ABS Finals Notes

1. **Cardiovascular system**
   a. Cardio
   b. Vascular system

2. **Respiratory system**

3. **Gastrointestinal system**
   a. The medical abdomen
   b. GI surgery

4. **Musculoskeletal system**
   a. Rheumatology
   b. Orthopedic surgery

5. **Urogenital system**
   a. Renal medicine
   b. Urology surgery

6. **Neurology**

7. **ENT & ophthalmology**

8. **Endocrinology**

9. **Breast and Neck surgery**

10. **Dermatology & superficial lesions**

11. **Practical surgery & the perioperative patient**

12. **Emergencies**

13. **Integrated PACES Summary notes**
Heart failure

- Always try and determine whether left or right sided
- Affects ~900,000 people in the UK
- Definition: a complex clinical syndrome of symptoms and signs that suggest impairment of the heart as a pump supporting the physiological and metabolic demands of the body
- Can be single ventricle or biventricular failure. Chronic heart failure is then classified according to the preservation of the ejection fraction.

Symptoms:
- Typical: breathlessness, orthopnoea, PND, reduced ET, fatigue, ankle swelling
- Atypical: nocturnal cough, wheeze, weight gain, weight loss (advanced), bloatedness, anorexia, confusion, depression, palpitations, syncope

Signs:
- Typical: JVP, hepatojugular reflux, gallop, displaced apex, murmur
- Atypical: peripheral oedema, pulmonary creps, dull bases, tachycardic, irregular pulse, tachypnoea, hepatomegaly, ascities, cachexia

Causes:
- IHD 40%
- Dilated cardiomyopathy 32% - often an unclear aetiology, but is due to damaged myocardium > dilated ventricle (Ax toxins, metabolic, infections, autoimmune, undetected arrhythmias)
- Valvular heart disease 12%
- HTN 11%
- Other 5%
**NEW YORK HEART ASSOCIATION (NYHA) CLASSES'**

<table>
<thead>
<tr>
<th>NYHA class I</th>
<th>NYHA class II</th>
<th>NYHA class III</th>
<th>NYHA class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No limitation on</td>
<td>• Slight limitation on</td>
<td>• Marked limitation on</td>
<td>• Inability to carry on</td>
</tr>
<tr>
<td>physical activity</td>
<td>physical activities</td>
<td>physical activities</td>
<td>any activity without</td>
</tr>
<tr>
<td>• No overt symptoms</td>
<td>• Comfortable at rest, but</td>
<td>• Comfortable at rest, but</td>
<td>any symptoms</td>
</tr>
<tr>
<td></td>
<td>ordinary physical activity</td>
<td>less than ordinary activity</td>
<td>symptoms even at rest</td>
</tr>
<tr>
<td></td>
<td>causes symptoms of heart</td>
<td>causes symptoms of heart</td>
<td></td>
</tr>
<tr>
<td>failure</td>
<td>failure</td>
<td>failure</td>
<td></td>
</tr>
</tbody>
</table>

- NYHA correlates with prognosis
- Management:
  - Counselling, lifestyle advice + RF management
    - Aspirin
    - Statins
  - Symptomatic:
    - Diuretics (loop, e.g. frusemide, or thiazide, e.g. bendrofluazide)
    - Digoxin (inhibits Na-K-ATPase > inc IC sodium > inc Ca exchange > increased IC calcium > improved isolated myocyte contractile performance)
      - Digoxin + bet-blocker is preferred for rate control of AF in HR
    - ACE inhibitors
  - Prognostic:
    - ACE inhibitors
    - Beta blockers
    - Oral nitrates with hydralazine (consider in patients with severe renal impairment)
    - Spironolactone (aldosterone antagonist) – avoid high doses with ACE-inhibitors (risk of hyperkalaemia)
  - Advanced therapies:
    - Ivabradine [sinus node inhibitor]: LVEF <35% and HR >70bpm (also used in chronic angina if normal sinus rhythm if unable to tolerate beta-blockers)
    - Cardiac resynchronisation therapy (CRT) device [either pacemaker or defibrillator]: LVEF <35%, HR >70bpm, QRS >120ms
    - LVAD (left ventricular assist device)
    - Heart transplant

**Case 1. 78yoM, large anterior MI 3m ago, thrombolysis. Increasing breathlessness, feet swelling + abdo swelling.**
- How would you stratify his prognosis? New York Heart Association Classification
- Drugs of prognostic value? Ramipril (Digoxin can reduce hospital admissions in HF and AF)
- Given his signs of pedal oedema, elevated JVP, tender RUQ. What valvular abnormalities are you likely to see? Mitral regurgitation and tricuspid regurgitation
  - Large anterior can affect papillary muscles and septum, affecting the mitral valve
  - Right sided symptoms consistent with tricuspid regurgitation
Acute coronary syndromes

Case 2. 55yo M, known T2DM + HTN. Ressure-like sensation in centre/left chest, radiating to shoulders intermittently for one week. Occurring whilst sitting and eating, increasing in freqncy. What is the following is the most likely diagnosis? Unstable angina (occurs at rest)

- **Definition:**
  - Stable: finding or suspicion of CAD that may or may not be symptomatic (stable angina)
  - ACS: history or ECG features/blood tests suggesting acute or impending myocardial ischaemia/infarction (includes unstable angina, STEMI, NSTEMI) > admission

- **CAD risk factors:**
  - Unmodifiable: age, male, FH
  - Modifiable: smoking, DM, HTN, hyperlipidaemia
  - Other: renal disease, chronic inflammatory disease, metabolic syndrome

- **Clinical features:**
  - Symptoms: pain, dyspnoea, N&V, palpitations, on exertion/increasingly minimal effort/at rest
  - Signs: tar staining, HTN, xanthelasma, corneal arcus, obesity
  - HF due to IHD: elevated JVP, ventricular heave, murmur, pulmonary/ pedal oedema

- **Investigations:**
  - Resting ECG (a normal resting ECG does not exclude CAD/IHD)
  - Stable:
    - Functional: ETT, stress (dobutamine), echocardiogram, perfusion scan
    - Anatomical: coronary angiogram, CT angiogram
  - Acute/unstable: serial ECGs, bloods (troponin)

- **Diagnosis:** stable CAD is diagnosed after the functional test and/or anatomical test. With ACS, any ST elevation on ECG > STEMI. If there is no ST elevation, but with elevated biomarkers > NSTEMI. If symptomatic but biomarkers negative > “unstable” angina

- **Management of stable IHD:**
  - Lifestyle: modify risk factors to prevent progression
  - Medical:
    - Preventative: antiplatelets
    - Symptomatic: GTN spray, long-acting nitrates (ISMN)
    - Alternative anti-anginals (e.g. nicorandil, beta-blockers, ivabradine, ranolazine)
  - Revascularisation:
    - Percutaneous coronary intervention (balloons and stents)
    - Coronary artery bypass grafts (see vascular surgery notes)

- **ACS Management**
  - Oxygen
  - Pain: 5-10mg IV morphine (+10mg IV metoclopramide)
  - Antiplatelets: 300mg Aspirin + 300mg clopidogrel/ticagrelor/prasugrel
  - Antithrombotic/ anticoagulant Rx
- STEMI > enoxaparin
- NSTEMI/UA > fonadaparinaux
  - Beta blockers
  - Serial ECG: look for signs of ischaemia and/or dynamic changes
  - On discharge ++ ACE-inhibitors, statins, cardiac rehabilitation

**Arrhythmias**

- **SVT:** 25yo F, fast pulse on way to work, feels light-headed, no syncope. Regular narrow complex tachycardia = supraventricular tachycardia
  - What is not appropriate?
    - Carotid sinus massage
    - DC cardioversion
    - Adenosine
    - Bisoprolol
  - Now she is haemodynamically unstable and in cardiogenic shock. What do you do? DC cardioversion

- **76yoM,** previous MI develops CP, collapse. Initial ECG shows VT (broad complex tachycardia)
  - BP unrecorable, 88/46mmHg, bibasal creps. DC cardioversion

- **Bradycardia:**
  - HR <60bpm
  - Diagnosis dependent on:
    - Presence or absence of P waves (120ms in width)
    - Relationship of P waves to QRS complexes (PR interval should be 120-200ms = 3-5 small squares)
  - Normal PR interval: sinus bradycardia, sick sinus syndrome (can lead to tachycardia + sinus arrest)
  - Abnormal PR: is it followed by a QRS complex?
    - Yes: first degree AV block
    - Prolonging PR with occasional dropped beat: Mobitz Type I (Wenkebach)
    - Constant PR with sudden dropped beat: Mobitz Type II
    - Every 2\(\text{nd}/3\text{rd}/4\text{th}\) P wave followed by QRS: 2:1, 3:1, 4:1
    - Complete dissociation: Complete/3\text{rd} HB
- **Tachycardia**
  - HR >100dpm
  - Diagnosis dependent on:
    - Presence/absence of P waves
    - Width of QRS complexes
  - AF: narrow complex, irregular, no p waves
  - Atrial flutter: narrow complex, sawtooth baseline
  - SVT: narrow, regular complex tachycardia
  - VT: Broad complex regular tachycardia
  - VF: broad complex, no pattern
Valvular heart disease
- 35yoF, prenatal counselling. FHx very tall, ++ eye troubles, some requiring corrective spinal surgery. Dx: Aortic regurgitation
  - What do you want to know on the echo when a diagnosis of Marfan's syndrome is made: aortic regurgitation and aortic root size
- 62yoM, acute anterior STEMI. Rx with occluded LAD with stents. Develops acute pulmonary oedema, low BP. ECG demonstrates anterior Q waves only.
  - Murmur is most likely to be mitral regurgitation (damage to the papillary muscles)
- 40yo lady with a systolic murmur: Aortic stenosis, VSD, pulmonary stenosis, tricuspid regurgitation

Aortic stenosis:
- Murmur: ejection systolic murmur, loudest over the aortic region, radiating o the carotids, accentuated by exhalation
- Ax. Congenital bicuspid (associated with aortic root dilation), or acquired (calcified)
- Sx. Angina, dyspnoea, syncope (when peak gradient >50mmHg or AVA <1.0cm2)
- Ix. Echo, functional ETT, angiography
- Mx. SAVR/TAVI for symptomatic severe

HOCM: loud ejection systolic at left lower sternal edge (sounds like AS)

Aortic regurgitation:
- Murmur: early diastolic murmur loudest over the lower left sternal edge, accentuated by exhalation
- Ax. Leaflet problem (bicuspid, damage following IE, post-op, rheumatic fever) or aortic root dilation (idiopathic, HTN, MArfan’s, Ehler-Danlos)
- Sx. Breathlessness, fatigue, heart failure, reduced exercise tolerance
- Ix. Echo (including aorta and root) or CT
- Rx. If symptomatic and causing enlargement of LV > SAVR

Mitral stenosis:
- Murmur: mid-diastolic rumbling murmur with an opening snap
- Ax. Rheumatic fever
- Sx. Dyspnoea, palpitations, CP, RHF
- Ix. ECG, echo, ETT
- Mx. For severe MS with symptoms:
  - Percutaneous mitral commissurotomy
  - Surgical commissurotomy
  - MVR (repair or replacement)

Mitral regurgitation:
- Case:
  - Leaflet problem: prolapse, infective endocarditis
  - Annular ring problem: LVF
  - Chordae rupture/papillary dysfunction (acute following MI)
  - RhF
- Sx. Dyspnoea, palpitations (+/- AF), HF
- Ix. ECH, Echo, ETT
- Mx: for severe with symptoms:
  - MVR (repair or replacement)
  - Mitraclip (percutaneous)

ECGs
1. Confirm patient details (name, DOB, ECG time)
2. Check the machine is calibrated according to standard methodology
3. Rate
   - Sinus rhythm: 300/number of squares between two QRS complexes
   - AF: count the number of QRS complexes on ECG strip then multiply by 6
4. Rhythm
5. Axis: the mean direction of the wave of depolarisation in one plane of the heart. Look at leads I and AvF
   - Both positive = normal
   - Lead I positive + negative AvF >> Look at Lead II
6. **P waves**
- Represents atrial contraction (depolarisation) – normally 3 small squares (120ms)
- >120ms = P mitrale (left atrial enlargement)
- >2.5mm = P pulmonale (right atrial enlargement)
7. **PR interval**
- Represents conduction through the AV node – normally 3-5 small squares (120-200ms)
- Abnormalities:
  - Heart block: Prolongation/loss of connection with QRS complexes
  - Pericarditis/atrial infarction: PR depression
  - Diseases like WPW: shortening
8. **QRS complex**
- Represents ventricular contraction (depolarisation) – normally 3 small squares (<120ms)
- Broad QRS complex suggests that one (or both) ventricles are slow to contract compared to the other, e.g. bundle branch block
  - LBBB: two fascicles
    - Anterior fascicular block >> LAD
    - Posterior fascicular block >> RAD
    - Both blocked >> no axis shift
  - RBBB: one fascicle, block results in no axis deviation (since left fascicles still intact)
  - Trifascicular block: RBBB + LAD + prolonging PR interval
9. **ST segment**
- The time between ventricular depolarisation to repolarization. Changes can signify ischaemia
10. **T waves**
- Represents ventricular relaxation (repolarization)
- Abnormalities:
  - Inversion: can imply ischaemia
  - Tall: hyperkalaemia
  - Very tall: earliest sign of MI
  - Appearing late after QRS complexes: long QT syndrome

### Pacemakers
- Single or dual chamber: atrial and ventricular lead
- Some CRT devices (cardiac resynchronization therapy) have an additional lead to stimulate LV
- RV lead activates RV first then LV >> LBBB

### Common presentations
- **Chest pain:** description, radiation, duration, associated sx, exacerbating/relieving factors. DDx
  - Cardiac
  - Musculoskeletal
  - GORD/peptic ulcer disease
  - Chest infection
  - Pulmonary embolism
  - Trauma, e.g. rib #s
  - Referred pain from vertebral disease
- **Dyspnoea:**
  - Is this heart failure? When does it come on, relating to exertion/position, worse at night, number of pillows, associated Sx
  - What does it prevent them from doing? Assess baseline function
- **Palpitations:**
- What do they mean? Fast or thumping
- What is the rhythm?
- Onset and cessation (sudden/gradual)
- Associated symptoms: dyspnea, syncope, pre-syncope, chest pain, oedema
- Exacerbating/alleviating factors

- **Faints/falls:**
  - Age of the patient
  - When and how often does it occur?
  - Is this sudden loss of consciousness (syncope) or “feeling weak and wobbly”?
  - Or did they get a warning? Could they abort the fall?
  - What brings it on? Effort, coughing, micturition, associated palpitations
  - Has the patient sustained any injuries: makes syncope more likely
EMQs

**Chest pain**
1. 55yo overweight F, lower chest-epigastric discomfort about 1h after fatty food. No relief from gaviscon. Dx. Biliary colic
2. 24yo tall M, sudden tearing chest pain, male Fx tall. Acutely unwell, hypotensive. Dx Aortic dissection
3. 49yoF, left sided pressure-like Sx at night, denies exertional chest discomfort and has no pain on inspiration. Sx occur even when she has skipped her evening meal. Dx. Decubitus angina
4. 83yoM attends GP. 2h chest pain before. ECG demonstrates inverted T waves in the inferolateral leads with Q waves. Dx. Myocardial infarction
5. 18yo M. central severe chest pain, worse at night relieved sitting up. Sore throat last week. ECG abnormal. No pleuritic pain. Dx. Pericarditis (Mx NSAIDs, ?steroids)

**Oedema**
6. 75yo L, bilateral leg swelling. Breathlessness, cough with white frothy sputum, pitting oedema, crepitations. Urine dip negative. Dx. Biventricular failure
7. 35yo F, recurrent pulmonary emboli and breathlessness. Leg swelling, mildly tender on deep palpation but not hot or tender. No wt loss or abdo Sx. Elevated JVP. Lungs clear. Urinarlysis is negative. Dx. RV failure
8. 52yoM, acutely short of breath, DM, no chest pain, widespread creps bilaterally, sats 85% on air. ECG shows T wave inversion in anterior leads. Elevated JVP but no. Acute pulmonary oedema from LV failure
9. 64yoM, Hx of HTN and DM, gross peripheral oeeema. Frothy protein +++ urine, sft systolic murmur LLSE, low albumin. Dx nephrotic syndrome
10. 48yo swollen right calf, hot tender, breathless, recent flying. Dx. DVT

**Palpitations**
11. 22yo student, heavy night drinking, fast pulse irregularly irregular 120-140bpm. Dx AF
12. 66yoM, central crushing chest pain post-op, unresponsive, no palpable pulse. Commence CPR and monitor reveals regular broad tracing with 180bpm. Dx Vt
13. 32 theatre nurse, frequent palpitations that stops her working, ECG normal. Feeling of doom. Dx anxiety
14. 35yo M, palpitations. Fast but regular pulse. Regular narrow width rhythm with a rate of 150bpm. P waves seen in V1 only. Relieved by IV amiodaron. Dx Atrial flutter
15. 20yo intermittent palpitations, 200bpm. Normal sinus rhythm with a rate of 60bpm. Delta wave. Dx. Wolff-Parkinson White
Vascular Surgery  Mr Colin Bicknell (colin.bicknell@imperial.ac.uk)

- Pink = good, black = bad, blue = venous, white = acute
- Artery can only do 3 things: Occlude > ischaemia, cut > bleed, swelling = aneurysm

Vascular Examination

- General inspection:
  - Smoking
  - Inhaler
  - DM meds
  - Fistula – good topic to talk about
  - Dressings
  - Walking stick
  - Body habitus: fat = ++ cholesterol, thin = ++ smoking
DON'T MISS THE FALSE LEG

- Hands (QUICKLY): splinter haemorrhages, missing digits (commonest cause = trauma), nicotine stains
- Supra-aortic pulses:
  - Radial: rate (tachycardic or not, don't waste time), rhythm, radio-radial delay (coarctation of the aorta)
    - Commonest reason for not feeling radial pulse: +++ radial artery lines
  - Brachial
  - BP
  - Subclavian (in the supraclavicular fossa)
  - Carotid – list for bruits (breathe in and out)

Presentation: “the pt appears comfortable at rest, with no peripheral stigma of chronic disease. His fingers are nicotine stained. He is not tachycardic with a regular rhythm, and there is no radio-radial delay. You have indicated he is normotensive. There is full complement of supra-aortic pulses with no bruits. I always perform a full examiner of the pre-cordium in my normal practice [looking at the examiner]”

- Abdomen:
  - Expose including the groin: I normally expose from nipple to knee
  - Scars + sides (tunnelled grafts from axilla to femoral – feel for a tube)
  - Palpate for an aneurysm: stand to the right, reach over the aorta and feel above the umbilicus for the pulsatile mass, then try and feel either side for expansiveness, then measure the size
    - Confirm findings: duplex ultrasound
  - List for bruits centrally and over the renal vessels
    - Aorta: just above umbilicus
    - Renal: Half way between xiphisternum and umbilicus

- Legs:
  - Inspect, feel temperature
  - Femoral arteries: ½ way between ASIS and pubic symphysis
    - Feel simultaneously as a weak femoral pulse is difficult to determine
    - Feel for radio-femoral delay
  - Popliteal arteries: feel for an aneurysm (take the weight with your fingers, slightly lateral)
  - Pedal arteries: anterior and posterior tibial
  - Bruits:
    - Iliac (1/2 way between umbilicus and mid-inguinal point), CFA and adductor hiatus (just above knee medially, site of superficial femoral) are the most useful sites
    - Sometime one can pick up a bruit after exercise only

- Arterial anomalies:
  - Dominant peroneal artery (5%): absent dorsalis pedis, pulse just anterior to the lateral malleolus as the foot is supplied by branches of the peroneal vessel
  - Persistent sciatic artery (rare): absence of femoral vessels, may present with claudication, aneurysm of the sciatic artery in the buttock

- Buerger’s
  - Angle: angle foot goes white (between leg and bed, normal = 90deg). Blood supply insufficient to pump blood up leg
  - Test: raise both feet and hold them up ~1 minute. When the foot blanches, swing the legs over the side of the bed and let them hang down. The ischaemic foot will go brick red (reactive hyperemia)
    - Positive Buerger’s test then indicates significant arterial disease of the lower limb
Foot in air > build up of metabolic products (CO2, lactate etc) > effect on dilatation of small arteries + capillaries

- Ankle brachial pressure index: Useful screening test for peripheral arterial disease
  - Claudicants may have ABPI >0.8 and only drop with exercise
  - Diabetics (and some renal disease) may have tissue loss with abnormally high ABPIs - +++ incomprehensible calcified vessels
  - Those with small vessel disease in the foot may have necrosis with ABPI >0.6
  - METHOD: Lie the pt on the couch, knees flexed. Place the manual BP cuff around the calf. Find the pedal arterial signal using a handheld Doppler device. Inflate the cuff until the signal disappears. Slowly let down the cuff until the signal reappears = ankle pressure. Repeat the procedure in the arm using the brachial artery signal to record to the branchial pressure.
    - ABPI = ankle pressure / brachial pressure

**Presentation:** “OE of the LL, there were no obvious scars and there was no ulceration. There was no difference in temperature between the lower limbs. The patient had bilateral and equal femoral pulses with no radiofemoral delay. There were palpable popliteal pulses. There was a full complement of pedal pulses. I detected no bruits on auscultation. Buerger’s test was negative. I would like to perform ABPIs on both sides.”

Examining for vascular bypass surgeries

- Points of vascular access
  - Thoracoabdominal aorta: thoracoabdominal scar (DDx. Oesophageal surgery)
  - Abdominal aorta: midline laparotomy OR rooftop (easier to breather post-op)
  - Common iliacs: Rutherford Morrison (lower quadrant, curved or straight)
  - Common femorals: vertical groin

- Principles of dealing with blocked arteries – there are 2 approaches:
  - Endovascular: balloon, angioplasty or stenting
  - Surgery
    - Endarterectomy: coring of artery + patching – good for localised lesions
    - Anatomical bypass: constructed alongside the diseased anatomy using large vessel inflow and have the highest patiency (transabdominal or retroperitoneal approach)
      - Example: aortobifemoral, iliofemoral
    - Extra-anatomical bypass: may be laparoscopic. Minimal blood loss and no clamping of intra-abdominal or thoracic vessels. Neither the abdominal or thoracic cavity is entered
      - +++ Risk of infection, variable patiency
      - Used in medically compromised patients, who are typically older, have advanced limb ischaemia, CKD, severe COPD
      - Extra-anatomical bypass: crossover iliofemoral/fem-fem, axillary-bifemoral, unilateral axillofemoral/popliteal, bilateral axillopopliteal

- Interpreting combinations of scars
  - Midline laparotomy + both groin: aorto-bifemoral
  - Rutherford + iliac fossa vertical: Ileofemoral bypass
  - Below clavicle + both groin: Axillo-bifemoral bypass (for aortic/bilateral iliac block)
  - Two vertical groin: fem-fem crossover graft
  - Vertical groin + medial knee: fem-popliteal (for superficial femoral block)

- Types of grafts
  - Synthetic (Dacron or PTFE): used above the inguinal ligament [post-op aspirin]
    - Most femoral-femoral bypasses

**ABPI Values**

- Normal: 0.8-1
- Claudication: 0.6-0.8
- Critical ischaemia: <0.6
- Autologous: typically long-saphenous vein, can be inserted with valves removed or reversed [post-op Warfarin]
  - If scar in long saphenous distribution – assume graft, but look for midline sternotomy = CABG
- Assessing the graft (Ix. Doppler examination)
  - Graft pulsations
  - Peripheral pulses
  - New/old ulcers
  - Colour changes of the extremities
  - Buerger’s test & venous filling time
  - ABPI

Common vascular cases
Claudication
- Hx: Cramping pain on exertion, worse if continue. Relieved by complete rest after 3-5 minutes (don’t need to sit down, but lean on walking stick/pretend to text on phone or look in shop window). Worse uphill and up stairs. Very repeatable history, standard distance (not varying)
- Pathological reason: narrowing in artery limits blood flow. At rest, leg only requires 100mls/min, but this requirement hugely increases on exertion but you cannot maintain this > anaerobic respiration > lactic acid build up > cramp – there is no damage to the muscle, but just requires the paying of oxygen debt
- Pulse pattern and Sx will tell you where the stenosis is. Buerger’s negative, ABPI >0.6, no ulcers
  - Calf pain: SFA (feel pulse in common femoral, but loss on one leg below), or popliteal
  - Thigh pain: common femoral or external iliac
  - Buttock: internal iliac
  - Leriche’s syndrome: buttock pain, no femoral pulses, impotence (aortic occlusion)
- Ix.
  - Physiological = Exercise treadmill ABPIs: should fall by 0.2/more – confirms diagnosis
  - Anatomical = Duplex (US + Doppler)
    - D-mode US: Vessel is seen in the L panel
    - Multi-directional Doppler: measure the velocity of blood
      - Normal elastic arterial system = triphasic (forward, backward, forward)
      - Stenosis > loss of pressure > loss of waveform = monophasic
  - Invasive = Intraarterial Digital subtraction Angiography (if considering intervention)
    - Needle, wire + catheter inserted
    - Contrast agent injected
    - XR taken around area of interest
    - 2nd contrast agent injected
    - XR taken
    - One image taken away from another
- Mx.
  - Only 15% of well-managed pts go on to reduce their exertional distance
  - 5yr survival = <60% (MI, stroke, renal failure)
Conservative: control RF
  - Diet
  - Smoking cessation
Medical: Cholesterol <4, BP <130/80, DM control

READ BRITISH HEART STUDY

Ischaemia

Critical ischaemia
- Definition:
  - >2 weeks duration
  - Ankle pressure <40mmHG: in DM patients the calf vessels are commonly calcified and incompressible, so that the pressure in the ankle is unrecordable.
  - Rest pain or tissue loss: constant pain in the distal portion of the lower extremity worse on raising feet. Night pain is a lesser defree of rest pain occurring at night, necessitating feet to be hung out of the side of the bed or sleeing in a chair. Tissue loss is any ulceration or necrosis
- Signs: skin damage over pressure areas, slow cap refill, small Buerger’s angle
- Outcome: sepsis, worsening gangrene
- These could come into exams – from the ward (black toe, identify bypass graft from scars/pulses, discuss critical ischaemia)

Acute ischaemia
- Six Ps: painful, pulseless, perishingly cold, pale (+ paralysis, paraesthesia) >> Immediate REVASCULARISATION
- Acute on chronic limb ischaemia on a background of claudication > collaterals develop around occluded vessels, which may thrombose > 4 Ps, but some
  - 6hrs to revascularise
- Causes:
  - Embolic: embolus is a solid/liquid/gas travelling from one point in the circulation to cause a distal obstruction, e.g. atrial fibrillation
    - Rx. Embolectomy: pass uninflated balloon past embolus, then inflate and pull
  - Thrombotic: typically acute-on-chronic
    - Rx. thrombolysis, angioplasty

Aneurysms
- Definition: an abnormal, balloon-like swelling in a blood vessel, resulting from weakening of the vessel wall
- History:
  - Most commonly incidentally – renal, prostate
  - Bursts
  - Asymptomatic,
- UK screening: 65yr old men
  - Normal > ++++ low risk > no further screening
  - <5.5cm > monitoring
  - >5.5cm > repair
- 10% of pts with AAA have popliteal, and 15% with popliteal have bilateral
- Complications:
  - Rupture: uncommon in short cases
  - Embolisation: trash foot in AAA, missing pulses in popliteal areusym
  - Thrombosis: acutely ischaemic leg
Pressure: DVT
Fistulation: acutely unstable usually
  - E.g. aorta-duodenal, aorta-venacaval

**Pseudoaneurysms**: expanding pulsatilily haematomas without an epithelial lining (after trauma, e.g. stab wound, leaking anastomosis after surgery, 1 in 500 after arterioraphy)
  - Blood leaves the vessel through the hole in the wall, but is contained by surrounding tissue (not involving the wall of the artery). Because the haematoma is still in communication with the arterial flow within the artery, it is pulsatile
  - Rx. Conservative, US compression, embolization or surgery (ligation, excision and or vascular repair)

Varicose veins
- **Definition (difficult)**: abnormal dilated tortuous superficial veins
- **Perforators** normally connect the deep and superficial venous systems of the leg, allowing the blood to flow into the deep veins where the muscle pump helps to aid venous return. Perforator valve incompetence > retrograde flow > superficial blood pooling > dilation + lengthening of superficial veins
- **Examine patient standing, gently bend knee by 3-4°**
- **Sx.** Distal pain, heaviness, dragging sensation, itching, swelling
- **Complications:**
  - Swelling
  - Venous eczema
  - Bleeding: older age with thin skin, e.g. on steroids > superficial bleeding
  - Thrombophlebitis: inflammation around clot, NSAID gel
  - Haemosiderin deposition: iron oxidases
  - Lipodermatosclerosis
  - **Frank venous ulceration**: shallow edge, sloughy base, irregular, granulation tissue
- **Tourniquet test**: empty superficial veins by raising the leg with the patient lying flat, apply tourniquet high in the thigh. Ask the pt to stand. If the veins below the tourniquet fill up, this implies that the incompetent perforators are below that level. If veins remain empty, perforator is above that level
- **Management:**
  - Conservative: wt loss, physical activity, advice on minimizing periods of inactivity + leg elevation
  - Advice of when to seek further help: hard/painful veins, skin changes, break in skin >2wks, bleeding
  - **Intervention:**
    - Surgery: stripping or ligation
    - Foam sclerotherapy: injection of an irritant foam into the vein > inflammatory response > closing off of the vein
- Endothermal methods: radiofrequency and laser ablation > heat inside vein > damage > closing off of the vein

### Chronic venous insufficiency

![Deep Vein Thrombosis Diagram](image)

- **Deep Vein Thrombosis**
  - clot organisation destroys valves
  - partial recanalisation narrows vein

- **Post Thrombotic Limb Calf Pump Failure Syndrome**
  - Oedema
  - Varicose eczema
  - Pigmentation:
    - "Cayenne pepper" initially
    - Then brown haemosiderin
  - Lipodermatosclerosis
  - Venous ulceration
  - Secondary varicose veins
  - Pale scars
  - Atrophic blanche

### Thoracic outlet syndrome

- **Pressure on the 3 things:**
  - Artery: Raynauds, claudication, embolisation
  - Venous: upper limb DVT, long term swelling
  - Brachial plexus: pain, radiculopathy

- **Ix.**
  - MRI/MRA/MRV
  - Duplex – in abduction
  - Nerve conduction studies

- **Rx.** Resect 1\textsuperscript{st} rib to increase thoracic outlet volume

- **RF:** Butterfly swimmers, wt lifters, violinist (strong scelaneous anterior muscle)

### Other

- **Diabetic feet:** Why do DM get ulcers?
  - PVD
  - Small vessel disease
  - Neuropathy
  - Infection: synergistic between anaerobic and aerobic organisms > gas gangrene within 24 hours > urgent drainage

- **Wagner classification of diabetic ulceration:**
  - 0: pre-ulcerative state
  - 1: superficial
  - 2: full-thickness
  - 3: deep +/- osteomyelitis, abscess or joint sepsis
  - 4: gangrene of a geographical portion of the foot
  - 5: extensive gangrene rendering the foot beyond salvage
• Charcot-joint: Highly abnormal non-painful joint of the foot due to collapse.

• Raynaud’s
  o White (cold) > blue (warming) > red (hyperemia)
    ▪ White: spasm of arteries
    ▪ Blue: deoxygenated blood
    ▪ Red: hyperaemia due to metabolic build up
  o Ax
    ▪ Primary = disease: no cause (middle-age women, carrying handbags in the cold)
    ▪ Secondary = syndrome: vibration white finger (pneumatic drills), thoracic outlet syndrome, thrombophilias, PVD of upper limb, AI (CREST, SLE)

• Buerger’s disease: young men, heavy smokers, presents with severe Raynaud’s
  o Vasculitis with thrombosis affecting the medium vessels of the forearm and calf, and small vessels of the hands and feet

• AV malformations:
  o May be arterial, venous or both
  o May present with a painless lump
  o Venous: predominantly formed by lakes of venous blood under low pressure
    ▪ Appearance: bluish, often raised, not pulsatily, no bruit, no signal with Doppler, no cardiac compromise
  o AV: rare, pulsatile nature, may cause atrophy or gross growth, may lead to high output cardiac failure (look for significant shunt)

• Lymphoedema:
  o Primary: Milroy’s (at birth), after pregnancy, older age
  o Secondary: filariasis (worldwide), iatrogenic (UK - post axillary drainage in cancer Rx, CFA surgery, RadioTx of LN, gynae/pelvic tumour obstructing)

• Carotid endarterectomy:
  o Stroke
  o Nerve damage: XII (stick tongue out), X (hoarse voice), VII (drooping of lip on one side), greater auricular (numb earlobe)

• Gangrene: infection with superimposed infection
  o Dead tissue is not painful
  o OE: Line of demarcation
Respiratory PACES  Dr Rachel Davies & Matthew Berry

Examination Advice

TOP TIPS
• If comes up in 22m long Hx, use the paper
• Don't ask why are you here – they are there for the exams!
• Don't forget smoking + drug allergies
• Aim for resp exam in 5-6 minutes
• Presenting signs
  o Part of disease process, e.g. crackles
  o Secondary complication, e.g. swollen ankles in cor pulmonale
  o SE of treatment, e.g. bruising from long-term steroids
• Deviation of trachea in exam is not going to be a tension pneumothorax: upper lobe fibrosis, pneumonectomy, lobectomy
• Hyper-expanded: requires measurement and comparison with a normogram – use the term Barrel Chest.
  Cardinal signs of hyper-expansion:
  o Reduced cricosternal distance (<3 fingers)
  o Loss of cardiac dullness
  o Displaced liver edge (normal size but sitting low)
• Percussion can only be symmetrical or asymmetrical – describe one side in relation to another
• Auscultation:
  o Normal: inspiration = longer + louder > expiration, continuous flow
  o Comment on reduced air entry
  o Bronchial breathing: no difference between inspiration/expiration, gap between
  o Wheeze:
    ▪ Monophonic: fixed airways obstruction, e.g. collection of mucus. Ask them to cough
    ▪ Polyphonic: expiratory phase is prolonged, musical sounding/squeaky – e.g. inflammation in airways
  o Crackles:
    ▪ Course: mucus bubbling with air building and popping through (wet) – pus in pneumonia, sputum in bronchiectasis
    ▪ Fine: stiff airways/lungs resists air, and then pops open (Velcro) – mucus, late fibrotic small airways, early mucus in large airways
• Do not need to tactile vocal fremitus AND vocal resonance unless you find an abnormality

REMEMBER FOR INSPECTION
• White stick
• Wheelchair
• Anaemia: Ax of breathlessness, steroids can cause GI bleeds – unlikely to be badly anaemic in exam
• Cushingoid due to steroids (Asthma, COPD, fibrosis, sarcoid)
• Clubbing: suppurative (bronchiectasis, chronic infection), interstitial lung disease (CF, IPF), malignancy
• Sputum pot: suggests bronchiectasis (think COPD)
• Breathing pattern:
  o Pursed lip breathing with prolonged expiratory phase > obstructive airway disease
  o Splinting (leaning forward and using arms to support)
• Cachexia: cancer, chronic respiratory disease (increased mortality in COPD) >> Mx. Refer to dietician
• RR likely to be normal in exam
• Scars + chest wall deformity
  o Thoracotomy scar (lobectomy or pneumonectomy) – oblique scar along inferior edge of scapula
  o Chest drain scar
  o Bilateral scars underneath breasts > bilateral transplant
  o Mediastinoscopy: used for staging of cancer or sampling LN
• Oxygen: describe device
  o Nasal cannulae
  o 2-4litres/min = 24-40% FiO2 implies chronic respiratory failure
• Non-invasive ventilation
  o CPAP: T1, sleep apnoea
  o BiPAP (inspiratory + expiratory): decompensated type 2: COPD, sleep apnoea, neuromuscular
• Inhalers: learn drugs, dose + types – say you’d like to check their inhaler technique
  o MDI
  o Accuhaler
  o Autohaler
  o Turbohaler
  o Handihaler
• Ask to take inspiration + forced expiration (>6s = airflow obstruction)
• Wasting in C8/T1 – apical tumour
• Tar staining in fingers/nails
• Yellow, dystrophic nails – yellow nail syndrome (if bronchiectasis/pleural effusions)
• JVP: right heart failure/ cor pulmonale
• Chest: SVC obstruction veins, radioTx tattoos
• Erythema nodosum on shins – sarcoid, TB

PRESENTATION
• DOES IT MAKE SENSE?
  o Reduced air entry, dull to percussion, reduced VF/VR = pleural effusion
  o Bronchial breathing (+-crackles), dull percussion, increased VR/VR = consolidation/collapse
  o Fine crackles, clubbed = fibrosis
  o Course crackles, clubbed, sputum = bronchiectasis
• Do not reconstruct your examination
• Completing exam: STOPX
• STOP AND LET THEM ASK QUESTIONS
• Investigations
  o Bloods: BC (anaemia, eosinophils)
  o Sputum culture
  o CXR
  o Spirometry (learn patterns) - Obstructive: Ratio <70
  o Echo: pulm HTN, cardiac failure
  o CT:
    ▪ High resolution CT: thinner slice with detailed sampling of the lung parenchyma, wider spacing
    ▪ Volume CT: closer slices

MANAGEMENT PLAN
• Pharmacological
  o Bronchodilators
  o Mucolytics
  o Immunosuppressives
  o Oxygen
  o Antibiotics
• Non-pharm MDT – get an action plan
  o Dietician
  o Physiotherapists, pulmonary rehabilitation
  o NIV
  o Surgical
  o Psychological/palliative
  o Smoking cessation
  o GP
Common Presentations

CHEST PAIN
- Case: 38yo F, pleuritic chest pain. Sudden onset, central, 8hrs, worse on deep inspiration. Improves when sitting quietly, no radiation. SOB on walking 10m, no haemoptysis. RF: COC, BMI 31
- Quantify SOB: walk up stairs and answer phone, walk to bus stop?
- DDx. Pulmonary embolism, pneumothorax, pleural effusion, asthma, tietze syndrome (costochondritis)
- OE: no peripheral features of resp disease, RR 30, HR 110bmp, BP 100/80mmHg, JVP 5cm > sternal angle, central trachea, normal percussion note throughout precordium, vesicular breath sounds throughout
  - This is pointing towards a diagnosis of pulmonary embolism, but it could be a small apical pneumothorax – need CXR
- Examining for the trachea: index + ring finger on clavicle ends, and middle finger to point
- Ix for PE:
  - Oxygen saturations: <95% predictive of poor outcome
  - ECG: deep S wave in lead 1, Q wave in lead 3, T wave inversion in lead 3 (S1Q3T3)
  - Bloods: D-dimer, FBC (to rule out infection indicated by raised WCC)
  - ABG: not useful diagnostic, but good as severity indicator – low pO2 <8kPa, normal pCO2 = type 1 respiratory failure
    - Failure of alveolar units (loss of membrane, or oxygen carrying problem) diffusion problem
    - VQ mismatch
  - CXR: significant PE may show a wedge-shaped infarct (proximal infarct)
  - CTPA = definitive test
  - VQ scan
- D-Dimer is a fibrin degradation product present after a blood clot is degraded by fibrinolysis – high sensitivity 89-98%, low specificity – must be used in conjunction with a clinical probability score
  - Very useful negative predictive test
- Wells score: probability score for pulmonary embolism (>4)

<table>
<thead>
<tr>
<th>Clinical Feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)</td>
<td>3</td>
</tr>
<tr>
<td>An alternative diagnosis is less likely than PE</td>
<td>3</td>
</tr>
<tr>
<td>Heart rate &gt;100bmp</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilisation for more than 3 days or surgery in the previous 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>1.5</td>
</tr>
<tr>
<td>Haemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Malignancy (on treatment, treated in the last 6 months, or palliative)</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Probability Simplified Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE Likely</td>
</tr>
<tr>
<td>PE Unlikely</td>
</tr>
<tr>
<td>&gt;4</td>
</tr>
</tbody>
</table>

- 18% of PE patients will have a normal ABG, but haemodynamic collapse may >> mixed acidosis
- O2 delivery methods: simpal face mask/nasal cannula (delivery dependent on RR), venture mask or air entertainment mask (O2 entry through adapter is controlled to receive set amount of oxygen, exhalation holes. All mixing of RA and O2 is controlled – 40% red, 60% green – adapter tells you flow rate to set), non-rebreather (one-way valve for exhaled gases – O2 is delivered at max flow rate into sealed bag, and then inspiratory effort is required)
  - Face mask – should not really use
  - Nasal cannula – no respiratory disease
  - Air entertainment mask – respiratory disease
  - Non-rebreather – high O2 requirement
- CXR: ABCDE
  - Airways – trachea, carina
- **Bases** - cardiophrenic + costophrenic angles
- **Cardiac contour** - heart, mediastinum + vascular markings
- **Diaphragm** – pneumoperitoneum
- **Edges** – bones
- **Fields** – lung fields (hemithorax)
- **Behind the heart**. apices!

