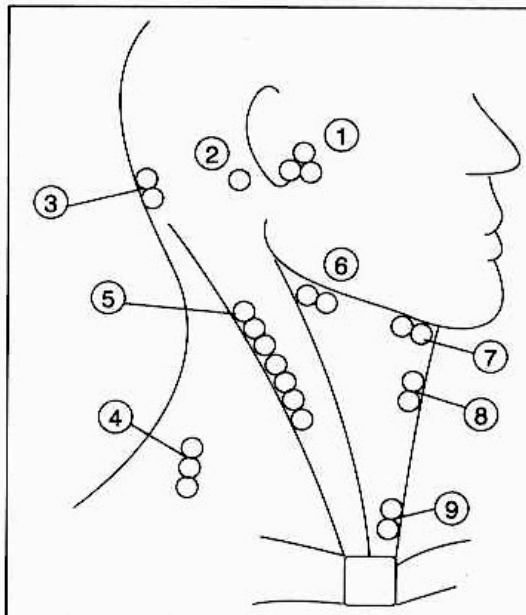
Neck Examination

WIPE	Position: Sitting in a chair, away from the wall. Looking forward with some extension.
General inspection	Look for signs of thyroid disease: Exophthalmos, myxoedematous facies, ankle oedema. SVC obstruction: Plethoric facies.
Neck inspection	**Location**.
Thyroid inspection	“Please take a sip of water and hold it in your mouth” Watch the neck - “Swallow”. Does a lump appear, or does the lump move with swallowing (thyroid). “Please stick out your tongue” - If lump moves up – thyroglossal cyst.
Thyroid palpation	Palpate from behind, slightly flexed. Ask for tenderness. If identify a thyroid lump, place one hand flat against the abnormal lobe of the thyroid, pushing gently towards the midline, making the normal side more prominent and allowing you to palpate the normal side first (upper, lower, medial and lateral borders). Repeat the swallow test. Comment on: • Size. • Soft, firm. • Nodular, or diffusely enlarged. • Moves readily on swallowing. • Lymph nodes.
Lymph node examintion	**Systematically**: Parotid, mastoid, occipital, anterior and posterior triangle of neck.
If ? Thyroid	Percuss for retrosternal goitre. Auscultate for a bruit. Formally assess the patients thyroid status. • Start by assesing the pulse.



1. Parotid tumour
2. Tonsillar node
3. Swollen submandibular gland
4. Thyroglossal cyst
5. Branchial cyst
6. Thyroid nodule
7. Virchow's node
8. Carotid body tumour

Differential diagnosis of a lump in the neck



1. Parotid (scalp, face, parotid gland)
2. Mastoid (scalp, auricle)
3. Occipital (scalp)
4. Superficial cervical (along external Jugular vein) (breast, lung, viscera, face, parotid)
5. Deep cervical (along internal Jugular vein) (all neck nodes ultimately drain to here)
6. Submandibular (tongue)
7. Submental (antrum and floor of mouth, lips)
8. Anterior cervical (oesophagus, front of neck)
9. Tracheal (thyroid)

Lymph nodes of the head and neck

CURRENT Thyroid Status

Visual Survey	Exophthalmos, goitre, thyroid acropachy, pretibial myxoedema. Can occur in association with any thyroid status.
Composure	**Hyperthyroid**: Hyperactive, **fidgety**, restless. **Euthyroid**: Normal, composed demeanour. **Hypothyroid**: Immobile and **uninterested**.
PULSE	**Avoid diagnosing altered thyroid status if normal pulse.** **Hypothyroid**: Slow pulse (<60). **Hyperthyroid**: Fast pulse, **ATRIAL FIBRILLATION**.
Palms	**Hyperthyroid**: **Warm** and sweaty. **Hypothyroid**: **Cold** and sweaty.
Tremor	**Hyperthyroid**: Stretch out hand to full extension. Place a piece of paper on the dorsal aspect of hand.
Eyes	**Lid retraction** - Sclera visible above the iris. **Lid lag**: “Please follow my finger whilst keeping your head still”. Move finger up and down. Normally, the lids move with the eye.
Bruit	**Hyperthyroid**: **Bruit**. Heard over the isthmus and lateral lobe of the thyroid. Not obliterated by occluding the internal jugular vein (venous hum), or by rotation of the head, and it will not be influenced by light pressure of the stethoscope.
Reflexes •	**Hypothyroid: Slow relaxation of reflex.** Test Ankle (over chair), supinator, or other jerks.
Questions	**Temperature** preference. **Weight change**. Appetite. Bowel habits. **Palpitations**. Exertional dyspnoea. Undue fatiguability. Can't keep still. Change of temper: **Irritability**, nervousness. **Menstrual** problems in females.