- **CTPA**: contrast medium injected into peripheral vein, and CT scan is timed with pulmonary circulation – higher sensitivity/specificity for a proximal acute clot
- **VQ scan**: better for insidious peripheral clots (looking for mismatch between ventilation and perfusion) – if pregnant you can do a V scan only, but still CTPA scan is still better to pick up all pathology
- **Rx of PE**
  - Haemodynamic compromise (systolic BP <80mmHg for 5-10mins = massive PE) – thrombolysis = alteplase
  - Traditional treatment – LMWH followed by warfarin
  - New oral anticoagulants: rivaroxaban (factor X inhibitor), dabigatran (factor IIa inhibitor)

**COUGH**

- **Case**: 56yo M, 2wk Hx cough, green sputum, no haemoptysis, fevers, able to walk from bedroom to kitchen with one stop, no wt loss. Smoker – 10/d. coughs after eating on occasion. Penicillin allergy. Unemployed and homeless, no travel Hx or IVDU.
- **DDx**: Pneumonia, infective exacerbation of COPD, pleural effusion
- **OE**: 38deg, tachycardic, RR 35, JVP visible lying flat, dull percussion note right upper lobe with bronchial bleeding (major airway sounds transmitted to periphery).
- **Ix.**
  - **O2 sats**
  - **Sputum culture**
  - **Blood tests**: FBC, cultures, U&Es
  - **ABG**
  - **CXR**

- **Qu to ask** – is this a CAP or is there something underlying the consolidation
  - **CURB-65 score** helps determine what Abx should be given + where they should be managed
    - Low (0/1): at home with oral amoxicillin
    - Moderate (2): hospital with oral amoxicillin plus macrolide
    - Severe (>3): level 3 care with IV co-amoxiclav plus clarithromycin

- **Bacteriology of pneumonia**
  - **Strep pneumonia**
  - **Staph aureus** (superadded infection following viral pneumonitis, flu-like illness)
  - **Haemophilus influenza** (if underlying respiratory disease – impaired host defence, e.g. COPD)
  - **Mycoplasma**
  - **Legionella** (Ix if CURB-65 >3, foreign travel/air conditioning)
  - **Chlamydia**

- **Case continued.. still coughing and breathless, CO pleuritic chest pain, persistent breath sounds, dull percussion note, absent tactile vocal fremitus (very good at picking up a pleural effusion) + absent breath sounds right hemithorax
- **What are we worried about?** Pleural effusion or empyema
- **Tactile vocal fremitus** (test if percussion note dull): absent in pleural eddusion, low inter-observer error, unable to detect increase
  - If preserved, then go on to vocal resonance – detects consolidation (whispering pectoriloquy is only heard in consolidated lung)
- **Empyema**: Hx, Ix (peripheral blood cultures, CXR, US +/- fluid aspiration)
  - **Rx.** IV ABx with anaerobic cover, intercostal drain with thrombolysis + DNAse – Abx alone will NOT effectively treat
SHORTNESS OF BREATH
COPD
- Case: OPD, 1m Hx of SOB, gradually increasing for two years, worse in last 4 weeks, now only able to walk 50 yards, cant climb a flight of stairs, constant white sputum + wheeze, swelling of ankles, 40pack-yr Hx, Hx hayfever + eczema
  - OE: cachectic, no clubbing, tar-staining, peripheral oedema to knees, raised JVP, loss of cardiac dullness (emphysema + bullae), reduced breath sounds throughout
    - Airflow obstruction: prolonged exp phase, pursed lip breathing, wheeze
    - Hyperexpansion: reduced cricosternal distance, loss of cardiac dullness, displaced liver
    - Smoking: tar staining
    - Complications: pulm HTN, CO2 retention (flap)
- DDx. COPD, congestive cardiac failure (would expect crackles), interstitial lung disease, asthma, emphysema (pathological diagnosis – should typically be made at post-mortem)
  - Ix.
    - Peak flow rate – good for large airway disease, will be reduced in COPD – particularly if emphysema type with loss of elastic recoil (collapse at end expiration)
    - CXR – flat hemi-diaphragm, full apices
    - Lung-function tests: spirometry (FEV1, FVC), lung volumes, lung perfusion (TLco, KCO)
      - Spirometry is very useful for airway disease
      - Lung perfusion – Total lung CO - ask pt to breathe in a known amount of CO + hold breath, then breathe out – measure expired CO (difference = amount diffused across the lung)
        - KCO = total lung/ alveolar lung volume
    - HRCT – bullae in apices, holes throughout
    - ABG: Type II respiratory failure, PaO2 <8kPa, PaCO2 >6.7kPa (oxygen sensitive – rely on hypoxic drive to maintain respiratory rate – chemoreceptors lose sensitivity to CO2) – also look at baseline CO2
    - FBC: polycythemia from chronic CO2 retention
    - Echocardiogram – looking for cor pulmonale (pulm HTN)
    - ECG
- Management: Beta blockers > LAMA > combination Rx
  - Conservative: smoking cessation, pulmonary rehabilitation (6-9wk course by physio + dietician)
  - Long-term medical: beta blockers > LAMA > combination Rx.
    - Bronchodilators
    - Inhaled steroids only if FEV1 <50% - at risk of pneumonia
  - Rx acut complications: steroids + 100mg doxycycline for 5d
  - Long-term O2 therapy if pO2 <7.3 (or 8 if pulm HTN) – must be for ~15hrs/day. Trial = measure ABG, give 2L + re-measure (PaO2 must be increased to >8kPa, with no CO2 retention)
    - Ambulatory supplemental oxygen is good for patients who desaturate when they exercise – no more than 4hrs/day. Measure O2 sats before/after walking – fall in O2 sats by >4% to <90%

Asthma
- Inspection: steroid use, oral thrush, pulmonary HTN
- Ix. Exhaled NO (measure % NO in ppm in exhaling breath, >40 suggestive of airway inflammation that responds to steroids), spirometry (if obstructive, you check reversibility using 400ug salbutamol using a spacer for correction of 12%), histamine challenge (increasing doses to check for bronchoconstriction), peak flow diary (diurnal variation), allergy tests (ski pricks, specific IgE for aeroallergens, eosinophils)
- Management = personalised asthma action plan with nurse specialist, self manage
  - Inhaled steroid mainstay (to treat inflammation)
  - Short acting and long acting bronchodilators
  - Oral steroids for exacerbations
  - Smoking cessation
  - Pulmonary rehabilitation
  - Omalizumab/anti-IgE (>3 courses of steroids in year for perennial allergic asthma)
Bronchiectasis

- **Sx.** Clubbing, course crackles, sputum
- **Complications:** pulm HT, cachexia, lobar collapse, massive haemoptysis, T2RF, situs inversus/Kartagener’s
- **Causes:** idiopathic, post-infective (measles, pertussis, TB), hypogammaglobulinaemia/CVID, primary ciliary dyskinesia, Kartagener’s, rheumatoid, IBD
- **Ix.**
  - GOLD STANDARD = HRCT (ring shadows, tramlines, blood vessels smaller)
  - Quantitative immunoglobulins, ABPA (total IgE, specific aspergillus), sweat test, spirometry, sputum cultures
- **Mx.** Physio (airway clearance, postural drainage), prompt ABx at high dose + long duration, correct underlying cause (IVIG, treat ABPA, CF), prophylactic ABx (azithromycin, consider if >3 infections/yr), pulm rehab, smoking cessation

**Lung cancer** – unlikely to come up in PACES, but read up for written

**Pleural effusions**

- Reduced expansion, stony dull, reduced air entry, decreased vocal fremitus/resonance
- **Associated causes (learn Light’s criteria for indeterminate)**
  - Transudate: live, cardiac
  - Exudate: malignancy, rheumatoid, TB, yellow nail, pneumonia, empyema
- **Ix.** CXR, US/CT, US guided aspiration (MCS, TB, protein, glucose, pH, LDH, cytology)
- **Mx.** Drain (+/- VATS, LA thoracoscopy, PleurX indwelling drain), treat underlying cause

**Fibrosis**

- Clubbing, associated disease (RA), fine late inspiratory crackles
- Ax. Idiopathic (honeycombing pattern), connective-tissue associated (scleroderma, RA, SLE), sarcoid, hypersensitivity pneumonitis (extrinsic allergic alveolitis)
  - Drugs: amiodarone, nitrofurantoin, chemo (methotrexate, bleomycin)
- **Ix.** FBC, complement, AI screen, CXR/HRCT, 6 min walk, ABG (T1RF)
- **Mx.** Physio/pulm rehab, nurse specialist, LTOT, anti-tussives, smoking cessation
  - Pirfenidone – IPF only
  - Immunosuppressives – Sarcoids/connective associated
  - Transplant workup

**Surgery**

- Pneumonectomy: Scar, chest wall deformity, shifted trachea/apex, reduced expansion, no breath sounds (be careful transmitted sounds)
- Lobectomy: scar, ribs depressed, reduced expansion focal, reduced breath sounds (compensatory hyperexpansion)
- Scar + normal lung: thoracotomy, transplant

**Pneumonia/Collapse**

- Reduced expansion, dull, reduced air entry, increased VR/TVF
- If well, pneumonia unlikely but they may have a chronic collapse
The Medical Abdomen

Prof Orchard, Chris Wadsworth, Shahid Khan

Common cases

- Liver: CLD, hepatomegaly, jaundice, liver transplant
- Spleen: splenomegaly
- Renal: renal enlargement, transplant
- IBD: Hx/stoma, or short case in surgery

The History station

- GI histories:
  - IBD (medicine and surgery)
  - Coeliac disease
  - Primary sclerosing cholangitis
  - Primary biliary cirrhosis
  - Viral hepatitis
  - Alcoholic liver disease
  - Pernicious anaemia
- Luminal conditions: assess the background, current status, specific acute problems, specific complications, co-morbidities, overall FUNCTION (work, shopping, social activities), previous/current Rx (important for
- Liver/biliary: background (length, RF), initial/current symptoms, features of portal HTN/cirrhosis/decompensation, current Rx, daily function?
- Symptoms
  - Dysphagia/Odynophagia
  - Reflux
  - Vomiting: freq, precipitating factors, relation to food and associated features e.g. chest infections (achalasia)
  - Diarrhoea: freq, consistency, presence of blood and mucus, associated features, BO at night, urgency (sign of rectal inflammation), flush away?
  - Constipation: freq, straining
  - Abdo pain: site, severity, frequency, duration, exacerbating and relieving factors, associated symptoms
  - Other: recognize associations, e.g. pruritis and jaundice with biliary obstruction
- IBD
  - Diagnosis: Uc vs. Crohn’s (10-15% undetermined colonic inflammation)
  - Date of diagnosis (risk of colon cancer increases after 8-10yrs)
  - Disease site/extent – determines symptoms, e.g. rectal > urgency with formed stool, pancolitis > bloody diarrhoea
  - Surgery
  - Frequency of relapse
  - Symptoms at relapse
  - Complications: EIMs (extra-intestinal manifestations), fistulae, obstructive Sx
    - Arthritis, ank spond, anterior uveitis, scleritis, iritis, erythema nodosum, pyoderma gangrenosum
  - Treatment
  - Current problems
- Coeliac
  - Date of diagnosis
  - Presenting symptoms: more commonly in adulthood with non-specific symptoms e.g. IDA and fatigue (classic is child on weaning)
  - Current symptoms
  - ?Gluten free diet compliance: check TTG Abs (should be normal if 100% compliant)
  - Complications: osteoporosis
  - Other AI conditions (HLA DQ2 in 90%): vitiligo, thyroid problems
- PSC/PBC/AI hepatitis – Cholestatic liver conditions
  - Date/method of diagnosis: ERCP, US, liver biopsy

PACES advice

- Look on the wards – stable chronic signs/disease
  - If pt has wrist band, they will be currently an inpatient (may be more acute)
- History station: may or may not have a specific current problem, so good opening question is key, e.g. what made you first go see the doctor/come to the hospital?
- Presenting the patient
  - Current condition in the context of the overall condition
  - Don’t be put off if you are interrupted
  - Practice summarizing
  - Focus on background, current problem, diagnosis and plan
- St Mary’s academic department = hepatology
- Presenting symptoms: pruritis, fatigue, jaundice, incidental abnormal LFTs
- Current symptoms
- Associated conditions: 80% PSC will have colitis, PSC/AI hepatitis and other AI disease
- Current Rx and effectiveness
- Any symptoms of liver decompensation/portal HTN
- Function

• Viral hepatitis
  - What is the Dx? When, how and why?
    - HCV is showing great progress
  - Were there any risk factors? IVDU
  - Initial symptoms
  - Viral coinfections?
  - Current Rx and effectiveness
  - Any symptoms of liver decompensation/portal HTN
  - Function

• Alcoholic liver disease
  - All patients with liver disease
  - In patients with a history of ALd need to know current and past consumption
  - CAGE
  - Signs of decompensation/portal HTN
  - Other effects of alcohol: AF, tremor
  - How are they functioning

Examination station
- Always check for ascites: tap towards you, roll away from you
- Introduction and exposure: be nice to the patient, make sure they are flat
- Completing examination: external genitalia and PR
- Presenting:
  - Name, age and ethnicity
  - Comfortable at rest?
  - Positive findings
  - Relevant negative findings
  - Most likely diagnosis
  - Always comment on CLD +/- portal hypertension +/- liver failure

• Scars:
  - Mercedes Benz: Liver transplant
  - Midline: bowel surgery
  - Kocher: open cholecystectomy or splenectomy
  - Rutherford Morrison (oblique/J shaped): renal transplant
  - Loin scar: nephrectomy
  - Lanz: transverse scar in iliac fossa
  - McBurney’s: oblique scar in iliac fossa

Physical signs
• Hepatomegaly:
  - Is it really a liver? RUQ mass, moves with respiration, cant get above it, can palpate the lower edge at XX fingerbreadths below the costal margin
  - What are the other features
  - Signs of CLD?
    - Palmar erythema, spider naevi, dupuytren’s
  - Signs of portal HTN?
    - Enlarged abdo veins, ascites, caput medusa, associated splenomegaly
  - Signs of liver failure?
    - Asterixis, foetor hepaticus, bruising, gynaecomastia, oedema, low JVP
    - Constructional apraxia (ask the patient to draw a 5-pointed star)
  - Could this be another systemic condition? E.g. heart failure
- Hepatosplenomegaly
  - Causes:
    - Liver disease with portal hypertension – look for signs
    - Haematologic: myeloproliferative disease, leukaemia, sickle cell disease, myelofibrosis
    - Infection: malaria, leishmaniasis
    - Other: amyloidosis, metabolic disorders
- Splenomegaly: start in the RIF, tip the patient
  - Haematological: myelofibrosis, CML, CLL, lymphoma, PRV
  - Infection: malaria, leishmaniasis, shistyp
- Enlarged kidneys:
  - Bilateral PKD
  - Single palpable very rare
  - Check for renal replacement therapy
  - Check for renal transplant in iliac fossa
- Renal transplant**
  - Smooth firm mass, often in the iliac fossa, associated with Rutherford Morrison (oblique or J-shaped) scar
  - Check for old/new renal replacement
- Ascites: look for curving sides, everted belly button
- Jaundice
- Peripheral stigmata with no abdo signs
  - Excoriations (pruritis from cholelithiasis)
  - IVDU track marks
  - AV fistulae
  - Palmar erythema
  - Dupuytren’s contracture
  - Spider naevi (5 or more – SVC distribution)
  - Jaundice
  - Gynaecomastia
  - Distended abdomen veins
    - How do you know if they are pathological? Pick a vein below the umbilicus and compress
    - Blood going away from the heart downwards is not normal
  - JVP: ascites due to heart failure vs. liver failure: heart failure will lead to a raised JVP, whereas you lose fluid out of the vasculature in liver failure > low JVP
- Odds and ends: don’t panic
Acute Upper Gi Bleed

Peptic Ulcer Disease

Case 1. 58yo caucasian M, ex-printer, smoker, 70u alcohol/wk, takes clopidogrel, MI 3yo. 3d black, loose stools 3d, run-down. GP referral

- OE: obese, tremulous, HR 105, RR 18. Lying BP 130/70, standing 108/66, pale conjunctivae, no stigmata CLD, soft abdo, malaena on PR
- Malaenia: black, loose viscous (upper GI bleed)
- Haematochesia: fresh blood in stool (lower GI bleed – terminal ileum or colonic)

- Ix.
  - Bloods:
    - FBC: Hb 5.8, WCC 12, MCV 104
    - U&E: 128, K 3.4, Cr 119, Ur 18
    - LFT: GGT 800, ALT 160, Br 10, Alb 29
    - PT 11
  - ECG: RBBB, anterior ST depression (poor oxygenation due to anaemia >> transfusion)
  - CXR: normal

- Risk stratification in Mx is key: Blatchford score - A score of zero is associated with an almost zero risk of the need for intervention, >5 means intervention is likely to be necessary. Factors include:
  - Blood urea nitrogen
  - Haemoglobin
  - Systolic BP
  - Other: HR, malaena, syncope, hepatic disease, cardiac failure

- Mx.
  - 1. Resuscitation - ABCDE, consider CV line/urinary catheter, bolus + maintenance fluids (crystalloids), cross-match (4 units, transfuse 2), optimise clotting (platelets if life-threatening bleed – last effort)
  - 2. Specific – 80mg omeprazole or pantoprazole IV bolus, pabrinex 1+2BD, NBM, consider reducing dose chlordiazepoxide
  - 3. Reassess – repeat Hb, inform gastro SpR + surgeons (likely GA, so inform anaesthetist too). If improving, reassess regularly
  - 4. OGD – within 24hrs
    - Tx. Can inject with adrenaline, coagulate, clip + heater probe

- Post-OGD Mx.
  - IV PPI for 72hrs, 8mg/hr
  - Repeat Hb + clotting – correct
  - Can eat next day
  - Eradicate H. pylori if CLO +ve or not done
  - Home after 72 hrs if well – 6 weeks of PPI, lifestyle advice, avoid NSAIDs, plan for antiplatelets (in high risk pts should try and restart within 1 week)

Oesophageal Varices

Case 2. 63yo lady, Italian, retired teacher, visiting UK on holiday, felt unwell for two days, vomit fresh blood (“cup full + clot”), nausea + cramps, no malaena, T2DM, metformin, atenolol, aspirin, no alcohol, non-smoker

- OE: alert, comfortable, HR 88 (can’t interpret since she is on a beta-blocker), RR 18, lying BP 105/60, sitting 84/40, pale conjunctivae, 8 spider naeae, abdo distended, dull flanks (ascites), active bowel sounds. PR malaena

- This lady has evidence of cirrhosis and chronic liver disease
  - NB: people with cirrhosis have a low BP, as they are peripherally vasodilated (systolic baseline ~100)

- Ix. Likely high risk Blatchford score – high risk re-bleeding
  - Bloods: low Hb, low platelets, elevated urea, ALP, Br, PT long, Alb low
Difficulty of interpreting urea – normally low in CLD, therefore can have a subnormal value despite massive upper GI bleed – liver fails to convert ammonia to urea

- ECG: sinus tachycardia
- CXR & AXR: NAD

**Mx.**
- 1. Resuscitation – ABC, fluids, cross-match, **optimise clotting** (Vit K 10mg IV, FFP – as per weight + PT), terlipressin 2mg IV, followed by 1-2mg QDS
  - Terlipression = vasopressin analogue > vasoconstriction of splanchnic blood supply. High risk of profound ischaemia if pre-existing IHD, PVD.
- 2. Specific – **PPI (increased pH promotes clotting), Abx (main CoD is sepsis), NBM, sliding scale, emergency OGD if active bleeding**
- 3. Reassess – if improving reassess regularly, request **OGD within 24hrs.** Consider catheter or central line. Discuss with gastro, ITU + anaesthetics

**OGD:**
- Top left - normal
- Top right – bulge at 4/5 + 11 o clock = varices
- Bottom left – varices with visible aneurysm
- Bottom right – banded aneurysm

Gastric varices tend to occur at the GOJ – very difficult to manage as they are very deep

Post OGD Mx. “3 large varices with several cherry red spots. Blood in stomach. Marked oesophagitis. Portal hypertensive gastropathy. 4 variceal bands applied”
- **Terlipression for 48-72hrs + IV antibiotic prophylaxis (IV cipro or augmentin)**
- Repeat Hb + clotting – correct
- Beware encephalopathy – consider lactulose
- Look for precipitants
- NBM for 24hrs
- IV PPI then high dose oral
- Non-invasive liver screen – USS, virology
- Discharge after 72hrs if well – **propranolol 40mg PO BD (reduce portal blood pressure), rescope in 2-4wks + reband if necessary, hepatology FU**

**Mallory-Weiss Tear**
Case 3. 28yo M, vomited 3x this morning, third with blood, dark green loose stool this AM, 22u alcohol/week, smoker
- OE: Hr 90, RR 15, Lying BP 130/60 & standing 128/58, abdo SNT, PR normal stool
- Ix.
  - Bloods: normal
  - Blatchford score 0
- DDx. Mallory-weiss tear – low risk (submucosal tear at GOJ due to shearing forces)
- Mx. Observation, reassure, ?oral PPI, discharge, ?OPD OGD
- NB: sometimes Mallory-weiss can go into a big vessel, and this is obviously a higher risk

**Gastric adenocarcinoma**
Case 4. 92 lady, Asian, semi-conscious, coffee-ground vomit (rarely represents a treatable condition, can be due to wretching, obstruction etc – fresh blood with clot is more indicative of a upper GI bleed). 8wks weight loss + weakness, +++ diarrhoea, fresh blood vomit + fall. Abdo pain. PMH: RHD, DM, IHD, AF, metallic AVR. Takes warfarin, frusemide, gliclazide. No alcohol, non-smoker
- OE: cachectic, pale conjunctivae, BP 70/36 lying, tender abdomen, haematochezia on PR
- Ix.
  - Bloods: low Hb, renal dysfunction, high inflammatory markers
  - ECG: fast AF
  - eCXR: cardiomegaly
  - ABG: metabolic acidosis – VERY SICK!
- Mx.
- Resuscitation – ABCDE, 250mls bolus + reassess, cross-match, reverse anticoagulation (Vit K 10mg IV, FFP as per weight + INR – speak with haem), PPI
  - 2. Consider central line/urinary catheter, calculate Blatchford, consider CT, NBM, discuss with on call gastro SpR & anaesthetist, inform surgeons
- OGD: gastric adenocarcinoma (rolled edge, deep ulcer). **Haemospray** applied with some benefit
- Post OGD Mx. “large, malignant ulcer occupying most of fundus. Copious blood + clot in stomach. Haemospray applied with some benefit (temporary)”
  - Repeat Hb + clotting – correct
  - CT – liver metastases would indicate poor prognosis
  - Continue PPI
  - D/W with ITu + surgeons
  - Speak with family
  - Consider DNAR, end-of-life decisions

**Refractory bleeding**
- Early endoscopy (within 24hrs) is recommended for most patients with acute UGI bleeding
- Majority of patients with UGI bleeding due to PUD will stop spontaneously in 70-80% of patients will not rebleed
- However a subgroup (20-30%) with severe UGI bleed from ulcers are at high risk for recurrent haemorrhage
- 2 attempts at endoscopy recommended – 73% achieve haemostasis 2nd time
- Non-variceal: consider angiography or surgery, when endoscopic Tx fails to stop or slow bleed
- Varices:
  - Sengstaken-blakemore tube (gastric balloon occludes varices – risk of pressure ulceration at GOJ, perforation of oesophagus)
  - Transjugular intrahepatic portosystemic shunt (TIPSS - blood flows from high pressure hepatic vein to low pressure portal vein > reduce bleed)
- Rockall score: a score of 2 or less is associated with a low risk of further bleeding or death

**Rockall score**
- A score of 2 or less is associated with a low risk of further bleeding or death
Hepatobiliary system

Bile
- Bile Function: cholesterol homeostasis, dietary lipid/vitamin absorption, and removal of xenobiotic/drugs/endogenous waste products
- Composition: water, bile salts, inorganic salts, pigments, fatty acids, lethicin, fat and cholesterol – in an alkaline electrolyte solution
- Anatomy of biliary tree: each hepatocyte is apposed to several bile canaliculi. These drain into intralobular bile ducts, which coalesce to form interlobular ducts
- Regulation of secretion:
  - Between meals the duodenal orifice is closed, therefore bile is diverted into the gallbladder for storage. Eating causes the sphincter of Oddi to relax.
  - Gastric contents enter the duodenum causing release of cholecystokinin > gall bladder contraction
- Function of gall bladder: storage, acidification, concentration

Bilirubin
- Insoluble yellow pigment, 75% from Hb breakdown (+ other haem proteins). Bound to albumin, but most dissociates in the liver. Free Br enters hepatocyte, binds to cytoplasmic proteins and is conjugated to glucoronic acid (more soluble). Conjugated Br is then transported across concentration gradient into bile canaliculi
- Urobilinogens: colourless derivative of Br formed by the action of GIT bacteria
  - ~1/2 of the urobilinogen formed is reabsorbed and taken up via the portal vein to the liver, enters the circulation and is excreted by the kidney
  - Some urobilinogens are passed in stool as Stercobilinogen. Oxidation of stercoobilinogen to stercoobilin causes brown colouration of faeces.

Cholestasis and Jaundice
- Cholestasis: cessation of bile flow
- Jaundice: excess bilirubin in the blood (>34-50um/L)
- Cholestasis normally results in jaundice, but jaundice does not necessarily mean there is cholestasis
- Pre-hepatic: Hb drop without overt bleeding, BR > LFTs. Ix blood film, haptoglobins, LDH
  - Haemolysis
  - Massive transfusion
  - Haematoma resorption
  - Ineffective erythropoiesis
- Hepatic: Urine = ++ Br, ++ urobilinogen
  - High unconjugated Br:
    - Defective uptake: IV contrast, congestive cardiac failure
    - Defective conjugation: hypothyroidism, Gilbert’s, Crigler-Najjar
  - High conjugated Br:
    - Hepatocellular dysfunction:
• Congenital: HH, Wilson’s
• Infection: Hep A/B/C (++ AST:ALT = <1), CMV
• Toxins: EtOH, alcohol (++ AST:ALT = >2)
• AI: Al hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis
• Neoplasms: HCC, metastases
• Vascular: Budd-Chiari
  ▪ Defective BR excretion: Dubin-Johnson, Rotor’s
  ▪ Intrahepatic cholestasis: sepsis, TPN, drugs (+ GGT)
• Post-hepatic: ALP/GGT > ALT/AST, dilated bile ducts on USS
  o Defective transport: common bile duct stones, hepato-pancreatic-biliary malignancy, local lymphadenopathy
  o Sepsis
• Gilbert’s syndrome: commonest hereditary cause of increased Br, AR inheritance of reduced activity of the UDPGT-1A enzyme
  o ++ unconjugated Br
  o Mild jaundice may appear under exertion, stress, fasting, infections
• Courvoisier’s law: Painless jaundice and a palpable gallbladder is unlikely to be gallstones
• Charcot’s triad = 3Cs: Colour change (jaundice), Colicky biliary pain, Chills and fever

Hepatomegaly
• Signs: RUQ mass that...
  o Moves inferiorly with respiration
  o Dull to percussion
  o Can’t palpate above it
• Comment on:
  o Xcm below costal margin
  o Pulsatile (tricuspid regurgitation >> CCF) or bruit (HCC)
  o Edge: smooth or nodular
• Associated signs:
  o Decompensation:
    ▪ Encephalopathy: asterixis, altered consciousness
    ▪ Hypoalbuminaemia: ascites, leukonychia
    ▪ Coagulopathy: bruising, petechiae
    ▪ Jaundice
  o Chronic liver disease
    ▪ General
    ▪ Hands: palmar erythema, clubbing, leukonycua, liver flap
    ▪ Face: kayser-fleisher rings, parotid swelling, jaundice, anaemia, subconjunctival haemorrhage, xanthelasma, hepatic fetor, central cyanosis
    ▪ Trunk: gynaecomastia, spider naevi, telangectasia
    ▪ Legs
      ▪ Evidence of Ax
      ▪ Tattoo - hepatitis
  o Evidence of Rx
    ▪ Cushingoid – steroid Tx?
  o Splenomegaly
• Causes:
  o Common = the C’s
    ▪ Chronic liver disease
    ▪ CCF
    ▪ Carcinoma
    ▪ Cirrhosis (early)
  o Rarer = The “I”s
    ▪ Infection
    ▪ Immune: PBC, PSC, AI
    ▪ Infiltrative: amyloid, myeloproliferative
• Investigations:
  o Bedside: urine dip – proteinuria
  o Bloods: FBC, U&Es, clotting, albumin, LFTs, glucose
Cirrhosis: histological definition – fibrosis of liver tissue and conversion of liver architecture into structurally abnormal nodules

• **Management:**
  - Unstable + decompensating: ABCDE
  - Stable + chronic
    - Conservative: alcohol advice
    - Medical: treat the cause
    - Surgical

### Chronic Liver Disease

#### Definition:
- Clinical definition – chronic condition involving progressive destruction and regeneration of liver leading to fibrosis and cirrhosis
- Histological definition – fibrosis of liver tissue and conversion of liver architecture into structurally abnormal nodules

#### Signs:
- Portal hypertension: ascites, splenomegaly, evidence of portal systemic shunt (varices, caput medusa)
- Decompensation:
  - Encephalopathy: asterixis, altered consciousness
  - Hypoalbuminaemia: ascites, leukonychia
  - Coagulopathy: bruising, petechiae
  - Jaundice

#### Causes:
- Common:
  - Alcohol
  - Hepatitis
  - NASH/NAFLD
- Rare:
  - Congenital
  - Autoimmune
  - Drugs
  - Cancer
  - Vascular

#### Investigations (as above)
- Bedside: urine dip
- Bloods:
- Imaging: Staging CT if suspect malignancy
- Invasive: Ascitic tap & Liver biopsy

#### Management:
- General: MDT, Alcohol, Low Na diet, HCC screening
- Treat cause
- Treat/avoid complications
  - Ascites
  - Bleeding
  - Encephalopathy
  - Varices
  - Hypoglycaemia

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Points assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Absent Bilirubin (mg/dL)</td>
<td>None</td>
</tr>
<tr>
<td>Bilirubin micromol/L (mg/dL)</td>
<td>&lt;34.2 (&lt;2)</td>
</tr>
<tr>
<td>Albumin g/L (g/dL)</td>
<td>&gt;35 (&gt;3.5)</td>
</tr>
<tr>
<td>INR</td>
<td>&lt;4</td>
</tr>
<tr>
<td>Prothrombin time</td>
<td>&lt;1.7</td>
</tr>
</tbody>
</table>

CPT classification:
- Child A: score 5-6 (well compensated);
- Child B: score 7-9 (significant functional compromise);
- Child C: score 10-15 (decompensated)

### Prognosis: Child-Pugh Score = ABCDE
- Albumin
- Bilirubin
- Clotting
- Distension
- Encephalopathy
• Spontaneous bacterial peritonitis
• Hepatorenal syndrome

• Ascites
  o Causes: 3 “Cs”
    ▪ Cirrhosis
    ▪ Cancer
    ▪ Congestive cardiac failure
  o Investigations:
    ▪ Bedside: urine dip for proteinuria
    ▪ Bloods: albumin
    ▪ Imaging: USS
    ▪ Invasive: Ascitic tap:
      ▪ Serum ascites albumin gradient to determine whether is a transudate or exudate – knowing cause will affect management plan
        ▪ >11g/L = transudate (portal HTN)
        ▪ <11g/L = exudate (cancer, infection)
      ▪ Chemistry
      ▪ Culture
      ▪ Cytology
  o Management: (British society of gastroenterology guidelines)
    ▪ Conservative:
      ▪ Monitor Na (salt restricting diet)
      ▪ Daily weights aiming 1kg reduction per day
      ▪ Alcohol advice
    ▪ Medical:
      ▪ Diuretics
      ▪ Abx if SBP
    ▪ Surgical
      ▪ Paracentesis + albumin infusion
      ▪ Portal systemic shunt
      ▪ Transplant – for malignant cause of ascites
        ▪ Mercedes Benz scar
      ▪ DDx: liver segmental resection, Whipple’s (for head of the pancreas Ca)
  ▪ Liver transplant
    o Indications
      ▪ Cirrhosis – end-stage, abstinence from alcohol >6 months
      ▪ Acute liver failure (King’s college criteria)
        ▪ Hep A/B
        ▪ Paracetamol overdose
      ▪ HCC
    o Complications
      ▪ Immediate: Acute rejection (pyrexia, tender hepatomegaly)
      ▪ Early: Sepsis, Hepatic thrombosis
      ▪ Late
        ▪ Immunosuppression
        ▪ Graft failure
        ▪ Recurrence
        ▪ General surgical

Splenomegaly
• Signs: LUQ mass...

Light’s criteria

<table>
<thead>
<tr>
<th>Ascites</th>
<th>Ascites-serum protein ratio</th>
<th>Ascites-serum LD ratio</th>
<th>Ascites LD (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transudative</td>
<td>&lt; 0.5</td>
<td>&lt; 0.6</td>
<td>&lt; 400</td>
</tr>
<tr>
<td>Exudative*</td>
<td>≥ 0.5</td>
<td>≥ 0.6</td>
<td>≥ 400</td>
</tr>
</tbody>
</table>

*Effusions are identified as exudative if at least two conditions are met.
LD – lactate dehydrogenase.

Absolute contraindications | Relative contraindications
---|---
Active extrahepatic malignancy | Age
Diffuse hepatic tumor invasion | Previous malignancy
Active or uncontrolled infection | HIV infection
Active alcohol or substance abuse | Active psychiatric disorder
Brain death

HIV: Human immunodeficiency virus
Unable to get above
Moves infero-medially
Cannot get above
Dull to percussion
Splenic notch
Cannot ballot

- Associated signs
  - Anaemia
  - Bruising
  - Lymphadenopathy
  - Hepatomegaly + portal hypertension

- Causes = CHINA
  - Congestion: portal HTN, amyloidosis
  - Haematological: haemolytic anaemia, sickle cell
  - Infection: Malaria, EBV, infective endocarditis
  - Neoplasia:
    - Myelo: CML, myelofibrosis
    - Lymph CLL, lymphoma
  - Autoimmune

- Investigations:
  - Bedside
  - Bloods: film (malaria), WCC differential
  - Imaging: USS, CT abdo pelvis
  - Invasive: LN biopsy, BM aspirate

- Splenectomy:
  - Causes
    - Trauma: rupture
    - Haem
      - AI haemolytic anaemia: hereditary spherocytosis
      - ITP
      - Hypersplenism: pancytopenia due to pooling of large no of cells and their destruction in an enlarged spleen
  - Complications
    - Infection: pneumococcus, meningococcus, Hib
    - Haem: increased platelets, lymphocytes, neutrophils, Howell-Jolly bodies
    - General surgical

Inflammatory Bowel Disease

- Distinguishing symptoms
  - Crohn’s: no blood in diarrhoea, abdo pain, wt loss
  - UC: bloody mucus diarrhoea, abdo pain, tenesmus, faecal urgency

- Extra-abdominal features:
  - Skin: erythema nodosum, pyoderma gangrenosum
  - Eyes: conjunctivitis, iritis
  - Joints: arthritis
  - Liver: cholangitis
  - Treatment: cushingoid
  - Peri-anal

- Investigations:
  - Bloods: FBC, U&Es, ESR/CRP (disease activity)
  - Stool MC&S (+ faecal calprotectin)

Complications of UC = PAST Colitis
  - Pyoderma gangrenosum
  - Ankylosing spondylitis
  - Sclerosing pericholangitis
  - Toxic megacolon
  - Colon carcinoma

Complications of UC = PAST Colitis
  - Pyoderma gangrenosum
  - Ankylosing spondylitis
  - Sclerosing pericholangitis
  - Toxic megacolon
  - Colon carcinoma

Crohn’s morphology & symptoms = CHRISTMAS
  - Cobblestones
  - High temperature
  - Reduced lumen
  - Intestinal fistulae
  - Skip lesions
  - Transmural
  - Malabsorption
  - Abdominal pain
  - Submucosal fibrosis
• Imaging: AXR, OGD
• Invasive: colonoscopy/sigmoidoscopy with biopsy

**Complications**

- UC: toxic megacolon, malignancy, extra-abdominal features
- Crohn’s: short-gut syndrome + malabsorption, fistulae, strictures

### UC Mx. | Proctitis and proctosigmoiditis | Left-sided and extensive | Acute severe |
--- | --- | --- | --- |
**Step 1** | Suppository/enema +/- oral aminosalicylate<br>Topical corticosteroid +/- oral prednisolone | High dose oral aminosalicylate<br>Topical aminosalicylate<br>Oral beclometasone<br>Oral prednisolone | IV corticosteroids |
**Step 2** | Oral prednisolone (4 weeks aminosalicylate failure)<br>Oral tacrolimus (2-4 weeks pred no response) | | IV ciclosporin (after 72hrs) |
**Biologics** | <18yrs – Infliximab for 12 months or until failure<br> >18yrs – Vedolizumab for 12 months or until failure | | Infliximab ONLY if ciclosporin CI |
**Maintaining remission** | Topical +/- oral aminosacylate (daily or intermittent) | Low dose oral aminosalicylate | Consider oral azathioprine or metcaptopurine |

Consider oral azathioprine or metcaptopurine if >2 exacerbations in 12 months that require oral steroids, or if remission not maintained by aminosalicylates

### Crohn’s Mx.

1. **Inducing Remission**
   - First presentation/single exacerbation last 12m: prednisolone or IV hydrocortisone
   - Distal ileal/ileo caecal or R sided colonic disease: consider budesonide (fewer SE, but less effective)
   - Children with concern about growth or SE: consider enteral nutrition
   - If steroids CI: consider 5-ASA (less effective)

2. **Add-on therapy**: if 2 or more exacerbations in 12m period, or unable to taper steroid dose
   - Assess TPMT activity
     - Normal: azathioprine or mercaptopurine
     - Low: low dose
     - Deficiency: methotrexate
   - Biologics: consider infliximab or adalimumab for severe unresponsive active disease. Rx for 12m or until failure
3. **Maintaining remission**: azathioprine, mercaptopurine or methotrexate (depending on what is used for induction)
4. **Surgery**: consider as an alternative to medical Rx early in the course of the disease. Consider maintaining remission with azathioprine or mercaptopurine if:
   - Adverse prognostic factors: More than one resection or complicated debilitating disease (abscess, involvement of adjacent structures, fistulising or penetrating disease)

<table>
<thead>
<tr>
<th>Site of origin</th>
<th>CROHN DISEASE</th>
<th>ULCERATIVE COLITIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal ileum</td>
<td>Rectum</td>
<td></td>
</tr>
<tr>
<td>Pattern of progression</td>
<td>“Skip” lesions/irregular</td>
<td>Proximally contiguous</td>
</tr>
<tr>
<td>Thickness of inflammation</td>
<td>Transmural</td>
<td>Submucosa or mucosa</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Crampy abdominal pain</td>
<td>Bloody diarrhoea</td>
</tr>
<tr>
<td>Complications</td>
<td>Fistulas, abscess, obstruction</td>
<td>Hemorrhage, toxic megacolon</td>
</tr>
<tr>
<td>Radiographic findings</td>
<td>String sign on barium X-ray</td>
<td>Lead pipe colon on barium X-ray</td>
</tr>
<tr>
<td>Risk of colon cancer</td>
<td>Slight increase</td>
<td>Marked increase</td>
</tr>
<tr>
<td>Surgery</td>
<td>For complications such as stricture</td>
<td>Curative</td>
</tr>
</tbody>
</table>

Severe UC attack = **A STATE**

- Anaemia <10g/dl
- Stool freq >6/d + blood
- Temp >37.5
- Albumin <30g/L
- Tachycardia >90bpm
- ESR >30mm/hr

Based on Truelove and Witt’s severity index.
GI Surgery  Mr Sanjay Purkayastha, Mr Anthony Antonio

Examining in surgery

- Talk through, can be to patient rather than reciting to examiner
  - Remember to ask about occupation + handedness, especially important for orthopaedics
- Say you would like to see the observations chart
- Percussion: don’t forget shifting dullness
- Finish: hernia orifices, groin, perineum (stoma > AP vs. Hartmann’s), PR
  - Urine dip
- Summarise RELEVANT findings, not all

Exam tips

- Causes of clubbing: bulbous swelling of the terminal phalanges, resulting in a loss of the normal angle between the nailbed
  - Familial
  - CLD
  - UC.CD
  - Malignancies
  - PBC
- What comes up? Scars, organomegaly, masses, jaundice, **hernia, **testicular lumps, **stomas, ascites, perianal pathology (unlikely)
  - Systemic signs: IBD, steroids, clubbing, cachexia
- Extras: Tubes, drains, bags
  - NGT/ NJT: for decompression (large bore Riles for BO, recurrent), feeding (narrow)
  - Lines: peripheral, central, tunneled (reduced infection risk)
  - Catheter: urethral, suprapubic
    - Convene: condom attached to catheter – reduced risk of UTI
  - Drain: neck, chest, abdomen
    - Robinsons
    - Redivac
    - Free drainage/ vac
  - Stoma bags
  - Dressings

Clinical Anatomy

- Xiphesternum > pubic symphysis
- 9 regions, 4 quadrants
  - Right hypochondrium: liver, gallbladder, hepatic flexure of the colon, right kidney
  - Epigastric: stomach, duodenum, pancreas
  - Left hypochondrium: spleen, left kidney
  - Umbilical: small bowel, abdominal aorta
  - Lumbar regions: ascending/descending colon, ureters
  - Right iliac: appendix, ovaries, fallopian tubes, caecum, ureters
  - Hypogastric: bladder, uterus
  - Left iliac: sigmoid colon
- Musculature:
  - Rectus abdominus, with midline linea alba + tendinous sheath – allows surgical entry
  - Linea semilunaris (point of spigalean hernias)
  - Layers laterally: skin, campers and scarpas fascia, external oblique internal, transversus abdominus, transversalis fascia, ilioinguinal
  - Rectus sheath:
    - Rectus sheath haematoma – Pt on clopigrel, aspirin who have LMWH injected too deeply
    - No posterior rectus sheath below arcuate line:
      - Bladder: space for bladder
- Lap inguinal hernia: transabdominal approach
- Emergency Femoral hernias

- Lines to divide the regions:
  - Mid axillar
  - Transpyloric plane of Addison: biliary colic, pancreatic carcinomas
    - Pylorus
    - Fundus of the GB
    - Origin of SMA
    - Duodenal junction
    - Neck of the pancreas
    - Hila of the kidneys
    - Vertebra L1
  - Supracristal plane (above ASIS) = L4/5 body: point of aorta bifurcation

- Retroperitoneal organs: pancreas, psoas, kidneys

- Lesser sac: upper GI/hepatobiliary surgery
  - Reason we get full when we eat
  - Pseudocyst > filling of the lesser sac > early satiety

- Levels of aorta: 3 anterior branches
  - Coeliax axis, supplying the foregut (just below the diaphragm)
    - Left gastric >> stomach
    - Splenic >> spleen
    - Hepatic > right gastric >> liver
  - Superior mesenteric, supplying the midgut (end of small bowel + half of the colon)
    - Middle colic >> transverse colon
    - Iliocolic >> ileocaecal junction + ascending colon
    - Right colic (only 2-3% of population) >> ascending colon
  - Inferior mesenteric, supplying the hindgut
    - Left colic >> descending colon
    - Sigmoid >> sigmoid colon
    - Superior rectal >> rectum
Scars

- Scars: if don’t know, just DESCRIBE + THINK OF ANATOMY. ALWAYS COMMENT ON HEALING
  - Kocher’s: open cholecystectomy
  - Midline: laparotomy, to the left of the umbilicus in case of R sided stoma (and vice versa)
  - Paramedian: old
  - Flank/ loin: nephrectomy
  - Rooftop: liver resection, oesophagectomy (ask to look at chest – front and back, Iver Lewis is second stage of oesophagectomy on back, neck scar for 3 stage of oesophagectomy)
  - Lanz: open appendicetomy
  - McBurney’s/Gridiron: oblique appendicetomy
  - Pfannenstiel: caesarean, lap Whipple’s
  - Oblique inguinal: open inguinal hernia, anal lymphadenectomy
  - Vertical groin: vascular access
  - Low loin/Rutherford Morrison: renal transplant
  - Laparostomy: if cannot close patient

- Laparoscopy (allowed to ask the patient)
  - SILS
  - Periumbilical: anything
  - LIF, 2 on the R side: sigmoid resection
  - RIF, 2 on the L side: right hemicolecetomy
  - Look for collection scars (bigger)
  - Abdo port + 3 RUQ: lap chole
Masses/organomegaly

- Liver, spleen, kidneys, aorta common
- Distended abdomen: fat, fluid, flatus, faeces, foetus
- Hepatomegaly:
  - Normal: crosses the midline, offer to measure
  - Size, smooth/irregular, dull to percussion, move with respiration, soft/hard, systemic signs (pitting oedema du
  - Causes (imp for EMQs)
    - Smooth without jaundice
    - Smooth with jaundice
    - Irregular without jaundice
    - Irregular with jaundice
- Epigastric: left lobe of liver, pancreatic mass
- Splenomegaly:
  - Usually 9-11cm in length, under ribs 9-11, weighs 150g, not usually palpable
  - Learn indications for splenectomy
  - Palpable = enlarged
  - Spleen vs. kidney: LUQ, notch, moves with respiration, dull tp percussion, cannot get above it, not ballotable
  - Ax.
    - Infection: EBV/CMV
    - Disease of liver: cirrhosis
    - Haemolytic anaemia
    - Cancer
- Renal masses: palpable at L2
  - Dialysis patients
  - AV fistula
  - +++ scars
  - Polycystic kidneys
  - Associated with HTN, loin pain, other mass symptoms, FHx, post-transplant, systemic symptoms, skin grafts from recurrent skin malignancies
- Other masses:
  - Pancreatic cancer
  - Pelvic masses: ovarian cyst, rectal tumours
- Cant get below it:
  - Uterine
  - Ovarian
  - Rectal
  - Bladder
- Abdominal aorta (Ix. US) – may be pt waiting for AAA repair
  - Expansile: up and out
  - Pulsatile: up and down

Stomas

Definition: artificial open between organ and skin surface, usually created by surgery. Breathing, feeding, anastomosis, decompression. Ask to take bag off if its stuck to the patient, but more likely need to examine if removable bag.

- Stoma (you notice the BAG, then say youd like to examine the stoma)
  - Perineum: hartmann’s (anal patent), AP resection (no anus)
- Palpate in the stoma with your little finger, ++++ KY jelly
- Types:
  - Tracheostomy
- Gastro: feeding or venting
- Jejunostomy: feeding or anastomosis
- Ileostomy
- Colostomy
- Urostomy/ileal conduit
- Neorhostomy: decompression

- Indications
  - Temp loop ileostomy for defunctioning following L sided resection and anastomosis
  - Permanent end ileostomy following panproctocolectomy – no perineum
  - Temporary end ileostomy prior to IRA or pouch (for HNPCC
  - Colostomy following Hatmann’s (common)
  - Colostomy Following APR
  - Urostomy following cystectomy for bladder cancer, or functional disorder of the bladder

- Complications:
  - Parastomal hernia
  - Prolapse
  - Stomal intussusception
  - Allergic reaction
  - Retraction
  - Stenosis

- Perineum:
  - APR >> perianal skin closed (can be site of hernia)
  - Hartmann’s >> anal canal patent

Hernias
Definition: the abnormal protrusion of a viscus or part of a viscus through the walls of its containing cavity

- Types
  - Paraumbilical
  - Incisional
  - Epigastric: commonly thought of as lipomas, tend to be irreducible, small defect + large sac
  - Inguinal
    - Indirect: through the deep inguinal ring, lateral to the inferior epigastric vessels
    - Direct: through Hesselbach’s triangle
    - Mixture: pantaloon
  - Femoral
- Inguinal hernia

Hesselbach's triangle
- Inferior border: inguinal ligament
- Medial border: lateral edge of rectus abdominus
- Lateral/superior border: inferior epigastric vessels

Inguinal canal
- Anterior: external/internal
- Superiorly: internal
- Posteriorly: transversalis fascia
- Inferiorly: inguinal ligament

Deep inguinal ring: mid-point of the inguinal ligament (ASIS to pubic tubercle), which lies lateral the inguinal canal
Mid-inguinal point: mid-point of the inguinal canal, where the femoral nerve, artery + vein pass deep to the inguinal ligament (NAVY)

Contents of the inguinal canal:
- Male: spermatic cord + ilioinguinal nerve
- Female: round ligament of the uterus + ilioinguinal nerve

Contents of the spermatic cord
- 3 arteries: Testicular Artery, Cremasteric Artery, Artery to Vas
- 3 veins: Pampiniform plexus, Cremasteric Vein, Vein of Vas
- 3 nerves: genital branch of genitofemoral nerve, sympathetics, ilioinguinal nerve (technically runs outside the spermatic cord.
- 3 fascias: External Spermatic Fascia, Cremasteric fascia, Internal Spermatic fascia
- 3 others: Vas Deferens, Lymphatics, Tunica Vaginalis
Common Cases

Jaundice
- DDx. carcinoma of the head of the pancreas, cholangiocarcinoma
- Ix. USS, CT, ERCP
  - USS shows intrahepatic dilatation (You should not be able the black biliary tree)
  - CT shows that both the CBD (drains the liver) and PD (drains the pancreas) are dilated. This indicates there is a large mass in the head of the pancreas, which is compressing the ampulla of vater
  - ERCP (endoscopic retrograde cholangiopancreatography) can be diagnostic and therapeutic, as you can cannulate the ampulla of vater, remove gallstones, and biopsy
    - NB: OGD (light is at the end of the scope) and ERCP (side light to view ampulla of vater)
- Whipple’s procedure: pancreateoduodenectomy (duodenum, pancreas and CBD). Pancreatic cancers are 95% resectable if ampullary (5yr survival 40-50% - typically picked up early), otherwise 25% (with 5yr survival 10-20%). An important predictive factor is presence of nodal mets

RUQ pain
“A 44 F severe RUQ radiating to the back, tender, involuntary guarding, unable to lie flat. Hb 140, WCC 13.8, Plt 179. U/E normal. Br 25, ALT 260, ALP 508, Alb 41, CRP 5, amylase 73”
- DDx. Cholecystitis, hepatitis, pyelonephritis, acute pancreatitis (typically amylase >100), peptic ulcer disease
- Ix. USS shows acoustic shadow and stone
- Rx of pancreatitis. Supportive medical Mx – score patient to gage severity, to determine whether ward or ITU-based care
  - Ward-based care: fluids, oxygen, BP, HR, urine output (fluid monitoring + U&Es)
  - ITU: ventilation, feeding, sugar-control, filtration
- Gallbladder pathology
  - Risk factors: forty, fat, female, fertile, fair
  - Asymptomatic gallstones do not require treatment. However symptomatic (constant RUQ pain, with ++ Why does it radiate to the back and shoulder tip? Nerve supply NOT diaphragmatic irritation
  - Mx of recurrent gallstones: cholecystectomy
- Calot’s triangle: cystic artery lies in the middle of this triangle, and this is what you clip first. The borders are the liver, common hepatic duct and cystic duct.
- Couviosier’s law: painless palpable gallbladder in a jaundice patient is unlikely to be gallstones. Why? Because gallstones > fibrosis and scarring of the gallbladder.
  - Exceptions to the law: gallstone ileus (due to a fistula directly from the gallbladder to the duodenum, where it obstructs at the ileocaecal junction.
  - Mx. Milk the stone up towards the stomach, and then remove – otherwise it will leak. Leave the fistula (very difficult, duodenum will fall apart)

Modified Glasgow/PANCREAS score
- PaO2 < 8kPa (60mmhg)
- Age > 55 years
- Neutrophils: WBC >15 x10^9/l
- Calcium < 2mmol/l
- Renal function: (Urea > 16mmol/l)
- Enzymes: (AST/ALT > 200 iu/L or LDH > 600 iu/L)
- Albumin < 32g/l
- Sugar: (Glucose >10mmol/L)

*Applicable for both gallstone and alcohol induced pancreatitis within 48 hours of admission
*Omission of age/serum transaminase increases the predictive value of scoring system a serum transaminase did not differ significantly between mild and severe pancreatitis
*Bold 4 factors are independently significant in predicting the severity
Appendicitis

“23yo F, periumbilical pain for 24hrs now moved to RIF. Nausea + anorexia. O/E: pyrexial, elevated WCC. Tender RIF (peritoneal inflammation) with guarding (involuntary muscle spasm) + rebound/percussion tenderness. Fullness in RIF (greater omentum)” You may not have an elevated WCC.

- **Psoas sign**: appendix sits on the psoas, therefore irritation > pain on leg lifting
- **Rovsing’s sign**: pain in RIF when pressing on the LIF (stretching the abdo wall). Tenderness on PR indicates an inflammatory process, but does not confirm appendicitis
- The appendix sits on the pole of the caecum, with a 2-3cm base therefore can sit anywhere in the RIF. This means it may be freely floating + retrocaecal. The appendicular artery (from the ileocolic) supplies the appendix.
- **Mx**: laparoscopic appendectomy. Two ties are applied laparoscopically, and the appendix is removed through one of the ports

Bowel obstruction

- 4 cardinal symptoms (+ high pitched bowel sounds)
  - Vomiting
    - Early vomiting = high obstruction. Late onset vomiting with constipation = low obstruction
  - Distension (bowel continues to produce juices + gases)
  - Pain
    - Central + colicky (over waves of peristalsis) = visceral
    - Severe pain = ischaemia/perforation (peritoneal irritation).
  - Constipation (absolute = no flatulence)
- If guarding and unwell, you HAVE to operate as the bowel is compromised. Otherwise you proceed with the algorithm. Complete obstruction requires surgery within 24 hours.
  - Bowel obstruction with VIRGIN abdomen > straight to surgery. If they have had any abdominal procedure in the past, the obstruction is likely to be adhesions
Diverticulitis
“left sided abdominal pain, localizing to severe tenderness and guarding. Change in bowel habit. Pyrexia”
- Blood supply: from the mesentery to the bowel is due to direct perforator vessels = point of weakness.
  Recurrent increase in pressure (due to straining etc) > outpouching through the wall = Diverticulum (made up of the mucosa, may be intraluminal, mural or extramural)
- Accounts for 1% of all hospital admission, 50% have had no previous Hx. 80% settle with conservative Mx, 45% remain symptom free.
- 2x episodes of diverticulitis is an indication for surgery
- diverticular disease complications: constipation/obstruction (due to stricture), perforation, PR bleeding, fistula (abnormal connection between two epithelial surfaces that is itself lined by epithelium), abscess
- Modified Hinchey classification directs treatment
  - Stage O/I: conservative Mx
  - Stage II: Fluid resuscitation and IV antibiotics, light diet + oral fluids
  - Stage III/IV require surgical Mx

Modified Hinchey classification
- Stage 0: Mild clinical diverticulitis
- Stage Ia: Confined pericolic infl. – phlegmon
- Stage Ib: Confined pericolic abscess (sigmoid)
- Stage II: Pelvic, distant intra-abd/ intraperitoneal abscess
- Stage III: Generalized purulent peritonitis
- Stage IV: Fecal peritonitis

Colorectal surgery
“45yo F with 12m Hx of PR bleeding – bright red, mixed with stool, every bowel movement. Hb 77, MCV 58, Plt 485”
- Colon Cancer
  - Pathology: adenocarcinoma (carcinoma of the lining)
  - Spread: local infiltrate, lymphatics + blood
  - Features: local Sx, secondary deposits (e.g. liver, lung)
  - Treatment: surgical or palliative
  - Ix.: Colonoscopy, histopathology, CT, MRI for rectal lesions

Staging of colorectal cancer

<table>
<thead>
<tr>
<th>Stage</th>
<th>Extent of tumor</th>
<th>5-year survival</th>
<th>5-year survival</th>
<th>Distant metastases</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No deeper than submucosa</td>
<td>&gt;95%</td>
<td>&gt;90%</td>
<td>70-85%</td>
</tr>
<tr>
<td>II</td>
<td>Through muscularis</td>
<td>&gt;90%</td>
<td></td>
<td>50-70%</td>
</tr>
<tr>
<td>III</td>
<td>1-3 lymph node metastases</td>
<td>70-85%</td>
<td>25-60%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>IV</td>
<td>&gt;4 lymph node metastases</td>
<td>50-70%</td>
<td>25-60%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td></td>
<td>Distant metastases</td>
<td>70-85%</td>
<td>25-60%</td>
<td>&lt;5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage at presentation</th>
<th>Colon</th>
<th>Rectal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>23%</td>
<td>34%</td>
</tr>
<tr>
<td>Stage I</td>
<td>31%</td>
<td>25%</td>
</tr>
<tr>
<td>Stage II</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Stage III</td>
<td>15%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Key Principles for anastomosis: blood supply, lack of inflammation, no tension (sufficient bowel), no cancer

Resections must be performed along the anatomy of the blood supply

- Right hemicolectomy: ileocolic, right colic, right branch of the middle colic (has 3 branches). Anastomose the terminal ileum to the transverse colon (side-to-side) – no stoma as blood supply from small bowel is great. Bowel function returns to normal in 3-5 days
- Left hemicolectomy (going out of favour): at the splenic flexure, there is a watershed area between the superior and inferior mesenteric artery. Blood supply in this area is difficult
  - Extended right hemicolectomy connects the terminal ileum to the sigmoid (if worried about tension or blood supply)

Principles of cancer surgery: clear margins, complete lymphadenectomy

- Sigmoid colectomy is not a cancer operation. LN lies adjacent to the vasculature. The sigmoid artery is a branch of the inferior mesenteric artery, therefore in malignancy you risk leaving malignant LNs
- Hartmann’s: tie off rectal stump, and you bring the descending colon as an end stoma (in the presence of sepsis). After ~6months, you perform a secondary anastomosis. This is an emergency surgery

Anterior resection vs. APR?

- The lower third of the rectum is another watershed area: superior rectal (from inferior mesenteric) to inferior rectal (from pudendal)
- Mesorectum: the mesentery is arranged like a donut around the rectum, sitting in the pelvis. In this fat, lies the vessels + LN. This must be excised in cancer. A TME (total mesorectal excision), you do not breach the mesorectal fascia BUT you remove everything in it – important not to breach in terms of outcome!
- Anterior resection: removal of part of the rectum, allowing for a primary end-to-end anastomosis to restore bowel continuity. Can be used a sigmoid tumour
- Abdominoperineal resection (APR): take out all of the rectum and anus, permanent end colostomy
- What determines which surgery? The distance of the tumour from the sphincter, which is assessed with a DRE. The anal sphincter is divided into a voluntary (fear) and involuntary (at night) set of muscles. A low carcinoma that is touching or invading the sphincter, you cannot preserve it and you need an APR. If you can get above the sphincter and below the tumour with your finger, you can perform an anterior resection.
Rheumatology

Rheumatoid arthritis: symmetrical small hand joint swelling (PIP + MCP) is most suggestive of rheumatoid

- F > M = 2:1. 75% of patients seropositive, and are more likely to have extraarticular features
- On examination:
  - Z-thumb: hyperextension of the interphalangeal joint
  - Swan-neck: DIP hyperflexion with PIP hyperextension
  - Boutonniere: PIP flexion with DIP hyperextension
  - Dorsal guttering: wasting of the dorsal interossei
  - Ulnar deviation + loss of ulnar styloid
  - MCP subluxation
  - Rheumatoid nodules on the extensor surfaces
- X-ray changes: carpal fusion, joint erosion, MCP subluxation, soft tissue swelling (but not synovitis), joint destruction
  - What is the earliest x-ray finding in RA? Periarticular osteopenia
  - Bone erosions are a late finding (whole point of DMARDs is to prevent).
  - NB: Gull’s wing (DIP joint) suggestive of osteoarthritis, but you can have a mixed picture
- OA hands: Herbeden’s nodes (DIP, no inflammation, Bouchard’s, distal deviation, fusiform swelling of joints

Disease activity score (out of 28 joints, assess whether tender, swollen, ESR, CRP)

- DAS >5.1 = high activity, eligible for anti-TNF
- 3.2-5.1 = moderate
- 2.6-3.2 = low activity
- <2.6 = remission

Management: combination therapy methotrexate + other DMARD (sulfasalazine/hydroxychloroquine)

- We don’t tend to give steroid treatment before DMARDs
- Biologics are used when DAS >5.1, but requires pre-treatment screening for TB, infection, hepatitis, + heart failure (all side effects)
  - Anti-TNF (etanercept, adalimumab, infliximab)
  - Anti-CD20 (rituximab)
  - Anti-IL6 (tocilizumab)

Psoriatic arthritis Affects 20% of patients with psoriasis, but is not temporally relating to timing or severity of psoriasis.

- Different articular manifestions from RA:
  - DIP involvement
  - SI joint may be affected (only atlanto-axial joint affected in RA)
  - Dactylitis (swelling of whole digit is unique)
  - Nail changes = POSH: pitting, onycholysis, subungal hyperkeratosis
  - No enthesitis
- X-findings contrast with RA: no carpal fusion, no periarticular osteopenia, more sclerosis, pencil in cup deformity, destructive erosions (in RA in the bare area = side of joint) is top of joint
- Management: very similar to RA, but typically monotherapy
Ankylosing spondylitis Affects young male patients, presenting with inflammatory back pain, ascending ankyloses +/- peripheral monoarthropathy. Signs: loss of lumbar lordosis (increase occiput to wall, lowered gaze angle)

- **+ve HLA B27** (occurs in 10% of the normal population, and 95% of ankylosing spondylitis)
- Ascending ankylosis: ossification of the ligaments in the spine, spindesmosites, fusion of SI joint
- Management: physioTx (improve pain + stiffness, but not fusion)
- Diagnosis: XR or MRI (early may not show XR changes)
- X-ray changes:
  - Loss of SI joint margins
  - Sindesmophytes > bamboo spine (diffuse idiopathic skeletal hyperoestosis – doesn’t give you ascending fusion)
- MRI changes (stir sequence): bone marrow edema (early sign visible only on MRI, cannot see on XR), widening of SI joint, erosions of SI joint
- Romanus lesions indicate early inflammatory changes in the spine, and can be seen on XR and MRI
- LOOK FOR: scar on back (indicative of corrective surgery)

**Connective tissue disease** include a group of AI conditions with a constellation of symptoms and signs, most of whom will be ANA positive.

- SLE: anti-dsDNA best test, symptoms = SOAP BRAIN MD
  - Serositis: pleurisy or pericarditis
  - Oral ulcers: usually painless
  - Arthritis: non-erosive, 2 or more, active disease
  - Photosensitivity
  - Blood disorders: Leukopenia or lymphopenia on >1 occasion, thrombocytopenia in the absence of Ax medications, haemolytic anaemia
  - Renal involvement: proteinuria, cellular casts
  - ANA positive (>1:160) in the absence of medications associated with drug-induced lupus
  - Immunologic phenomena: dsDNA, antiSm antibodies, antiphospholipid antibodies (anticardiolipid, lupus anticoagulant)
  - Neurologic disorder: seizures or psychosis
  - Malar rash: fixed erythema over the cheeks and nasal bridge
  - Discoid rash: erythematos raised-rimmed lesions with keratotic scaling and follicular plugging
- SLE: true multisystem disease
  - Monitoring: ESR, complement, ds-DNA levels
    - Complement decrease during flare
    - CRP does not go up (unless infection or serositis)
  - Common management: hydroxychloroquine, prednisolone
    - Second-line Mx: mycophenolate, azathioprine, cyclophosphamide
      - Cyclophosphamide can cause ovarian failure
  - Systemic manifestations:
    - Cardio: Common: HTN, pericarditis + increased risk of MI, Rare: Libman-sacks endocarditis (non-infective inflammatory thrombotic lesions on cardiac valves)
    - Respiratory: Common: pleurisy, pleuritis and fibrosis, Rare: Shrinking lung syndrome (loss of volume, restrictive defect)
    - Other: psychosis, glomerulonephritis, Raynauds, neutropenia, non-erosive arthropathy (but you do get swan-neck deformity, ulnar deviation, but not due to erosions)
- Scleroderma: telescoping (sclerodactyly), long fingers with shiny tight skin
  - NB: dactylitis = sausage fingers
  - CREST syndrome: calcinosis, Raynauds, esophageal atresia, scleroderma, telangiectasia = AI connective tissue disease that may benefit from immunosuppressive Tx
  - Antibodies: anti-centromere
• Sjogrens: dry eyes and mouth (anti-Ro and anti-La – can be seen in SLE too, and this predisposes to neonatal heartblock), Shirmer’s test, parotid gland swelling (lymphocytic infiltrate)
• Myositis: muscle breakdown, increased CK, painless weakness
  o Dermatomyositis: same as polymyositis, but with rash (Gottron’s papules + Helitrope rash) and cancer risk (Jo1 – 1/3 patients will have solid tumour)
• Antiphospholipid syndrome
  o Clinical features: Recurrent spontaneous foetal loss, DVT/PE, thrombotic stroke
  o Abs: anti-cardiolipin, lupus anticoagulant, anti-beta2PG1

Vasculitis

Chapel Hill Consensus Criteria
Nomenclature update 2012

• All vasculitidis present with ++ constitutional Sx
• Giant cell arteritis: headache, jaw claudication, elderly
• Takayasu’s: younger female, pulselessness, slowly progressive stenotic disease of large arteries (e.g. carotid) but typically asymptomatic
• Polyarteritis nodosa: male, HTN, artery aneurysms (especially renal arteries)
• Kawasaki: children, lymphadenopathy, coronary aneurysms
• Granulomatosis with polyangitis (Wegener’s): cANCA (PR3 component), ENT/resp involvement
  o Can present with subglottic stenosis
• Churg-Strauss: pANCA, eosinophilia, asthma, neuropathy
• Microscopic polyangitis: pANCA (MPO component), severe renal failure
• Immune complex vasculitides – vasculitis rash on the legs (painful purple purpura), ANCA negative
Osteoporosis

- Definition: T score of -2.5 or lower on DEXA (porous bone), Osteopenia: T score -1 to -2.5 (paucity of bone)
- T score is comparison of your bone density, to that of peak bone mass (mid-20s)
- Risk factors:
  - Sex: 15% in women aged 50-59, 70% in >80s
  - Age: BMD decreases by 0.86% to 1.21% annually
  - Ethnicity (Afro-carribean 2.5x less risk)
  - Early menopause
  - FHx of osteoporosis
  - Weight: obesity or anorexia
  - Smoking: 2% reduction of BMD per decade
  - Exercise: weight training and impact can lead to new bone formation
- Secondary osteoporosis: low testosterone, rheumatoid arthritis, long-term prednisolone use
- Assessment of L1-L4 and the hips
- Treatment:
  - First-line: bisphosphonates, e.g. alendronic acid
    - SE: back pain, flu-like symptoms, osteonecrosis of jaw, subtrochanteric fractures (paradoxical)
  - Others: denosumab (rank-ligand binding), strontium, teriparatide

Gout

- Joints affected: mono-articular, 1st MTP, knee, ankle, wrist elbow (spares hips and shoulders)
- Ix of a gout tophus: XR, aspirate > uric acid + examine under polarized light (negatively birefringent crystals)
- Management:
  - Chronic > allopurinol (xanthine oxidase inhibitor therefore stop making uric acid)
  - Acute > Colchinine (SE: diarrhoea) + NSAIDs (rapid response over few hours - ?ulcers)
  - Probenicid: uricosuric drug (urine excretion)
  - Stop thiazide diuretics
- Common causes in elderly: alcohol use, renal failure, diuretic use (most common)
Trauma & Orthopaedics

Chinmay Gupte + Prof Cobb

Trauma

Describing fractures
- Clinical signs of a fracture: pain, deformity, swelling, crepitus, adjacent structural injury (nerves, vessels, ligament, tendon)
- Ix options:
  - Radiographs
  - CT scans: better definition of bone anatomy, especially for comminuted fractures
  - MRI scans: soft tissue structures
  - Bone scans: not typically used, can be used to spot multiple bony metastases, stress fractures
- Describing a fracture radiograph
  - Location: which bone and which part?
  - Pieces: simple, multi-fragmentary
  - Pattern: transverse, oblique, spiral
  - Displaced or undisplaced?
  - Translated (lateral) or angulated (valgus)?
  - X/Y/Z plane
  - Child: presence of growth plates? Describe as skeletally immature bone
- Displacement can occur in 6 ways
  - Translation = straight movement: proximal/distal, A/P, medial/lateral
  - Angulation = rotation about different axis: internal/external rotation (axial), dorsal/volar (sagittal), varus/valgus (coronal)

Management of fractures
1. Reduce: closed, open
   - Closed (manipulation, traction in skin or skeletal with pins)
   - Open with a mini-incision or full exposure
2. Hold: no metal, metal
   - No metal = closed: plaster or traction (skin or skeletal)
   - Metal = fixation: internal (intramedullary pins/needles, extramedullary plate, screws or pins) or external (monoplanar, multiplanar – used in #s with ++ soft tissue injury to prevent bone infection)
3. Rehabilitate: move, physiotherapy, use (pain relief, retrain), strengthen, weight bear
   - Chronic regional pain syndrome (Sudeck’s atrophy) – due to chronic non-use

VARUS = VARE IS MY PIG (knees out looking between legs)
VALGUS = It is VALGAR to have your knees apart
Complications of fractures
- Immediate: bleeding, pain  >>  Early: bleeding, necrosis  >>  Late: malunion
- General (early or late): pain, bleeding fat embolus, DVT + PE, infection, prolonged immobility (UTI, chest infection, pressure sores), septicaemia
- Specific: limb ischaemia, osteomyelitis, neurovascular injury, muscle/tendon injury, non-union/malunion, bone necrosis, intra-articular degenerative change, reflex sympathetic dystrophy (disproportionate prolonged stiffness/pain), nerve injury (paraesthesia or paralysis)

#NOF (fractured neck of femur)
- Causes: osteoporosis (older), trauma (younger), combination
  - Common osteoporosis #: NOF, colles (wrist)
- History: age, comorbidity (resp, cardio, DM, cancer), pre-injury mobility (independent, shopping, walking, sports), social Hx (relatives, stairs, ETOH)
- Blood supply comes from capsular vessels, therefore intracapsular increase risk of AVN

Displacement - Shenton's line is preserved in an undisplaced fracture
Management: depends on location/displacement and age
- Extracapsular: minimal risk to blood supply and AVN, fix with plate and screws (Dynamic hip screw: effectively like a cannulated screw, in which the screw can pass through the plate to prevent the screw going through the capsule of the femoral head on standing)
- Intracapsular:
  - if undisplaced, less risk to blood supply, fix with screws
  - If displaced, 25-30% risk AVN, replace in older patients, fix in young
- Displaced intracapsular >5yrs: replace – total vs. hemi??
  - Total hip replacement: Walks ++ miles a day, Independent, Minimal comorbidities
  - Hemiarthroplasty: lower mobility, multiple comorbidities
**Sports injuries**
- Questions to ask in the history:
  - Mechanism of injury
  - Loss of consciousness
  - Focal neurological change
  - Immediate vs. delayed swelling – immediate = bleeding, delay = sympathetic
    - Knee: immediate = ligament, delayed = meniscus
- Previous injury: 50% chance of repeated shoulder dislocation (lower risk in older population)
- Joint instability
- Knee: locking, giving way, patellar movement, loose body

**Wrist injuries**
- Colles: distal radius with dorsal angulation
- Smiths: distal radius with volar angulation – this has worse outcome
- Scaphoid #: snuffbox tenderness, axial loading of thumb pain, wrist supination scaphoid tenderness
Orthopaedics

Osteoarthritis

- Definition: degenerative joint disorder in which there is progressive loss of hyaline cartilage and new bone formation at the joint surface and its margin
- Sx: pain (exertional, rest, at night), disability (walking distance, stairs, giving way), deformity
- Hx: previous history (trauma, infection), treatments given (physio, injections, operations), other joints affected
- Plan:
  - Exclude rheumatological disease: FBC, ESR, RF, ANA
  - Check renal function before NSAIDs: U&Es
  - X-ray of the knee with a weight bearing AP and lateral view
- Radiographic changes = LOSS
  - Loss of joint space
  - Osteophyte
  - Sclerosis
  - Subchondral cysts
- Management
  - Conservative: analgesia, physio, walking aids, avoidance of exacerbating activity, injections (steroid, viscosupplementation)
  - Operative: replace (knee/hip), osteotomy to realign (knee/big toe), excise (big toe), fuse (big toe), synovectomy (rheumatoid), denervate (wrist)

<table>
<thead>
<tr>
<th>OA</th>
<th>RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATHOLOGY</td>
<td></td>
</tr>
<tr>
<td>Degenerative</td>
<td>Inflammatory</td>
</tr>
<tr>
<td>Negative serology</td>
<td>Positive serology</td>
</tr>
<tr>
<td>CLINICAL</td>
<td></td>
</tr>
<tr>
<td>Assymetric</td>
<td>Symmetric</td>
</tr>
<tr>
<td>Large joints</td>
<td>Small joints</td>
</tr>
<tr>
<td>Early AM stiffness &lt;30min</td>
<td>Early AM stiffness &gt;1hr</td>
</tr>
<tr>
<td>Worse PM</td>
<td>Worse AM</td>
</tr>
<tr>
<td>Hands: DIPJs and PIPJs</td>
<td>Hands: PIPJs and MCPJs</td>
</tr>
<tr>
<td>No extra-articular features</td>
<td>Extra-articular features</td>
</tr>
<tr>
<td>RADIOLOGY</td>
<td></td>
</tr>
<tr>
<td>Loss of joint space with mild deformity</td>
<td>Severe joint deformity</td>
</tr>
<tr>
<td>Osteophytes</td>
<td>Soft tissue swelling</td>
</tr>
<tr>
<td>Sclerosis</td>
<td>Periarticular osteopenia</td>
</tr>
<tr>
<td>Subchondral cysts</td>
<td>Periarticular erosions</td>
</tr>
</tbody>
</table>

Bone infections

- Bone: osteomyelitis
  - Refer to pathology lectures
  - Acute or chronic
  - Primary or secondary
  - Pain/swelling/discharge
  - Systemic signs: fevers, sweats, wt loss
- Joint: septic arthritis
  - Pain
  - Joint swelling/stiffness
  - Fevers, sweats, wt loss
- Investigations
  - Radiology:
    - Plain films
    - MRI scans: bony architecture/collections
    - Bone scans: multifocal disease
    - Labelled white cell scans
Bloods: CRP (acute marker), ESR (slower response), WCC, TB culture/PCR

- Treatment: best antibiotic is IV flucloxacillin (S. aureus most common organism)
  - Osteomyelitis: 6wks IV Abx, surgical drainage (if collections/sequestrum), ??amputation
    ▪ Chronic: ABx suppression, dressings
  - Septic arthritis: surgery (joint washout, drainage + repeat), days-weeks IV Abx, immobilise joint, physiotherapy

Joint Examinations

Shoulder – examine while STANDING
- Look (front/back): scars, swelling, deformity, muscle wasting (supra/infra – related to scapular spine)
- Feel: sternoclavicular joint > clavicle, ACJ (posterior tenderness in arthritis), humeral head, down the scapula
- Move: feel the joint for crepitations + popping, if any pain can do passive movement
  - Flexion/extension: Arms by side, all the way up (forward) and then as far back as possible – if they have any pain, ask to passively move
  - Abduction/adduction: Arms out to side with palms facing the front, All the way up, and let me know if it hurts (look for grimace = first sign of pain)
    ▪ Impingement sign: Painful arc (pain in the middle between 60-120deg– subacromial space is inflamed, and impinged supraspinatus tendon as you bring the greater tuberosity under the acromion)
  - External rotation: hands behind head. Movement almost exclusively in glenohumeral joint with little scapula movement.
    ▪ Frozen shoulder > pain + limitation of external rotation
  - Internal rotation: hand behind your back and far up as possible (test each arm individual and measure spinal height reached)

- Special tests:
  - Rotator cuff
    ▪ Resisted abduction (supraspinatus): arms at 30-40deg in front, beer can movement
    ▪ Resisted external rotation (infraspinatus + teres minor): elbows im with arms flexed, push hands outwards
    ▪ Napoleon/Belly press (subscapularis): hands on hips and push elbows forward
  - Scarf test (ACJ dysfunction): Cross body abduction + put pressure. Pain >> ?arthritis
  - Hawkin’s test (subacromial impingement): support the elbow at 90 deg in front of you like a waiter holding a tablecloth (hold, internally rotate)
  - Apprehension test (glenohumeral joint instability): support the elbow at 90 deg out to side (hold, externally rotate bring the forearm backwards)

- Complete the exam: examine the elbow and cervical spine, neurovascular examination, X-rays (AP, lateral, Y view)

- Shoulder conditions
  - 15-45yrs: dislocation, fractures
  - 45-60yrs: impingement, dislocation, ACJ OA, rotator cuff tears, fractures
  - >60yrs: glenohumeral OA, impingement, cuff tears, fractures

Hip
- Look standing: scars, swelling, deformity, muscle wasting (glutes), alignment
- Look walking: antalgic/short leg/trendelenberg, trendelenberg test
  - Antalgic gait = pain > favouring of one side (longer in swing phase on affected side – less time weight-bearing on affected limb)
  - Trendelenberg = abductor muscle pain/loss of function (gluteus medius/minimus). Right sided abductors life left side of the pelvis. In trendelenberg, when you swing > pelvic tilt to the opposite side of the weak muscles
    ▪ Test: kneel + put your hands on their hips, get them to support on your shoulders + then stand on one leg. SOUND SIDE SAGS

- REPOSITION = LYING AS CLOSE TO FLAT AS POSSIBLE
- Feel: femoral pulse, greater trochanter, ASIS
- Offer leg length:
  - Apparent (xiphisternum to medial malleolus), true (ASIS)
• Shortening: hip, femur or tibia? >> bend the knees to 70deg + galeatses test [assume short leg is abnormal]

• Move: flexion, abduction/adduction (holding contralateral ASIS), internal/external rotation (lifting legs by heels, both in extension and flexion)

• Special tests:
  o Thomas’ test (fixed flexion lying flat with hand on small of back looking for lumbar loudosis)
    ▪ OA
    ▪ #NoF
  o Neurovascular examination
  o Impingement

• Hip conditions
  o 15-45yrs: developmental dysplasia, leg length discrepancy, impingement
  o 45-60yrs: OA, AVN, impingement
  o >60yrs: OA, total hip replacement

Knee
• Look standing: scars, swelling, deformity, muscle wasting, alignment (valgus, varus)
  o Offer to measure the quads (15cm above tibial tuberosity)
• Look walking: antalgic, valgus/varus thrust (valgus: VAL has rheumatoid)
• Look sitting on edge of bed (get them to straighten leg and look for how the knee cap moves)
• Feel: effusion, warmth, muscle wasting, joint line (with knee bent at 80 degrees), popliteal pulse
  o Milk test with patellar tap + cross-fluctuance
• Move: extension (lift leg up straight), fixed flexion + extensor lag (let me take the weight), flexion, patellofemoral tracking
  o Place hand on knee as you are flexing, you are looking for patellar crepitus
  o Bend one knee > bend the other > extend one knee > extend the other
• Special tests: 3 Cs: cartilage, cruciates, collaterals
  o Cruciate ligaments: anterior + posterior drawer test
    ▪ Observe for posterior sag first = PCL tear
    ▪ At 80 degrees, gently rest your butt on top of their foot, to stabilise the foot
    ▪ Anterior/posterior drawer – thumbs on tibial tubercle, rock back and forth with your elbows flexed (<5cm is physiological)
    ▪ Lachmanns (more sensitive than AP drawer, done at 30 degrees) – your contralateral leg against their ipsilateral leg just above the popliteal fossa. One hand above knee, and other just below tibial tubercle medially + just wobble
    ▪ Pivot shift test: only performed under GA in theatre
  o Collateral ligaments: thumbs on joint line + wobble laterally (full extension + 30 degrees of flexion)
    ▪ Valgus stress (medial ligament)
    ▪ Varus stress (lateral ligament)
  o Meniscus:
    ▪ McMurrays test (be aware, you are unlikely to have to do it)
• Knee conditions
  o 15-45yrs: patellofemoral maltracking, ACL/PCL, meniscal tears, fractures
  o 45-60yrs: OA, patellofemoral maltracking, ACL/PCL
  o >60yrs: OA

Spine
• Look standing: scars, swelling, deformity (scoliosis/kyphosis), muscle wasting
• Look walking: antalgic
• Feel: sensation (dermatomes)
• Move: straight leg raise, sciatic stretch test, myotomes
• Special tests: knee/ankle jerks, pulses
Elective orthopaedics histories

Key competencies: organised Hx taking, detailed examination, empathy with the pt, distil findings
- Musculoskeletal history:
  o Exactly what is the problem?
  o ADL and specifics, whole life of activity – make it subjective to the patient, compare activities from teenage years to now
  o Patterns of pain - ?Nerve entrapment/vascular/arthrosis/instability
    ▪ Vascular claudication vs. spinal stenosis – cramping and points to muscle in vascular claudication
    ▪ Joint:
      o Analgesic use and drug history
      o PMHx, FHx, SHx
- Typical Hx: stiff hip/knee, back pain
  o Hockey players: varus legs
  o Ballet dancers: hyperextension, external rotation
  o Catwalk models: valgus legs
  o +++ childhood activity: arthritis hip in 30s
- Examination:
  o Empathy: eye contact, minor physical contact if appropriate (don't just grab them)
  o General: first impression of general health, wasting, neuropathy
  o Local exam: deformity, swelling, joint line tenderness, ROM, stability, pain under tension or compression
- Investigations
- Management: know drug doses, but don't say them until asked
  o Conservative
  o Joint replacement
  o Alternatives: osteotomy, fusion, excision
- Effectiveness vs. cos: QALYS
Renal Medicine

Summary of renal pathology: ABCDEF

- **Acid-base balance (PCT)**
  - Dysfunction > acidosis > catabolic state
  - Rx. Oral bicarbonate
- **BP regulation (renin-angiotensin system)**
  - Reduced BF to afferent arteriole > renin production from JGA/macula densa
  - Angiotensinogen > Angiotensin I (ACE in lung) > Angiotensin II
  - Angiotensin II > aldosterone (>> salt restriction) + vasoconstriction >> inc BP
  - In RAS, you have reduced BF distal to stenosis, therefore reliant on RAS to maintain BF > systemic HTN
    - ACE I >> inc creatinine
- **Concentration of urine (loop of Henle)**
- **Drug alteration**
- **Erythropoiesis (interstitial fibroblasts in medulla)**
  - EPO produced >> BM >> RBC production
  - Medulla is physiologically hypoxic, therefore very sensitive to O2 delivery > EPO production
  - Rx anaemia in RF = recombinant EPO (Araness) + iron
- **Filtration (glomerulus)**
  - eGFR (creatinine, gender, age, ethnicity)
  - urine output 24hr collection
  - Urea = product of protein breakdown in the liver

Presenting complaints

Urine: colour, blood/myoglobin, protein (?nephrotic syndrome), nitrite (infection), cells, casts (glomerular disease), electrolytes

- **Haematuria**
  - If surgical most likely > imaging (US, IVU), cystoscopy
  - If medical most likely > renal function, urine protein quantification, bloods for underlying systemic/immune disease > biopsy
- **Proteinuria >> Urine protein: creatinine ratio**
  - Nephrotic syndrome = >3g/day (300mg/mmol) AND oedema AND hypoalbuminaemia (+/- hypercholesterolaemia)
  - Ax. Minimal change, membranous, diabetes, amyloid, SLE
  - Ix. Creatinine & electrolytes, glucose, urine protein dipstick + microscopy, LFTs, inflammatory markers (CRP)
    - Immunology: ANA, dsDNA, complement screen, autoantibodies (ANCA, anti-GMB)
    - Myeloma screen: Igs, urine BJP, protein electrophoresis
    - Virology: Hep B, C and HIV
- **Oliguria/anuria >> ??obstruction**
  - Pre-renal
  - Renal
  - Post-renal

Acute kidney injury

- Presentation: non-specific, uraemic (nausea, vomiting, anorexia), oliguria, systemic features (rash, myalgia, arthralgia, headaches)
  - Biochemistry: high urea, creatinine, hyperkalaemia, acidosis
- **Complications**
  - Urgent
    - Hyperkalaemia
    - Pulmonary oedema (SOB, hypoxia, hypercapnia, acidosis, fluid overload)
    - Metabolic acidosis
    - Hypertension – watch ACEi if possibility of bilateral renal artery stenosis
    - Uraemia
  - Volume overload
  - Other
    - Hypocalcaemia
    - Hyperphosphataemia

What to ask:

- Exclude obstruction
- Volume status
- Major vascular occlusion
- Evidence of severe parenchymal disease
Causes:

- **Pre-renal**: oliguria, urine osmolality >500mOsm >> Rx fluids to prevent ATN
  - Hallmark is reduced renal perfusion – either due to generalised reduction in tissue perfusion or selective renal ischaemia
    - No structural abnormality
  - Occurs when normal adaptive mechanisms to reduced circulating volume (RAS, vasopression and sympathetic nervous system) fail to maintain renal perfusion
  - Causes:
    - True volume depletion
    - Hypotension
    - Oedematous states
    - Selective renal ischaemia
    - Drugs affecting GFR – ACE inhibitors, ARBs, NSAIDs, COX-2 inhibitors, Diuretics, Calcineurin inhibitors (cyclosporin, tacrolimus)
    - Underlying renal artery stenosis
  - Pre-renal AKI is not associated with structural renal damage and responds immediately to restoration of circulating volume.