Lump Examination

History	How long has it been there? Does it hurt? Does it itch? Does it bleed? Are there any other lumps? Is it getting bigger? Foreign travel? Cancer signs? Thyroid status questions if neck lump?
Position	Distance from bony point.
Size.	
Surrounds	Attached to what? If movement is reduced by muscle contraction then the lump is in or deep to the muscle.
Shape	Remember 3d, so do not say circle.
Surface	Colour and texture of overlying skin.
Edge	Describe the margins. Well-defined
Consistence	Stony hard (not indentable). Rubbery (Hard to firm, but slightly squashable). Spongy (soft, but some resilience). Soft (no resilience). Poor guide to composition.
Temperature	
Tenderness	
Transillumination	Light will pass through a clear fluid.
Pulsatile	Innate or transmitted?
Resonance	
Fluid thrill	
Compressibility	Compressed until they dissapear, then re-forms. Sign is consistent with venous vascular malformations where the intravascular pressure is low. Do not confuse with reducibility – does not reforms without external force (cough, gravity).
Auscultate	Bruid / bowel sounds.
LYMPH NODES	

Fundi Examination Cheat Sheet

Diagnosis	Usually...Diabetic retinopathy, retinitis pigmentosa, optic atrophy, papilloedema, hypertension
General	Evidence of diabetes – foot ulcers, arcus lipidus.
Lens	Cataracts – diabetics get early cataract formation.
Viterous	Opacities: Asteroid hyalinosis. Diabetes – haemorrhages, fibrous tissue, new vessel formation.
Optic disc	Optic atrophy - Disc is pale and clearly delineated. The pupil reacts to light consensually but not directly. • Multiple sclerosis (temporal pallor only?) • Compression of the optic nerve – tumour, aneurysm. • Glaucoma. Papillitis. Papilloedema – Swollen, poorly demarcated disc. • Intracranial space-occupying lesions, tumour, abscess, haematoma. • Accelerated (malignant) hypertension. • Benign intracranial hypertension. • Central retinal vein thrombosis. Raised CO2. Myelinated nerve fibres – streaky, white, irregular patches with frayed margins. Benign. Does not affect vision.
Arterioles and venules	Calibre, light reflex (silver wiring), and AV crossing points (AV nipping).
Each quadrant + Macular	Haemorrhages: Dot, blot, flame. Microaneyryms. Exudates: Hard (well-defined edges, increased light reflex); soft (fluffy with ill-defined edges). Hard exudates may form a ring (circinates) in diabetics. Cotton wool spots.