- **Renal/intrinsic**
  - May represent abnormality of any part of the nephron
    - Vascular, e.g. vasculitis
    - Glomerular, e.g. glomerulonephritis
    - Tubular, e.g. acute tubular necrosis (urine osmolality <350mOsmol/kg)
    - Interstitial, e.g. analgesic nephropathy
  - Common mechanisms
    - Direct tubular injury
      - Ischaemic - DIC
      - Endogenous toxins – myoglobin (compartment syndrome > rhabdomyolysis), immunoglobulins
      - Exogenous toxins - contrast agents, aminoglycosides, amphotericin, acyclovir
    - Immune dysfunction causing renal inflammation
      - Glomerulonephritis
      - Vasculitis, e.g. SLE, anti-GBM
    - Infiltration/abnormal protein deposition
      - Amyloidosis
      - Lymphoma
      - Myeloma-related renal disease
  - **Ix** = RENAL BIOPSY (point of inflammation/necrosis determines Mx)
    - Histological Dx: glomerulonephritis (e.g. IgA), focal segmental, crescentic

- **Post-renal**: oligo/anuria
  - Hallmark is physical obstruction to urine flow, which may be intrarenal, ureteric, prostatic/urethral or due to a blocked urinary catheter
  - Pathophysiology: GFR is dependent on hydraulic pressure gradient. Obstruction results in increased tubular pressure >> immediate decline in GFR
  - Immediate relief of obstruction restores GFR fully, with no structural damage. But prolonged obstruction may lead to glomerular ischaemia, tubular damage and long-term interstitial scarring

Investigations

- GFR/creatinine
- Urine: dipstick, microscopy, casts
- Bloods: FBC, U&E, bone profile, CRP, CK, ESR, clotting
- ABG
- ECG – looking for signs of hyperkalaemia
- KUB, US – looking for renal stones
- Specific: ANA, C3, C4, anti-GBM, biopsy

- **Fluid status exam**:
  - General: SOB, IV, catheter, charts (fluid, drugs, obs), **lying and standing BP** (in young pts, standing BP drops first)
  - Head/neck: puffy eyes/sunken, carotid pulse, JVP
  - Hands: pulse (bounding, collapsing), orthostatic hypotension, cap refill, skin turgor
  - Chest: pulmonary oedema (crackles, S3)
  - Abdomen: ascites, palpable bladder
Dialysis: indicated in ESRF when GFR <5-8 ml/min

- **Principle:** filter blood through an "artificial kidney: with a bathing solution aiming to normalise K+, Na+, Urea, creatinine, phosphate"
- **Indications for urgent dialysis:** AEIOU
  - Acidosis
  - Electrolyte imbalance (hyperkalaemia)
  - Intoxicants (methanol, lithium)
  - Overload
  - Uremia (dec consciousness, peripheral neuropathy, restless legs, cramps, nausea, ureaemia pericarditis)
- **Hyperkalaemia:**
  - 1. Calcium gluconate 10ml of 10%
  - 2. Insulin + glucose (10u in 50ml 50%), nebulised/IV salbutamol
  - 3. Calcium resonium, IV sodium bicarbonate
  - 4. Dialysis

<table>
<thead>
<tr>
<th>Serum potassium</th>
<th>Typical ECG appearance</th>
<th>Possible ECG abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild (5.5-6.5 mEq/L)</td>
<td><img src="image" alt="Mild ECG" /></td>
<td>Peaked T waves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prolonged PR segment</td>
</tr>
<tr>
<td>Moderate (6.5-8.0 mEq/L)</td>
<td><img src="image" alt="Moderate ECG" /></td>
<td>Loss of P wave</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prolonged QRS complex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST-segment elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ectopic beats and escape rhythms</td>
</tr>
<tr>
<td>Severe (&gt;8.0 mEq/L)</td>
<td><img src="image" alt="Severe ECG" /></td>
<td>Progressive widening of QRS complex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sine wave</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ventricular fibrillation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asystole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Axis deviations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bundle branch blocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fascicular blocks</td>
</tr>
</tbody>
</table>

- **Types:**
  - Haemodialysis:
    - AV fisula
    - Central venous catheter in SVC: non-tunelled or tunnelled (under skin from forearm)
  - Peritoneal dialysis (Tenchkoff catheter)
    - Continuous ambulatory
    - Automated
  - Continuous veno-venous haemofiltration – ICU only
- **Complications:** Arrhythmia, Headache, Disequilibrium syndrome (unbalanced), N&V, Fluid overload, Pruritis, Anaemia, Hypotension, Hypokalaemia, Muscle cramps & Back pain
  - Access: infection, thrombosis, aneurysm, stenosis
- **Drugs pt commonly on during dialysis (ABCDE)**
  - Anaemia > EPO
  - Bones > cholecalciferol, 1-alpha calciol, phosphate binders
  - CV risk factors > statins, anti-HTN
  - Diabetes > insulin, gliclazide
  - Enoxaparin
AV fistula examination

- Look, feel, listen
- Complications:
  - Thrombosis, venous stenosis, aneurysm, infection, steel syndrome
- Look:
  - General: pain
    - Type: radicephalic, brachcephalic, upper arm transposed basilica
  - Scars, inflammation, rash, swelling erythemia
  - Veins – occlusion, pulsation
  - Hands: oedema, steal syndrome (ischaemia)
- Feel:
  - Thrill
  - Consistency: soft, compressible
  - Anatomotic stenosis
    - Vein should NOT be pulsatile if there is no occlusion
    - Augmentation test
      - Occlude vein 1-2cm above fistula
      - Look for pulsation of vein in fistula.
- Listen: Bruit:
  - High pitch > stenosis
  - Absence of thrill distal to fistula > stenosis

Renal transplantation

- Indications
  - Diabetes
  - Arteriosclerosis
  - HTN
  - GN
  - Microscopic vasculitis
  - Children: congenital structural abnormalities, genetic XXXX
- Selection
  - LE <5 yrs
- Who can donate?
- Warm ischaemia: time between cutting blood supply across clamping + cooling/cold perfusion is commenced AND from renal of the organ from ice until reperfusion
- Cold perfusion: XXXX
- Donor risks:
  - Premature renal failure
- Living donors: use
- Inspection
  - CKD signs
  - Scars from points of access of old dialysis catheters
  - Drugs SEs
  - RIF scars (Rutherford-morrison)
  - Collar incision (for parathyroidectomy)
  - Prev nephrectomy
- Palpation:
  - Iliac fossa mass (well-defined, placed outside peritoneum, covered only….)
  - DDx for RIF mass
    - Appendix mass/abscess
    - CD
    - Amoevic colonic abscess
    - Cancer
- Problems for recipient:
  - Post-operative complications
  - DGF: need for dialysis in first week after transplant
  - Rejection
  - Immunosuppression SEs
    - Infections

Exclusion criteria for living donors

<table>
<thead>
<tr>
<th>Absolute contraindications</th>
<th>Relative contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt; 18 years</td>
<td>Active chronic infection (e.g., tuberculosis, hepatitis B/C, parasitic)</td>
</tr>
<tr>
<td>Uncontrolled hypertension</td>
<td>Obesity</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Psychiatric disorders</td>
</tr>
<tr>
<td>Proteinuria (&gt; 300 mg/24 h)</td>
<td></td>
</tr>
<tr>
<td>Abnormal GFR compared to normal range for age</td>
<td></td>
</tr>
<tr>
<td>Microscopic haematuria</td>
<td></td>
</tr>
<tr>
<td>High risk of thromboembolism</td>
<td></td>
</tr>
<tr>
<td>Medically significant illness (chronic lung disease, recent malignant tumour, heart disease)</td>
<td></td>
</tr>
<tr>
<td>History of bilateral kidney stones</td>
<td></td>
</tr>
<tr>
<td>HIV positive</td>
<td></td>
</tr>
</tbody>
</table>

---

**Note:**
- XXXX
- LE: Life Expectancy

---
- Malignancy
- Rejection: clinical evidence is rarely characterized by fever, swelling, and tenderness over the allograft. Rejection may present only with a rise in serum creatinine, with or without a reduction in urine volume
  - Hyperacute (within first 24 hours)
    - Dx usually made by surgeon in theatre as the pink kidney becomes mottled + cyanotic
    - Rare
  - Early (1-12wks)
    - Oliguria +/- tender graft
    - Methylprednisolone (0.5-1g IV)
  - Chronic
    - Malignancy: 5-6% (100x > than general population)
- Immunosuppression
  - Induction: ATG, Alemtuzumab (anti CD25)
  - Maintenance therapy:
    - Prednisolone
    - Calcineurin inhibitors: cyclosporin
    - Antimetabolites (azathioprine)
  - Fever/suspected sepsis >> URGENT IX + MX

### Chronic Kidney Disease
- Causes:
  - Diabetes
  - HTN
  - Glomerulonephritis
  - Congenital: PKD, Febry, cystinosis, Alport, Tuberous sclerosis
  - Misc: TB, HIV, amyloidosis, myeloma, SCD, sarcoidosis
- Modification of Diet in Renal Disease:
  - Stage 1: normal (eGFR > 90)
  - Stage 2: mild (eGFR 60-89)
  - Stage 3: moderate (eGFR 30-59)
  - Stage 4: severe (eGFR 15-29)
  - Stage 5: established end-stage RF (eGFR <15/on HD)
Urology for PACES Miss Norma Gibbons

Urological History

- Age
- PC
  - Haematuria/poor flow/dysuria/incontinence
  - Dysuria and frank haematuria = RED FLAG
- PMHx. Diabetes
- DHx. Diuretics, anticoagulation
- SHx. Including smoking (v. important for TCC of bladder)
- Systems review

Urological exam

- General condition: sick, weight loss
- BP, temperature
- Abdominal examination
- Palpate for the bladder
- Genital examination: testes and penis (with chaperone)
- PV/PR exam
  - Size of prostate
  - Vaginal masses/prolapse/cervical hardness/tenderness

Haematuria

- Causes of haematuria:
  - Kidney: tear, stone, tumour, ulcerating TB, parenchymal disease e.g. nephritis
  - Ureter: stone
  - Bladder: tear, tumour, cystitis, stone (lining of the bladder is urothelium)
  - Prostate: BPH, tumour, veins over
  - Urethra: urethritis
  - Vagina
- Questions to ask:
  - Frank: seen in toilet – serious in all age groups
  - Non-visible: on light microscopy – not worried under age of 40
    - Dipstick: 2 or 3 + is significant
  - Initial/terminal = urethra, prostate, seminal vesicles, or bladder neck
  - Total = bladder, ureter or kidney
  - Pain: flank (pyelonephritis/renal nephrolithiasis), radiating to groin (kidney stones), suprapubic (bladder outlet obstruction)
  - LUTS: dysuria, frequency, urgency, urethral discharge
  - Obstructive symptoms: hesitancy, straining, incomplete emptying
  - Glomerular Ax. Periorbital/peripheral oedema, wt gain, oliguria, dark urine, HTN
  - Recent pharyngitis or skin infection >> ?post-infectious glomerulonephritis
  - Joint pains, skin rashes or low grade fever >> SLE
- Ix.
  - Blood pressure
  - Urine dipstick
    - Haematuria
    - Proteinuria: indicator of renal dysfunction
    - Nitrite or leukocyte esterase
  - MSU
- Problems: intraluminal, intramural, extramural (insert above)
  - TCC of bladder tract or upper tract
  - RCC
  - Cervical cancer
  - UTI
  - Stones
  - Enlarged prostate/prostatitis
  - Kidney disease/injury
  - Cyclophosphamide
  - Strenuous exercise (>> transient)
  - Spurious: menstruation, sexual intercourse, drugs (chloroquine, rifampicin, doxyrubicin), foods (beetroot, blackberries, rhubarb), rhabdomyolysis

---

Case 1. 65yo M, frank painless haematuria, intermittent 3wk Hx, smoker – TCC of the bladder
• 2-week referral:
  o All frank haematuria
  o Persistent haematuria with dysuria
  o Micro/macrohaematuria with LUTS
  o Female retention with pain and haematuria – usually due to large fibroid, prolapse or malignancy in pelvis

• Rapid access diagnostic pathway:
  o GP refers patient with haematuria:
    o Urology RAC
      ▪ MSU
      ▪ US of kidneys/bladder
      ▪ CT urogram all patients with frank haematuria or >50yrs/smoker
      ▪ Diagnostic flexible cystoscopy
  o Cancer diagnosis >> locally performed procedures (TURBT), X-ray/biopsy, ureteroscopy + biopsy
  o Local MDT discussion

• Radiological investigations (LEARN DIFFERENCE FOR THE EXAM)
  o Ultrasound: non-invasive, differentiates between cystic (fluid = dark) and solid (bright). Used to assess for hydronephrosis (dilation of the renal pelvis). Can also show stones and masses (e.g. Exophytic lesion shown on right lateral wall of bladder)
  o CT urogram: CT exam of the kidneys/ureters and bladder, before and after administration of 100mls IV contrast. Includes control, 5 and 15 min scans (includes excretory phase images). Picks up urothelial filling defects
    ▪ Can also identify masses: calcified speculated lesion measuring 10cm in the wall of the bladder, very suspicious for TCC
  o CT KUB: non-contrast CT scan of the kidneys, ureters and bladder. Taken at 2.5mm cutes to diagnose renal calculi (shown as white on the tract)
  o Triple phase CT: used to further evaluate renal tumours. Non contrast is used to look for fat in tumours (indicative of angiomylipomas – risk of bleeding), arterial contrast enhancement (renal tumour has good blood supply) and venous phase (looks at level of renal vein to look for invasion)
    ▪ Location of the tumour
    ▪ Size
    ▪ Renal vein involvement
    ▪ Any lymph nodes or distant metastases
    ▪ Always comment on the present/absence/state of the contralateral kidney
    ▪ Can be viewed in Axial or coronal view

• Who needs a cystoscopy?
  o Smokers
  o Occupational exposure to chemicals/dyes
  o History of persistent dysuria or frank haematuria
  o Phenacitin abuse
  o Pelvic radiotherapy
  o Cyclophosphamide exposure

• Urology MDT
  o Urologist
  o Medical and radiation oncologists
  o Histopathologists
  o Radiologists
  o Clinical nurse specialist
  o MDT team coordinator
  o Patient lead tracker

---

<table>
<thead>
<tr>
<th>Summary of urology imaging methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
</tr>
<tr>
<td>CT urogram (contrast)</td>
</tr>
<tr>
<td>CT KUB</td>
</tr>
<tr>
<td>Triple phase CT (contrast)</td>
</tr>
</tbody>
</table>
TCC of the urinary tract

- Remember: the renal pelvis, ureter and bladder all have the same urothelial lining.
- Risk factors
  - Cigarettes (aromatic amines)
  - Aniline dyes, e.g. beta naphthylamine
  - Rubber, textiles, Leather printing
  - Petroleum
  - Age 60-80
  - Chronic irritation: long-term indwelling catheter (paraplegic) or recurrent UTI
  - Schistosomiasis
- Initial management: transurethral resection of the bladder tumour (TURBT) + review histopathology for stage and grading
- Blue light cystoscopy with Hexfix can be used to visualise malignant growths in the lower urinary tract, which you are unable to visualise with naked eye. Upper tract imaging includes US or CTU.
- Types: Non-muscle invasive (70%, ++ recurrence) >> TURBT + intravesical Tx, Muscle invasive (30%, ++ metastases) >> chemo + surgery + radiation
- Staging:
  - CIS
  - T1: on the mucosa (50% no recurrence)
  - T2: past the submucosa into lamina propria
  - T3: into muscle
  - T4: distant metastases
- T1 G3 tumours: 50% die within 5yrs, high risk superficial TCC bladder, risk of becoming muscle invasive within 18m. Offer intravesical immunotherapy with close cystoscopic surveillance or or radical cystectomy.
- Radical cystectomy (early >> 90% 5yr survival, BCG and delayed surgery >> 70% 5yr survival)
  - Man: bladder, prostate + pelvic LN
  - Woman: bladder, uterus, fallopian tubes, cervix, anterior vagina + pelvic LN
- Surveillance cystoscopy: 3 months for 1 year, 6 months for 2 years, then yearly
- CIS: presents with bladder pain and dysuria. If untreated for 2y, 50% develop cancer. Mx is intravesical BCG. Radical cystectomy for those who fail to respond to Tx
- TCC of the upper tract (20-40% of seeding in the bladder)
  - Superficial, low grade tumours in unfit patients, or solitary kidneys >> ureteroscopy and laser Rx
  - Higher grade/muscle invasive >> nephroureterectomy (kidney, ureter and cuff of bladder)
- TCC of lower tract only has 2-4% of seeding in the bladder

Upper tract diversion

- Ileal conduit: ureters joined to distal end of isolated segment of small bowel (18cm proximal to ileocaecal valve to prevent short gut syndrome), brought out to the right anterior abdominal wall
- Neo-bladder: 60cm of small bowel is detubularised, made into a small pouch and joined to urethra. Ability to void, but requires self-catheterisation
Renal cancer

- Usually an incidental finding on US
- Classic triad: haematuria, loin pain + palpable mass (very rare, advanced – haematuria indicates invasion into the collecting system)
- Paraneoplastic syndromes (in RCC)
  - Paraneoplastic: high Ca (10%)
  - Stuffer’s syndrome: high LFTs
  - HTN and inc Renin (high stage RCC)
  - Polycythaemia

- Renal tumours
  - Wilms: 75% <5yrs, Ch11p, 90% present with mass +/- pain. Rx nephrectomy +/- chemo (90% survival)
  - Renal Cell (85% of renal malignancies, including hypernephroma, clear cell, Grawitz, adenocarcinoma): RF dyes, long-term dialysis, obesity
    - Inherited RF: renal cancer, von hippel-lindau (3p), tuberous sclerosis (9q/16p)
  - Transitional Cell: RF smoking, M:F 3:1
  - Oncytoma: ++ eosinophils, often with RCC
  - Angiomyolipoma AML: blood vessels, muscles + fat. <4cm observe, >4cm remove/embolis

- Lx.
  - Check renal function: U&Es
  - Staging CT scan TAP (thorax, abdo + pelvis)

- Example Hx. 30yo M, low Hb, anorexia, wt loss 5months, night sweats, haematuria for 2 weeks
  - 3cm renal mass >> 1-2% of metastases >> DON'T RUSH

- Rx.
  - Organ confined: radical, laparoscopic or open nephrectomy (Laparoscopic vs. open: enhanced recovery)
  - Small tumours <3cm: active surveillance, partial nephrectomy or lap/open nephrectomy

- Absolute indications for partial nephrectomy:
  - Solitary kidney
  - Bilateral renal masses
  - Renal impairment

- Minimally invasive approaches for treatment of a renal mass:
  - RFA (radiofrequency ablation) = heating
  - Cryotherapy = freezing

Renal calculi

- 85% calcium (radio-opaque), 15% combination of uric acid (radiolucent), cysteine and struvite
  - Struvite stones: combination of magnesium, ammonium and phosphate – occur in infected urine
- Presentation: loin >> groin (don’t ignore penile/vaginal pain), pain out of proportion to clinical findings, fever is an indication for admission

- Lx. Temp, BP, bloods (WCC, creatinine), CT KUB
- Mx. Analgesia (NSAIDs/morphine). Stones <5mm have an 80% chance of passing spontaneously
  - Obstruction + temperature: insert JJ stent (flexible tube with two curls at either end inserted retrograde through a nephrostomy – purpose: allows ureter to dilate + pass urine)
    - Stein straBe – insert JJ if stone >2mm, as when stone broken up may have secondary obstruction
  - Uretetoscopy + laser or stone
  - ESWL (shock wave lithotripsy) – very good for renal ca
  - PCNL (percutaneous nephrolithotomy)
**Bladder outflow obstruction**

- Obstruction may be caused by enlarged middle lobe (seen on sagittal MRI)
- Prostate is an accessory gland, which secretes seminal fluid through the ejaculatory duct
- **BPH:** Starts to hypertrophy after the age of 30, which may lead to obstruction > hypertrophy of the detrusor muscle > trabeculated bladder. Under high pressure, there may be high pressure retention leading to bilateral hydronephrosis
- Hx.
  - Storage: weak stream, straining, hesitancy, terminal dribbling, incomplete emptying
  - Voiding: urgency, frequency, nocturia, incontinence post-micturition dribbling
- **Management:**
  - Medical: alpha blockers, e.g. Doxazosin, Prazosin (relax small muscle at bladder neck) or 5-alpha reductase inhibitors, e.g. finasteride
  - Surgical: TURP, enucleation of prostate
    - Why do you not do a TURP on a very large prostate? You should only be resecting for 1hr, as you use a solution called glysine. >1hr >> reduction in Na serum = post-TURP syndrome
- **Assessment of prostate:**
  - DRE
  - PSA (<4 = normal)
  - Flow rate
  - Transrectal US prostate + needle-biopsy
  - MRI of prostate in patient where cancer is suspected
  - Bone scan if cancer diagnosis to rule out bone mets
- **Stage I-IV**
- **Management:**
  - Active surveillance
  - Hormone treatment
  - RadioTx/brachyTx
  - Surgery: radical prostatectomy
  - Cryotherapy
  - HIFU (heat Tx)

---

**PSA PPV for cancer**

- <4ng/ml 10%
- 4-10ng/ml 21%
- >10ng/ml 50%
Testicular cancer

- **Presents:** painless enlarging lymph in the body of the testes, doubling time of 10 days. Peak age 35-40 yrs. RF undescended testis.

- **Types:**
  - Germ cell: teratoma, seminoma, chorioCa
  - Non-germ cell: Leydig, Sertoli

- **Management**
  - Markers: APF (yolk sac cells), betaHCG (expression of trophoblasts), LDH (marker of tissue destruction)
  - US of the scrotum to assess clinical findings
  - CT TAB to look for LN + metastases
  - Inguinal orchidectomy (to prevent LN seeding)
    - Sperm banking before
  - Send for histology: seminoma vs. non-seminoma
  - Chemo BEP + CHOP
  - Removal of nodes post chemotherapy: retroperitoneal LN dissection

Short cases

- **Urinary catheter**
  - Tube placed within the bladder through the urethra to drain the bladder
  - Colour-guided; 12-26 gaug French catheter (indicated by side port)
  - Do not inflate balloon until you have urine draining to prevent trauma to the urethra
  - 2 way: for drainage
  - 3 way: for irrigation/haematuria/post TURP or TURBT

- **Double J stent**
  - 22-30 length
  - hollow plastic tube, placed in the ureter (retrogradely or anterogradely) to bypass obstruction in the ureter
  - Curve at either end holds in place

- **Plain X-ray** showing large bladder stone. How would you manage this?
  - Telescope through the urethra, and break using laser
  - Surgical approach (cystolithotomy)

- **Nephrostomy:**
  - Artificial opening created between the skin and the kidney, found on the back of the patient
  - Radiological procedure to drain the kidney directly
  - Ranges in length from 22 to 30 cm
  - In emergency, little difference between outcome between nephrostomy and JJ stent – consider that a nephrostomy is inserted by interventional radiology so a sick patient you may want closer to theatre/ITU

- **Nephroscopy:**
  - Used to break stones in renal pelvis (percutaneous nephrolithotomy)

- **Ileal conduit:** located in the RIF, drains clear urine into the bag
  - Abnormalities: prolapse, incisional hernia, parastomal hernia (28%), stenosis, ischaemia, stricture, retraction, prolapse, skin reactions/dermatitis

- **Post-op patient:**
  - What operation? Radical cystectomy
  - Scar: lower midline incision (fresh) + old upper midline (pale)
  - What is on the right side? Ileal conduit
  - What is on the left side? Drain (look for tube)
  - Lesion adjacent to the scar? Blister reaction to mefix

- **Radical nephrectomy:**
  - Horizontal incision (for large open nephrectomy)
  - Flank: simple nephrectomy
  - Laparoscopy
  - Look for bruising from SC clexane
• **Scrotal pathology**
  o DDx for scrotal lump: testicular tumour, hydrocele, varicocele, epididymal cyst, lipoma of cord, appendix of morgagni
  o Imaging: US with Doppler flow
  o Hydrocele: 34yo enlarging scrotum 3 months, transilluminate, can get above it
  o Inguinal hernia: 34yo enlarging scrotum 3 months, can’t get above it, exacerbated by heavy lifting/coughing
  o Torsion: 18yo male, acute left testicular pain
    ▪ Mx. exploration surgery (US will not help)
  o Varicocele size and grading:
    ▪ Subclinical: not detected on physical exam; found by radiologic or other imaging
    ▪ Grade I: only palpable during or after valsava maneuver on physical exam
    ▪ Grade II: palpable on routine physical exam
    ▪ Grade III: varicocele visible to the eye and palpable on physical exam

_Urological procedures_
• Flexible cystoscopy: inspection of the urethra and bladder under LA
• Rigid cystoscopy: inspection of the urethra and bladder under GA. This allows for concurrent biopsy, diathermy, stent insertion/removal and removal of any bladder stones

_Stones_
• Cystoscopy and retrograde pyelogram: contrast exam of the ureter
• Cystoscopy and insertion of JJ stent: under GA, for an obstructed ureter
• Insertion of nephrostomy: passing a tube directly into the kidney, performed by interventional radiology
• Ureteroscopy and laser of stone/tumour: direct visualization of the ureter
• Uretero-renoscopy: direct visualization of the ureter and inside the renal pelvis to laser stones or tumour TCC
• PCNL (percutaneous nephrolithotomy): insertion of a scope directly into the kidney to laser stones, performed under GA
• ESWL (electro-shock wave lithotripsy): breakage of a stone via an x-ray machine

_Kidney_
• Simple nephrectomy: removal of a non-functioning kidney (Ax stones, reflux, PKD) – laparoscopic or open
• Radical nephrectomy: removal of kidney, perinephric fat and adrenal gland (Ax malignancy)
• Partial nephrectomy: removal of part of kidney for small lesion (only absolute indication is when there is poor function in the contralateral kidney) – can be performed as laparoscopic, open or robotic
• Nephroureterectomy: removal of kidney and ureter (for TCC of the renal pelvis or ureter) – performed as laparoscopic or open

_Bladder_
• Cystoscopy and bladder biopsy
• Cystoscopy and transurethetral resection of bladder tumour (TURBT)
• Radical cystectomy (laparoscopic, open or robotic)
  o Man: bladder, prostate + pelvic LN
  o Woman: bladder, uterus, fallopian tubes, cervix, anterior vagina + pelvic LN

_Prostate_
• Cystoscopy + TURP: transurethral resection of the prostate
• Simple prostatectomy (Millans): removal of the prostate adenoma for BPH – used when the gland is too big for resection by TURP
• Trans rectal Bx of the prostate (TRUS): US guided biopsy done in the OPD to diagnose prostate cancer
• Radical prostatectomy: removal of prostate and pelvic LN or cancer (can be done as open, laparoscopy or robotically
• Testicular exploration: through the median raphe of the scrotum and bilateral fixation of the testes (emergency surgery)
• Radical orchidectomy: removal of testes for suspected cancer (always through an inguinal incision, never through the scrotum)
Neurology  Dr Omid Halse

- Distinction: Locate the lesion, give a DDx, suggest a diagnostic test
- Locating the lesion:
  - Central
    - Brain: hemisphere, basal ganglia, brainstem, cerebellar, L or R
    - Spinal cord: level, which tracts
  - Peripheral
    - Nerve: mono/poly, sensory, motor or mixed
    - NMJ
    - Muscle
- Can the findings be explained by a single lesion or whether it requires a multifocal process
- Avoid eye contact with the examiner unless you are ready to present, spend a second washing your hands and prepare

- **Upper motor neurone** (above the anterior horn cell):
  - Increased tone (spasticity)
  - Weakness (flexors > extensors in LL, extensors < flexors in UL)
  - Increased reflexes
  - Upgoing plantar response
  - Sustained clonus
- **Cord lesion**: sphincter symptoms, sensory level, bilateral motor signs
- **Brainstem lesion**: dysarthria, dysphagia, Horner’s syndrome, cerebellar signs, spinothalamic sensory loss
- **Motor cortex lesion**: frontal signs, dysphasia, hemianopia, disturbance of higher sensory function e.g. agnosia
- **Lower motor neurone** (in or distal to the anterior horn cell)
  - Decreased muscle tone (flaccid)
  - Weakness and wasting (in specific muscle)
  - Arreflexia
  - Muscle fasciculations
- Root lesion: back pain and sciatica
- **Cord disease at C5/C6**: weakness of the biceps, absence of the biceps reflex, UMN signs in the legs
- **Median nerve pathology**: weakness of thumb abduction, wasting of thenar eminence, numbness in the thumb and lateral 2 ½ fingers

### Cranial Nerves

**UMN**: brain or brainstem (above nucleus) vs. **LMN**: nerve, NMJ + muscle = brainstem nuclei
- Cranial nerves III onwards sit in the brainstem
- Ascending sensory + descending motor tracts also in the brainstem

**Nose**: I (Olfactory): have you noticed a change in your sense of smell? Formally = smelling salts in each nostril
**Eyes**: II, III, IV and VI – INSPECT FOR A GLASS EYE
- **Optic (II)**: acuity, colour, fields, blind spot, pupillary reflexes, fundoscopy
  - Acuity: do you wear glasses or contacts? What for? Changes in vision?
    - Normally, I would like to test your vision in both eyes separately both corrected and uncorrected using a Snellen Chart (6m at pt height > 3m > hand-waving > light perception)
    - Colour: Ishihari plates both corrected/uncorrected
    - Fields: tell me as soon as you see the finger wiggling, don't move it in too quickly
      - Homonomous Hemianopia (common)
      - Confrontational testing (for visual inattention)
  - Blind spot:
    - Use: red-topped hat pin or red-topped neurotip
- Reduced: central scotoma
- Causes of enlarged blind spot: papilledema, optic neuritis in MS (more common)

- Reflexes (best seen in dim ambient lighting)
  - Inspect: pupil size, shape and symmetry (anisocoria), any ptosis
  - Direct (brisk or sluggish, equal or unequal) = CN II
  - Consensual = CN III (innervation to ciliary muscle)
  - Swinging light—looking for RAPD (MS)
  - Accommodation: pupil constricts on near vision

- Pupils:
  - 3\textsuperscript{rd} nerve: down and out (+/- dilatation) – describe!
  - 6\textsuperscript{th} nerve (lateral rectus): failure of abduction
  - Holmes-Aide: mydriasis with no reflex, arreflexi, abnormal sweating
  - Drugs
  - Horner’s (very subtle): miosis, ptosis
  - Argyl-Robertson: bilateral miosis, loss of light reflex but preserved accommodation reflex

- Fundoscopy:
  - DM changes + lasers
  - HTN changes
  - Disc abnormalities: atropy, papilledema
  - Changes of retinal pigmentation

- Pupillary reflex: afferent sensory nerves travel with CNII to the midbrain through the branchium of the superior colliculus and synapse in the pretectal nucleus. Each pretectal nucleus distributes the afferent pupillary impulses to the ipsilateral and contralateral Edinger-Westphal subnucleus of the oculomotor nerve. Efferent impulses then travel in the parasympathetic fibres of CNIII, synapse in the ciliary ganglion of the orbit, and then pass via the short ciliary nerves to innervate the iris sphincter muscle.

- RAPD: due to differences between the two afferent pathways due to retinal or optic nerve disease. In a positive result, the following occurs:
  - When the light is shone into the bad eye, the pupils of both eyes will constrict (but not fully)
  - When the light is shone into the other normal eye, both pupils will constrict further (afferent pathway less damaged)
  - When the light is shone back into the abnormal eye, both pupils will get larger

- CN III, IV and VI: Eye movement (www.youtube.com/watch?v=FKrCh6BnTR4)
  - Occulomotor (III) >> superior, inferior + medial rectus, inferior oblique, levator palpebrae superior
  - Trochlear (IV) >> superior oblique
  - Abducens (VI) >> lateral rectus
  - Comment on primary gaze: equal, nystagmus, divergent/convergent squint
o Start with left lateral gaze – ask about nystagmus + diplopia (ask which is outer image, obscure both eyes – eyes > loss of outer image is pathological)
o INO: medial longitudinal fasciculus = communication between III and VI (failure of ADDuction with contralateral nystagmus)

**Face:** V, VII

- **Trigeminal (V):**
  - **Motor:**
    - Inspect for masseter and temporalis wasting then ask to clench teeth to test power
    - Ask pt to open jaw and keep it open against resistance to test pterygoid power – look for jaw deviation towards side of lesion
  - **Sensory:** ophthalmic (V1), maxillary (V2), mandibular (V3)
  - **Reflexes**
    - Corneal (afferent V1, efferent CN VII) – very rare to do
    - Jaw-jerk (afferent V3, efferent motor CN V) – useful for bulbar vs. pseudobulbary palsy
      - Supranuclear (pseudobulbar) > exaggerated jerk

- **Facial (VII):** look for parotid surgery
  - **Motor:** muscles of facial expression
  - **Sensory:**
    - Change in sense of taste (anterior 2/3rds tongue)
    - Hyperacusis (increased sensitivity to noise) due to LMN loss of innervation to the muscle of the stapedius
  - **UMN:** ospares forehead due to bihemispheric innervation
  - **LMN:** Bell’s palsy, Ramsay-Hunt syndrome

**Ears:** VII (vestibulocochlear)

- Do you wear hearing aids and have noticed any change in your hearing?
- Free hearing: Whisper a number in each of the patient’s ears in turn + ask them to repeat it – from behind so they cannot lip-read
- Rinne/Weber test (512Hz tuning fork)
  - Rinne’s tests conduction pathway: bone > air = conductive hearing loss
  - Weber’s tests for sensorineural hearing loss
    - Equal: cochlear is same (normal or bilateral sensorineural hearing loss)
    - Right: conductive R, sensorineural L side (sound lateralises to better hearing cochlear)
    - Left: conductive L, sensorineural R side
- Otoscopy & audiometry to formally assess hearing loss
- **Balance:** Rhomberg’s
  - Marching > rotation towards side of lesion

**Mouth:** IX, X, XII

- Inspection: PEG or NG
- **Glossopharyngeal (IX):** ask to swallow
- **Vagus (X):** Assess speech quality and volume for hoarseness and quietness
- **Hypoglossal (XII):** fasciculations, wasting stick out tongue (deviates towards lesion) + check tongue power

**Neck:** XI (spinal accessory) – should examine with the shoulders exposed

- Supplies the sternocleidomastoid and trapezius
- **Inspect:** asymmetry, wasting, fasciculations
- **Trapezius:** shrug shoulders
- **Sternocleidomastoid:** turn head against my hand

**Limb motor examination**

- Motor structures: cerebral cortex > pyramidal decussation > spinal cord > anterior horn cell > nerve > NMJ > muscle
- **UMN** (from precentral gyrus > anterior horn cell): Spasticity, pyramidal weakness, increased reflexes, no wasting, no fasciculations, Hoffman’s sign
- **LMN** (nerve and NMJ): Decreased tone, weakness and atrophy, areflexia, fasciculations
- **MND:** combination of UMN and LMN signs in all four limbs with no sensory signs
Upper limb

- Inspection: SWIFT
  - Scars
  - Wasting
  - Involuntary
  - Fasciculations
  - Tremor

- Tone:
  - Lead pipe/clasp knife rigidity: elbow flexion/extension
  - Cogwheel: wrist flexion/extension
  - Pronator catch: wrist pronation/supination

- Power:
  - Shoulder abduction/adduction
  - Elbow flexion/extension
  - Wrist and finger extension
  - Hand
    - Grip
    - Interossei
      - Dorsal: spread your fingers (DAB)
      - Palmar: hold this paper between your fingers (PAD)

- Nerves of the hand:
  - Ask the patient to place their hands palm up with their thumb in line with the index finger (3rd finger is fulcrum)
    - Median nerve: abductor pollicis brevis (lift your thumb to my ginger)
    - Ulnar: adductor pollicis (thumb across palm)
    - Radial: extensor pollicis (hitchhike)

- Coordination:
  - Pronator drift = marker of corticospinal destruction
  - Rebound (++ bouncing)
  - Finger to nose test: pass pointing and intention tremor (depth is more important than different locations)
  - Dysdiadokokinesia (rapidly alternating movements)

- Reflexes:
  - Biceps C5,6
  - Supinator C5,6,7
  - Triceps C6,7,8
  - Finger flexors
  - Jendrassik (reinforcement)
  - Hoffman’s sign: flick distal phalanges, and look for twitching of the thumb

Lower limb

- Gait
- Clonus: may present bilaterally in MS
- Power: don't forget eversion and inversion

- Reflexes:
  - Knee (L2-L4)
  - Ankle (S1)
  - Plantar response: extensor (UMN) or plantar (normal/LMN)
    - Look for the first movement of the big toe

- Bony deformities: Pes Cavus (flexion + high arch)
  - Charcot-Marie-Tooth
  - Friedrich’s Ataxia
Sensory

- Dermatomes
  - C2 back of head
  - C4 shoulder
  - C5 deltoid
  - C6 thumb
  - C7 3rd finger
  - C8 medial forearm
  - T4 level of nipple
  - T10 level of umbilicus
  - L2 hip
  - L3 medial knee
  - L4 medial foot
  - L5 big toe
  - S1 little toe

- Sensory problems may be: cerebral cortex, thalamic nucleus, spinal cord neuron, DRG, peripheral nerve, pain receptor
- Dorsal columns: JPS and vibration sense – start distal > proximal
  - Decussates at medulla level
  - Signals from the upper limb travel in the fasciculus cuneatus (the lateral part of the DC). They then synapse in the cuneate nucleus of the medulla
  - Signals from the lower limb travel in the fasciculus gracilis (the medial part of the dorsal column). They then synapse in the gracile nucleus of the medulla oblongata.
- Spinothalamic: pain and temperature
  - Decussates at spinal level
- Romberg’s sign: vision, posterior columns, vestibular syndrome

Extra pyramidal examination

- Rigidity, bradykinesia, tremor
- Gait: festinate gait with small steps and turning en-bloc and reduced arm swing
- Mask like face (hypomimia)
- Hypophonic (quiet voice)
- Tremor resting 4-6Hz
- Lead pipe (elbow) + cog-wheeling (wrist)
- Bradykinesia (open and close fingers), synkinesia, micrographia
- Tap foot (Extinction of movement)
- Dyskinesia (on and off)

Cerebellar syndrome examination

- Gait (broad based gait)
- Heel to toe walk (don’t make them fall)
- Romberg’s negative
- DANISH:
  - Dysdiadochokinesis
  - Ataxia
  - Nystagmus
  - Intention tremor
  - Scanning dysarthria
  - Heel-shin test positivity
Common cases

**Median nerve palsy**
- Sensory loss to lateral border of the hand
- Loss of LOAF muscles:
  - Lateral 2 lumbricals
  - Opponens pollicis
  - Abductor pollicis brevis
  - Flexor pollicis brevis
- Wasting of thenar eminence
- Look for carpal tunnel syndrome (30s hold)
  - Phalen’s
  - Tinel’s
- Causes of CTS: RA, acromegaly, hypoT4

**Ulnar nerve palsy**
- Caused by injury at the elbow
- Claw hand - 4th/5th finger
  - Ulnar paradox: less “claw” if more proximal ulnar lesion
- Hypothenar eminence wasting
- Weakness of muscles (finger abduction, thumb adduction)
- Sensory loss of ulnar border of the hand

**Radial nerve palsy**
- Sensory loss on dorsum of hand
- Weakness of wrist extension, finger extension > wrist drop
- Causes: humerus #, prolonges pressure, lipoma, fibroma, systemic causes of a mono-neuritis multiplex

**Myotonic dystrophy** (often on short case)
- Examination:
  - Face: myopathic macies, frontal balding, cataracts, reduced power
  - Wasting of neck and distal arms, distal weakness. Absent reflexes
- Inheritance: trinucleotide repeat, autosomal dominant
- Special tests
  - Percussion myotonia: percuss thenar eminence > slow opposing movements of the thumb
  - Hand grip: hold posturing therefore unable to let go
- Conclude examination:
  - Cognitive assessment
  - Cardiovascular system: associated with cardiomyopathy (look for recent pacemaker)
  - Urine dip for glucose: association with diabetes
- Investigations:
  - Serum CK, EMG
  - ECG and Echo – look for cardiomyopathy or conduction block
  - FBG or HbA1C – Diabetes
  - Ophthalmology RV – cataracts
  - Formal cognitive assessment

**Myasthenia Gravis**
- AI disease, IgG Abs block ACh receptor on postsynaptic membrane of NMJ
- Fluctuating weakness, worsens with activity, and ocular weakness, causing ptosis and diplopia
- In 15% of patients, life-threatening respiratory weakness can occur, called myasthenic crisis
- Ix. Clinical history, neuro exam, EMG studies, AChR antibodies
- Management:
  - Immunosuppression: prednisolone, azathioprine, mycophenolate mofetil
  - Evidence of thymoma: thymectomy
  - Myaesthenic crisis: plasmapharesis or IVIG
Stroke
• Spasticity: initial resistance to passive movement followed by sudden “give” with continued pressure
  o Mainly affects antigravity muscles, i.e. flexors in upper limbs and extensors in lower limbs
• Causes:
  o Elderly:
    ▪ Vascular event, i.e. thrombotic, embolic, haemorrhagic
    ▪ Subdural haematoma
    ▪ Other: tumour, tertiary syphilis
  o Young: trauma, tumour, MS, embolism

Spastic paraparesis
• CP: Difficulty walking, Hypertonia, clonus, hyperreflexia, up-going plantars, weakness/wasting, NO fasciculations
• Clues
  o Cerebellar signs: Friedrich’s ataxia
  o Post polio-syndrome: obvious distal muscle wasting, bony deformity
  o MS: eye signs
• History:
  o Causes: onset + progression of symptoms, trauma, back pain (?prolapse), risk factors for vit B12, FLAWS for malignancy > metastases
  o Complications: incontinence (concern re cauda equine)
  o Functional: ADL
• Causes:
  o Structural: Traumatic cord injury, spinal cord compression
  o Inflammatory: MS
  o Congenital: cerebral palsy
  o Vascular: atherosclerotic disease of spinal arteries
  o Infective: taboparesis (tertiary syphilis)
  o Intracranial: parasagittal meningioma
  o Other: MND, metastatic disease, subacute combined degeneration of the cord (SACD)
• Investigations:
  o Bloods: FBC (infection ?compressive abscess, inflammatory ?MS), B12 levels (SACD)
  o Spinal XR/CT – bony mets, compressive fractures
  o MRI spine – identify compressive cord lesions

Peripheral neuropathy
<table>
<thead>
<tr>
<th>Diabetic sensorimotor polyneuropathy:</th>
<th>Charcot Marie Tooth: Male pt difficulty walking, father is also a sufferer. Motor and sensory com</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Predominantly sensory</td>
<td>• Distal wasting</td>
</tr>
<tr>
<td>• Predominately feet</td>
<td>• Mixed motor and sensory polyneuropathy, mainly peripheral</td>
</tr>
<tr>
<td>• Reduced pain, temp, vibration and JPS</td>
<td>• Pes Cavus, “inverted champagne bottle legs”</td>
</tr>
<tr>
<td>• Reduced reflexes</td>
<td>• High stepping gait, scoliosis</td>
</tr>
<tr>
<td>• Ulcers or Charcot joints</td>
<td>• Inheritance: AD, commonest genetic neurological disease</td>
</tr>
<tr>
<td>• Neurogenic pain/allodynia</td>
<td></td>
</tr>
<tr>
<td>• Wasting only occurs if severe</td>
<td></td>
</tr>
</tbody>
</table>
Otorhinolaryngology (ENT) for Finals

Common investigations

• **Audiometry:** used to quantify hearing loss and determine its nature
  - Pure tone audiometry: headphones deliver tones at different frequencies and strengths in a sound-proofed room. Pt indicates when sound appears and disappears. Mastoid vibrator >> bone conduction threshold. Threshold at different frequencies are plotted to give an audiogram
• **Tympanometry:** measures the stiffness of ear drum >> evaluate middle ear function. May be flat to look for fluid or perforation, or shifted to determine the mid-ear pressure
• **Evoked response audiometry:** used for neonatal screening

Otological problems

**Adult hearing loss**

- Conductive: impaired conduction anywhere between auricle and round window
  - External canal obstruction: wax, pus, foreign body
  - TM perforation: trauma, infection
  - Ossicle defects: otosclerosis, infection, trauma
  - Inadequate Eustachian tube ventilation of middle ear
- Sensorineural: defects of cochlea, cochlear N or brain
  - Drugs: aminoglycosides, vancomycin
  - Post-infective: meningitis, measles, mumps, Herpes
  - Misc: Meniere’s, trauma, MS, BPA lesion, reduced B12
- Acoustic neuroma/vestibular schwannoma: benign slow-growing tumour of superior vestibular N > CPA syndrome
  - CP: slow onset unilateral SNHL, tinnitus +/- vertigo, headache, CN V, VII and VIII palsies
  - Ix. MRI
  - Rx. Gamma knife
- Otosclerosis: AD condition characterised by fixation of the stapes at the oval window
  - Bilateral conductive deafness + tinnitus, begins in early life, improved in noisy places, worsened by pregnancy/menstruation
  - Mx: hearing aid or stapes implant
- Presbyacussis: age-related hearing loss
  - Rx. Hearing aid

**Childhood hearing loss**

- Universal neonatal hearing tests: detection and Mx of hearing loss before 6mo improves language
  - Otoacoustic emissions
  - Audiological brainstem responses
- Congenital:
  - Conductive: anomalies of pinna, external auditory canal/TM/ossicles, congenital cholesteatoma
  - Sensorineural:
    - Waardenburgs (AD): SNHL, heterochromia + telecanthus
    - Alport’s (AR, X-linked): SNHL + haematuria
    - Jewell-Lange-Nielsen: SNHL + long QT
    - Infections: CMV, rubella, HSV, toxo, GBS
- Perinatal: anoxia, cerebral palsy, kernicterus, meningitis
- Acquired: glue ear, meningitis, measles, head injury
Vertigo: illusion of movement
- Causes:
  - Vestibular: Meniere’s, benign paroxysmal, labyrinthitis
  - Central: acoustic neuroma, MS, stroke, head injury
  - Drugs: gentamycin, loop diuretics, metronidazole, co-trimoxazole
- Examination and tests:
  - Hearing
  - Cranial nerves
  - Cerebellum and gait
  - Romberg’s
  - Hallpike manoeuvre
  - Audiometry, calorimetry, LP, MRI
- Meniere’s disease: dilatation of endolymph spaces of membranous labyrinth
  - CP: cluster attacks up to 12h, vertigo, N&V, tinnitus, aural fullness
  - Mx:
    - Medical: cyclizine, betahistine
    - Surgical: gentamycin instillation via grommets
- Viral labyrinthitis: follows febrile illness, sudden vomiting, ++ vertigo exacerbated by head movement
  - Rx. Cyclizine
- Benign positional vertigo: displacement of otoliths in semicircular canals (common after head injury)
  - Sudden rotational vertigo for <30s, nystagmus
  - Dix-Hallpike manoeuvre (diagnosis)
    - Fold arms, turn head 45 deg towards you, then lower backwards so 20deg behind crouch + observe for 20-30s for nystagmus
    - Explain need for keeping eyes open
    - Repeat in left and right lateral – asymptomatic side first
  - Epley manoeuvre (treatment)
    - Start with Dix-Hallpike manoeuvre + hold until nystagmus disappears
    - Turn head to other direction, slowly roll onto that direction + rotate head a further 90 degrees
      - Sit the patient up and bring the chin to the chest

Tinnitus: sensation of sound without external sound stimulation
- Causes:
  - Specific: Meniere’s, acoustic neuroma, otosclerosis, noise-induced, head injury
  - General: HTN, anaemia
  - Drugs: aspirin, aminoglycosides, loop diuretics, EtOH
- History of vertigo + deafness: Meniere’s, acoustic neuroma (unilateral)
- Lx. Audiometry, tympanogram, MRI if unilateral
- Psych support + hypnotics

Otitis externa
- Otitis externa
  - CP: watery discharge, itch, pain and tragal tenderness
  - Ax: Moisture, trauma, absence of wax, hearing aid
  - Organisms: mainly pseudomonas, staph aureus
  - Mx: betamethasone (for non-infected), with neomycin, or hydrocortisone
- Malignant otitis externa: immunocompromised pt, presenting with ++ otalgia which is worse at night, copious otorrhoea and granulation tissue in the canal. Risk of skull osteomyelitis
  - Mx: surgical debridgement + systemic Abx
- Bullous myringitis: concurrent influenza, painful haemorrhagic blisters on deep meatal skin
• TMJ dysfunction: pain, joint clicking/popping, teeth grinding
  o OE: joint tenderness exacerbated by lateral movements of an open jaw
  o Mx: MRI > NSAIDs > stabilising orthodontic occlusal prostheses
• Otitis media:
  o Classification:
    ▪ Acute >> Paracetamol + delayed Amoxicillin
    ▪ Glue ear: effusion after symptom regression >> consider grommets if persistent hearing loss
    ▪ Chronic: effusion > 3mo if bilat, or >6mo if unilat
    ▪ Chronic suppurative: painless discharge with hearing loss and evidence of perforation >> aural toilet, Abx drops
      • Complication: cholesteatoma
  o Ax: pneumococcus, haemophilus
  o Complications:
    ▪ Intratemporal: glue ear, perforation, mastoiditis, facial N palsy
    ▪ Intracranial: meningitis, brain abscess, sup/epidural abscess
    ▪ Systemic: bacteraemia, septic arthritis, IE
• Mastoiditis: fever, mastoid tenderness, protruding auricle
  o Middle ear inflammation > destruction of mastoid air cells and abscess formation
  o Mx: CT > IV Abx, myringotomy +/- mastoidectomy
• Cholestatoma: locally destructive expansion of stratified squamous epithelium within the middle ear >> foul smelling white discharge, headache, CN involvement. Mx: surgery

Rhinological problems

Allergic Rhinosinusitis: IgE mediated inflammatory response from allergen exposure
• Seasonal (hayfever) or perrenail
• Sx: sneezing, pruritis, rhinorrhoea, with swollen, pale and boggy turbinates
• Mx: allergen avoidance, anti-hitamines (cetirizine), beclometasone nasal spray, intramasal steroinds.
  Adjuvants include pseudoephedrine, otrivine
  o 4th line: immunotherapy

Sinusitis: pain on bending/straining, discharge, nasal obstruction
• Ax: viruses (pneumococcus, haemophilus) > mucosal oedema and reduced mucosal ciliary actions > retention and secondary bacterial infection (S. aureus)
• Ix: Nasendoscopy +/- CT
• Mx:
  o Acute 1st episode: decongestants, douching and topical steroids
  o Chronic/recurrent: fluticasone nasal spray, functional endoscopic sinus surgery
• Complications: mucoceles, orbital cellulitis, osteomyelitis, intracranial infection

Nasal polyps typically affects males >40yrs
• Sx: watery, anterior rhinorrhoea, purulent post-nasal drip, nasal obstruction, sinusitis, headaches
• Single unilateral polyp mat be a sign of rare but sinister pathology, e.g. nasopharyngeal Ca, neuroblastoma
• In children, consider neoplasms and cystic fibrosis

Fractured nose
• Consider facial #, check for teeth malocclusion and ploplopia (orbital floor #)
• Mx: exclude septal haematoma (boggy swelling and nasal obstruction), re-examine after 1 week, reduction under GA with post-op splinting best within 2 weeks
Epistaxis
- Ax: 80% unknown, trauma, local infection, pyogenic granuloma, Osler-Weber-Rendu, coagulopathy
- Initial Mx: assess for shock, if not shocked sit up, head down + compress nasal cartilage for 15 mins.
- Anterior (usually in Little’s area): insert gauze in vasoconstrictor + 2% lignocaine for 5 mins >> cauterise with silver nitrate sticks >> Mericel pack
- Posterior/major: 18G folie catheter into nasopharynx, inflate with 10ml and pull forward until lodges >> admit + leave for 48hrs
- Osler-Weber-Rendu/HHT: ADD
  - Telangiectasia in mucosae
  - Internal telangiectasia + AVM
  - Rarely: pulmonary HTN, colon polyps

Laryngological problems

Tonsillitis
- Sx: sore throat, fever, malaise, lymphadenopathy, inflamed tonsils and oropharynx, exudates
- Organisms: viruses (e.g. EBV), GrA strep (pyogens), staphs
- Mx: analgesia
- Centor criteria for Abs: 2 >> consider rapid Ag test + Rx if +ve, >3 >> Abx (1 point for each)
  - Hx of fever
  - Tonsilar exudates
  - Tender anterior cervical adenopathy
  - No cough
- Tonsillectomy:
  - Indications: airway obstruction, quinsy, suspicion of Ca, or recurrent tonsillitis if all criteria met:
    - Tonsilitis Ax
    - 5+ episodes/yr
    - Sx for >1yr
    - Episodes are disabling and prevent normal functioning
  - Methods: cold steel or cautery
  - Complications: reactive haemorrhage, damage to teeth, TMJ or posterior pharyngeal wall

Strep throat complications
- Peritonsillar abscess (Quinsy): adults, ++ halitosis, odynophagia, unilateral tonsillar enlargement with contralateral uvula displacement
  - Rx. Admit, IV Abx, incision and drainage under GA
- Retropharyngeal abscess: unwell child with stiff extended neck who refuses to eat or drink, unilateral swelling. Fails to improve with oral Abx
  - Rx. Lateral XR, CT skull base – diaphragm
  - Mx: IV abx, incision and drainage
- Lemierre’s syndrome: IJV thrombophlebitis with septic embolization most commonly affecting the lungs. Rx. IV Pen G, clindamycin, metronidazole
- Scarlet fever: sandpaper rash on chest, axilla or behind ears, strawberry tongue. Rx: start Pen V and notify HPA
- Rheumatic fever: carditis, arthritis, subcutaneous nodules, erythema marginatum, Sydenham’s chorea
- Post-strep glomerulonephritis: malaise and smoky urine 1-2wks after a pharyngitis
The larynx

- Functions: phonation, respiration, prevention of aspiration
- Laryngitis: usually viral and self-limiting
  - Pain, hoarseness and fever
  - Rx: supportive, pen V if 2nd bacterial infection
- Laryngeal papilloma: pedunculated vocal cord swellings caused by HPV, presents with hoarseness in children
- Recurrent laryngeal nerve palsy
  - Nerve supplies all intrinsic muscles of the larynx except for the cricothyroidus
  - Sx: hoarseness, bovine cough, repeatedly coughing from aspiration, exertional dyspnoea
  - Ax: 30% cancers, 25% iatrogenic, bukbar/pseudobulbar palsy
- Laryngeal SCC
  - Male smoker, progressive hoarseness and dysphagia, wt loss
  - Ix: laryngoscopy, biopsy, MRI staging
  - Mx: laryngectomy > permanent tracheostomy

Common paediatric problems

- Glue ear
- Recurrent tonsillitis
- Airway issues
  - Laryngomalacia: immature and floppy aryepiglottic folds and glottis >> laryngeal collapse on inspiration
    - PC: stridor within first weeks of life, worst on lying, feeding.
  - Epiglottitis: sudden onset continuous drooling, stridor
    - Ax: haemophilus, group A strep
    - Rx. Consult anaesthetists and ENT surgeons, O2 + nebulised adrenaline, IV dexamethasone, cefotaxime
  - Foreign body: sudden onset stridor in a previously normal child
    - Rx. Back slaps and abdominal strusts, needle cricothyrotomy
  - Subglottic stenosis: stridor, FTT
    - Ax: prolonged intubation, congenital abnormalities
    - Rx: conservative, tracheostomy, partial tracheal resection
Facial palsy

Bell’s palsy: inflammatory oedema from entrapment of CNVII in narrow facial canal, probably of viral origin (HSV1)
- PC: sudden onset complete unilateral facial weakness, ageusia, hyperacusis
- Ix: serology, MRI, LP
- Mx: protect eye, give prednisolone within 72hrs, 60mg/d PO for 5-7d
- Complications: synkinesis, crocodile tears

Ramsay Hunt Syndrome: reactivation of VZV in geniculate ganglion of CNVII
- PC: preceding ear pain, vesicular rash in auditory canal +/- pinna, tongue, ipsilateral facial weakness, hyperacusis
- Mx: if Dx suspected give valaciclovir and prednisolone
- Prognosis: 75% recovery within 72hr

Other causes:
- Intracranial lesions:
  - Vascular: MS, SOL
  - Cerebello-pontine angle lesion (CN V, VI, VIII palsies)
- Intratemporal lesions: Otitis media, Cholesteatoma, Ramsay Hunt
- Infratemporal: Parotid tumours, Trauma
- Systemic
  - Peripheral neuropathy
    - Demyelinating: GBS
    - Axonal: DM, lyme, HIV, sarcoid
  - Pseudopalsy: MG, botulism
Ophtalmology for Finals  Prof Meeran, Dr Mirza

The examiner might instruct you to do only one of these: normally, you always check the acuity first – examiner may not want you to but don’t be put off

1. Introduce
2. Inspect – proptosis, exophthalmos, enophthalmos, ptosis, asymmetry, eye position, facial droop, scars
3. Visual acuity (CN II) – make sure they are not blind, or have a glass eye
   a. Snellen chart: Top number = distance pt is standing (6m > 3m > 1m > finger counting > hand movement > light). Bottom number = what a normal person can read
   b. LogMAR (Log minimal angle of resolution) = log scale used for research
4. Visual fields – typically stroke or pituitary patients
5. Eye movements (CN III, IV, VI)
6. Accomodation = swelling of the lens to increase focus
7. Red reflex
   a. Absent/white = cataracts
   b. Leukochoria = single red eye = retinoblastoma
8. Direct + consensual reflex
   a. Direct = CN II (optic)
   b. Consensual = CN III (occulomotor)
9. RAPD: afferent drive from bad eye < efferent drive from good eye >>> dilation of bad eye when good eye returns to darkness
   a. INO (MS) can also present with failure of Abducting bad eye with nystagmus of ADDucting healthy eye
10. Anterior exam: lid, conjunctivae, cornea, sclera, iris (pigment, shape), pupils
11. Posterior exam (Fundus)
   a. Cup (pale? >1/3 size of disc = cupped, e.g. glaucoma ratio > 0.6)
   b. Disc margin (well defined? Swelling, e.g. papilloedema = bilateral due to raised ICP)
   c. Vessels: fat = vein, thin = artery

Common short cases

Ptosis
- Sign: drooping of eyelid
- Causes:
  o Unilateral: Horner’s syndrome, 3rd nerve palsy, myasthenia
  o Bilateral: Dystrophic myotonia, Myasthenia Gravis, bilateral Horner’s
- Is the pupil small, large or normal?
  o Small: Horner’s syndrome (+ anyhydrosis)
  o Large: surgical 3rd nerve
  o Normal
- Horner’s syndrome: ptosis, miosis, anhydrosis +/- enophthalmos (posterior displacement of eye) = damage to sympathetic chain
  o Ask about respiratory problems, trauma to carotid sheath, previous stroke (same side as lesion)

Third nerve palsy: pupil down and out
- May have complete ptosis – ask pt to open their eye and then check eye movements SLOWLY (asking about double vision – “how many fingers can you see?”)
- Eye movements: if the pt develops double vision while you are checking their eye movements, then you can check which eye is weaker by covering each eye in turn. The weak eye ALWAYS sees the outer image
- Signs
  o Left eye is in a fixed in a down and out position
  o There is ptosis of the left eyelid
  o The pupil may/may not be dilated
Causes: PHD
- PCA aneurysm (painful)
- Hypertension
- Diabetes
  - (+ MS, trauma, bleed, tumour)

Key question: is it painful (back of eye/headache)? >> PCA = neurosurgical emergency

What two things would you like to measure? Blood pressure and blood mannose

Does the pupil dilate early or late in a 3rd nerve palsy? Depends on whether a surgical or medical
- Surgical >> compression of external parasympathetic fibres
- Medical >> damage is on the inside
- Ix. May be a space occupying lesion > Imaging (Acute >> CT head, Chronic >> MR head)
- If not pupil sparing (surgical), think about PCA aneurysm –

Sixth nerve palsy:
- Sign: failure of ABduction on side of lesion
  - Horizontal diplopia worse looking on the side of the lesion
- Causes:
  - Hypertension
  - Diabetes
  - Multiple Sclerosis
  - Raised ICP
- What are the signs of a raised ICP?
  - Reduced GCS
  - Cushing’s triad:
    - hypertension (increased SBP + widened pulse pressure)
    - bradycardia
    - abnormal respiration
  - Ocular palsies (3rd and 6th particularly)
    - Eye signs: early loss of retinal vein pulsations = papilloedema
- Why is the 6th nerve so frequently affected in raised ICP? Longest intracranial course
  - Where does it get pinched? Petrous temporal bone
- Which is the longest cranial nerve in the body? Vagus
  - Where does the vagus terminate? 2/3 way along the transverse colon

Complex opthalmoplegia = mixture of nerves involved > physical restriction of eye movements
- Ax. Graves disease (most common, even of unilateral), myaesthaenia gravis (intermittent), retro-orbital tumour, Miller-Fisher syndrome (orbital Guillain-Barre)

Common visual problems
- Myopia (short-sighted = difficulty with distance) – light forms an object BEFORE it reaches the retina. This is because the eye is too long, or the cornea/lens is too strong.
  - Rx. Concave lens (minus powered) in front of a myopic eye, moving the image back to the retina
- Hypermetropia (long-sighted = difficulty with near)
  - Rx. Convex (plus powered) lens in front of a hypermetropic eye, moving the image forward
- Amblyopia: blurred vision in squint eye despite cover test (if poor squint not corrected by 1yr) – not correctable by pinpoint as macula is not developed
Cover test

- Squint (strabismus) >> Midline cover test
  - Monocular heterophoria (tendency squint vs. heterotropia = constant squint) is the only useful squint for finals – you can see this when asking them to look at you covering the “good” eye
  - Double vision while you are checking their eye movements, then you can check which eye is weaker by covering each eye in turn. The weak eye ALWAYS sees the outer image

Alternate cover test: determine magnitude of squint

Visual field defects

- Homonymous hemianopia: CVA, stroke
- Bitemporal: pituitary tumour (commonest is non-functioning macroadenoma, otherwise think Acromegaly)
  - Ix. MRI pituitary, cortisol (need to give hydrocortisone before surgery), prolactin (if ++++ pre-surgery > cabergoline better Mx option), TFTs
- Unilateral hemianopia: optic nerve damage or small pituitary tumour

Why have we evolved with the right side of the brain controlling the left side of the body? Threat on right side of body, retina on left side of the brain picks up first > defend ourselves to push threat away
**Fundoscopy**

**TOP TIP:** Look at COLOURS
- **Red** = vein occlusion, flame-shaped haemorrhages (superficial, along nerve fibres), dot haemorrhages (deeper) – Ax. HTN, DM
- **Yellow** = drusen spots (macular degeneration), exudates (HTN, DM)
- **White** = cotton wool spots = localised ischaemia > interruption of axoplasmic flow
- **Black** = pigement, melanoma, panphotocoagulation

**Normal retina**

**Diabetic retinopathy:** Tell the patient the DM is affecting their eyes, so is likely to be affecting the rest of your body. Better control > fewer complications. Can eat what you like in moderation, but need to control with drugs to bring blood sugar.
- **Risks:** loss of vision, heart, renal, stroke (RED flags)

**Background:** hard exudates, microaneuysms (dot + blot haemorrhages) – MOST COMMON IN EXAM
- Hard exudates at the macula > maculopathy = site threatening (need laser therapy)

**Pre-proliferative:** cotton wool spots (retinal ischaemia)
- Ischaemia > lactate > New vessel growth is good for ischaemia in legs, but BAD for eyes (risk of bleeding).
- Rx. Pan retinal photocoagulation in both eyes (prevent bleeding in 1yr > vitrectomy + high risk blindness)

**Management:** aim = gradual reduction in HbA1C to 6.5-7%

**Conservative:** tight BP, lipid and glycaemic control reduces the progression and severity of DR regardless of therapy >> statins
- **Diabetic Rx:** diet + exercise > metformin > metformin MR (less GI side effects) > gliclazide (increases appetite > wt gain) or gliptins or pioglitazone

**Screening**
- Annual digital photography for all diabetic patients
- R2 disease > 10wk referral to ophthalmology
- M1 disease > 2wk referral to ophthalmology for fundus fluoresceine angiogram (to determine whether ischaemic)
• Anti-VEGF
• Panretinal photocoagulation for proliferative: Pan-retinal photocoagulation: old lasers give black scars, new ones give white scars. Macula is spared to maintain central vision.
• Macular laser
• Vitrectomy (to relieve retinal traction and treat diffuse macular oedema)

Other cases
Retinitis pigmentosa: peripheral pigmented lesions, spicular pattern. Look for white stick >> think of checking visual acuity
• Heritable
• Refer for specialist opinion
• Many genetic syndromes, e.g. usher’s syndrome with deafness (recessive), Refsum’s disease (Chelsea & Westminster = UK clinic = failure to metabolise phytanic acid)

Hypertensive retinopathy

<table>
<thead>
<tr>
<th>Grade</th>
<th>Stage</th>
<th>Ophthalmoscopic signs</th>
<th>Systemic associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mild retinopathy</td>
<td>One or more of the following arteriolar signs:</td>
<td>Modest association (risk and odd ratios of &gt;1 but &lt;2) with risk of clinical stroke, subclinical stroke, coronary heart disease and mortality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Generalised arteriolar narrowing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focal arteriolar narrowing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arteriovenous nicking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arteriolar wall opacity (silver wiring)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Moderate retinopathy</td>
<td>One or more of the following arteriolar signs:</td>
<td>Strong association (risk and odds ratios of &gt;2) with risk of clinical stroke, subclinical stroke, cognitive decline and cardiovascular mortality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Haemorrhage (blot, dot or flame shaped)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Microaneurysm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cottonwool spot</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard exudates</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malignant retinopathy</td>
<td>Moderate retinopathy plus optic disc swelling</td>
<td>Strong association with mortality</td>
</tr>
</tbody>
</table>

Think of causes of HTN: urine for catecholamines, aldosterone level (+ Mx)
Cataracts

- Definition: opacity of the lens of the eye, which occurs when fluid gathers between the lens fibres. The refractive index alters and causes light scatter with resulting blurred vision.
- Classified according to the part of the lens that is opacified (think peanut M&M: coloured coating = capsule, chocolate = cortex, peanut = nucleus). All will show a reduced red reflex
  - Posterior subcapsular (coloured coating = capsule)
  - Cortical (chocolate = cortex) >> black spoke-like shadows coming from the edge of the red reflex
  - Nuclear sclerotic (peanut = nucleus) >> central black shadow
- Risk factors:
  - Old age
  - Systemic illness: DM, myotonic dystrophy, Wilson’s disease
  - Ocular illness: inflammatory eye disease, previous surgery
  - Trauma
  - Congenital: metabolic disorders
  - Drug history: steroids, amioderone, phenothiazines
- Indications for surgery
  - Refractory myopia > reduced best-corrected visual acuity <6/9
  - Monocular diplopia
  - Glare in sunshine or care lights
  - Clouding of vision
  - Diabetes
- Biometry: US measurement of the length of the eye, keratometry to measure the curvature of the cornea. Enables surgeon to decide which strength of lens should be implanted and where on the cornea the incision should be made
- Anaesthetics:
  - Topical proxumethocaine – full kinesis of extraocular muscles
  - Subtenons = dissect through the conjunctiva and Tenon’s capsule inferomedially. Use a blunt cannula to administer 2ml of lidocaine
  - Peribulbar = 5-10ml lidocaine via skin/conjunctiva into orbit
  - Sedation/GA rarely used
- Surgical technique: phacoemulsification and intraocular lenses
  - Incision in your cornea
  - Lens and capsule are separated by hydrodissection
  - Phacoemulsification of lens by US
  - Removal of liquefied affected lens
  - Replacement with soft, foldable IOL into remaining capsule (usually set to be emmetropic for distance and need glasses to read)
- Post-operative care:
  - Clear protective shield
  - Steroid + Abx topical QDS for 2-4 weeks
  - Glasses can be prescribed from 6 weeks after surgery
- Complications:
  - Acute: Endophthalmitis (intraocular infection of whole eye, most commonly by Staph epidermidis)
    - Sx. Severe pain, loss of vision, injected conjunctiva, intense inflammation and fibrin plaque
  - Subacute: postoperative cystoid macular oedema or Irvine-Gass syndrome (6 weeks)
    - Sx. Sudden distortion in vision
    - Rx. Topical steroids, NSAIDs, CAI
  - Chronic:
    - Posterior capsular opacification (“after cataract”)
    - Rhegmatogenous retinal detachment (PC tear)
    - Bullous keratopathy (cornea decompensation > cloudy + painful bullae)
Endocrinology & Thyroid Short Cases

Thyroid disease

- Hyperthyroidism:
  - Increased hormone:
    - Graves
    - Toxic adenoma
    - Toxic multinodular goitre
  - Gland inflammation:
    - All other

- Hypothyroidism:
  - Primary thyroid failure
    - AI Hashimoto’s thyroiditis
    - Idiopathic atrophy
    - Previous radioiodine Rx or thyroidectomy
    - Iodine deficiency
    - Anti-thyroid drugs
    - Subacute and postpartum thyroiditis (transient)
    - Infiltrative conditions: systemic sclerosis, sarcoidosis
  - Secondary thyroid failure
    - Hypothalamic
    - Pituitary

- Examination
  - Introduce/questions: temperature preference, weight, appropriately dressed, thin/overweight, voice sound normal
  - Inspection: eyes, goitre, composure, shins
  - Hands: out-stretched hands, palmar sweating, nails, acropatchy, pulse, onycholysis
  - BP
  - Face: peaches + cream complexion, course/straw hair, fine/thinning hair, dull facial express, loss of outer 1/3 eyebrow
  - Eyes: lid retraction, exophthalmos, lid lag, extra-ocular movements
  - Thyroid: inspect, palpate, auscultate
    - Regional lymph nodes
    - Percussion for retrosternal goitre
  - Periphery: pretibial myxedema, proximal myopathy, ankle reflexes

Case 1. 36yo F with palpitations. fT4 40 (11-25), fT3 28 (3-6), TSH <0.02 (0.35-4.5)
- What is the biochemical diagnosis? Hyperthyroidism
- Sx. Increased appetite with wt loss, anxiety, oligomenorrhoea, gritty eyes
- Signs. Sinus tachycardia, sweaty palms, fine tremor, fidgety, lid lag, smooth diffuse goitre
- DDx.
  - Graves’ disease: smooth goitre, gritty eyes
  - De Quervain’s thyroiditis: smooth goitre
  - Multinodular goitre: smooth on examination
  - Toxic nodule: but expect a discrete nodule rather than a smooth goitre

- Thyrotoxicosis:
  - Sweaty palms, fine tremor
  - Fidgety
  - Reproductive: oligo/amenorrhoea
  - Metabolic: increased appetite, wt loss
  - Eye signs (NOT specific to Graves’): Levator palpabrae has a smooth muscle component.
  - Hyperthyroidism > increased adrenergic sensitivity >>
    - Lid retraction (upper sclera visible) = Dalrymple’s sign
    - Lid lag: upper eyelid doesn’t keep pace with the eyeball when following examiner’s finger down, leaving the upper sclera visible
• Graves’ disease: anti-TSH receptor antibody
  o Periorbital oedema
  o Ophthalmoplegia: due to infiltration, oedema and fibrosis of extra-ocular muscles
  o Exposure keratitis and corneal ulceration
  o Optic nerve compression, secondary to proptosis so must assess acuity, RAPD
  o Diffuse, smooth goitre
  o Pretibial myxoedema
  o Thyroid acropathy
  o Other autoimmune disease, e.g. vitiligo, T1DM
• Subacute De Quervain’s thyroiditis: damaged follicular cells > breakdown of stored thyroglobulin > transient high T4/T3 with suppressed TSH
  o May complain of neck pain, with an acutely tender diffuse goitre
  o Preceding viral URTI
  o As TSH suppressed, no new T3/T4 made as stores are depleted
• Investigations:
  o Bloods: fT3, fT4, TSH
    ▪ TSH receptor antibodies
    ▪ Positive >> Graves (or falsely positive De Quervain’s)
    ▪ Negative >> multi nodular goitre or toxic nodule
  o Technetium99m uptake scan (if no clinical features of Graves’)
    ▪ Technetium99m (mimics iodine, lower radiation dose, much cheaper)
    ▪ Injected IV, thyroid images 20m later using scintillation camera
    ▪ Low uptake: subacute (de Quervain’s) thyroiditis, post-partum thyroiditis, amiodarone
    ▪ Increased uptake: Graves’ disease (40-60%), Toxic multinodular goitre (30-50%), Single toxic adenoma (5%)
• Management
  o Conservative: smoking cessation, eye lubrication
  o Symptomatic: beta-blockers
  o Anti-thyroid: carbimazole, propylthiouracil
  o Radioiodine ablation: oral solution of radioiodine leads to thyroid tissue destruction for 8-12 weeks (pregnancy CI for 4 months)
  o Surgery
• Risks of thyroidectomy:
  o Recurrent laryngeal nerve palsy
  o Haemorrhage > airway compromise
  o Hypocalcaemia (removal of PTH glands)
  o Hypothyroidism

Neck lumps
Anatomical boundaries of the neck: anterior triangle (midline, sternocleidomastoid, sternal notch, mandible), posterior triangle (trapezius, clavicle, sternocleidomastoid)
• Simple colloid goitre: puberty/pregnancy, long Hx, asymptomatic smooth enlargement in the neck. TSH high, T4 normal
• Plummer’s syndrome: age >60, long-standing goitre, rapid onset hyperthyroid Sx
• Toxic solitary adenoma: large solitary nodule, hyperthyroidism + no stigmata of Graves disease
• Toxic multinodular goitre: irregular lump, hyperthyroidism + no stigmata of Graves disease
• DeQuervain’s thyroiditis: acutely painful goitre, fever, pain on swallowing, hyperthyroid Sx
• Hashimoto’s thyroiditis: Hypo Sx with intermittent episodes of hyperthyroidism, AI disorders, associated w non-Hodgkin’s lymphoma
• Thyroglossal cyst: midline painless, smooth lump. Moves upwards on protrusion of tongue + swallowing
• Lingual thyroid: flattened, strawberry-like lump at the base of the tongue
• Cystic hygroma: swelling in base of the tongue, fluctuant, brilliant translucence
• Pharyngeal pouch: reducible mass in neck, dysphagia
• Mumps: neck/parotid + scrotal swelling, fatigue + fever
• SVC syndrome: gross facial, neck + hand swelling
  o Pemberton’s sign: facial flushing and vein distension on arm lifting
• Cystic lymphangioma: huge lateral neck lump in baby
• Pulsatile mass: carotid body tumour (chemodectoma)
• Branchial cyst: large anterior nodule, painful, fistulae
• Hodgkin’s lymphoma: islayted lump in neck, wt loss, anorexia
• Anaplastic carcinoma: elderly, recurrent laryngeal nerve palsy > hoarseness + stridor, lymphadenopathy
• Papillary carcinoma (70%): non-tender hard lump, cervical lymphadenopathy, FNA >> orphan Annie eyes + Psammoma bodies
• Medullar carcinoma: high T4, raised PTH
• Follicular carcinoma (25%): lung + bone metastases

Endocrine Disorders

Acromegaly
Case 2. Man with course facial features complains of headache
• Clinical features
  o Signs of ACTIVE disease: headache, sweatiness, rings don't fit, shoe size increases, HTN and DM (ask to check BP and BM)
    ▪ Ask the patient if he has any old photographs
  o Height does not increase in adults
  o Hands: Spade-shaped hands, doughy palms, carpal tunnel
  o Face: Prominent supraorbital ridge, macroglossia, interdental separation, prognathism
  o Vision: Bitemporal hemianopia
• Diagnosis:
  o Insulin-like growth factor (IGF-1)
  o Oral glucose tolerance test
    ▪ Normal: fall in GH
    ▪ Acromegaly: paradoxical rise in GH
  o Pituitary MRI
  o Assess pituitary function: cortisol deficiency, high prolactin, secondary hypogonadism (high PRL or gonadotrophin)
    ▪ 9AM cortisol
    ▪ Insulin tolerance test – hypoglycaemia ‘stresses’ corticotrophs to produce ACTH and hence cortisol should increase
• Management
  o Transphenoidal pituitary surgery
  o Medical:
    ▪ Cabergoline (dopamine agonist)
    ▪ Octreotide (somatostatin analogue)
  o Radiotherapy: indicated if GH not normalised post-surgery

Cushing’s
• Sx: plethoric, round moon-shaped face, centripetal weight gain, fatigue, depression, thin skin, interscapular fat pad, abdominal striae, proximal myopathy
• Diagnosis: Dexamethasone suppression test
  o Low dose overnight: serum cortisol <1.8mcg/dL
  o High dose overnight: decrease of more than 50% serum cortisol
• Syndrome: failure of serum cortisol to suppress on LOW dose
  o False positives: oral contraceptive pills, phenytoin, carbamazepine, alcohol
  o False negatives: nephrotic syndrome (fall in albumin + cortisol-binding globulin), liver failure
• Disease: suppression in patients with Cushing disease
• Ectopic ACTH: cushingoid features, but cachexia/wt loss + hypokalaemic alkalosis (?small cell bronchial carcinoma)

• Management:
  o Medical: metyrapone (cortisol inhibiting medications)
  o Surgery:
    ▪ Removing tumour or transphenoidal adrenoectomy
    ▪ Laparoscopic adrenalectomy

• Risks of adrenalectomy
  o Low cortisol > hydrocortisone
  o Nelson’s syndrome (if bilateral): hyperpigmentation, headaches, vision loss (rapid tumour that grows in pituitary gland)

Diabetic Foot

Case 3. This gentleman’s wife noticed an ulcer on the base of the foot when she was helping him to get dressed.

• RF for developing diabetic foot ulcers:
  o Neuropathy >> loss of protective sensation
  o Foot deformity: neuropathy causes muscle imbalance which can lead to deformity >> abnormal pressure loading
  o Vascular disease >> insufficient blood supply for adequate healing
  o High blood glucose environment >> promotes bacterial growth and impairs PMN function

• Neuropathic foot is present in 80% of patients with foot ulcer
  o Sensory: decreased pain perception >> trauma can go unnoticed
  o Motor: foot intrinsic muscles and claw toes >> increased pressure under metatarsal heads
  o Autonomic: reduced sweating > dry, cracked feet >> susceptible areas for infection

• Diabetic foot ulcers:
  o Neuropathic: numb, warm, dry foot with palpable foot pulses, ulcers at points of high pressure loading
  o Ischaemic: cold, pulseless, ulcers at the foot margins

• Charcot Neuropathic Osteoarthropathy
  o Always preceded by neuropathy, most commonly diabetes mellitus
  o Affects the bones, joints + soft tissue of foot and ankle >> Hallmark deformity (midfoot collapse > rockerbottom foot)
  o Acutely = inflammatory condition (swollen, red, hot, only mild discomfort)

• Examination:
  o Introduce: check pain, describe previous amputations
  o Ulcer: describe site, callous, cellulitis
  o Neuropathy: appearance (Perfusion), light touch, joint/vibration sense, ankle jerks
  o Peripheral vascular disease: appearance (white, hairless, poor refill), pulses
  o Charcot’s deformity

• Investigations:
  o Osteomyelitis >> urgent XR + MRI
  o Ischaemic ulcer >> ABPI, arterial duplex Doppler

• Management:
  o Bloods: CRP, WCC, HbA1C
  o Swab ulcer: MC&S
  o Plain XR > MRI
  o Vascular review if concerns
  o Broad spectrum antibiotics
  o Tight glycaemic control – may need insulin

• Annual DM review:
  o Weight > BMI
  o Glycaemia: HbA1c, HBGM
- Blood pressure
- Lipids: cholesterol, triglycerides, LDL
- IHD risk: smoking
- Complications:
  - Feet
  - Retinal screening
  - Urine albumin: creatinine ratio
Breast Surgery

Benign breast conditions
- Cyclical breast pain: long Hx, bilateral, hormonal variation
- Benign breast lumps:
  - Fibroadenoma = overgrowth of breast lobule
    - <30, premenopausal
    - smooth, rubbery, mobile
    - Non-tender
  - Fibrocystic changes = fibrosis, diffuse lumpy area +/- tenderness
    - 25-45yrs
    - Non-mobile
    - Cyclical variation with menses
  - Benign cyst
    - Perimenopausal
    - Non mobile
    - Non-tender
    - Non-hormonal variation
- Non-breast lumps:
  - Fat necrosis: hx of trauma/injury, rapid development, unilateral, tender + hard lump, irregular borders
  - Sebaceous cyst: firm, slightly tender smooth lump attached to skin with punctum in the centre, discharge
- Inflammatory/infection
  - Breast abscess – staph aureus/strep, spread by cracks in nipple. Fever, painful, red hard lump
    - Rx. Stop breastfeeding on that breast, but continue lactation through milk expression, needle aspiration, flucloxacillin
    - RF: Smoking, immunocomprimides
  - Acute pyogenic mastitis: ill-defined lump, tender, post-partum, red + hot
    - FNAC >> ++ neutrophils, inflammatory debris
  - Duct ectasia: thick, greeny discharge from nipple with poorly defined subareolar mass
    - US >> dilated ducts
    - FNAC >> macrophages + debris. No epithelial cells

Breast cancer
- Malignancy signs/symptoms
  - Peau d’orange: inflammatory breast cancer (+thickened skin, nipple inversion, hot + tender) – caused by cancer cells blocking the lymphatics = lymphoedema of the breast
  - Paget’s disease of the nipple: eczematous changes secondary to invasion with malignant cells within the skin
  - Plylodes tumour: tear-drop
- RF for breast cancer:
  - Unopposed oestrogen: early menarche, late menopause, nulliparous, obesity, HRT
  - Genetics: BRCA ½ + family history
  - Previous benign breast disease
- Ix. Triple assessment:
  - Examination/ history
  - Imaging: US (<30, +++ glandular dense tissue) or mammography (50-70yrs routine)
    - Between 30-50, often do both
  - Sampling: core biopsy +/- FNAC
    - Biopsy > histology + receptor status
    - FNAC > cytology (can be therapeutic for a cyst)
Dermatology & Superficial Lesions

**Erythema ab igne**: “hot water bottle rash”, reticular pigmented rash, usually in elderly and on anterolateral aspect of legs

**Rosacea**: “sign of the cross rash”, erythematous rash affecting face, long Hx of flushing, associated w rhinopyma and telangiectasia. Rx Abx + topical steroids

**Necrobiosis lipoidica**: rare complication of DM, partial necrosis of dermal collagen > waxy, pigmented-looking lesion commonly on anterior shin. Self-limiting but Rx intradermal steroids

**Lupus vulgaris**: haematological spread of TB > scaling, erythematous, plaque-like rash. Biopsy shows granulomatous infiltration associated with tubercles. Rx TB therapy

**Dermatitis herpetiformis**: either in isolation or in association w coeliac disease. Peak incidence 30s, pruritic rash, diffuse, symmetrical, commonly extensor limbs, papular and vesicular. Share common HLA markers, abnormal IgA activity. Rx gluten-free diet and dapsone

**Erythema multiforme**: self-limiting rash following infection/drug exposure, itching with pink-red blotches symmetrically arranged starting on the extremities. “Target lesion” appearance, pink red ring around a pale centre.

**Stevens-Johnson Syndrome**: “malignant” form of erythema multiforme, secondary to infection > blistering rash on mucosal membranes (+ eyes in 30%). Rx steroids + IV fluids

**Herpes Zoster Virus**: dermatomal rash caused by reactivation of VZV. Triggered by stress, sunlight + illness. Rx acyclovir to reduce risk of post-herpetic neuralgia

**Pemphigoid**: bullous blistering rash affecting dermis (deep lesions), with variable sized lesions that are tense and may be de-roofed. Rarely affects mucous membranes. Rx 1-2yrs steroids

**Pemphigus**: superficial blistering rash affecting epidermis, often de-roofed > denuded + tender. May affect mucosal membranes, genitalia + eyes. Rx high dose steroids + immunosuppressants

**Erythema nodosum**: inflammation of the fat cells under the skin > tender red smooth shiny nodules/lumps seen on both shins. Freq associated with fever, malaise, joint pain + inflammation. Age like a bruise. Self-limiting (2-6wks)

**Causes: SORE SHINS** (strep, OCP, risketts, eponymous [Bechet’s disease], sulfonamides, Hansen’s disease [leprosy], IBD, Non-Hodgkin’s Lymphoma, Sarcoidosis)
Erythema marginatum: non-pruritic rash of pink rings on trunk and extensor surfaces of limbs, sparing the face. Associated with rheumatic fever

Erythema migrans: early stage of Lyme disease, following tick. 5-7cm diameter, “bull’s-eye” rash

Pyoderma Gangrenosum: necrotizing, ulcerating lesion. Starts as popular and pustular area, rapidly coalesce and enlarge. Associated with IBD, rheumatoid arthritis and multiple myeloma

Atopic Eczema: 6 months, 30-50% associated with other atopic disorders, eg asthma, hayfever, food/med allergies. Intensely pruritis, affects flexures + face, lichenification (dry + thickened)

Contact dermatitis: allergic response to environmental agents. Rx stress reduction, avoidance, topical steroids

Psoriasis: large pink silvery scaly plaques, with a well demarcated edge, extensor distribution.