Diabetic Retinopathy	Pathogenesis: Microangiopathy in capillaries, precapillary arterioles, and venules causes occlusion ± leakage. **Background retinopathy.** • Capillaries bulge – M**icroaneurysms.** • Rupture of microaneurysms at the nerve fibre level cause **flame haemorrhages**, if deep in the retina, **blot haemorrhages**. • Vascular leakage leads to **oedema** (greyish thickening) and **hard exudates** (circinate pattern around leaking aneurysms). **Preproliferative retinopathy.** • Vascular occlusions – ischaemia – new vessel formation. • Ischaemia: **Cotton wool spots,** large dark blot haemorrhages, venous bleeding, intraretinal microvascular abnormalities. **Proliferative retinopathy.** • New vessel formation can take place on the optic disc or elsewhere on the retina. Risk of **viterous haemorrhage**. **Advanced diabetic eye disease.** • Progressive fibrovascular proliferation leads to blindness due to **viterous haemorrhage** and traction **retinal detachment**. • **Rubeoisis iridis** and **neovascular glaucoma**. **Lasar Scars**
Hypertensive retinopathy	Grade I: **Narrowed retinal arterioles**. Increased light reflex – **silver wiring** Grade 2: **AV nipping.** Grade III (malignant hypertension): **Flame** (and less-frequently), **blot haemorrhages**, and **cotton wool exudates**. Grade IV: **Papilloedema** (indicating cerebral oedema).

Breast Examination

WIPE	**Wash hands**: **Introduce**: **Explanation** of inspection and palpation; **Consent.** **Position**: Supine then sitting. **Exposure**: Upper half.
Inspection: Breast	**Size**: The breast may be under or over developed. **Symmetry and contour**: Usually due to pathology; occasionally unilateral under or over development. **Contour: Retraction. Peau d'orange**: Oedema of the skin gives it an orange peel appearance because of sweat glands / Cooper's ligaments. **Nodules**. **Colour:** Erythema – eczema, infection, Paget's. Discoloured – underlying malignant disease. **Scarring:** Incisions. **Masses**. Can use alternate positions; “Please slowly raise their arms above their head.”. “Please press your hands against your hips.”; Shoulder movements may be affected by disease in the axilla.
Inspection: Nipples, areola	**Presence**: Destroyed? Inverted? **Colour**: Changes with age and pregnancy. **Areola**: Slightly corrugated, contains a few small nodules – Montgomery's glands. Glands become much larger during pregnancy – Montgomery's tubercles. **Asymmetry**: Same horizontal level and point outwards. Changes deep in the breast may displace the nipple before noticeable changes in the substance. Retraction? **Discharge**: **Duplication**: Supernumerary nipples along the mammary line - axilla to the groin.
Inspection: Axillae, Arms, Supraclav. Fossa	**Swelling** of arm. Swellings of **lymph nodes**. Distended **veins**. Wasted **muscles**.

Palpation: Breasts	Ask if they have a lump and where it is; feel normal side first. **Position**: Supine with ipsilateral hand on head. **Perimeter:** **Pattern of search:** Vertical stripe. **Palpation:** Finger pads of three middle fingers. **Pressure:** Light, medium, deep.
Lumps	**Location:** Subcutaneous, midlevel, next to chest wall, and according to a clock face as the examiner faces the patient. **Size**. **Shape**: round, oblong, irregular, lobular. **Mobility.** Tethered – infiltration of Astley Cooper's ligaments making shorted and inelastic. Fixation – cannot be moved independently of skin. **Consistency, texture.** **Relations to the muscle.** “Rest hands on hips; press hands on hips”. Assess mobility to perpendicular directions.
Palpation: Nipple	**Retracted**: press on each side to see if it will evert. Lump tethering to nipple. **Discharge** from nipple. Number of **ducts**. **Material**: Blood, Serum, Pus, Milk. Swab for culture.
Axilla and Supraclav Fossa	**Axillary lymph nodes**: Three-sided pyramid whose apex is in the narrow gap between the first rib and the axillary vessels. Rest their relaxed arm on your opposite arm, hand to elbow. Warn patient of **firm palpation**.
Arms	**Swelling,** venous, arterial, neurological.
General	**Abdomen: Hepatomegaly, ascites.** Lumbar spin**:** Pain, limitation of movement.
Source	American Cancer Society 2004.