- Koebnerisation: psoriatic plaque over trauma/scar area
- Nail changes = POSH (pitting, onycholysis (lifting), subungal hyperkeratosis)
- Joint swelling: psoriatic arthropathy (distribution is similar to OA, with inflammation similar to RA)
- Mx. emollients, coal tar oil, steroids, calcipotriol (vit D3 analogue) cream

HIV-associated: candida (white patches that scratch off), Kaposi’s sarcoma

Pretibial myxoedema: accumulation of excess glycosaminoglycans in the dermis and subcutis of the skin in Graves’ disease > swelling and lumpiness

Basal cell carcinoma: pearly appearance, rolled edges with a depressed middle +/- crusty ulcer. Slow growth but ability to metastasise

Squamous cell carcinoma: crusty scaly ulcer, rapid growth but little metastases

Melanoma: ABCDE checklist for moles:
- Assymetry
- Border (uneven, notched, scalloped)
- Colour (more than one)
- Diameter (>6mm)
- Evolving

Causes of Pruritis: Lymphoma (FLAWS Sx), IDA (common in elderly), Uraemia (ACE-I s/e – also confusion, seizures, low GCS, pericarditis + hiccups)

Causes of pigmentation changes: ectopic ACTH (bronchial carcinoma), Vitiligo (AI – well demarcated), Addison’s (low BG, hypotension, hyponatremia, hyperkalemia), Acanthosis nigricans (velvety, indicates gastric carcinoma, associated w diabetes)
Assessment of the postoperative patient

- New **22 min station** in surgery PACES
- History: PC, HPC (Sx + associated Sx), PMHx, DHx, SHx = FOCUSSED Hx
- Summarise Hx (at 5 mins): with important negatives
- Examiner questions: perioperative assessment

Confusion
- Instructions: you have been asked by the nursing staff to **review a patient with** confusion. The patient had a recent operation two days ago for a neck of femur fracture
  - Take a **history** (5m) 0 you are NOT required to examine the patient
  - You will then be asked questions by the examiner about the **Mx** of this patient and asked to **talk to the pt**
- Mark sheet: clinical skills, formulation of clinical issues, management, professionalism
- History: PC, HPC (Sx + associated Sx), PMHx, DHx, SHx = FOCUSSED Hx
- Examiner questions: perioperative assessment

Questions in Hx
- Orientation: time, place + person
- AMTS
- Why are you in hospital?
- Pain?
- PMHx, DHx, SHx
- Common peri-operative problems: DVT, PE, bleeding, infection

Summarise Hx (at 5 mins): important negatives, e.g. breathlessness

Questions from the examiner
1. Describe how you will assess this patient in an ABCDE approach (at 8 mins – 4 mins)
   - Airway: assess airway, ensure intact (if they are talking to you during Hx, airway is in tact)
   - Breathing: O2 saturations, RR, examine the chest
   - Circulation: cap rill, HR, BP, examine the heart
   - Disability: CBG, GCS and/or AMTS (compare when they came into hospital)
   - Exposure: check for bleeding, sources of infection (e.g. cannula, wound site, catheter) + temperature

Examiner will then tell you...
   - Airway is patient
   - Chest is clear
   - Capillary refill <2 sec
   - HS I + II + 0
   - JVP not elevated

2. What are the possible causes of this patient’s confusion (4 minutes)
   - Infection, e.g. HAP, UTI, wound/line infection
   - Drugs, e.g. opiates
   - Metabolic
   - Fat embolism

3. What do you want to do next? (At 14 mins)
   - Request observation charts
   - Order relevant investigations, e.g. bloods, blood cultures, urinalysis

4. Discussion of management (at 16 mins) – please interpret the following (basic obs chart, urinalysis + urine output chart,
   - Obs chart: fever, tachycardia + tachypnoea
   - Fluid balance chart: adequate UO
   - Urinalysis: State the obvious

5. Please explain to the patient your management plan (at 20 mins)
   - Send for urine for MC&S – make sure no infection
   - Start some antibiotics (according to local guidelines)
Discuss with senior doctor

**Hypotension**
- Ax.
  - Reduced intravascular volume: haemorrhage, third space, evapourative
  - Pump failure: MO/fluid overload/CCF
  - Sepsis (check lactate)
  - Sympathetic shock: epidurals, high nerve blocks
- Case 1. 70yoM, BP90/60, NEWS 8 4hrs post-femorodistal bypass
  - A: pt speaking, appears agitated
  - B: sats 95%, RR30, good air entry, no added sounds
    - Administer 15l high flow O2
  - C: In 500mL plasmalyte. OUT: 2L bloodstained in drain
    - 2x large bore cannulas, bloods + VBG (Hb although might not be reflected if acute rapid loss, lactate)
    - 500ml 0.9%
    - ECG shows sinus tachycardia
    - VBG: lactate of 3
  - D: BM 5.6, temp 36.2, GCS 13, PEARL
  - E: groin soaked dressing, active bleeding
- **Management of haemorrhagic shock:**
  - Activate haemorrhage protocol
  - Make sure G&S in date
  - Inform surgeons
  - Direct compression to stop bleeding

<table>
<thead>
<tr>
<th>Class of haemorrhagic shock</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss (mL)</td>
<td>Up to 750</td>
<td>750–1500</td>
<td>1500–2000</td>
<td>&gt; 2000</td>
</tr>
<tr>
<td>Blood loss (% blood volume)</td>
<td>Up to 15</td>
<td>15–30</td>
<td>30–40</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>Pulse rate (per minute)</td>
<td>&lt; 100</td>
<td>100–120</td>
<td>120–140</td>
<td>&gt; 140</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Pulse pressure (mm Hg)</td>
<td>Normal or increased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Respiratory rate (per minute)</td>
<td>14–20</td>
<td>20–30</td>
<td>30–40</td>
<td>&gt; 35</td>
</tr>
<tr>
<td>Urine output (mL./hour)</td>
<td>&gt; 30</td>
<td>20–30</td>
<td>5–15</td>
<td>Negligible</td>
</tr>
<tr>
<td>Central nervous system/ mental status</td>
<td>Slightly anxious</td>
<td>Mildly anxious</td>
<td>Anxious, confused</td>
<td>Confused, lethargic</td>
</tr>
</tbody>
</table>

- 3 types:
  - Primary: during/immediately after procedure
  - Secondary: venous bleeding (first 24hrs)
  - Reactive: infective processes

**Fever**
- Timeline:
  - Day 1-2: atelectasis
  - 3-4: pneumonia
  - 5-6: anastomotic leak
  - 7-8: wound infection
- 8-10: DVT/PE
- 40yo, 5d post hemicolecotomy, temp>38. RR 22. In 1.5L PO fluids, OUT urine 400mL (<0.5ml/kg/h), vomit 80mL

**RED FLAG SEPSIS >> SEPSIS 6 w. 1HR**
- Systolic BP <90mmHg (or >40 from baseline)
- Heart rate >130bpm
- O2 sats <91%
- RR >25/min
- Purpuric rash
- Responds only to voice or pain/unresponsive
- Lactate >2.0mmol/l

- Sepsis six:
  - In: high flow O2, IV fluid resuscitate, broad spectrum IV antibiotics
  - Out: lactate (VBG/ABG), urine (insert catheter/fluid balance), blood cultures

- Investigations:
  - ECG: AF
  - ABG: metabolic lactic acidosis (high anion gap)
  - Bloods: WCC 17, Hb 10, platelets 550, CRP 345, Cr 140, Ur 14 >> infection, dehydration + AKI
- D: BM 18 (don’t start insulin, natural response to sepsis)
- E: abdomen: rigid, peritonitic, scanty bowel sounds
- Mx. Inform surgery, urgent laparotomy
- Anastomotic leaks: risks inversely related to distance of anastomosis from anal verge. If stable, CTAP can localise leak
  - Intraperitoneal: generalised peritonitis + sepsis
  - Extraperitoneal: localised infection

### Respiratory difficulty
- Causes: atelectasis, PE, chest infection, pain
- Case: 8d post ortho procedure – likely PE
- Mx. High flow O2, examine calves (swelling, tender, erythema)
- Ix. ECG, bloods, ABG, D-dimer if Wells score <4
- ABG shows T1 respiratory failure (low O2)
- ECG shows T wave inversion in R precordial leads (V2, V3 and lead III) and right ventricular strain
- Review drug chart/PMHx
- CXR: wedge shaped infarct
- CTPA
- Consider: echo (RV strain), USS Doppler legs
- Mx. 1.5mg/kg/day SC enoxaparin
- Virchow’s triad: hypercoagulability, venous stasis, endothelial damage
- RF for VTE: THROMBOSIS
  - Travel
  - Hypercoagulable: remember Factor V leiden present in ~5% general population
  - Recreational drugs
  - Old (>60)
  - Malignancy
  - Birth control pills/HRT

<table>
<thead>
<tr>
<th>Wells Criteria for PE</th>
<th>Total points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical sxs of DVT (leg swelling, pain w/ palpation)</td>
<td>3</td>
</tr>
<tr>
<td>PE is more likely than other diagnosis</td>
<td>3</td>
</tr>
<tr>
<td>Prior DVT/PE</td>
<td>1.5</td>
</tr>
<tr>
<td>HR&gt;100</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilized ≥ 3d or surgery w/ prior 4 wks</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptyisis</td>
<td>1</td>
</tr>
<tr>
<td>Malignancy</td>
<td>1</td>
</tr>
</tbody>
</table>

5 or more = Likely (35-46%)
≤4 = Unlikely (5-10%)
- Obesity
- Smoking
- Immobilisation
- Sickness (CHF, IBD, nephrotic syndrome, vasculitis)

**Low urine output** (<0.5 ml/kg/hr, ~30 ml/hr or 80 ml/24 hrs)

- **Causes:**
  - Pre-renal: dehydration, IV contrast
  - Renal: IV contrast (> nephropathy)
  - Post-renal: catheter obstruction, post TURP

- 75yo 1d post TKR, UO past 4hrs 40mls. PMHx HTN and CKD. Hypotensive, tachycardiac, cool peripheries, minimal fluid intake.
  - Mx. 2x large bore cannula > 500mL 0.9% NS asap
  - ABG: hyperchloaemic hyperkalaemic acidosis with respiratory compensation
  - ECG: tented T waves
  - Cr: 221, Ur 15, K 6.5 >> AKI
  - Mx. 10mL 10% calcium gluconate, 50mls 20% glucose + 10u actrapid, 5mg salbutamol nebs

**Nausea & vomiting** causes: Ileus, Mechanical bowel obstruction, Opioid use
## ABCDE ASSESSMENT

Read ILS Manual

Investigations: B²FISH
- Bedside
- Bloods
- Fluids
- Imaging
- Special & specific
- History

## SHOCK + SEPSIS

### Definition

Inadequate perfusion of vital organs

### Causes: CHAOS

<table>
<thead>
<tr>
<th>Cardiogenic</th>
<th>Hypovolaemic</th>
<th>Anaphylaxis</th>
<th>Obstruction</th>
<th>Systemic vasodilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>Haemorrhage: GI tract, aortic dissection, trauma (#s, liver, spleen, haemothorax)</td>
<td>Recent drug Tx, Food allergy, Insect stings</td>
<td>Cardiac tamponade</td>
<td>Sepsis</td>
</tr>
<tr>
<td>Arrhythmias</td>
<td>Fluid losses (D&amp;V, polyuria, burns)</td>
<td>PE</td>
<td>Tension pneumothorax</td>
<td>Liver failure</td>
</tr>
<tr>
<td>Thoracic aorta dissection</td>
<td>3rd space (acute pancreatitis)</td>
<td>Endocrine: Addisonian crisis, DKA</td>
<td></td>
<td>Drug overdose</td>
</tr>
<tr>
<td>Acute valve failure/VSD</td>
<td></td>
<td></td>
<td>Obstruction</td>
<td>Adrenal failure</td>
</tr>
<tr>
<td>Myocarditis</td>
<td></td>
<td></td>
<td></td>
<td>Neurogenic (bradycardia + hypotension)</td>
</tr>
</tbody>
</table>

### Investigations

- Bedside: ECG (acute MI, arrhythmias, PE), ABG > academia (DKA, drugs, renal), VBG (Hb)
- Bloods:
  - FBC (haemorrhage, reduced platelets in liver failure/sepsis)
  - U&E (adrenal failure, dehydration)
  - CRP (sepsis)
  - Glucose
  - Clotting studies (liver failure, DIC in sepsis)
  - LFTs (liver failure)
  - X-match (haemorrhage)
  - Troponin
  - Culture (sepsis)
- **Fluids**: Urine, Sputum
- **Imaging**: CXR (pneumothorax, PE, dissection, tamponade, pleural effusion)
- **Specific**: echo (suspected tamponade, dissection, valve dysfunction), LP, USS, CT abdo/head

**Management:**

- 15l 100% O2 non-rebreather (aim for 94-98%), cosider intubation if GCS <8
- Fluids: 2 large bore IV cannulae > 500ml fluid challenge 0.9% NaCl. If large volumes are needed, consider Hartmann’s to avoid causing hyperchloreaemia and metabolic acidosis
  - Maintenance fluids: UO >30ml/hr, SBP >90mmHg
- **Monitoring**: BP, urine output, ?CVP
- Consider inotropes if persistent hypotension

**Choice of inotropes**

- **Anaphylaxis**: adrenaline (B1 receptor effect)
- Hyperdynamic septic shock (high cardiac index, warm extremeties): noradrenaline (acts on a1 and B1 receptors)
- Hypodynamic septic shock (low cardiac index, cold extremities): dopamine 2-10mcg/kg/min (increase MAP with minimal increase in SVR)
  - Monitor for lack of response and need for second agent e.g. noradrenaline
- Dobutamine is suggested in patients with hypotension (SBP 70-100mmHg) who do not have clinical evidence (symptoms/signs) of shock (increased CO = B1 effect, vasodilation/reduced SVR = B2 effect)

**Specific management**

- **Anaphylaxis**:
  - 0.5ml 1:1000 IM adrenaline
  - 200mg IV hydrocortisone
  - 10mg IV chlorphenamine
  - 5mg salbutamol nebuliser with 0.5mg ipratropium
  - Ix: mast cell tryptase
- Cardiogenic shock: consider Dopamine if very hypotensive
- Hypovolaemic shock: blood to maintain Hb >/=8g/dL

**SEPSIS**

- Sepsis six: 3 out 3 in
  - 3 out: cultures, lactate, urine (catheter)
  - 3 in: O2, IV abx, fluids

**Choosing antibiotics**

- **Unknown origin**: Meropenem IV 1g/8h + IV 5mg/kg Gentamycin
- **Abdo/biliary**: Cefuroxime IV 1.5g TDS, metronidazole IV 500mg TDS (+ single dose Gentamycin IV 5mg/kg)
- **Bone/joint**: Flucloxacillin IV 2g QDS (+ vancomycin IV if MRSA, Ceftriaxone Ig if gonococcal)
- **IE**: 3 sets of blood cultures, from separate sites (20ml per set) BEFORE treatment
- **Line infection**: Iv vancomycin
- **Urosepsis**: Cefuroxime IV 1.5g TDS + gentamycin IV 5mg/kg

**Meningitis**

- **PC**: headache, neck stiffness, photophobia, fever, increased CRT, purpuric rash, DIC
- **Management**
  - Community: Benpen 1.2g IV
  - Viral: acyclovir
- Septicaemic >> IV ceftriaxone 2g
- Meningitic >> LP first >> IV ceftriaxone 2g + dexamethasone 0.15mg/kg IV QDS

- Try LP unless ContraIndicated
  - Thrombocytopenia
  - Late (delay in Abx)
  - Pressure (signs of ICP)
  - Unstable
  - Coagulation disorder
  - Infection at LP site
  - Neurological signs

<table>
<thead>
<tr>
<th>LP Findings</th>
<th>Bacterial</th>
<th>TB</th>
<th>Viral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Turbid</td>
<td>Fibrin web</td>
<td>Clear</td>
</tr>
<tr>
<td>Cells</td>
<td>PMN</td>
<td>Lymphocytes (+ mononuc)</td>
<td>Lymphocytes (+ mononuc)</td>
</tr>
<tr>
<td>Glucose</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Protein</td>
<td>High</td>
<td>Very high</td>
<td>Normal</td>
</tr>
</tbody>
</table>

NEWS SCORE

- Reduced O2 sats
- Hypertensive emergency

CARDIO

ARRHYTHMIAS

Narrow complex tachycardia
- Rate >100bpm. QRS width <120ms
- DDx. Sinus tachy, atrial flutter, AF, AV re-entry
- If pt compromised, sedate + DC cardioversion > 300mg over 60mins Amiodarone
- If rhythm regular:
  - Vagal manoeuvres (carotid sinus massage) transiently increase AV block and may unmask underlying atrial rhythm
  - If manoeuvres unsuccessful, give 6mg IV bolus adenosine
  - If adenosine fails, consider digoxin, atenolol, verapamo. amiodarone
- If rhythm irregular, control rate with beta blocker or digoxin

Broad complex tachycardia
- Rate 100bpm, QRS width >120ms
- If pt compromised, sedate + DC cardioversion > 300mg over 60mins Amiodarone
- If pt not compromised, correct electrolyte problems:
  - 40mmol K+ at 20mmol/hr
  - 4ml 50% MgSO4 in 30 mins
- If regular > VT > amiodarone
- If irregular > ?pre-excitation AF > flecanide

VT Causes: IM QVICK
- Infarction
- Myocarditis
- QT interval increase
- Valve abnormality, e.g. AS, mitral prolaps
- Iatrogenic, e.g. digoxin
- Cardiomyopathy (dilated)
- K+/Mg/O2/pH low

ACUTE CORONARY SYNDROMES

<table>
<thead>
<tr>
<th>STEMI</th>
<th>NSTEMI/UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td></td>
</tr>
</tbody>
</table>
- Anagelsia: morphine 5-10mg IV (+ metoclopramide 10mg IV)
- Antiplatelet: aspirin/clopidogrel 300mg PO
- Anti-ischaemia: GTN 2 puffs/1 tablet, atenolol 5mg IV (CI if asthma, LVF)
- DVT prophylaxis: enoxaparin 40mg SC OD
- Analgesia: Morphine 5-10mg IV (+ metoclopramide 10mg IV)
- Antiplatelet: Aspirin/clopidogrel 300mg PO
- Anti-ischaemia: GTN 2 puffs/1 tablet, atenolol 50mg/24hr PO (CI if asthma, LVF)
- Anti-coagulate: fondaparinux 2.5mg SC
Short term
- PCI: if <12hrs
- Thrombolysis: >12h/24hr from pain ONSET
  CI thrombolysis = AGAINST
  - Aortic dissection
  - GI bleeding
  - Allergic reaction
  - Iatrogenic (major surgery <14d)
  - Neuro (CVA Hx)
  - Severe HTN (>200/120)
  - Trauma (inc CPR)
- Positive (or T depression/DM) >> Tirofiban (GPIIb/IIIa antagonist), Angiography within 96 hour
- Negative (or no further pain, flat/inverted T waves): discharge if 12hr troponin negative, OPD angio/stress echo/cardiac perfusion scan

Long term
- Lisinopril 2.5mg within 24hrs
- 1.25mg OD bisoprolol
- DVT prophylaxis until fully mobile
- 80mg atorvastatin
- Lifelong aspirin 75mg
- 1 month clopidogrel 75mg
- Lisinopril 2.5mg within 24hrs
- 1.25mg OD bisoprolol
- 80mg atorvastatin
- Lifelong aspirin 75mg
- 1 year clopidogrel 75mg

SEVERE PULMONARY OEDEMA
- PC: SOB, pink frothy sputum, distressed, tachy, increased JVP, S3, gallop rhythm, bibasal creps, pleural effusions
- DDx. Acute asthma/ IECOPD, pneumonia, PE
- Immediately: sit pt up, 15l O2 non-rebreather bag
- Ix. Bloods (inc ABG, BNP and troponin), CXR, ECG, consider echo
- Mx.
  o Analgesia: diamorphine 2.5-5mg IC (+ metoclopramide 10mg IV) – this also acts as a pulmonary venodilator, therefore decreases preload and optimises the patient on the Starling Curve (Rule: SV increases with EDV increases)
  o Frusemide 40-80mg IV
  o SBP < 100 – Rx as cardiogenic shock (consider inotropes)
  o SBP >100
    ▪ GTN 2 puff or 2x300u tabs SL
    ▪ Isomnonitrate 2-10mg/h IV
  o Consider CPAP or dialysis if worsening
- Long-term: daily weights, change to oral frusemide, consider spironolactone
  o Add ACE-I and B-blocker if heart failure

CARDIOGENIC SHOCK
- PC: distressed, cold clammy peripheries, tachy, pulmonary oedema
- Mx causes and abnormalities
  o Diamorphine 2.5-5mg IV (+ 10mg metoclopramide IV)
- Cardiac tamponade
  o Ax: trauma, malignancy, pericarditis, MI
  o Signs:
    ▪ Beck’s triad: hypotension, increased JVP, muffled heart sounds
    ▪ Kussmaul’s sign: reduced JVP on inspiration
    ▪ Pulsus paradoxicus: faded pulse on inspiration
  o Ix: Echo
  o Mx: pericardiocentesis (under US guidance)

Causes of cardiogenic shock: MI HEART + lungs
- MI
- Hyperkalaemia
- Endocarditis
- Aortic dissection
- Rhythm disturbances
- Tamponade
- Lungs = tension pneumothorax or massive PI
**RESPIRATORY**

**ACUTE ASTHMA**
- PC: acute SOB + wheeze
- Lx. PEFR, ABG (O2 normally normal, CO2 low – if high sent to ITU ASAP), FBC, U&E, cultures
- DDx. IE COPD, pneumonia, pneumothorax

**Management**
1. Sit up + 100% O2 15l non-rebreather
2. Back-to-back 5mg nebulised salbutamol + 0.5mg ipratropium
3. 100mg IV hydrocortisone (+/1 50mg PO pred)

No improvement in 15-30 mins…inform ITU!
4. IV magnesium sulphate 2g over 20 mins
5. IV salbutamol 3-20ug/min (monitor HR + K)
6. Consider loading 5mg/kg IV aminophylline over 20min

Monitor PEFR every 15-30 mins (pre + post B-agonist), keep >92% O2 sats + monitor PaCO2

**INFECTIVE EXACERBATION COPD**
- PC. Cough, sputum, SOB, wheeze
- Lx. STOPX
  - Sputum
  - Temperature
  - O2 saturations – ABG
  - Peak flow
  - XR chest – PA
- Mx.
  1. Sit up + 24% O2 via venturi mask (target SpO2 88-92%) – vary according to ABG aim for PaO2 >8kPa
  2. Air driven nebulised 5mg/4h salbutamol, 0.5mg/6h ipratropium – NASAL SPECS
  3. 200mg IV hydrocortison, 40mg PO prednisolone 7-14d
  4. Doxycycline 200mg PO STAT + 100mg PO OD for 5 days
- NIV (BiPAP) if pH <7.35, RR>30

**PULMONARY EMBOLISM**
- PC: SOB, pleuritic pain, haemoptysis, syncope, fever, tachy, cyanosis
  - RHF: hypotension, inc JVP, loud P2
- Lx:
  - ABG: normal/low O2, low CO2, inc pH
  - CXR: wedge-shaped infarct, linear atelectasis
  - ECG: sinus tachycardia, RBBB, right heart strain (inverted T in V1-V4) – S1Q3T3 rare
  - CTPA + venous phase legs and pelvis (85-95% specificity)
- D-dimer 95% NPV for PE. Should be used when low probability of PE as assessed using Wells Score
- Mx.
  - Sit up, 15I O2 non-rebreather. Morphine + metoclopramide if distressed

<table>
<thead>
<tr>
<th>Severe</th>
<th>Life-threatening</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEFR &lt;50%</td>
<td>pO2 &lt;33%</td>
</tr>
<tr>
<td>RR &gt;25</td>
<td>Cyanosis</td>
</tr>
<tr>
<td>HR &gt;110</td>
<td>Hypotension</td>
</tr>
<tr>
<td>1 sentence = &gt;1 breath</td>
<td>Exhaustion</td>
</tr>
<tr>
<td></td>
<td>Silent chest</td>
</tr>
<tr>
<td></td>
<td>Tachyarrhythmias</td>
</tr>
</tbody>
</table>

**Common presentations**
- SOB
- Chest pain
- Cough
- Haemoptysis

**Clinical Feature**
- Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)
- An alternative diagnosis is less likely than PE
- Heart rate >100bpm
- Immobilisation for more than 3 days or surgery in the previous 4 weeks
- Previous DVT/PE
- Haemoptysis
- Malignancy (on treatment, treated in the last 6 months, or palliative)

**Clinical Probability Simplified Score**
- PE Likely: >4
- PE Unlikely: 4 or less

---

**REFERRAL TO INTENSIVE CARE**

Refer any patient:
- requiring ventilatory support
- with acute severe or life-threatening asthma, who is failing to respond to therapy, as evidenced by:
  - deteriorating PEF
  - persisting or worsening hypoxia
  - hypercapnia
  - ABG analysis showing \( \downarrow \) pH or \( \uparrow \) H^+
  - exhaustion, feebile respiration
  - drowsiness, confusion, altered conscious state
- respiratory arrest
- Fluid resuscitation
- 1.5mg/kg/24h SC enoxaparin
- Massive PE: haemodynamically unstable, SBP <90
  - Alteplase 50mg bolus STAT >> embolectomy
  - Warfarin
  - Consider dobutamine if no improvement
- Long-term: continue LMWH until INR >2 (at least 5 days) – if no identifiable cause 3mo. VC filter if repeat DVT/PE

**PNEUMOTHORAX**

**Definition:** accumulation of air in the pleural space.

**Classification**
- Closed: intact chest wall and air leeks from lung into pleural cavity
- Open: defect in the chest wall allows communication between PTX and exterior – may be suckling
- Tension: air enters pleural cavity through one way valve and cannot escape >> mediastinal compression

**Causes**
- Spontaneous: primary (no lung disease, e.g. ruptured subpleural bulla in thin young men, smokers), or secondary (COPD, Marfan’s, pulm fibrosis)
- Trauma: penetrating, rib #s
- Iatrogenic: subclavian CVP line insertion, PPV, transbronchial biopsy
- PC: SUDDEN ONSET, reduced expansion, resonant, reduced breath sounds, (tension – mediastinal shift, tachycardia, hypotension)
- Ix. ABG, expiratory CXR

**Tension PTX management**
- Large bore venflon into 2nd ICS, mid-clavicular line
- Resuscitate pt, no CXR
- Chest drain inserted by Seldinger technique
- CXR after – a CXR should NEVER be performed before a CD if ?tension PTX

**GASTRO:**

**UPPER GI BLEEDING**
- PC: CLD signs, cool, clammy, CRT >2s, hypotension, reduced UO, tachycardia, reduced GCS
- Ax. PUD 40% (most commonly duodenal ulcer), gastritis 20%, Mallory-Weiss tear 10%, oesophageal varices 5% (portal HTN > dilated veins at sites of porto-systemic anastomoses: L gastric and inferior oesophageal veins)
- Ix. Urea, Hb, U&E, LFTs, clotting, X-match 6u, ABG, glucose

**Glasgow-Blatchford score:** used to predict the need to treat patients presenting with upper GI bleeding, identifying “low risk” for OPD management. A score of >6 indicates a >50% need for acute intervention

**Rockall score:** prediction of rebleeding and mortality (performed pre and post endoscopy). Initial >3/post >6 >> Sx
### Glasgow-Blatchford Score

<table>
<thead>
<tr>
<th>Admission parameter</th>
<th>Score value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea (mg/dL)</td>
<td></td>
</tr>
<tr>
<td>&gt;5.6 to &lt;9.0</td>
<td>2</td>
</tr>
<tr>
<td>&gt;9.0 to &lt;12.0</td>
<td>3</td>
</tr>
<tr>
<td>&gt;12.0 to &lt;15.0</td>
<td>4</td>
</tr>
<tr>
<td>&gt;15.0 to &lt;20.0</td>
<td>5</td>
</tr>
<tr>
<td>&gt;20.0</td>
<td>6</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td></td>
</tr>
<tr>
<td>&gt;13.0</td>
<td>1</td>
</tr>
<tr>
<td>&gt;10.0 to &lt;13.0</td>
<td>3</td>
</tr>
<tr>
<td>&gt;13.0 to &lt;14.0</td>
<td>3</td>
</tr>
<tr>
<td>&gt;14.0</td>
<td>6</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td></td>
</tr>
<tr>
<td>100 to 120</td>
<td>1</td>
</tr>
<tr>
<td>&gt;120 to 140</td>
<td>2</td>
</tr>
<tr>
<td>&gt;140</td>
<td>3</td>
</tr>
</tbody>
</table>

### Rockall Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>&lt;60</td>
<td>60-70</td>
<td>70-80</td>
<td>&gt;80</td>
</tr>
<tr>
<td>Comorbidty</td>
<td>Nil major</td>
<td></td>
<td>Congestive heart failure, ischaemic heart disease</td>
<td>Renal failure, liver disease, metastases, cancer</td>
</tr>
<tr>
<td>Shock</td>
<td>No shock</td>
<td>Pulse &gt;100 bpm</td>
<td>Systolic BP &lt;100 mmHg</td>
<td>Malignancy</td>
</tr>
<tr>
<td>Source of bleeding</td>
<td>Mallory-Weiss tear</td>
<td>All other diagnoses e.g. esophagitis, gastritis, peptic ulcer disease, varices</td>
<td>Malignancy</td>
<td></td>
</tr>
<tr>
<td>Stigmata of recent bleeding</td>
<td>None</td>
<td></td>
<td>Malignant clot, spurring vessel</td>
<td></td>
</tr>
</tbody>
</table>

### Management

- **Head DOWN.** 100% O2. 2x large bore cannulae >> IV crystalloid up to 1L (avoid 0.9% NS in decompensated liver disease – worsens ascites – use O- blood or albumin for resusc and 5% dextrose for maintenance
- If variceal bleed...
  - IV Terlipressin (splanchnic vasopressor)
  - Abx prophylaxis e.g. ciprofloxacin 1g/24h
  - Correct coagulopathy: vit K, FFP, platelets
  - Thiamine if EtOH
- Urgent endoscopy
  - Ulcer > adrenaline, coagulation, fibrin glue or endoclips
  - Varices > 2 of either banding, sclerotherapy, adrenaline or coagulation
- Life-threatening bleed:
  - Balloon tamponade using Sengstaken-Blakemore tube
  - Transjugular intrahepatic porto-systemic shunt (creating artificial channel between hepatic vein and portal vein)
- After endoscopy
  - IV omeprazole
  - Keep NBM for 24h > clear fluids > light diet at 48h
  - Daily bloods
  - H. pylori testing and eradication

### NEURO

#### ENCEPHALITIS

- **PC:** infectious prodrome, bizarre behaviour, confusion, reduced GCS, fever, seizures
- **Hx.** travel/animal bite
- **DDx** without FEVER = encephalopathy
  - Hypoglycaemia

**Common presentations**

- Drowsy/reduced GCS
- Seizures
- Fall/collapse
- Confusion/delirium
- Headache
- DKA
- Drugs
- Uraemia

- **Ix.**
  - Bloods: cultures, viral PCR, malaria thick + thin film
  - Contrast CT head (focal bilateral temporal involvement suggests HSV)
    - Ring enhancing lesion with ICP signs >> ? cerebral abscess
  - LP
  - EEG > diffuse abnormalities

- **Mx:** IV acyclovir 10mg/kg/8h **OVER 1HR ASAP**

**STATUS EPILEPTICUS**

- **Ix:** glucose, ABG, U&E, FBC, CA2+. Consider ECG + tox screen.
- **Mx:**
  - Protect airway: consider left lateral position, nasopharyngeal adjunct? Suction
  - Reverse potential causes:
    - Thiamine 250mg IV if EtOH
    - 10ml 20% glucose unless know blood glucose is normal
  - Slow bolus phase
    - IV lorazepam 2-4mg (2nd dose if no response within 2 mins)
    - PR Diazepam 10mg (max 20mg)
    - Buccal midazolam 10mg
  - **GET ANAESTHETICS!!**
  - Infusion phase: phenytoin 18mg/kg @50mg/min (monitor ECG + BP)
  - Maintenance: 100mg/6-8 phenytoin
  - Consider dexamethasone IV 10mg if vasculitis/cerebral oedema

**HEAD INJURY**

- Look for: lacerations, obvious facial/skull deformity, CSF leak from nose or ears, Battle’s sign, Racoon eyes, blood behind TM, C-spine tenderness
- **Hx ASAP:** headache, fits, vomiting, amnesia, EtOH, LOC
- **CT head guidelines = BANGS LOC**
  - Break – open, depressed, base of skull #
  - Amnesia >30 mins retrograde
  - Neuro deficit or seizure
  - GCS <13 anytime (or <15 2hrs post injury)
  - Sickness - >1 vomits
  - LOC

- Also CT if any dangerous mechanism of injury, >65yrs, coagulopathy
- Monitoring:
  - Admit if difficult to assess, severe vomiting or severe headache
  - Neuro-obs half-hourly until GCS 15: GCS, pupils, HR, BP, RR, SpO2, Temp
- **Advice:** stay with someone for first 48hrs + explain red flags
RAISED ICP

- PC: headache, N&V, seizures, drowsiness, papilloedema
  - Cushing’s reflex: hypertension, bradycardia + irregular breathing
  - 6th CN palsy (limited abduction)
- Mx. ABC, treat seizures + correct hypotension. Elevate bed to 40 degrees
  - Neuroprotective ventilation (requires good sedation + NM blockade – GET ANAESTHETIST!!)
    - PaO2 >13kPa (100mmHg)
    - PaCO2 4.5kPa
  - Mannitol or hypertonic saline (may rebound)

ENDOCRINE

ACUTE KIDNEY INJURY

- Sx. (in context of critical illness) Fatigue, malaise, rash, joint pains, N&V, CP, SOB, abdo pain, oliguria, hypertension and oedema
- Causes:
  - Pre-renal: hypotension of any cause, e.g. sepsis, hypovolaemia, cardiac dysfunction
  - Renal: drugs, glomerulonephritis, vasculitis
  - Post-renal: obstruction, e.g. prostatic, stones
- Ix.
  - Urgent ABG/VBG for hyperkalaemia, acidosis
  - ECG for hyperkalaemia changes (peaked T waves > flattened P > increased PR > widened QRS > VF)
  - Bloods: U&E, Ca, PO4, FBC, ESR, CRP, clotting, LFTs, CK
  - Renal screen: protein electrophoresis, hepatitis serology, autoantibodies (ANCA, ANA, anti-GBM), complement, rheumatoid factor, cryoglobulins
  - USS: hydronephrosis
  - CXR: pulmonary oedema

Management
- Resuscitate and assess fluid status
  - Assess intravascular volume: BP, JVP, skin turgor, fluid balance, weight

Treat life-threatening complications
- Hyperkalaemia
  - 10mL 10% calcium gluconate (stabilise cardiac membrane)
  - 50ml 20% glucose + 10 units actrapid (drive K into cells)
  - Salbutamol 5mg nebuliser
- Pulmonary oedema
  - Sit up and high flow O2
  - Morphine 2.5mg IV (+ metoclopramide 10mg IV)
  - Frusemide 120-250mg IV over 1hr
  - GTN spray + ISMN IV
- Sepsis > blood cultures + IV ABx

Monitoring
- Cardiac monitor
- Catheterise to assess hourly urine output, establish fluid charts + fluid resusc
  - Maintenance fluids: 20mL + prev hour’s UO per hour
- Evidence of post-renal causes:
  - Palpable + tender bladder
  - Enlarged prostate
  - Complete anuria

Consider need for rapid dialysis: AEIOU
- Acidosis (pH <7.2)
- Electrolyte abnormalities (K>7mM)
- Intoxicants (e.g. aspirin)
- Oedema
- Uraemia symptoms

Common renal presentation
- Frank haematuria
- Anuria/oliguria
- Loin pain

Common renal presentations
- Frank haematuria
- Anuria/oliguria
- Loin pain
**DKA**

**Pathogenesis**
- Ketogenesis (>2+ dipstick/>3mM): reduced insulin > inc stress hormones + glucagon > reduced glucose utilisation + increased FA oxidation > increased ATP + generation of ketone bodies
- Dehydration: reduced insulin > reduced glucose utilisation + increased gluconeogenesis > severe hyperglycaemia > osmotic diuresis > dehydration
- Acidosis (pH <7.3): dehydration > reduced renal perfusion

**Diagnosis**: above + glucose >11.1mM

**Presentation**: abdo pain, vomiting, gradual drowsiness, hyperventilation, dehydration, lethargy, urinary Sx

**Ix**: urine, blood glucose/ketones, WCC, U&Es, amylase, osmolality, ABG/VBG, blood culture. CXR for evidence of infection

**Complications**: cerebral oedema, aspiration pneumonia, hypokalaemia, hypophosphataemia, VTE

**Management**

AIM: reduce ketones by 0.5mM/h, glucose by >3mM/hr, maintain normal potassium, avoid hypoglycaemia
- Fluids: 1L 0.9% NS over 1hr (STAT if SBP <90), then 2L over 4hrs, 1L over 4hrs
- Potassium replacement (in 2nd bag of fluid) – 40mmol/l if 3.5-5.5mM
- Insulin: 6units Actrapid if no weight (0.1u/kg/h) – transfer to sliding scale when resolved, SC when eating + drinking
- VTE prophylaxis: enoxaparin SC
- Monitoring:
  - Urinary catheter (>30ml/hr)
  - NGT if vomiting/red GCS
  - Hrly cap glucose + ketones
  - VBG at 1hr, 2hr then every 2hrly
  - Plasma electrolytes 4hrly

**HONK (HYPEROSMOLAR NON-KETOTIC COMA)**

- T2DM, marked dehydration, glucose >35mM, reduced GCS
- Complications: thrombosis >> LMWH
- Mx: 0.9% NS over 48hrs, wait 1hr before starting insulin
- Look for precipitant: MI, infection, bowel infarct

**HYPOGLYCAEMIA**

- Symptoms:
  - Autonomic: sweating, anxiety, hunger, tremor, palpitations
  - Neuroglycopenia: confusion, drowsiness, seizures, coma, personality change
- Cause: exogenous insulin, liver failure, Addison’s
- Management:
  - Alert and orientated: oral carb (lucozade + toast)
  - Drowsy + intact swallow: buccal hypostop + get IV access
  - Unconscious or swallow concerns: IV dextrose 100ml 20%
  - Deteriorating/refractory/no IV access: 1mg glucagon IM
THYROID EMERGENCIES

- **Thyroid storm**: increased temperature, agitation, confusion, tachycardia, AF, HF
  - Fluid resuscitation + NGT
  - Bloods
  - Propranolol PO/IV
  - Digoxin?
  - Carbimazole (then Lugol’s iodine 4h later to inhibit thyroid)
  - Hydrocortisol
  - Rx cause: infection, MI, trauma

- **Myxoedema coma**: looks hypothyroid, hypothermia, hypoglycaemia, bradycardia, hypotensive, seizures, coma
  - Correct hypoglycaemia
  - T3/T4 IV slow infusion (may precipitate myocardial ischaemia)
  - Hydrocortisone 100mgIV

ADDISONIAN CRISIS

Presentation: shock, fatigue, lethargy, hypoglycaemia, abdo pain (precipitants: infection, trauma, surgery, long-term steroids)

**Management**: if suspected, treat before biochemical results
- Bloods: cortisol, ACTH, U&E (hyperkalaemia, hyponatraemia)
- Hydrocortisone 100mg IV STAT (then 100mg/8hr) – change to oral steroids after 72 hours if good condition
- IV fluid bolus
- Monitor BG: danger is hypoglycaemia
- Abx if concern about infection

HYPERTENSIVE CRISIS

- Presentation: pallor, pulsating headache, HTN, impending doom, pyreclial
- Precipitants: stress, abdominal palpation, GA, parturition, contrast media

**Management**: GET HELP AND GET TO ICU. Alpha blockade BEFORE beta blockade to prevent worsening HTN
- 2-5mg IV phentolamine (short-acting alpha blocker) to control BP
- 10mg/24hr PO phenoxybenzamine (long-acting alpha blocker) when BP controlled
- B1 blocker (atenolol) to control tachycardia, myocardial ischaemia
- Surgery after 4-6weeks
<table>
<thead>
<tr>
<th>Sign</th>
<th>DDx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast/irregular pulse</td>
<td>Salbutamol, antimuscarinics, TCA</td>
</tr>
<tr>
<td>Respiratory depression</td>
<td>Opiate, benzodiazepines</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>Phenothiazines, barbiturates</td>
</tr>
<tr>
<td>Hyperthermia</td>
<td>Amphetamines, cocaine, ecstasy</td>
</tr>
<tr>
<td>Coma</td>
<td>Benzodiazepines, alcohol, opiates, TCA</td>
</tr>
<tr>
<td>Seizures</td>
<td>TCA, recreational drugs</td>
</tr>
<tr>
<td>Constricted pupils</td>
<td>Opiates</td>
</tr>
<tr>
<td>Dilated pupils</td>
<td>Amphetamines, cocaine, TCA</td>
</tr>
<tr>
<td>Hyperglycaemia</td>
<td>Organophosphates</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>Insulin, alcohol, salicylates</td>
</tr>
<tr>
<td>Renal impairment</td>
<td>Salicylate, paracetamol, ethylene glycol</td>
</tr>
<tr>
<td>Metabolic acidosis</td>
<td>Alcohol, ethylene glycol, methanol, paracetamol, CO poisoning</td>
</tr>
<tr>
<td>Reduced cognition</td>
<td>Digoxin, CO poisoning</td>
</tr>
<tr>
<td>Yellow-green vision</td>
<td>Digoxin</td>
</tr>
</tbody>
</table>

**General management:** take blood as appropriate, consider specific antidote or oral activated charcoal. Check toxbase!
- Monitoring
- Psychiatric assessment
- Suicide risk assessment

**Salicylate and paracetamol poisoning**
- Salicylate: vomiting, dehydration, hyperventilation, tinnitus, vertigo, sweating
  - Correct dehydration
  - Give activated charcoal
  - Correct acidosis – if severe sodium bicarb to alkalize urine
  - Dialysis if salicylate >700mg/K
- Paracetamol poisoning: vomiting, RUQ pain, jaundice, encephalopathy
  - Activated charcoal <4hr after OF
  - N-acetylcystein IV 150mg/kg in 5% dextrose over 1hr, depending on plasma levels
  - If INR rising next day, continue NAC until <1.4

**Opiate overdose >>** 0.2-2mg IV naloxone – repeat every 2 mins until breathing adequate. May precipitate withdrawal
> diarrhoea + crampes > diphenoxylate and atropine (Lomtitil PO)
COPD: **airway obstruction** (FEV1 <80%, FEV1:FVC >0.7), **chronic bronchitis** (excessive mucus prod with airway obstruction > cough/sputum most d, 3m, 2y), and **emphysema** (histological Dx. airway destruction distal to terminal bronchioles)

- **DDx wheezy chest:** granulomatous polyarteritis (saddle-nose, obliterave bronchiolitis), RA, post-lung Tx (chronic rejection)
- **Imp negatives O/E:** CO2 retention, malignancy. Cor pulmonale (inc JVP, oedema, RV heave, loud P, pansystolic TR)
- **Pink puffers** (emphysema): destruction of airway + capillary bed > inability to oxygenate > compensatory hyperventilation > breathless + normal O2, low CO2. >>> T1RF. **Blue blotters** (chronic bronchitis): Reduced ventilation with inc. cardiac output > + VQ mismatch > high CO2, low O2 + polythymia >> T2RF
- **Ax:** environmental = smoking/industrial (apical), genetic = alpha 1 antitrypsin def (basal)
- **Ix:** Hb (polycythemia), WCC + CRP (IECOPD), alpha-1 antitrypsin (young, FHx), Echo (pulm HTN + cor pulmonale)

**GOLD Classification:** mRCC dyspnoea score (1. Vigorous, 2. Stairs, 3. Walk slowly, 4. <100m, 5. Dressing), FEV1 (mod <80%, sev <50%, v. sev <30%) + no of exacerbations/yr

### Exacerbation risk (FEV1)

<table>
<thead>
<tr>
<th>Exacerbation risk</th>
<th>Symptoms</th>
<th>1st line Rx</th>
<th>Rx examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A LOW = &gt;50%</td>
<td>Few</td>
<td>SABA/SAMA PRN</td>
<td>salbutamol (SABA), salmeterol (LABA)</td>
</tr>
<tr>
<td>B Many</td>
<td>Many</td>
<td>SAMA + LAMA</td>
<td>ipratropium bromide (SAMA), tiotropium (LAMA)</td>
</tr>
<tr>
<td>C HIGH = &lt;50%</td>
<td>Few</td>
<td>ICS + LAMA/LABA</td>
<td>budesonide, fluticasone (ICS)</td>
</tr>
<tr>
<td>D Many</td>
<td>Many</td>
<td>ICS + LABA + LAMA (Theome neb/LTOT)</td>
<td>Symbicort (budesonide + formoterol), Seretide (salmetoril + fluticasone)</td>
</tr>
</tbody>
</table>

**Asthma**

- **Conservative:** smoking cessation, pulm rehab, CV risk Mx, pneumococcal/fu vaccine. **Surgical:** bullectomy, lung reduction surgery. **LTOT:** non-smoker, PaO2 <7.3 (2x >3wks apart), PaO2 <8 + cor pulmonale/polythymia. **Aim:** PaO2 >8, >15hrs/d

- **BODE index:** mortality predicting tool (BMI, FEV1 on MRC score, exercise capacity on 6mw)

- **Complications:** IECOPD, polycythemia, pneumothorax (ruptured bullae), cor pulmonale, lung carcinoma

- **IECOPD:** 24% O2, air driven salbutamol 5mg + ipratropium 0.5mg, hydrocortisone 200mg, pred 40mg PO 7d, Doxy 200mg PO STAT + 100mg OD for 5d. BiPAP if pH<7.35, RR>30

**Asthma:** Acute: mast-cell + Ag > histamine. Chronic: Th2 cells > mast cell + eosinophil > remodeling > bronchial hyper-reactivity

- **Control:** SABA use (check technique), peak flow diary (>20% diurnal variation), attacks, admissions + ITU, oral steroid use (+ SE?). **Associated disease:** GORD (?dyspepsia), Churg-Strauss (?recent onset, rash, neuropathy), ABPA

- **DDx:** COPD (FEV1:FVC <0.75, but >15% improvement in FEV1 with beta-agonist), pneumothorax (acute)

  - **Mx. Step 1:** Salbutamol (2-4mg up to 4x/d). **Step 2:** Belometasone 400ug/d. **Step 3:** Salmeterol 50ug BD (+/- inc steroid to 800ug/d) **Step 4:** Stop LABA + trial of: 1000ug/d steroid, montelukast (leukotriene rece antag).

  - **Life-threatening (PP CHEST):** PEFR <33%, PO2 <92%, Cyanosis, Hypotension, Exhaustion, Silent chest, Tachycardia

- **Acute Mx:** 100% O2, back-to-back neb salbutamol 5mg + ipratropium 0.5mg, hydrocortisone 100mg IV, pred 50mg PO. If life-threatening: MgSO4 2g IV 20m, salbutamol IVI 10ug/min (monitor HR + K), consider aminophylline 5mg/kg over 20min

**Pneumonia:** reduced expansion, dull percussion, bronchial breathing (insp = exp, gap between, focal course crackles, increased VR. **DDx.** Collapse, effusion, IECOPD. **CURB 65** (if XR changes + >65yrs): Confusion (AMT <8), Urea >7mM, RR >30, BP <90/60

- **SMARTCOP (<5yrs):** SBP <90, Multilobar CXR, Albumin <35, RR >25, Tachycardia, Confusion, O2 low, pH <7.35

- **Mx.** CAP (pneumococcus, haemophilus) > amoxicillin/benzylpenicillin or cephalosporin + clarithromycin, HAP (pseudomonas) > co-amoxiclav + vanc, aspiration (anaerobes) > co-amoxiclav, PCP (HIV) > co-trimoxazole), TB > RIFE, fungi > amphotericin, HSV > gangioclav, clamydia/mycoplasma/legionella > clarithromycin

- **Ix. Bedside:** sputum MCS, urine (pneumococcal Ags, Hb = mycoplasma). **Bloods:** WCC, U+E (low Na = legionella), CRP, LFTs (mycoplasma/legionella), culture, paired sera (mycoplasma), ABG (T1RF). **CXR:** consolidation +/- air bronchograms (air-filled bronchi visible c/w pus filled alveoli), effusion, cavities (S. aureus), reticolunodular (mycoplasma)

- **Complications:** sepsis + MOF, parapneumonic effusion, abscesses (swinging fever,clubbing), resp failure, empyema (recurrent fever + turbid tap). **SIRS:** temp >38/36, HR >90, RR >20, WCC >12/4. **Pneumovax:** >65yrs, DM, hypoplasenism, chemo, HIV

**Bronchiectasis.** Chronic infection of bronchi/ permanent dilatation > retained secretions > damage + recurrent infection.

- **Specific Ax.** RA (rheumatoid hands), Yellow nail syndrome (yellow nails + lymphedema), CF (young pt), hypogammaglobulinemia (splenomegaly), IBDO (abdo scars), Kartageners’ (dextrocardia). Hx childhood infection

- **PC:** cough ++ purulent sputum, mixed crackles shift with coughing, clubbing, wt loss +/- cor pulmonale, haemoptysis

- **Ix.** Gold standard = High resolution CT shows signet ring sign (thickened dilated bronchi + adjacent vascular bundle), CXR > tramlines and ring shadows, lg (hypogamma), Aspergillus RAST (ABPA), Rhf, sweat test (CF), ciliary motility (Kartageners)

- **Complications:** Secondary amyloidosis (proteinuria), massive haemoptysis (mycotic aneurysm), pulmonary HTN

- **Mx.** Pulm rehab + active cycle breathing, ciprofloxacin 7-10d for exacerbations, prophylactic azithromycin, nebulized bronchodilators. **Rx underlying cause:** CF: DNAase, pancreatic (Creon), ADEK vit. ABPA: steroids. Immune def: IVIG

**Cystic fibrosis:** mutation in CFTR gene on Chr 7 > reduced luminal CI secretions and inc Na reabsorption >> viscous secretions.

+++ resp infections: Young > S aureus, H influenza. Old > pseudomonas aeruginosa, Burkorderia cepacia (worse prognosis)

- **O/E:** clubbed, small, portacath/Hickman line/scars for long-term Abx, PEG for malabsorption, young (mean survival 35 yrs)

- **Systemic manifestations:** lungs (bronchiectasis), pancreas (DM, malabsorption), GIT (obstruction), liver (gallstones, cirrhosis), GU system (infertility), neonate (FTT, meconium ileus, rectal prolapse).

- **Ix.** Immunoreactive trypsinogen (neonatal), Sweat test (Na and Cl >60mM – false +ve Addisons, hypoT4), faecal elastase

- **Mx.** Physio, prompt Abx, mucolytics. Rx systemic complications: pancrease + ADEK, insulin, ursodeoxycholic acid, DEXA osteoporosis screening, immunizations. **Conservative:** fertility/genetic counselling. **Advanced:** LTO2, NIV, heart-lung Tx.
Lung cancer: Squamous (35%, squamous differentiation, M, smoking, central + local invasion, ++ Ca), small (20%, bronchi, SIADH), adenoCa (25%, F, far-east, peripheral w gland/mucin, extrathoracic mets early), large (10%), alveolar (1%)

- Complications: Local: SVC obstruction (facial oedema, plethoric, dilated chest veins, stridor), recurrent LN palsy (hoarse, bovine cough), Pancoast’s (Horner’s, claw hand, dorsal intersosseous wasting). Endocrine paraneoplastic: SIADH (euvelaemic low Na), Cushing’s syndrome, carcinoid (serotonin > flushing, diarrhoea), 1o HPT ( = SCC, inc Ca, bone pain).
- Other: dermatomyositis (heliotrope rash, Gottron’s papules), acanthosis nigricans

- Collapse: tracheal deviation TOWARDS, dull PN, INCREASED VR. Effusion: deviation AWAY, STONY dull, REDUCED VR

- Rx: CRR (collapse, mass, hilar lymphadenopathy), contrast volume CT, determine cell type (sputum, US guided biopsy), lung function tests (pneumoneumonia Cl if FEV1<1.2L). Staging Rx: CT, PET, thoracoscopy/mediastinoscopy + LN biopsy

- Coin lesion DDx = FANGS: Foreign body, Abscess, Neoplasia, Granuloma, Structural (AVM)

- Pleural effusion: asymmetry reduced expansion, treachea displaced away, stony dull PN, reduced air entry, reduced VR. Signs of Ax: cancer, CCF, CLD, CRF, CT disease (RA hands, SLE rash)

- Exudate (protein >35g/L. Ax = inc. capillary permeability): infection, neoplasm, inflammatory

- Transudate (protein <25g/L. Ax = inc. capillary hydrostatic or red ocnicotic pressure): CCF, CRF, liver failure, Meig’s

- Lights criteria (effusion/plasma ratio: albumin >0.5, LDH >0.6, LDH >2/3 UL of normal serum LDH = EXUDATE

- Empyema (exudate with low glucose + pH <7.2): recurrent fever. Ax anaerobes, staph, gram neg. Assoc w. bronchial obstruction (carcinoma), recurrent aspiration, poor dentition, alcohol dependence

- Mx. Rx cause. drainage if Sx (<2L/24h), IV Abrams, intrapleural DNAse plus TPA, chemical pleurodesis or PleurX if recurrent

Sarcoidosis: F, afro-carrabian. Often incidental CCR (bilateral hilar lymphadenopathy). Sx dry cough, SOB, chest pain

- Presentation = GRANULOMAS: General, Resp Sx + BHL (fine crackles lower zone), Arthralgia (+dactylitis), Urine (inc Ca), Low hormones, Opthalmic/control restrictive cardiomyopathy, Abdo (hepatosplenomegaly), Skin (erythema nodosum, lupus pernio)

- Ax. Raised ESR, Ca, serum ACE. CCR > bilateral LN, biopsy > non-casing granulomas

- Mx. Acute > bed rest + NSAID. Chronic > pred 40mg/d for 6 weeks. Prognosis: 60% with thoracic responds within 2 years

Pulmonary fibrosis: cyansis, clubbing, fine late inspiratory crackles (don’t shift on cough), Al signs, steroids Tx

- Ax. Idiopathic (honeycombing pattern), CT-associated (scleroderma, RA, LSE), sarcoi, hypersensitivity pneumonitis (extrinsic allergic alveolitis), drugs (amiodarone, nitrofurantoin, chemotox (methotrexate, bleomycin)

- Ax. CRP/ESR, ANA, Rh factor, CCR (retinonodular changes), ABG T1RF, HRCT (bibasal = ITP, widespread ground-glass = Al, apical = sarcoidosis, ABPA, old TB), lung function (FEV1/FEVC >0.8 = restrictive, low TLC), BAL (lymphocytes = good, PMN/oesinophils = bad)

- Mx. Pulm rehab, LTOT, anti-tussives, smoking cessation, Pirfenidone (anti-fibrotic used in IPF when FEV1 50-80%), immunosuppressives (sarcoid, CT), transplant. PROGNOSIS: 50% 5yr survival

- Upper zone = APENT: Aspergillus, Pneumocooniosis, Extrinsic allergic alveolitis, Negative seroarthropathy, TB

- Lower zone = STAIR: Sarcoidosis, Toxins, Asbestos, Idiopathic pulm fibrosis, Rheum (RA, SLE, scleroderma, Sjogrens)

Old TB: asymmetry (absent ribs), scars (thoracoplasmy = rib removal to collapse lung, phrenic nerve crush for diaphragm paralysis in supravclavicular fossa), consolidation, tracheal deviation towards apex, red expansion. Microscopy = Ziehl-Neelsen, culture = Lowenstein-Jensen (gold standard for)

- Drugs = RIPE: Rifampicin (SE: hepatitis, enzyme inducer, red/orange secretions), Isoniazid (peripheral neuropathy, hepatitis), Pyrazinamide (hepatitis, gout), Ethambutol (optic neuritis > loss of colour vision first). Rx = 2m RIPE, 4m RI

- Primary TB: organisms @ pleural surface > Ghon Focus, move to LN > Ghon complex. Fibrosis > calcified nodule

- Primary progressive: resembles acute pneumonia +/- lymphohematogenous spread > extra-pulm/military TB

- Latent TB: infected but no clinical or CCR signs of active TB. Dx. Tuberculin skin test > IFN gamma release assay

- Secondary TB: reactivation due to red host immunity > tissue destruction > cavitation + casing granulomas


Pulm HTN (PA pressure >25mmHg): Ax. Left heart disease, lung parenchymal (hypoxic vasoconstriction), pulm vascular disease, hypoventilation. Gold standard Ix. Right heart cathetisation. Complication = cor pulmonale (inc JVP, L parasternal heave, Graham Steel EDM, pan-syst TR, pulsatily hepatomegaly, oedema). Rx: LTOT, CCB e.g. nifedipine, ACE-I, BB, diuretics

OSA: intermittent collapse of pharyngeal airway during sleep. Ix. Polysomnography. Rx. CPAP at night. Comp: pulm HTN, T2RF
PACES Summary Notes: Orthopaedics

Fractures

Clinical signs: pain, deformity, swelling, crepitus, adjacent structural injury (NAV + ligament/tendon)

- Describing 8s: mechanism (traumatic, stress, pathological), location, no of pieces, pattern (open, simple, transverse, comminuted, spiral), displacement (translation, internal/external rotation, dorsal/volar angulation, varus (bow-legged) vs. valgus (knock knees) deformity)

- # healing: 1. Reactive (<48hrs): haematoma + inflammation » leucocyte/fibroblasts »granulation tissue. 2. Reparative (48hr-2wk): osteoblast/fibroblast proliferation » callus woven, endochondral ossification » lamellar bone. 3. Remodelling (up to 7yrs): according to Wolff’s law (form follows function, ie forces)

- Mx. Principles = follow ATLS, trauma series in 1st survey (C-spine, CAP-CT), assess neurovasc, consider reduction + splinting before Ix. Reduce (open/closed) » hold (no metal/metal) » rehab. ORIF: intra-articular, open, 2in1 limb

- General complications: tissue damage (bleeding, shock, infection, rhabdomyolysis), anaesthesia (damage to teeth, aspiration), prolonged bed rest (chest inf/UTI, pressure sores, DVT/PE), pain

- Specific complications: immediate (neurovascular or visceral damage), early (compartment syndrome, infection, fat embolus), late (non-union/malunion, AVN, growth disturbance, OA, Sudek’s atrophy, myositis ossification)

- Seddon classification [nerve injuries]: neuropraxia (temp interruption conduction), axonotmesis (disruption of nerve axon), neurotmesis (entire nerve fibre » surgery required)

- Common palsies: axillary N (ant shoulder dislocation or humerus surgical neck # » numb reg patch + weak abduction), radial N (# humeral shaft » Wather’s tip), ulnar N (elbow dislocation » claw hand), sciatric N (hip dislocation » foot drop), fibular N (# neck, knee dislocation » foot drop)


Types of Fractures

- Colles: FOOSH » dinner-fork (distal = dorsal angulated), loss radial height (norm 11mm), loss radial inclination (norm 22°). Comp = EPL rupture, carpal tunnel, radial artery damage. Mx. 6wks POP dorsal backslab – ulnar deviated + wrist flexed

- Smiths: fall on back of flexed wrist » volar displacement + angulation of distal fragment. Mx above elbow, extend + pronate

- Scaphoid: FOOSH, pain – anatomical snuffbox, axial loading thumb, wrist supination. Ix. Scaphoid + hand XR. Mx beer-glass POP (# visible » 6wks, clinically tend » 2wks). Risk AVN

- Supracondylar # of humerus: child, FOOSH. OE: swollen elbow, semi-flexed, distal displaced backwards. Mx + flexion, collar + cuff. Cx: sharp edge compress brachial artery » compartment syndrome, Gunstock deformity: cubitus varus (extended forearm deviated towards midline of the body, limited internal rotation – cant use computer mouse)

- Ankle #: Ottawa rules: pain in malleolar zone + tenderness distal 6cm post tib/fib, inability to weight bear, navicular + 5th metatarsal base pain. Weber classification = relation of fibula # to joint line (at or above) injury to syndesmotic ligaments

Shoulders

- Dislocation: Anterior (95%) » ++ pain, square shoulder, arm supported by contralateral, torn capsule. Posterior (epileptics) » “light bulb sign” = internal rotation » greater trochanter not visible. Bankart lesion = damage to anteroinferior glenoid labrum. Hill-sachs lesion = cortical depression in the postero-lateral part of humeral head following impaction against the glenoid rim » recurrent dislocation (90% <20yrs traumatic dislocation. Mx. Assess for axillary N, XR + transcapular Y view, Hippocratic (longitudinal) or Kocher’s (external rotation) reduction.

- Painful Arc (impingement): entrapment of supraspinatus tendon and subacromial bursa between acromion and greater tuberosity » bursitis/tenonitis. Pain 60-120%, weakness, red ROM, +ve Hawkins’. Ix. XR, US +/- MRI. Mx. Physio » NSAIDs, steroid/LA injection » arthroscopic acromioplasty. DDx. Partial supraspinatus tear, AC joint OA

- Frozen shoulder (adhesive capsulitis): <30deg external rotation, <90deg abduction, night pain (cant lie on shoulder). Mx rest, physio » NSAIDs + subacromial bursa steroid + LA injection

- Rotator cuff tear: 2nd to degeneration or sudden jolt/fall. Shoulder tip pain, full passive ROM, inability to active abduct arm + “drop arm” sign. Mx. Open or arthroscopic repair. Special tests: Jobe’s beer can, resisted external rotation, Gerber’s lift off

- Scapula winging DDx: Long thoracic nerve injury 2nd to axillary surgery, upper brachial plexus injury, muscular dystrophy

- Other special tests: Scarf test for ACJ dysfunction or arthritis. Apprehension test for glenohumeral joint instability

Knees: don’t forget to feel popliteal fossa, measure quad bulk, and to offer McMurray’s

- Clinical presentation DDx: Swelling: haemarthrosis (primary, # or cruciate) » immediate, effusion (meniscus or collateral) » overnight. Pain/tenderness: meniscus » joint line, collaterrals » margin. Locking: meniscal tear, loose body.

- ACL: deceleration/rotation, hears/fears pop, instability » giving way. Mx rest + physio to strengthen quads/hams » autograft repair using semitendinosis +/- gracilis (threaded through heads of tibia and femur + held using screws)

- Meniscal tear Rx depends on age, chronicity, location + type: Analgesia » partial meniscectomy » total meniscal repair

- ∆ of O’Donoghue = lateral foot impacts knee while foot fixed on ground » valgus deformity (+ ACL, MCL, medial meniscus)

- Surgical Mx RA in the knee: synovectomy + debridement, removal of pannus/cartilage, supracondylar osteotomy, TKR

- Knee arthroplasty: aim = reduce pain. Uni- or bi-compartmental, typically cemented. Performed under tourniquet, ACL usually sacrificed, metal prosthesis + ethylene articular disc (+ patellar resurfacing). Knee bending 2-3d, hospital stay 10d.

- Complications: immediate (peroneal N injury » foot drop), early (DVT), late (loosening, prosthesis #, instability, 5-10y)

Minor leg + foot conditions:

- Baker’s cyst = fluctuant, transilluminable, posterior herniation of joint capsule, 2nd to OA. Dx US. Mx aspiration. DDx (lipoma, aneurysm, tibial neroma). Hallux valgus: lateral dev @ MTP = inc w/t bearing 2nd metatarsal head + bunion. Ix w/t bearing XR (degree + OA). Mx. Pads, bunionectomy. Lesser toe deformities (hammer/claw/mallet) = imbalance between lumbricals (intrinsic) + long flexors/extensors, assoc w RA. Mx appropriate footwear, flexor-extensor tendon transfer.
**Hip Trendelenberg gait DDx.** 2nd to chronic pain, S gluteal N injury, DDH. **Leg length:** true: (ASIS » medial malleolus) – NOF#, dislocation, SUFE, Perthes. Apparent (xiphisternum) scoliosis. **Galeazzi test:** bend knees to 70deg + tibia/femur shortening (short = abnormal). **Thomas’ test:** place hand under lumbar spine, fully flex one hip + contralateral hip lifts = fixed flexion deformity (NOF/OA).

- **#NOF:** OE shortened + externally rotated. Hx: mechanism, RF for osteoporosis/pathological #, premorbid mobility, premorbid independence, comorbidities, MMSE. Prognosis 30% mortality @1yr. **XR:** Shenton’s line, extra capsular (subtrochanteric or intertrochanteric) vs. intracapsular (Subcapital or Transcervical), displaced/non-displaced (shaft » head = 120-130°), osteopenic. **Garden Classification:** 1. Incomplete + undisplaced. 2. Incomplete + displaced .3. complete + undisplaced. 4. Complete + displaced. **Mx:** extracapsular > ORIF wDHs, Garden 1 or 2 > ORIF w cancellous screws, Garden 3 or 4 > ?age. <5yrs > ORIF w cancellous screws + f/u in OPD for AVN. 5yrs - 7yrs > THR. >7yrs > hemiarthroplasty (head + neck)

**Blood supply to femoral head:** retinacular vessels supply capsule distal » proximal = high risk AVN (pain, stiffness, OA)

**Hip arthroplasty technique:** Posterior = curved incision behind greater trochanter, cut through gluteus maximus » risk Sciatic N injury » foot drop (good access, higher dislocation rate). Anterolateral = anteriorly from ASIS to thigh + reflect gluteus minimus » S gluteal N injury » Trendelenberg gait. **Hip resurfacing:** <65y, ++ active, expected to out-live prosthesis.

**Bearing surfaces:** polyethylene acetabulum (non-toxic, may wear), ceram (reduced wear, inc #, more expensive, required more bone excision, metal (concern re metal ion fragments » Leukaemia). **Complications:** immediate (cement reaction), early (DVT, dislocation on squatting), late (leg length, revision 10-15yrs)

- **OA in the hip:** +/ - trendelenberg pain, stiffness, red ROM (esp internal rotation), fixed flexion deformity
- **Limping child:** DDH (breach, assymetric skin folds, limp. **Mx:** = maintain abduction in Pavlik harness or derotation varus osteotomy), Irritable hig (following viral infection), Perthes disease (osteochondritis 2nd to AVN of fem head – M 4-10yrs, insidious onset pain » painless, inc density of fem head. **Mx traction » abduction » osteotomy), SUFE (posteroinfier displacement of the femoral head – 10-15yrs, ++ thin/flat, CP: groin pain, short + externally rotation. ++pain on ROM)

**Back: Lesage’s sign** = painful straight leg raise (Sciatica)

**Mechanical pain:** inciting event + spasm. Max 2d bed rest w paracetamol » NSAIDs » codeine (low dose diazepam)

**Disc prolapse:** herniation of nucleus pulposus through annulus fibrosis (L5 and S1 roots) – severe pain on sneezing, lumbago + sciatica. Limited flexion/extension – free lateral extension.) MRI (rule out cauda equina

- Lateral » radiculopathy: L5 » weak hallux extension, foot drop, weak inversion (c/w common peroneal N), inner sensation loss. S1 » weak foot plantarflexion, eversion, loss of ankle jerk, calf pain, reduced sole sensation
- Central » cauda equina syndrome: saddle anaesthesia, reduced anal tone, incontinence. Rx laminectomy
- **Mx.** Conservative (rest, mobilise), Medical (analgesia, transforaminal steroid injection), Surgical microdiscectomy

**Spondylolisthesis:** forward displacement of L5 on S1 » palpable step. Ax congenital malformation, OA. Pain in adolescence, worse on standing, hamstring tightness +/- abnormal gait and sciatic. Lx. **XR spine. Mx.** Corset, nerve release, spinal fusion

**Spinal stenosis:** developmental predisposition +/- facet joint OA » generalised narrowing of lumbar spinal canal » spinal claudication (aching on walking, rapid onset +/- neuro 5x, eased by leaning forward or extending spine). Lx MRI. **Mx.** Corsets, NSAIDs, epidural steroid, injection, canal decompression surgery

**Cord compression:** bilateral radicular pain, LMN signs at compression level, UMN + sensory signs below

**Cervical spondylolisthesis:** disc degeneration + bony spurs » pain + stiffness in neck, worse on holding fixed position e.g. reading/driving. **Assoc w headache, grinding/popping on head turning, UL radiculopathy. Mx.** Conservative (soft cervical collar), medical (paracetamol, NSAIDs +/- muscle relaxants), cervical epidural block or facet joint block

**Hands:** Froment’s = flexion of IP on thumb adduction (ulnar), Finkelstein’s = ulnar deviation grip (APL + EPB tendonitis)

- **Motor supply:** Median > spread thumb » abductor pollicis brevis, Ulnar > spread fingers » 1st dorsal interossei, Radial » lift fingers off table (MCP extension). **Sensory supply:** Median > index/middle, Ulnar > little finger, Radial » snuffbox

- **Boutonnieres’:** rupture of central slip of extensor hood at PIP + subluxation and palmar migration of lateral bands > unopposed PIP flexion + DIP hyperextension

- **Swan-neck:** rupture of the PIP volar plate + lateral slips to DIP » hyperextension of PIP + hyperflexed DIP (mallet finger)

- **Z-thumb:** hyperextension of IPJ. **MCP volar subluxation:** proximal phalynx slips palmar direction (squares in OA)

- **OA surgery:** joint arthrodesis. **RA surgery:** carpal tunnel decompression, tendon repairs/transfers, ulna stylectomy

- **OA:** soft tissue swelling, periarticular osteopenia, loss of joint space, periarticular erosions, deformity

- **OA:** loss of joint space, osteophytes, subchondral sclerosis + subchondral cysts

- **Carpal tunnel:** 4 tendons of FDS/FDP, 1 tendon FPL, median N (» lateral 2 lumbricals, oppoenes pollicis, abductor pollicis brevis, flexor pollicis brevis) – Palmar cutaneous branch travels superficial to flexor retinaculum » spared thenar sensation. Ax. F>D,M, idiopathic, hypothyroid, pregnancy, RA. Sx: tingling/pain, worse @ night, relieved by shaking. Signs: red sensation over lateral 3 ½ fingers, red 2-point discrimination (early irreversible), thenar wasting (later irreversible), Phalen/Tinel. Non-surgical Mx. Wrist splint + local steroid. Surgical Mx. Decompression by division of flexor retinaculum (Cx. Keloid, 40% tender, palmar cutaneous N injury, failure).

- **Dupuytren’s:** progressive thickening of palmar fascia » fixed flexion of MCP/PIP joint (little + ring finger). **Assoc w HIV, DM, FH (AD), idiopathic, epilepsy, smoking, CLD »look for signs of CLD, check drug chart. Mx: physio, allopurinol, fasciectomy (w Z-line incision). DDx. Scar contracture, trigger finger, Ulnar N palsy

- **Mallet finger:** damage to extensor tendon of terminal phalynx, due to avulsion #. 6wk extension splint +/- Kirschner wire

- **Trigger finger:** tendon nodule catches on sheath » fixed flexion w forced extension snap. Assoc RA. **Mx.** Steroid injection
PACES Summary Notes: Cardio


**ECG findings**: RVH = tall R in V1, deep S in V6 (cor pulmonale), LVH = deep S in V1, tall R in V6 (HTN, AS, HOCM). RA hypertrophy (pulm HTN, TS) = peaked P (P pulmonale). LA hypertrophy (MS) = broad, bifid P (P mitrale). **Axis**: positive in I, II + aVF = normal. Positive in I + aVF, negative in II = LAD. Positive in I + II, Negative in aVF = RAD. Rate: 300/no of squares between QRS. ST elevation (>1mm limb, >2mm chest): acute MI, pericarditis, vent aneurysm.

- **WPW** (accessory conducting bundle > SOB, palpitations, + syncope): short, PR, slurred upstroke QRS = delta wave (V3/V4).
- **RBBB** (inferior MI, RVH, AS/VSD) = wide QRS, RSR in V1. LBBB (inf MI, LVH, AS/HTN) = wide QRS, notched V6.
- **1st HB**: PR >200ms. **2nd Wenkebach/Mobitz I**: lengthening PR. **2nd Mobitz II**: 2:1 or occasional dropped p.
- **Regular SVT Mx**: TRANSIENT AV BLOCK AFOUR manoeuvres (Carotid sinus massage) > 6mg IV Adenosine. FAILED = 500ug Digoxin over 30m. UNSTABLE = sedate, DC cardioversion +300mg amiodarone over 30m
- **VT** (reg., >100bpms, QRS >120, no p/T): STABLE = correct electrolytes > amiodarone. UNSTABLE = sedate + DC > amiodarone. Ax = infarction, myocaritis, mitral prolapse, digoxin, dilated cardiomyopathy, low K/Mg

**Atrial fibrillation**: DDX = multiple ventricular ectopics (becomes regular w inc HR). Sig Neg: murmur, ++T4,LVF, warfarin bruising

- **Ax**: common (IHD, Rh heart disease, thyrotoxicosis, HTN), rare (alcohol, pnmeumonia, sepsis, PE, hypokalaemia) – LOOK FOR: ++T4 (tremor, thin, palmar erythema, sweating, eye signs), MS (mitral flush), sepsis (bounding pulse, pyrexia)
- **Acute (<48hrs)**: Rate = diltiazem, start LMWH + cardiovert (DC or medical – flecainide or amiodarone)
- **Paroxysmal (recurrent, <7d)**: pocket flecainide, B-block, anticoagulate according to CHADVASC Score
- **Rate control (>7d)**: 1st line if reversible cause, CCF. 1st line = beta blocker OR diltiazem (2nd line combo +/- digoxin)
- **Rhythm control (>7d)**: amiodarone Tx starting 4 weeks before + up to 12m after electrical cardioversion (TOE or conventional – TOE to exclude LA mural thrombus). Long term: 1st line = beta-blocker, 2nd line = Dronedarone if Rx fail AND DM, ++HTN, previous TIA/stroke, LAD >50mm, >70yrs, no LV dysfunction, no HF. 3rd line=HF = amiodarone. 4th = LA ablation
- **CHA2DS2VHAS Score** (stroke risk): CCN, HTN, Age >75 (Points), DM, Stroke/TIA (Points), Vascular disease, Age 65-74, Sex (F)
- **HASBLED (bleeding risk)**: HTN >160mmHg, Abnormal renal/liver function, Stroke, bleeding, Labile INR, Elderly >65yrs, Drugs (antiplate, NSAIDs, alcohol)

**Heart failure**: syndrome of Rx/signs > inability of heart to meet physiological + metabolic demands. LVF = lung, RHF = body

- **Framingham criteria** (2 major OR 1 major + 2 minor): MAJOR: PND, neck vein distension, S3, bibasal creps, cardiomegaly, acute pulm oedema (Mx. Sit up, 100% O2, IV frusemide + 2.5mg IV dymorphine), Inc CVP, wt loss>4.5kg in 5d post Rx. MINOR = peripheral oedema, SOB on exertion, HR >120, nocturnal cough, hepatomegaly, pleural effusion.
- **LVF Ax**: IHD, dilated cardiomyopathy, valvular heart disease, HTN. **RVF Ax**: LVF, cor pulmonale (pulm HTN), tricus/pulm valve
- **NYHA Class**: 1 – no SOB, 2 – SOB on mod exertion, 3 - SOB on mild exertion, 4 – SOB at rest
- **Mx**: 1st = ACE-i, beta-block, loop diuretic (frusemide) [ACE =Sx/prog – Consensus 1 trial, BB=prog – MERIT 2, diuretic=Sx]. 2nd = spiro (aldost, K ant, sparging), 3rd = Digoxin (inhibits Na-K ATPase > inc Ca >> + myocyte contractility = Sx control).
- **Advanced Mx**: Iabradine (sinus node inhibitor when LVEF <35% HR>70), CRT device (QRS >120ms), LVAD, transplant

**Pacemakers**: significant negatives: AF, LVF, valvular pathology, complications (infection, erosion)

- **Indications**: bradycardia (complete AV block, Mobitz II, +Sx), AF, HF (biventricular), syncope
- **Ax.** ECG (pacing spikes), CXR (visualize + count leads), Echo (LV function, valve pathology)
- **Types**: single lead (to and from RA/RV), dual lead (to RA and RV – allows maintenance of physiological response during exercise), biventricular (RV/LV +/- RA – use for CRT in HF), implantable defibrillator (can be incorporated into any)
- **Complications** (lasts 5-10yrs): Insertion >bleeding, arrhythmias. Post > erosion, lead migration, pocket injection malfunction

**ACS**: STEMI= 5x + ECG findings, NSTEMI = 5x + troponin + NO ECG findings. UA = 5x + NO troponin+ NO ECG findings

- **Ax**: ECG, Functional (ETT, echocardiogram), anatomical (coronary angiog, CT angio), bloods (trop, BNP, U&E)
- **Mx.** Conservative (RF modification), Medical (antiplatelets, statins, ACE-i, GTN), Interventional (PCI), Surgical (CABG)
- **Acute Mx**: O2, 5-10mg IV morphine + 10mg IV metoclopramide, 300mg aspirin + 300mg clopigogrel, enoxaparin (STEMI) or fondaparinux (STEMI), GTN + B-block, PCI or thrombosis for STEMI. Discharge on beta-blockers + ACE-i
- **Complications**: ISCHAEMIC – angina, reinfarct, extension. MECHANICAL – failure, rupture (> cardiac tamponade (Beck’s Δ: inc BP, inc JVP, muffled HS + pulsus paradoxus), aneurysms, mitral valve dysfunction. EMBOLIC – LV mural thrombus. INFLAMMATORY – pericarditis, Dressler’s syndrome (autoAbs vs. myocyte sarcolemma, recurrent pericarditis, anaemia ++ ESR. Mx. NSAIDs +/- steroids) ARRYTHMIAS – tachycardias, bradycardias

**Hypertension** Stage 1. >140/90, Stage 2. >160/100, Severe >180/100, Malignant >180/110

- **Ax.** Essential, renal, endo (Cushing’s, ++T4, phaeo, Conn’s), drugs (cocaine, NSAIDs, OCP), Coa, pregnancy, overload
- **Ax.** 24hr ABPM, CV risk: glucose, lipids, end-organ damage: ECG (LV hypertrophy), urine dip (haematuria, Alb:Cr ratio), fundoscopy (Keith-Wagener: 1. Silver wiring, 2. Urinary 3. Flame haemorrhages/cotton-wool, 4. Papilloedema). **Specific Ax**: low K+, renin/aldost (Conn’s), 24hr urinary vanillylmandelic acid (phaeo), cortisol (Cushing’s), TFTs (thyrotoxicosis)
- **Mx**: <80yrs, stage 1 + of (target organ damage, 10yr CV risk >20), established CVD, DM, renal disease) or worse
- **1st line**: ACEI/ARB (<55) or CCB e.g. nifedipine (>55/black). 2nd line = A+C. 3rd = add thiazide diuretic (avoid with BB > DM)

**MI Leads**

<table>
<thead>
<tr>
<th>MI</th>
<th>Leads</th>
<th>Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferior</td>
<td>II, III, aVF</td>
<td>RCA</td>
</tr>
<tr>
<td>Anterolateral</td>
<td>I, aVL, V5-V6</td>
<td>L circumflex</td>
</tr>
<tr>
<td>Anteroseptal</td>
<td>V2-V4</td>
<td>LAD</td>
</tr>
<tr>
<td>Anterior</td>
<td>V2-V6</td>
<td>Left main stem</td>
</tr>
<tr>
<td>Posterior</td>
<td>V1-V3 (recip)</td>
<td>RCA</td>
</tr>
</tbody>
</table>
CABG Indications: >50% LMS, >70% proximal LAD/circumflex + 3-vessel disease, disabling angina

- Harvest: saphenous vein (41% 10yr patency), internal mammary (83% 10yr patency), inferior epigastric, radial artery
- Prognosis: lasts 10-15yrs, 75% free of ischaemic events at 5yrs. Complications: death, arrhythmias, bleeding.

Murmurs

- Lx: ECG (arrhythmias, LVH), bloods (FBC, U+E, BNP, lipids, glucose), CXR (calcified valve, LVH, cardiomegaly), Echo (severity, cause, LV function, other valves). Gen Mx: MDT, optimize CV risk, FU

- Aortic stenosis: ejection systolic murmur, R2 ICS (aortic), end-expiration (L sided), carotid radiation. OE: slow rising pulse, narrow pp, deceleration (LVF), signs of IE. Sx [<50% 5yr survival]: angina, dyspnea, syncope (peak gradient >40mmHg)
  - Ax congenital bicuspid (+root dilatation), acquired calcified. Mx. Replacement or TAVI. DDx. Sclerosis, HOCM, PS.

- HOCM: Harsh ESM @LLSR with systolic thrill (increased by Valsalva, reduced by squatting). OE: jerky pulse, double apex beat.
  - Ax. Angina, SOB, palpitations, exertional syncope/sudden death. Ax = LV outflow obstruction from asymmetric septal hypertrophy. AD inheritance (50% sporadic), B-myosin chain mutation.
  - Lx. ECG > LAD/LVH, echo > ASH. Mx. Medical (beta-blockers, amiodarone, anticoagulate if AF). Surgical septal myomectomy, consider ICD

- Mitral regurgitation: blowing PSM, apex, left lateral, end expiration. Axilla radiation +/- displaced apex, L parasternal heave, soft S1. OE: AF, LVF, signs of IE. Sx [25% 5yr survival]: dyspnea, AF, HF. Echo features of severity: jet width >0.6cm, systolic pulm flow reversal, regurgitant vol >60ml. Ax. Leaflet (IE), annular ring (LVF), papillary rupture (MI), CT disorders (Marfan’s, ED). Mx. MVR, AF (rate control + anticoagulate), reduce afterload (ACE-I, diuretics) DDx. AS, VSD, TR

- Barlow syndrome: mitral valve prolapse (5% all valve problems) > mid-systolic click +/- late systolic murmur. Sx. Atypical chest pain, palpitations, anxiety, panic attack. Ax. Primary myxomatous degeneration, MI, Marfan’s, ED, Turner’s.

- Aortic regurgitation: early diastolic murmur, lower L sternal edge, end expiration. OE: collapsing pulse, wide pp, soft S2, aortic thrill. Signs of Ax: Marfan’s (tall, thin, long arms, high arch palate), Ank spond (young man, cervical kyphosis), RA (RA hands).
  - Sx: SOB, fatigue, HF, red ET. Ix: Echo (aorta + root), CT, ESR, HLA-B27, ANA, RH F. Mx. ACE-I, diuretics, SAVR
  - Eponymous signs: Quinke’s = nailbeds, Corrigan’s = Carotids, De mussets = head bobbing, Traube’s = pistol shot femorals, Muellers = uvala, Rosenbach’s = liver. DDx. MS, PR, TS

- Mitral stenosis: mid-diastolic rumbling, opening snap, L lateral, end expiration with BELLE. OE: middle-age, F, malar flush, AF, tapping apex, L parasternal heave, loud S1, AF. Sx: SOB, palpitations, CR, RHF. Ix. CXR > LA hypertrophy, ECG > p mitrale, AF.
  - Ax = Rh fever. Mx. 1st = percutaneous balloon vavuloplasty (pliable + minimally calcified, CI if LA mural thrombus), surgical commissurotomy, MVR. Mx. AR, Austin-flint (rumbling MDM 2nd to regurgitant AR flucttering mitral valve), PR, TS


- Pulmonary stenosis: ESM ULSE radiating to L shoulder, ejection click, soft P2. OE: dymorphic, RV heave, ascites, oedema. Sx. SOB, fatigue. Ax. congenital (Turner’s), rhhs, carcinoid syndrome. Ix. ECG > p pulmonale + RAD, CXR > prominent pulm A. Mx. Valvuloplasty or valvotomy

- Tricuspid stenosis: EDM LLSE in inspiration, Ax = RhF. Sx. Fatigue, ascites, oedema. Mx. Diuretics, TVR

- Pulmonary regurgitation: decrescendo EDM @ ULSE. Ax pulmonary HTN. 2nd to MS > high pitched = Graham-steel


- Metallic (ball + cage, tilting disc, bileaflet) – 20yrs, lifelong warfarin (INR 3-4) Biologic: older pts, child-breareing age, bleeding

- Complications: surgery (5% mortality), valve (thromboembolism, MAHA, IE, failure), anticoag (bleeding, anaemia)

- AS indications: severe Sx, EF <50%, undergoing CABG or other valve op. TAVI (transcatheter) – folded valve is deployed in the aortic root, inserted through the groin. Inc perioperative stroke risk but red major bleeding. Similar 1yr survival

Rheumatic Heart Disease: Abs cross-reactivity following group A beta-haemolytic strep pyogenes infection (Aschoff nodes + Anitschkow myocytes). Jones criteria: evidence of infection (throat culture, rapid strep Ag, inc ASOT titre, recent scarlet fever) + 2 major or 1 major + 2 minor. Mx. Benpen IM for 10 days, NSAIDs, oral pred (if 3rd degree deg HCFCC, halidol/diazepam for choreo

- Major = PACES (Pericarditis, Arthritis, Chorea, Erythema marginatum = raised red edges with central clearing, Subcutaneous nodules) Minor = fever, inc ESR/CRP, arthralgia, prolonged PR interval, prev Rh fever

- 60% with carditis develop chronic Rh heart disease > valve regurgitation => stenosis (mitral 70%)

- 2nd prophylaxis: carditis + valve disease = until 40yrs penV 250mg PO, carditis NO valve disease => 10yrs, NO carditis => 5yrs

Infective Endocarditis: Dx = Duke criteria: 2 major, 1 major + 3 minor or ALL 5 minor

- MAJOR: +ve cultures (3 >12hrs apart), endocardial involvement (+ve echo, new valve regurg – 85% MR, 55% AR)

- MINOR (IE Petit Features): Immune (GN, oslers nodes, roth spots, RF), Embolic (septic infarcts, splinter haemorrhages, Janeway lesions), Predisposition (cardiac lesion, IVDU), Fever >38

- Normal valves >> Acute (Staph - 30% mortality) – RF: IVDU, IS (DM, CRF), Ix: bloods, urine, ECG, echo. Mx fluclox + gent

- Cardiac disease (disease/prosthetic valves) >> Subacute (Strep viridans – 6% mortality). Mx benpen + gent

Connective tissue disorders

- Marfan’s: AD, mutation in FBN1 gene Chr 5. Clinical features: cardiac (aortic aneurysm, root dilatation > regurg, MV prolapse), ocular (lens dislocation), MSK (high arched palate, arachnodactyly, arm-span > 107cm, pectus excavatum, scoliosis, joint hypermobility). Complications: ruptured aneurysm, spontaneous pneumothorax. Dx: 2/3 organ systems. Mx. Ortho referral, reduce cardio intense sport, beta blockers (slow root dilatation), surgery (when root >5cm)

- Ehlers-Danlos: hyperelastic skin, hypermobility, AR/HR, aneurysms, easy bruising/bleeding
**Scars:** Mercedez-Benz: liver Tx, Whipple’s, oesophagectomy (+ back scar = liver Liver) **Midline laparotomy** (Layers: skin, camper’s fascia, scarpa’s fascia, linea alba, transversalis fascia, pre-peritoneal fat, peritoneum): emergency bowel, Kocher: open cholecystectomy or splenectomy, Rutherford Morrison: kidney Tx, loin: nephrectomy, Lanz: transverse in Rif, McBurry’s: oblique in Rif, McEvedy: high horizontal inguinal, Lockwood: low horizontal inguinal, vascular access: vertical inguinal **LAPAROSCOPIC:** sigmoid resection = LIF, 2 on the R. Right hemicolecction = Rif, 2 on the L. Lap Chole = Abdo port + 3 RUQ Whipple’s = for fit, no mets, tumour <3cm. removes head of pancreas, gallbladder, part of duodenum, pyloris, LNs. **Common complication:** delayed gastric emptying >> Mx. feeding

**Stomas:** artificial union between conduits or between a conduit and the outside, indicated for exerocieration diversion, decompression, feeding or lavage. **Early complications:** haemorrhage, ischaemia, high output (>> low K+) – Rx Loperamide +/- codeine, parastomal abscess, stoma retraction. **Late complications:** parastomal hernia (lateral), obstruction, dermatitis, prolapse, stenosis, fistulae, psychosexual

- Urostomy (following total cystectomy): _ileal conduit_ (incontinent) – ureters attached to portion of resected ileum which is exteriorised as spouted stoma, _Indiana pouch_ (continent) – pouch created from 2ft of resected bowel inc ileocaecal valve, ureters anastomosed to colon end + ileal >> spouted stoma)

**Hernias:** the abnormal protrusion of a viscus through its containing walls

<table>
<thead>
<tr>
<th>End ileostomy</th>
<th>Permanent: panproctocolectomy (no anus)</th>
<th>UC FAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop ileostomy</td>
<td>Temporary defunction (prior or primary anastomosis)</td>
<td>Colon Ca Crohn’s</td>
</tr>
<tr>
<td>Loop colostomy</td>
<td>Permanent: APR resection</td>
<td>Colon Ca Diverticulitis</td>
</tr>
</tbody>
</table>

**Hernias:**

- Define groin anatomy to pubic tubercle (2-3cm lateral to symphysis): above + medial = inguinal, below + lateral = femoral
- Spermatic cord: _Penises Do Contribute To A Good Fun Sex Life_ = Pampiniform plexus, Ductus deferens, Cremasteric artery, Testicular artery, _Artery of the ductus deferens, Genital branch of genitofemoral, Fascia, Synpathetic supply, Lymphatics_
- Hesselbach’s Δ: inguinal lig (inferior), rectus abdo (medial), inferior epigastric artery (lateral)
- _Inguinal canal:_ inguinal lig (inferior), transversalis + conj tendon (posterior), internal oblique (superior), external (ant)
- _Contents of inguinal canal:_ Male (spermatic cord + ilioinguinal nerve), Female (round ligament uterus + ilioinguinal nerve)
- _Deep inguinal ring:_ mid-point of ligament (ASIS – tubercle). _Mid-inguinal point_ (NAVY pass deep to ligament) >> symphysm
- _Indirect inguinal:_ lateral to inferior epigastric veins, young, patent processus vaginalis >> bowel project through deep inguinal ring, may extend into scrotum + strangulate. _Direct:_ medial to inguinal ligament, elderly, weak Hesselbach Δ in posterior wall of canal. **Management:** early (urinary retention, haematoama), late (recurrence, ischaemic orchitis, chronic paraesthesia)
- _Femoral:_ through femoral canal, middle-age F, inferior and lateral to pubic tubercle. High risk obstruction + strangulation. **Elective surgery:** Lockwood (low incision), emergency surgery = McEvedy (high approach to allow inspection + resection)
- _Umbilical:_ congenital, RF afro-carib or trisomy-21, usually resolves by 2-3yrs. **Paraumbilical:** middle-aged obese men, inc abdo pressure, defect through linea alba. _Mx Mayo mesh repair_ (small defect >> higher risk of strangulation)
- _Incisional_ (through prev acquired defect) RF: pre-op comorbidities, intra-op (too small suture bites, placing drains through wounds), post-op (inc IAP, infection, haematoama). Mx. Manage RF, elasticated corset, Nylon mesh repair (open/lap)

**Chronic liver disease:** chronic condition - progressive destruction + regeneration of the liver >> fibrosis and cirrhosis (histological def: conversion of liver architecture into structurally abnormal). **Signs:** palmar erythema, duopytren’s, xanthelasma, gynaecomastia, spider naevi (SVC, >4, central filling). **Causes:** Alcohol, NASH, hepatitis, (HH, AI hepatitis, methotrexate)