Hand Examination

WIPE	P: Place hands on **white pillow**. E: Must see **elbows**.
Face	**Systemic sclerosis**: Expressionless, telangeiectasis. **Cushingoid**: Steroid in RA. **Exophthalmos**: Thyroid.
Elbows	“Put your **hands** on your **shoulders**”: Look for **psoriasis** and rheumatoid nodules
Inspect hands	**Rheumatoid**: Phalangeal - **Swan-neck**, **Boutonniere's**, Z-**deformity** of **thumb**, **Triggering**. Metacarpophalangeal – **Volar subluxation**, ulnar deviation. Wrist – disruption, **subluxation** of ulnar. Elbow – **Rheumatoid nodules**. **Osteoarthritis**: **Heberden's nodes** at bases of distal phalanges, Bouchard's at proximal. Signs of joint inflammation are generally absent. Trendelenberg's sign +ve. Varus at knee. **Gout**: Asymmetrical swelling, **tophi** formation – helix of ear and some tendon sheaths. **Systemic sclerosis**: **Sclerodactyly** with tapering of fingers, **gangrene** of fingertips, **tight**, **shiny**, adherent skin, calcified nodules. **Wasting** of the small muscles of the hand, dorsal guttering. **Psoriasis**: **Pitting** of nails, terminal interphalangeal arthropathy, scaly **rash**. **Ulnar** nerve **palsy**: **Claw** hand, muscle **wasting** may spare thenar eminence. **Clubbing**.
Hands	**Joints**: **Swelling**, **deformity**, Heberden's nodes. **Nails**: **Pitting**, onycholysis, clubbing, nail-folds **infarcts** (RA), splinter haemorrhages. **Skin**: **Colour** (pigmentation, icterus, palmar erythema), **consistency** (tight and shiny, papery thin, purpuric), **lesions** (psoriasis, vasculitis, purpura, xanthomata, spider naevi, telangiectasis, tophi, neurofibromata, rashes). **Muscles**: **Wasting** of the **thenar eminence** (median nerve lesion), generalised wasting but sparing the thenar eminence (ulnar nerve lesion), generalised (T1 lesion). **Fasiculation** – **MND**, syringomyelia, old polio, Charcot-Marie-Tooth.

Palpation	**Joints** for **active disease** – **swelling**, **temperature**. Dupuytren's contracture. **Nodules**. Calcinosis. Xanthomata. **Osteoarthritis: Heberden's nodes** – bases of distal phalanges; **Bouchard's nodes** – proximal interphalangeal joints. (Varus deformity at knee).
Sensation	**Numbness?**, tingling – worse at night (carpal tunnel). **Median**: **Index finger pulp.** Thenar eminence and flexor aspects of the radial 3 ½ digits, extending over the tips of the digits to the nail beds. Affected by carpal tunnel. **Ulnar**: **Little finger pulp**. Loss of sensation over the palmar and dorsal aspects of the ulnar 1 ½ fingers. **Radial**: **Dorsum of the first intermetacarpal space.** Proprioception and vibration sense
Tone	Flex and extend all the joints.
Motor	**“Open and close you hands quickly”:** Myotonic dystrophy. **“Squeeze my fingers”**: C8, T1. **Radial nerve:** “Hold fingers out straight, stop me bending them” - C7. Lesion – **Wrist drop**. **Ulnar nerve**: “Hold your fingers apart, stop me pushing them together” - **Dorsal interossei**; “Hold this piece of paper between your fingers, stop me pulling it out” - **Palmar interossei**. Lesion – hyperextended metacarpophalangeal joints – clawed hand. **Median nerve**: “Point your thumb at the ceiling, stop me pushing it down into your palm” - **abductor pollicus brevis**; “Put your thumb and little finger together, stop me pulling them apart” - **opponens pollicis**. Lesion – wasting of thenar eminence, and weak pincer grip.
Function	“Undo a **button**”; “Hold **pen**”; “Pick up **paper**”
Pulses	Radial pulses.
Elbows.	Don't forget.

Vascular Leg Examination

Introduction	Expose lower limbs. Patient lying down.
General inspection	Signs of cardiovascular disease, cigarette smoking, diabetes.
Arterial inspection	**Pallor**. **Venous guttering** (at 10-15 degrees). **Discolouration** (ischaemic leg usually pale, if red – inflammation and cellulitis.
Venous inspection	**Oedema.** **Venulectasis** – venous stars: Bluish vessels that may distend above the skin surface 1-2mm in diameter. **Superficial thrombophlebitis**: Red, painful lump. **Haemosiderine** deposition – brown pigment: Increased venous pressure. **Venous eczema**. **Scarring** from previous ulceration. **Lipodermatosclerosis**: Inverted champagne bottle - fibrin deposition leads to progressive sclerosis of the skin and subcutaneous fat, + oedematous ankle. **Scars** from previous vein surgery.
Ulcer examination	**Ischaemic: Pressure areas – heel, malleoli, head of 5th metatarsal, tips and between the toes, ball. Punched out (no healing). Grey, yellow slough** (often infected). Poor granulation tissue. Often **Deep**. Serum or pus. Tissues may show signs of ischaemia. **Venous**: **Medial gaiter** region. Flat, sloping edge, shallow. **Neuropathic**: Trauma areas – **sole** of foot. **Painless.** Like ischaemic, but **surrounding** tissue is **healthy±callous** **Undermined**: Infection of subcutaneous tissue. **Rolled**: **BCC.** **Everted**: Fast growing tissue spills over normal skin – carcinoma.
Feel temperature.	Legs exposed for 5 minutes. Use back of hand. Stroke down, feel temperature change down leg. Compare legs.

Palpate **pulses**. Use ultrasound if available.	**Femoral, popliteal, dorsalis pedis, posterior tibial.** Check for **AAA**. **Capillary refill.**
Buerger's test	**1st: Lift legs** to 90 degrees keeping legs straight. Should remain pink throughout. **Severe ischaemia** – pale at **50** degrees; **critical** – pale at **25** degrees. **2nd**: **"Sit up, put leg over bed"**. **+ve**: If the legs become **engorged** and **purple.**
ABPI	Put cuff around upper arm and ankle (not calf).
Varicose veins	**"Please stand"** **Long** saphenous: Length of **medial** aspect. Origin just **infront** of **medial malleolus**. **Short** saphenous: Below the knee, **posteriorlateral** distribtion. **Accessory** vein of Giacomini: **Posterior** thigh.
Saphenofemoral Junction (SFJ)	**Two fingers**' breaths **below femoral vein** at the **inguinal ligament**.
Confirm varicosities	**"Please stand"**. Place hand on the varicosities and tap on the SFJ. Fluid thrill – SF incompetence. Confirm with ultrasound. **Cough impulse** – SFJ incompetence.
Trendelenberg test	**"Lie down"**. Raise leg and empty varicosities. Put **pressure** on **SFJ**. (If do not empty – outflow obstruction / increased filling volume). **"Please stand"**. **If controlled** whilst maintaining pressure - **SF incompetence**. If they refill – leaky perforating vein further down.
Tourniquet test	**"Lie down"**. Raise leg to empty varicosities. **Put tourniquet**, in turn, to the thigh, lower thigh, and then below the knee. **"Stand up"**. If the tightened tourniquet controls the varicose veins then the defect is above the tourniquet. If the veins refill then the defect is below.
Auscultate	Arteries for **bruits**. Veins for AV **fistula**.
Finishing	**Consider aetiology** or associated factors. **Arterial** - Carotids, heart **murmurs**, **AF**, **BP** in both arms, neurological examination, urine **dipstick**. **Venous** – **Abdominal** pathology? **Pregnant**?

Cerebellar Examination

Signs

- Eyes.
    - Skew deviation: Ipsilateral down and in, contralateral up and out.
    - Nystagmus.
- Arms.
    - Ipsilateral hypotonia and reduced power.
    - Failure of displaced ipsilateral arm to find its original posture.
    - Finger-nose test.
        - Impaired.
        - Past pinting.
        - Intention tremor, increases on approaching the target.
- Legs.
    - Ipsilateral pendular knee jerk.
    - Heel-shin test is impaired.
    - Ataxic gait, tends to fall to the side of the lesion.
- Speech.
    - Ataxic dysarthria with explosive speech.

Differential diagnosis.

- Mutliple sclerosis.
    - Internuclear ophthalmoplegia, optic neuritis or atrophy.
- Brainstem vascular lesions.
- Posterior fossa space-occupying lesions.
    - Papilloedema.
- Paraneoplastic syndrome.
    - Clubbing, cachexia.
- Alcoholic cerebellar deeneration.
    - Nutritional.
- Freidreich's ataxia.
    - Scoliosis, pes cavus, pyramidal and dorsal column signs, absent ankle jerks.
- Hypothyroidism.
- Anticonvulsant toxicity.
    - Especially phenytonin which can cause gross multidirectional nystagmus.
- Ataxia-telangiectasia.

External Genitalia Examination Cheat Sheet

WIPE	W: Put on **gloves**! P: **"Stand up"** – gravity to expose hernias. Kneel by side.
Inspection	Remember to **lift up** and **look at everything**.
Inspection of penis	Size, shape, colour of skin, **foreskin**, **discharge**, **scaling**, or scabbing around distal edge.
Palpation of penis	**Texture**, assess state of dorsal vein. Retract the prepuce carefully to examine skin on its inner aspect, glans, and external urethral meatus. Discharge?
Inspection of scrotal skin and scrotum	**Reddened**? **Teathered**? **Fixed**? Conditions that affect hair-bearing skin? Always lift up to examine the posterior aspect. **Size** and **shape**. **Asymmetry**?
Palpation of **scrotum**	Support with one hand, feel testis and other lumps between index finger and thumb. Do not squeeze. Check contains **two testis**. **Position** and **nature** of testis, **epididymitides**, and the **cords**.
Lumps	Can you get **above it**? If not it is an inguinoscrotal hernia. Does it **transilluminate**? Does it have an **expansilve** cough impulse? Is it **separate** from the testis? Is it **cystic** or **solid**? Separate and cystic: Epididymal cyst / spermatocoele. Separate and solid: Epididymitis. Testicular and cystic: Hydrocoele. Testicular and solid: Tumour, orchitis, granuloma, gumma. Bag of worms: Varicocele. Transilluminate: Hydrocoele, spermatocoele.
Lymph	**Penis** and **scrotum**: **Inguinal glands**. **Covering** of the **testis** and **cord**: **Internal** – **common iliac**. **Body** of **testis**: **Para-aortic glands** (**above bifurcation** at **umbilicus**).

Assessment Of Volume Status

Examination

- Skin turgor.
- Mucous membranes, patients complains of feeling dry.
- Pulse: Resting (though may be blocked by drugs or autonomic neuropathy).
- Blood pressure: Resting, postural drop (remember autonomic neuropathy).
- Venous pressure.
- Oedema. Effusion, ascities.
- **Daily weight.**
- Urine output, concentration.

	Hypovolaemia	Hypervolaemia
Intravascular	Cool, clammy. Peripheral cyanosis. Poor capillary refill. Weak rapid pulse. Low BP, postural drop.	High BP. Raised JVP. 3rd heart sound. Pulmonary oedema.
Extravascular	Poor tissue turgor. Dry mucous membranes.	Oedema. 3rd space fluid (pleural, peritoneal).

	Class I	Class II	Class III	Class IV
% loss	<15	15-30	30-40	>40
Volume loss	<750	750-1500	1500-2000	>2000
Systolic	Normal	Normal	Reduced	Very Low
Diastolic	Norma,	Raised	Reduced	Very Low
Pulse	Tachy	100-120	120, thready	120+, v. thready
Resp	Normal	Tachy	>20	>20
Urinary ml/min	>30	20-30	10-20	0-10
Extremities	Normal	Pale	Pale	Pale, clammy, cold
Complexion	Normal	Pale	Pale	Ashen
Mental state	Alert	Anxious / aggressive	Anxious / aggressive or drowsy	Drowsy, confused, unconscious