- _Liver screen:_ ETOH (MCV, GGT, AST:ALT >2), viral serology, NASH (lipids), AI (anti-SM, pANCA), Ig (IgG = AI, IgM = PBC), genetic (caeruloplasmin, ferritin, alpha1-antitrypsin), malignancy (AFP, CA-19-9), clotting, albumin
- _Complications:_ Portal HTN: ascites, splenomegaly, varices, caput medusa + distended abdo veins. **Decompensation:** encephalopathy (asterixis, altered CNS), hypoalbuminaemia (ascites, leukonychia), coagulopathy (bruising), jaundice
- _Mx complications:_ Ascites (Mx, fluid/salt restrict, spiro, frusemide, tap + daily wt), bleeding (Mx, Vit K, FFP, platelets), encephalopathy (Mx. Avoid sedatives, lactulose + rifaximin), Varices (Mx. IV terlipressin, b-blockers, banding), Hypoglycaemia (Mx. Dextrose), Sepsis/SPB (PMN >250, Mx. Tazocin)

- _Portal HTN Ax:_ pre-hepatic (splenic/portal vein thrombosis), hepatic (cirrhosis, sarcoidsis, myeloproliferative), post-hepatic (RHF, Budd-Chiari) [Acute: SAAG: >11g/L = portal HTN (transudate)]
- _Jaundice_ [normal Br 3-17uM, visible @50uM (3x UL)] Ax. Pre-hepatic haemolysis: SCD, AIHA. _Hepatic:_ hepatitis (ETOH, viral), decompenesated CLD, drugs (paracetamol, statins, anti-TB). **Post-hepatic:** gallstones, Ca head of pancreas, LN @porta hepatitis
- US: dilated ducts (>6mm), gallstones, pancreatic mass or LPnpathy
- **Post-op jaundice:** pre-hepatic (haemolysis after a transfusion), hepatic (anaesthetics, sepsis), post-hepatic (biliary surgery)
- **Iox:** Pre-hepatic (inc cBR, LDG, coomb’s test, Hb electrophoresis), _Hepatic_ (AST:ALT >2=eTOH, <1 = viral, inc GGT = eTOH), post-hepatic (inc cBR, inc ALP)

- **CLD Specific Mx.** HCV (IFN alpha + ribavirin), HBV (IFN alpha) PBC (ursooxycolic acid), Wilson’s (penicillamine), HH (venesection, desferrioxamine), pruritis (cholestyramine = bile acid sequestrant)
- **Liver Tx.** Kings College Hospital criteria for acute failure – paracetamol = pH <7.3 after 24hrs, non-paracetamol = PT>100s
Organomegaly

- **Hepatomegaly Ax:** Common: CLD, CCF, carcinoma. Rare: infection, immune (PBC/PSC/AI), infiltrative.
  - *Rx.* CLD (Hx: EtOH, travel, RF), cardiac (Hx: SOB, PND, RF), haem (Hx: fatigue, bone pain, infections, wt loss)
- **Hepatosplenomegaly Ax:** haematologic (myeloproliferative, SC), infection (malaria, leishmaniasis)
- **Splenomegaly Ax:** Haem – SCD, CML/CLL, myelofibrosis (pallor, bruising, purpura, LNs, cachexia), portal HTN (CLD signs), IE (spiral haemorrhages), Felty’s syndrome (RA hands), massive spleen (CML/CLL, amyloidosis, malaria). *Rx.* Urine (haem = IE, protein = amyloid), WCC – CML, pancytopenia – myeloma, lymphocytosis – CLL, anaemia – haemolysis, film – malaria

Biliary: Cholesterol Gallstones (20%) formation = *Admirand’s Δ*: red bile salts, red lethicin, inc cholesterol

- **Complications:** GALLBLADDER (biliary colic, acute cholecystitis +/- empyema, chronic cholecystitis, mucocele, carcinoma, Mirizzi’s syndrome = hepatic duct obstruction), COMMON BILE DUCT (obstructive jaundice, pancreatitis, cholangitis), GI TRACT (gallstone ileus – Rigler’s triad: pneumobilia, SBO, gallstone in RLQ)
- **Biliary colic:** spasm against stone impacted in Hartmann’s pouch (+ bile stasis > infection = cholecystitis. *Rx.* Cefuroxime + metronidazole). Empyema = spasm against stone impacted in Hartmann’s pouch (+ bile stasis > infection = cholecystitis. *Rx.* Cefuroxime + metronidazole. Empyema = spasm against stone impacted in Hartmann’s pouch (+ bile stasis > infection = cholecystitis. *Rx.* Cefuroxime + metronidazole
- **Chronic cholecystitis:** flatulent dyspepsia exacerbated by fatty foods. AXR: porcelain gallbladder, shrunken on US.
- **Charcot’s Δ:** rigors, RUQ pain + jaundice = ascending cholangitis (Ms. Cef, met + ERCP) Calot’s Δ: liver edge, common hepatic duct + cystic duct (cystic artery in the middle)

Inflammatory bowel disease

- **Crohn’s:** Th1/17, 20s, +/- concordance, skip lesions, transmural, rose-thorn ulcers, cobblestones, fistulae, granulomas. Diarrhoea, abdo pain, wt loss, ++ arthritis, aphtous ulcers, malabsorption (fat = steatorrhea, gallstones, B12 = megaloblastic anaemia, Vit D = osteomalacia, protein = oedema), Rif mass, perianal abscess, anal strictures
- **UC:** Th2, 30s, mucosal continuous, crypt abscesses, ++ pseudopolyps, clubbing, erythema nodosum, pyoderma gangrenosum, ankylosing spondylitis, sclerosing pericholangitis, to anaemia, V. Diarrhoea, tabd pain, wt loss, ++ arthritis, apthous ulcers, malabsorption (fat = steatorrhea, gallstones, B12 = megaloblastic anaemia, Vit D = osteomalacia, protein = oedema), Rif mass, perianal abscess, anal strictures
- **Complications:** Crohn’s (stoma complications, enterocutaneous fistulae, anastomotic leak, short-gut syndrome when <1-2m small bowel), UC (SBO, anastomotic stricture, pelvic abscess, toxic megacolon, CRC in 15% w pancolitis for 20yrs)
- **Ax:** Bloods, stool culture (exclude infective), AXR, contrast studies (Crohn’s = small bowel follow through, UC = gastrografin/8a enema => lead pipe, thumbprinting), ileocolonoscopy + regional biopsy
- **Truelove/Witts Criteria severe UC = 2 Sx (BO >6x/d, large PR bleed), 2 Obs (HR>90, temp>37.8), 2 lab (Hb <10.5, ESR >30).** Mx. IV corticosteroids > IV cyclosporin after 72hrs. Maintenance consider azathioprine/mercaptopurine (TMPT activity)
- **UC Mx:** consider mercaptopurine/azathioprine if >2 exacerbations in 12m requiring oral steroids, or not maintained
- **Proctosigmoiditis INDUCTION:** 1st = suppository +/- oral mesalazine, 2nd = oral pred (after 4w) > oral tacrolimus (after 4w), 3rd = vedolizumab. **MAINTENANCE:** topical +/- oral mesalazine. **Left-sided/extensive INDUCTION:** 1st = high dose oral mesalazine + pred, 2nd = oral tacrolimus (after wk pred). **MAINTENANCE:** low dose oral mesalazine
- **Surgery for UC** (curative intent): ELECTIVE: proctocolectomy with ileo-anal pouch (colon + rectum removed, ileal pouch anal anastomosis, diverting loop ileostomy for 3m) or irreversible panproctocolectomy (also FAP). **EMERGENCY:** subtotal colectomy w end ileostomy +/- mucus fistula (all colon removed, leave distal sigmoid – reversed after 3 months)
- **Crohn’s INDUCTION:** 1st = prednisolone (budesonide/mesalazine if CI), add-on = azathioprine/mercaptopurine (TPMT activity, methotrexate if CI), biologics = adalimumab (12m or until failure). **MAINTENANCE:** azathioprine/mercaptopurine
- **Perianal disease (50%):** Ax. MRI, Rx. Metronidazole PO, steroids +/- infliximab, local surgery **Acute severe:** IV metronidazole
- **Surgery for Crohn’s** (never cure, avoid short-gut): ileoaeectectomy, abscess drainage, defunctioning, subtotal colectomy

Colorectal carcinoma: Dukes criteria for staging (A: bowel wall, B: through wall, C: regional LN, D: distant mets). *Rx.* CEA marker, Ba/gastrografin enema => apple-core, flexi sig (access 65%), screening (Faecal occult blood 2yrs 60-75yrs, 1x flexi-sig 55-60). FAP: AD, APC gene, 5q21. **Gardener’s:** thyroid, osteomas, dental abnormalities, epidermal cysts, polyps. HNPCC: AD, Lynch 1=R sided CRC, Lynch 2=CRC + gastric, endometrial, prostate, breast. **Peutz-Jeghers:** mucocutaneous hyperpigmentation, multiple GI haemartomatous polyps, inc Ca risk

**Colonic resections:** key principles: blood supply, lack of inflammation, no tension, clear margins, complete LNadenectomy
GI Histories
Alcoholism: Rx withdrawal – tapering regimen chlorhexidasepoxide PO, thiamine +/- lorzepam IM, baclofen/acamprosate to reduce cravings, disulfiram aversion therapy. Alcoholic hepatitis: Maddrey score predicts short term mortality

PBC: middle-aged F, pruritis, lethargy, ++ AI disease, subsequent liver failure. Other clinical feat: face pigmentation, osteoporosis, HSM, coagulopathy, ++ cholesterol, steatorrhea. Ax = chronic granulomatous inflammation > cholestasis + intrahepatic bile duct destruction. ++ALP, AMA+. IgM. Prognosis <2yrs from jaundice.

PSC: younger, male, jaundice, pruritis, fatigue, abdo pain, ++ IBD. Ax = inflammation, fibrosis, and strictures of the intra/extrahepatic ducts > 2b biliary cirrhosis > liver failure. Comp: bacterial cholangitis, inc cholangiocarcinoma. lx: pANCA, beaded appearance on ERCP. Mx: transplant, Ca19-9 screening for cholangiocarcinoma + colonoscopy for CRC. Recurrence 30%

Coeliac: HLA-DQ2, CD8+ mediated response to gliadin in gluten, anti-endomyosal IgA, anti-TTG Iga, anti-gliadin IgG (persists with exclusion diet), subtotal villous atrophy + crypt hyperplasia on duodenal biopsy. Mx = gluten-free diet

• Abdo distension, colic, flatus, steatorrhea, anaemia (red Fe/folate), bone pain/osteoporosis (red Vit D/Ca), petechiae/INR (Vit K), angular stomatitis (Vit B2), polyneuropathy (Vit B1/B6), IgA deficiency, Enteropathy associated T-cell lymphoma, hyposplenism (Mx pneumovax), dermatitis herpetiformis (extensor, pruritic – Mx dapsone), aphthous ulcers

IBS: disorder of enhanced visceral perception >> bowel symptoms for which no organic cause can be found. ROME criteria:

• Abdo discomfort/pain for >12wks + 2 of: relief by defecation, change in frequency, change in stool form
• +2 of: urgency, incomplete evacuation, bloating/distention, mucous PR, worsening Sx after food
• Exclusion criteria: >40yrs, blood stool, anorexia, wt loss, diarrhoea @night. Lx. FBC, ESR, LFT, coeliac serology, TSH.

Rx. FODMAP diet, bulking agents (e.g. fybogel), antispasmodics (e.g. mebeverine), amitryptilline, CBT

Dysphagia:
• Achalasia (degeneration of Auerbach’s myenteric plexis >> reduced peristalsis + failure of LOS relax) – liquid/solid dysphagia, regurg, substernal cramps, comp: oesophageal SCC, lx Ba swallow >> dilated tapering oesophagus, manometry >> red peristalsis. Mx. Medical (CCB, nitrates), interventional (balloon dilatation), surgical (Heller’s cardiomyotomy)
• Pharyngeal pouch: posterior outpouching between crico- and thyro-pharyngeal components of the infra pharyngeal constrictor (through Killian’s dehiscence). CP: regurgitation, halitosis, gurgling. Rx. Excision + endoscopic stapling
• Diffuse spasm: Ba swallow > corkscrew oesophagus. Nutracker: intermittent, increased pressure with normal peristalsis
• Oesophageal Ca: dysphagia solids > liquids. RF: smoking, EtOH, Barrett’s. Rx. lvor-Lewis oesophagectomy (abdo + R thoraco)
• GORD: OGD indications = 55 Persistent ALARMS: >55, Persistent sx, Anaemia, Loss of wt, Anorexia, Recent onset progressive, Malaena, Swallowing difficulty. Rx. PPI > H2RA > Nissen fundoplication (mobilise gastric fundus around LOS)


Enlarged kidneys Bilateral: ADPKD, bilateral RCC (5%), amyloidosis. Unilateral: cyst, RCC, hydropnephrosis, compensatory hypertrophy [Complete exam: external genitalia (hydrocele 2nd to RCC), urine dip, CVS [mirtal valve prolapse]]

• ADPKD: PKd1 gene on Chr16 85%. 30-50s, HTN, pain, mass, urinary Sx. Extra-renal: hepatic cysts, intracranial Berry aneurysms (>SAH), MV prolapse (mid systick click + late systolic murmur)
• Mx. General (inc water, red Na/caffeine, monitor U&E + BP, genetic counselling, MRA screen for Berry aneurysm), medical (ACE-i), surgical (nephrectomy, transplant), Rx complications (ESRF in 70% by 70yrs)

CRF Complications: CRF HEALS – CV disease, Renal oedystrophiy, Fluid, HTN, Electrolyte disturbances, Anaemia, Leg restlessness, Sensory neuropathy (Uraemia: fatigue, weakness, anorexia, vomiting, restless legs, pruritis, bone pain, pericarditis)

• Ax. Common (DM, HTN), ADPKD, drugs, TB, sarcoid, CTD (SLE, scleroderma), amyloid, myeloma
• Investigations: URINE: blood, myoglobin, protein, nitrite, cells, casts (RBC = glomerular, WBC = interstitial nephritis, tubular = ATN), Bence-Jones proteins. BLOODS: FBC, U&E, bone profile, CRP, CK, ESR, clotting, urea + creatinine, glucose, immunology (ANA, dsDNA, complement, ANCA, anti-GBM), myeloma (lg), ABG (acidosis, ++K), BIOPSY
• ABCDEF of Mx: Anaemia (EPO), Bones (cholecalciferol, 1- alphaacidol, calcichew), CV RF (statins, ACE-I), Diabetes (insulin, gliclazide), Enoxaparin, Frusemide
• Nephrotoxic drugs: NSAIDs, Abx (gent, tetracyclines, vac, acyclovir), anaesthetics, ACE-I, contrast (last 24-72hrs?), cisplatin (> haemorrhagic cystitis), cyclosorpin, methotrexate

Transplant immunosuppression: pre-op campath, short-term pred, long-term tacrolimus/ciclosporin (calcineurin inhibitor)

• Complications: post-op (bleeding, thrombosis, infection, urinary leaks), CV disease (HTN, atheroma), drug toxicity
• Rejection: hyperacute (minutes – AB0), acute (<6mo – cell mediated, fever + pain. Mx methylpred), chronic (intersitial fibrosis + tubular atrophy > gradual + Cr + proteinuria). Monitoring: LFTs (ciclosporin), glucose (tacrolimus), drug levels

Gum hypertrophy DDX. Drugs (ciclosporin, phenytoin, nifedipine)

Replacement Tx Dialysis (when GFR <15ml/min) Urgent dialysis: AEIOU (acidosid, electrolyte, intoxicants, overload, uraemia)

Complications: CVD, infection, malnutrition, amyloidosis, renal cysts

• Pulm oedema: sit up high flow O2, morphine 2.5mg IV, frusemide 250mg IV, GTN spray. HyperK: 10ml 10% calcium gluconate, 10u insulin in 50ml 50% glucose, salbutamol, Ca resonium (Peakd T > prolonged QRS/p loss > sine wave)
• AV fistula: steal syndrome (distal ischaemia + red pulses), stenosis (occlude vein 1-2cm above fistula + look for pulsation = stenosis, high pitch bruit or absence of thrill distal to fistula). A: high flow, low recirculation, low infection
• Haemodialysis (AV fistula or Tissio) counter-current flow on semipermeable membrane, with reduced hydrostatic pressure of diyslate. Comp: disequilibriation syndrome (15°) – rapid changes in plasma osmolality >> cerebral oedema
• Peritoneal: Tenckhoff catheter, uraemia solutes diffuse across peritoneum. ~3l/d with 4h dwell times. Less haem instability
PACES Summary Notes: Neurology


EYES

• Blind spot: Small = central scotoma, Big= optic neuritis, papilloedema Movements: 6th=LR > ABduction. 4th=SO > down/out

• Pupillary reflex: CN II afferent > through superior colliculus > pretectal nucleus > ipsilateral/contralateral Edinger-Westphal subnucleus of CN III > efferent parasympathetic fibres > ciliary ganglion > short ciliary nerves > iris sphincter

• RAPD: due to damage to the afferent CN II supply of one eye (retinal/optic nerve disease). The consensual efferent supply > direct afferent supply » when light shone back into bad eye, there is relative dilatation.

• INO: medial longitudinal fasciculus = communication between III + VI nerve > failure of ADDuction with contralateral nystagmus Ax bilateral extra-ocular palsies: MG, Graves, Miller-Fisher variant of Guillaume Barre. Ax bilateral ptosis: congenital, senile, MG, myotonic dystrophy, bilateral Horner’s

• 3rd nerve palsy: pupil down + out (+/- pupil dilatation and ptosis). Ax PCA aneurysm (painful + pupil dilation – compression of external parasympathetic fibres), HTN + DM

• 6th nerve palsy: failure of Abduction + horizontal diplopia. Ax. HTN, DM, raised ICP (reduced GCS, papilloedema + Cushings A; HTN, bradycardia + abnormal resp). CNVI = longest intracranial course, pinched at petrous temporal bone

• Horner’s syndrome: ptosis, miosis, anhydrosis (+/- enophthalmos) = damage to sympathetic chain. Hx resp problems, carotid trauma, stroke. Central = MS, Pre-ganglionic = Pancoast’s, Post-ganglionic – cavernous sinus thrombosis (+ CN 3-6 palsies)

• Holmes-Aide: benign moderately dilated pupil, poor direct light response + accommodation. Ax damage to preganglionic parasympathetic or idiopathic. (+ absent knee/ankle reflexes + hypotension = syndrome)

• Argyll-Robertson: » small, irregular. Accommodation but poor light reaction. Iris depigmentation. Ax. 4o syphillis, DM

• Field defects: homononous hemianopia (lesion at optic tract = stroke), bitemporal hemianopia (lesion at optic chiasm = pituitary tumour – think prolactinoma, acromegaly » Ix = MRI pituitary), monocular vision loss (lesion at optic nerve).

UPPER MOTOR NEUROE

Spastic paraparesis: difficulty walking, hypertonia, clonus, hyperreflexis, weakness. NO fasciculations, scissoring gait. Ax signs: cerebellar » Friedrich’s ataxia, distal muscle wasting + bony deformity » old Polio, eye signs » MS, sensory level » spinal, bladder/bowel » cord compression. Common Ax: MS, MS, trauma, CP, MND, cord compression. Rare: syringomyelia, subacute combined degeneration of the cord, Friedrich’s ataxia Ix. Bloods (infective, inflammatory, B12 » SACD), spinal CT » bony mets, MRI » compressive cord lesions

• Cord compression (EMERGENCY): radicular pain, sensory level, sphincter disturbance. Ax. Disc prolapse (above L1/2), malignancy, infection, IVtreatedraw. Ix. MRI. Mx. Urgent decompressive laminectomy +/- Abx + dexamethasone (malignancy)

• Cauda equina: radicular pain, bilateral flaccid areflexic LL, saddle anaesthesia, poor anal tone


Stroke: acute onset focal neuro Sx >24hrs. Ax. Ischaemic (80%), haemorrhagic (20%) – in young pts (thrombophilia, vasculitis, SAH, carotid artery dissection). RF: mod (smoking, HTN DM, inc lipids, PVD, OCP, AF), non-mod (male, age, prev TIA)

• Bamford Classification: total anterior (carotid/MCA/ACA » hemiparesis/hemisensory, homononous hemianopia, higher cortical dysfunction » aphasia, neglect, apraxia), partial anterior » homononous hemianopia + higher cortical dysfunction (2/3), posterior circulation » vertebrobasilar territory » cerebellar/brainstem syndrome, homononous hemianopia, lacunar infarct (basal ganglia, internal capsule, thalamus +pons » pure motor/sensory, dysarthria/clumsy hand, ataxic hemiparesis)

• Ix. NGT, BM (exclude hypoglycaemia), neuro obs, FBC (infection), U&E, cloting, CXR (aspiration pneumonia, Lung Ca, cardiomegaly) CT (exclude primary haemorrhage), diffusion-weighted MRI (most sensitive).
• **Mx.** Alteplase if 18-80yrs + <4.5hrs since onset, aspirin 300mg PO/PR once haemorrhage excluded, neurosurgical opinion » stroke unit + specialist nursing/physio, early mobilization, DVT prophylaxis » secondary prevention + rehabilitation

• **Prognosis:** 40% full recovery, 20% die within 1 month, 10%/yr recurrence. **Late complications:** depression, dysphagia, epilepsy, DVT, contractures, pressure sores. **Poor prognosis:** cerebral haemorrhage, elderly, reduced GCS, ++ paralysis

• **TIA ABCD score:** Age >60, BP >140/90, **Clinical features** (2 for focal weakness, 1 for speech disturbance only), **Duration of sx** (1 for 10-59m, 2 for >60m). 7d stroke risk <4 ~0%, 35.5% = 6. **Mx (>4):** ABCDE, aspirin 300mg, specialist referral within 24hrs

• **Non-acute work-up:** ECG +/- 24hr tape, U+E (renovasc), glucose, lipids, clotting, thrombophilia screen (F5 Leiden, lupus anticoagulant, Anti-cardiolipin, PCR for prothrombin gene mutation, Protein S/C assays), CXR, Echo (mural thrombus)

• **Secondary prevention:** statin after 48hrs, aspirin/clopidogrel 300mg for 2wks » clopidogrel 75mg OD, warfarin if AF/cardioembolic stroke, carotid endartectomy.

**Cerebellar Syndrome:** completing: cranial nerves, corneal reflex (CPA), optic atrophy (MS), Pes Cavus (Friedrich’s). **ix. MRI**

• **Sx = DANISH:** Dydiadochokinesia, Ataxia, Nystagmus, Intention tremor (+ past-pointing), Speech (slurred, staccato, canning dysarthria), Hypotonia. **Ax = DASIES:** demyelination, alcohol, infarct, SOL (CPA tumour), Inherited (Friedrich’s ataxia, Wilson’s), Epilepsy meds (phenytoin), system atrophy (parkinson + MSA)

• **Nystagmus:** cerebellar = fast towards lesion, vestibular = fast away from lesion

• **Specific Mx.** MS » methylpred, EtOH » prabrinex, chloldiazepoxide, Schwannoma » gamma-knife, Wilson’s » pencilamine

• **Vestibular swannoma:** tumour of superior vestibular nerve (80% CPA tumours » CPA tumours), assoc w NF2

• **CPA:** ipsilateral CN5-8 palsies + cerebellar signs » facial anaesthesia, absent corneal reflex, sensorineural deafness + DANISH

• **Von Hippel Lindau:** renal cysts, bilateral RCC, cerebellar haemangioblastomas, phaeochromocytomas, islet cell tumours

• **Wilson’s:** AR mutation Ch13 » Cu accumulation: Kayser-Fleischer, CLD, arthritis, parkinsons, ataxia, psychiatric problems

**Lateral medullary syndrome:** occlusion of one vertebral arteries or posterior inferior cerebellar artery » dysphagia, ipsilateral ataxia, ipsilateral nystagmus, vertigo, ipsilateral facial anaesthesia + absent corneal reflex, contralateral pain loss, Horners

**Brainstem syndrome:** vertigo, vomiting, diplopia, dysphagia, ataxia. **Millard-Gubler** (pontine infarct): diplopia, CVII + V(motor) palsy, contralateral hemiplegia. **Weber’s syndrome:** ipsilateral III nerve palsy, upward gaze palsy + contralateral hemiplegia

**Multiple Sclerosis:** AI condition, unknown aetiology (CD4-mediated destruction of oligodendrocytes) » plaques of demyelination in brain/SC (separated by time + space). **Types:** relapsing-remitting (80%), primary progressive (10%), secondary progressive, relapsing progressive. **Presentation** = tingling, optic neuritis + INO (MLF connecting CN6 to CN3), cerebellar signs, constipation, Lhermitte’s sign (neck flexion » electric shock), sexual/GU dysfunction, spastic paraparesis (exclude cord compression). **Uthoff’s sign:** eyes worse w heat + exercise.

• **ix. MRI** » T2 hyper-intense plaques, LP » IgG oligoclonal bands, Abs » Anti-MBP, EMG » delayed evoked potentials

• **McDonald Criteria for Dx:** Clinical (Hx >1hr >30d apart), Radiolongical (MRI), Laboratory (IgG oligoclonal bands)

• **Mx.** Acute » Methylpred for 3d. Preventing relapse » IFN-beta, plasma exchange IVIg, natalizumab (anti VLA-4 Ab). Symptomatic » modafinil (fatigue), SSRI (depression), oxybutynin (urgency), clonazepam (tremor)

• **Poor prognosis:** older, motor signs at onset, ++ early relapses, ++ MRI lesions.

**MIXED NEUROEND DISORDERS** = Don’t forget the mixed signs (Diabetes, Friedrich’s Ataxia, Tabo paresis, MND, Subacute combined degeneration of the cord!)

• **Friedrich’s ataxia:** hereditary spinocerebellar degeneration (AR, mitochondrial, expansion of GAA repeat on Chr), teenage onset, assoc w HOCM. **Clinical features:** Pes cavus, bilateral cerebellar ataxia, leg wasting + areflexia + extensor plantars, loss of dorsal columns, high-arched palate, optic atrophy + retinitis pigmentosa, DM in 10%

• **Taboparesis:** syphilitic myelopathy of the dorsal columns » weakness, hypopexiax, paraesthesia. Argyll Robertson pupils

• **Motor neurone disease:** 10% AD, F>M, 2/100,000, 50-70yrs. Features: LMN in UL (++, tongue fasciculation), UMN in LL (Rule out cord compression – NO sensory/spinherch, NO cognitive decline, speech/swallowing impaired). **Ix. MRI** » rule out structural, EMG » fasciculations, LP » exclude inflammatory. Diagnosis = **Revised El Escorial Criteria** (UMN/LMN + progressive + no other cause). **Mx.** Riluzole (antiglutamatergic – prolongs life by 3m), amitriptyline (drooling), feeding, tracheostomy, baclofen (spasticity). **Amyotrophic lateral sclerosis** (50%) = corticospinal tracts » flaccid arms + spastic legs. **Progressive bulbar palsy** (10%) = CN9-12 LMN » fascilitating tongue, dysarthria, dysphagia, choking, nasal speech, absent jaw jerk + gag reflex (Ax MN, MG, central pontine myelinolysis). **Spinal muscular atrophy** (10%) = Anterior horn cell [LMN only] » ++ distal atrophy. **Primary lateral sclerosis** (30%): Betz cell in motor cortex [UMN only] » spastic legs + pseudobulbar palsy = above mid-pons » spastic tongue, slow deliberate speech + brisk jaw jerk. (Ax MND, MG, stroke)

• **Subacute combined degeneration of the cord:** degeneration of the posterior + lateral columns of the SC (Ax. Vit B12 def, Vit E def, Cu deficiency – assoc w pernicious anaemia). Loss of vibration + proprioception, paraesthesia in UL/LL.
LOWER MOTOR NEURONE


Myasthenia Gravis: IgG Abs against Ach receptor on post-synaptic NMJ = weakness + fatiguability. HLAB8/DR3, 25% thymoma (check to ask to look up + hold), bulbar (voice deteriorates count 50-1), face (myathenic snarl), limb (assymetric prox weakness, normal reflexes » repeat arm flap). Ix: Tension test (IV anticholinesterase » inc power), anti-AChRs Abs, EMG (fatiguing response), red FVC, thymus CT, TFTs (Graves in 5%). DDX. SLE, polymyositis. Mx: Pyrostigmine (anti-Ch » salivation, lacrimation, urination, diaphoresis, GI upset, emesis, miosis), prednisolone for crises, thymectomy (remission in 25%), IVIG/plasmapheresis (crisis)

Ax. Widened mediastinum = 5Ts: thoracic dissection, thymoma, thyroid (retrosternal goitre), TB, terrible lymphoma

Lambert-Eaton syndrome: Abs to VGCC » red Ca influx during pre-synaptic excitation » red ACh vesicle fusion » proximal pelvic girdle weakness, diminished reflexes that ++ after exercise. ++ malignancy. EMG: “second wind phenomenon”

Peripheral neuropathy Sensory: DM (absent ankle reflex, autonomix 5x, glove/stocking), alcohol (small fibres = painful, burning, CLD signs), isoniazid/vincristine, B12 deficiency (large fibres » loss of proprioception, Romberg’s positive). Motor: acute (Guillaine-Barre – preceding D&V) or chronic (HSMN = Charcot-Marie Tooth). Autonomic: SLE, DM (postural BP drop >20/10mmHg, ECG >10bpm variation with respiration). Mononeuropathic multiplex: BM, CT disease (SLE, RA), vasculitis (PAN, Churg-Strauss), HIV, malignancy. Ix. Urine dip (glucose), HBa1c, LFTs, B12, ESR, TFTs. Nerve conduction studies.

• DM neuropathy: BM fingerpicks, loss of ankle jerks, night pain, ++ complications. Ax. Metabolic (glycosylation, ROS + sorbital accumulation) ischaemic loss of vassal navorum » axonal degeneration » red conduction amplitude. Mx glycemic control, amitrityline + capsicain cream [+/- flururoctidone w codeine phosphate] (for autonomic 5x)

• Charcot Marie-Tooth (HMSN): wasted LL + preserved thigh » champagne bottle appearance, pes cavus = toe clawing w contractures of Achilles tendon (DDx Friedric’s Ataxia), weak dorsiflexion, mild sensory loss, high stepping/stamping gait, wasting hand muscles, palpable lateral popliteal nerve. HMSN1: common, AD, myelin protein 22 gene mutation » demyelinating » red conduction velocity. HMSN2 – rare, axonal degeneration » norm conduction velocity. Mx. Supportive – foot care + orthoses. Distinctive CF: atrophy begins distally (c/w MND or dystrophy) + degree of disability < deformity.

• Charcot joint: painless deformity, joint destruction + new bone formation following repeated minor trauma secondary to loss of pain sensation. Ax: tabes dorsalis » hip + knee, diabetes » foot + ankle, syringomyelia » elbow + shoulder. Mx. Bisphosphonates

Guillain-Barre: following infection, Abs x-react with ganglioside. Symmetrical ascending flaccid paralysis, paeraesthesia + autonomic 5x. Ix. Low Na common, ++ CSF protein. Mx. Airway, analgesia, autonomic (inrotopes), antithrombotic (TEDS), IVIG. 5% mortality from resp involvement. Miller-Fisher = opthalmoplegia + ataxia + areflexia

Mononeuropathies:

• Brachial plexus (Ax. Trauma, radioTx): High (CS5/6) » Erb’s palsy (waifter’s tip), Low (C8-T1) » Klumpke’s claw hand = paralysis of flexor carpi ulnaris + ulnar flexor digitorum profundus (++) check for Horner’s syndrome

• Lat cut N of thigh (L2-3): entrapment under inguinal ligament » meralgia parasthetica (anterolat burning thigh pain)

• Sciatic (L4-S3): total hip arthroplasty, IM injections » loss of sensation lateral LL + foot, muscle weak below know

• Common peroneal (L4-S1): Ax trauma, crossed leg (fibular head) » foot drop, weak ankle dorsiflexion. Lat calf sensation

• Foot drop DDX: Peroneal nerve injury, knee dislocation, hip replacement (sciatic nerve injury), MND, MS, herniated disc

• Tibial (L4-S3): cant stand on tiptoes, foot inversion, toe flexion. Sole of foot

• Median nerve palsy (C6-T1): Ax. Carpal tunnel » thenar wasting + LLOAF (lateral lumbricals, opponens pollicis, Abductor pollicis, flexor pollicis brevis). Sensory: lateral 3/1 fingers + palm. Tinel’s/Phalen’s +ve

• Ulnar nerve palsy: Ax supracondylar # (elbow trauma). Partial claw hand (worse with ++ distal lesions), hypothemn arasting, cant do thumbs up, wasting of 1st dorsal interosei, Froment’s » ve (flexion of IP of the thumb when ADDucting)

• Radial nerve palsy: Low (wrist ) » finger drop, High (humerus) » wrist drop, V high (axilla) > triceps paralysis + wrist drop, snuffbox sensory

Facial nerve palsy: CN7 » internal acoustic meatus + petrous temporal bone, turns posteroinferoily + leaves skull » stylomastoid foramen (close to parotid) Signs: drop, absent nasolabial fold +/- forehead crease, scar or parotid mass, ear rash (otoscopy), CN8 signs (vettigo, tinnitus, deafness, tinnitus). UMN: sparing of forehead + orbicularis oculi due to bilateral cortical representation. Branches: superficial petrosal nerve (lacrimation – aberrant connection » crocodile tears), nerve to stapedia (hyperacusis), Ax. Lesion at...Pons (MS/stroke » VI palsy), CPA (tumour), auditory canal (Bell’s, Ramsay-Hunt), neck and face (parotid)

CV, MS, CPA or parotid tumour, Ramsay-Hunt syndrome. Bilateral: bilateral Bell’s, sarcoidosis, Lyme’s, Guillain-Barre

CPA: ipsilateral CNS-8 palsies + cerebellar signs » facial anaesthesia, absent corneal reflex, sensorineural deafness + DANISH chorda tympani (anterior 2/3 tongue), 5 facial branches (temporal, zygomatic, buccal, mandibular, cervical)

Bell’s palsy: 75%, inflammatory oedema » compression in narrow facial canal (probably HSV1) Mx. 60mg/d PO Prednisolone within 72hrs, protect eye, plastic surgery (80% full recovery)

Ramsay-Hunt: reactivation of V2V in geniculate ganglion of CNVII, vesicular rash. Mx valaciclovir + prednisolone
Basal Ganglia Conditions

Parkinsonism = clinical Δ: bradykinesia, tremor, rigidity (+/- loss of postural reflexes)

Parkinson's disease: progressive neurodegenerative disease affecting dopaminergic neurones in Substantia Nigra (Lewy bodies)
- CF: +/- autonomic disturbance (increased saliva, dribbling, dysphagia), dementia, sleep disorder (90%). ASSYMMETRIC
- Completing Exam: gait, write sentence/draw spiral, eye movements » progressive supranuclear palsy (upward gaze palsy), lying + standing BP (+ autonomic features) » MSA, MMSE, review drug chart, abdo exam » hepatomegaly/CLD (Wilson’s)
- Principles of Mx » increase Dopamine + reduce motor fluctuations. Young + fit » Da agonist + MOA-B inhibitors (red SE c/w L-DOPA) Old + comorbid » L-DOPA + MOA-B inhibitors. Adjuncts: Sinemet (decarboxylase inhibitor) » inc Da availability), Amantidine (dyskinesia), domperidone (nausea), quetiapine (psychosis), citalopram (depression), modainil (daytime sleepy).
- L-DOPA SE = DOPAMINE (Dyskinesia, On-off motor fluctuations, Psychosis, ABP drop, Mouth dryness, Insomnia, N&V, Excessive daytime sleepiness). ~2yrs, the beneficial effects of L-DOPA reduce, by ~5yrs 50% have unwanted SE

Parkinsons + syndromes: often diagnosed with poor response to L-DOPA
- MSA: Papp-Lantos bodies. Δ = cerebellar ataxia, parkinsonism, autonomic Sx (++++ autonomic = Shy Drager)
- PSP: symmetrical onset parkinsonism (tremor uncommon), postural instability, pseudodobular palsy + vertical gaze palsy
- Lewy Body dementia: ++ Lewy bodies in brainstem/neocortex » Parkinsonism, fluctuating cognition + visual hallucinations
- Vascular Parkinsonism: sudden onset, legs worse than arms, pyramidal signs + prominent gait abnormality

Causes of tremor: resting » parkinsonism, intention » cerebellar, postural » BET (better alcohol, worse anxiety), B-agonists, ++T4

Miscellaneous

Epilepsy: recurrent tendency to spontaneous, intermittent, abnormal electrical activity in brain » seizures (+/- prodrome + aura)
Ax. Idiopathic (2/3), congenital (NF, tuberous sclerosis), Acquired (SOL, CVA), provoked (withdrawal, hypoglycaemia, infection).
- Partial (features referable to part of one hemisphere): simple = awareness not impaired, complex = SAs (aura, autonomic, awareness loss, automatism, amnesia). Secondary generalised (focal = generalized). Mx 1st = Lamotrigine, 2nd = CBZ
- Localising features: Temporal (automatisms, déjà vu, delusional behavior, GI Sx, emotional, taste/smell), Motor (Jacksonian march, Todd’s palsy = paresis of limb up to 3d), Parietal (sensory), occipital (visual phenomena)
- Primary generalised (no warning aura): Absence (Abrupt, Short, Eyes, Normal exam/ix, Clonus, EEG 3Hx spike, Stimulated), Tonic-clonic (sudden jerk), Atonic (loss of tone, no LOC). Mx. 1st = Valproate, 2nd = Lamotrigine
- Pt advice: driving (post diagnosis no driving until >1yr seizure free), avoid ladders, baths, machinery, heights, swimming, pregnancy (take Lamotrigine + 5mg folic acid daily), OCP (CBZ is enzyme inducer » red effectiveness), Valproate = inhibitor
- Status epilepticus: 2x 2-4mg IV lorazepam > IV phenytoin infusion (+/- thiamine, glucose, dexamethasone)

Tuberculosis: AD, 80% epilepsy, 50% cognitive defects, renal angiomyolipomas, renal cysts + RCC, renal failure
- Skin changes: butterfly rash, perungal fibromas (hands/feet), Shagreen patch (roughened, leather patch on lumbar region), ash leaf macules (depigmented, fluorescence on Woods light) Resp: cysticlung disease. Abdo: enlarged kidneys (PKD or renal angiomyolipomas), transplanted kidney, dialysis. Eyes: retinal phakomas (dense white patches, 50%). CNS: retardation, seizures, signs of epilepsy Rx
- Ix. Skull XR » “railroad track” calcification, MRI head » tuberous masses in cerebral cortex, Abdo US » renal failure

Neurofibromatosis: Type 1 = von Recklinghausen (AD Chr 17): >6 >15mm café-au-lait spots, neurofibromas, Lisch nodes (iris hamartomas on slit lamp), CNS neoplasia, phaeochromocytoms, reduced IQ, RAS » HTN. Mx. Yearly BP/cutaneous review + genetic counselling. Type 2 (AD Chr 22, 50% de novo): café-au-lait spots, bilateral vestibular schwannomas » bilateral CNVIII palsies, SNHL, tinnitus + vertigo, lenticular opacity » juvenile cataracts. Ix. MRI. Mx hearing tests

Haemorrhage: blood in sulci + cisterns » SAH, crescent-shape » subdural, lens-shape » extradural (trauma + lucid window)

Migraine: Ax cerebrovascular constriction » aura, dilatation » headache. Triggers = CHOCOLATE.
- Prodrome (50% - days): cravings, sleep/mood. Aura (20% - <1hr): visual (flashes, lines, blindspot), sensory, motor, speech.
- Diagnostic: aura + headache, or >5 for 4-72hr + n/v or photophobia > 2 of unilat, pulsing, interfering + worsening by ADL.
- Mx. Acute » Paracetamol + metoclopramide/domperidone. Prophylaxis (if >2d/wk or ++ severe >1/m): avoid triggers, propranolol, topirimate (SHT3).
- Types: basilar (2nd to neurologic disease » brainstem dysfunction), hemiplegic (reversible limb weakness), ophthalmoplegic (CNIII), menstrual (due to drop in oestrogen)
PACES Summary Notes: Surgical Shorts

VASCULAR Mx is always non-surgical, interventional, surgical

- Arterial exam: UL: tar stain, IE, missing digits, radial rhythm + RR-delay, BP, supra-aortic +/- bruits. Radial = lat to flexor carpi radialis, brachial = medial to biceps tendon, Femoral = mid-inguinal point (1/2 ASIS > symphysis), popliteal = heads of gastrocnemius (slightly lat), PEDAL = posterior tibial (posteriorinferior to medial malleolus) + dorsalis (ext. hallux longus). Iliac bruit (1/2 umbilicus > mid-inguinal), adductor hiatus (SFA – just medial + above knee). **Buerger's**: <20% = severe ischaemia, reactive hyperaemia secondary to ischaemic metabolic products. **ABPI**: Norm >0.8, claud 0.6-0.8, crit <0.6, diab >1 (calcif)

- Bypass grafts: blocked arteries > RF Mx, endovascular: balloon, angioplasty, stening, surgery: endarterectomy, anatomical or extra-anatomical bypass (lap, no clamping intra-ado/Thorax vessels, ++ risk infection, for medically compromised pts).

- Synthetic (Dacron/ PTFE): above inguinal ligament + post-op aspirin. **Autologous** (long saphenous) + post-op Warfarin

- Indications: <100m claud dist, ++ Sx, rest pain. **Aorto-iliac stenosis** (PC: Leriche syndrome – butt pain, no fem pulses,impotence) → aortobifem (midline + 2x groin), axillofem (clavicle + 2x groin). Common iliac stenosis → aorto-fem.

- External iliac or proximal femoral (PC: thigh claudication) → ileo-femoral (groin + oblique) or fem-fem-crossover.

- Assessing graft: palpable thrill, peripheral pulses, ulcers, colour changes, Buerger's, venous filling, ABPI + Doppler

- **Claudication Hx**: lx. FBC (anaemia), U&E (renovasc), glucose (DM), lipids, exercise treadmill ABPI (red by >0.2), multi-direction Doppler (stenosis > monophasic), Intrarteral digital subtraction angiography (therapeutic Mx). **Prognosis**: conservative > 1/3 improve/constant/deteriorate, 25% 1yr mortality. **Non-surgical Mx**: walk through pain, exercise program, smoking, aspirin, statins, DM + foot care. **Interventional Mx**: angioplasty + stent (short stenosis in large vessels). **Surgical**

- **Critical ischaemia**: >2wks, ankle <40mmHg (toe <30), rest pain or tissue loss

- Acute ischaemia: <2wks, painful, pulseless, perishingly cold, + paraesthesia + paralyasis. 6hrs to revascularise! Ax. Embolic (30% - complete @femoral bifurcation), thrombotic (70% - prev stenosis plaque rupture). **Compartment syndrome**: +++pain worse on toe flexion, tense, swollen, acute ischemia. 4 compartments of leg: ant, lat, deep + superficial posterior

- Amputation: stump health/PVD, soft tissue moving freely, fixed flexion deformity, use of prosthesis, examine other limb.

- **Carotid endarterectomy**: scar beneath angle of mandible parallel to SCM (within 2wks of neurologic event + symptoms). Nerve injury: hypoglossal (ipsilateral tongue deviation), great auricular (nurb earlobe), recurrent laryngeal (hoarse)

- **Aneurysm**: abnormal, balloon-like swelling, resulting from weakening of vessel wall >inc 50% of normal diameter (fusiform = two-way e.g. AAA, saccular =one-way e.g. Berry. **MASS trial** = 65-75yrs US screening (<5.5cm → monitor, >5.5cm → repair) 50% reduced mortality. **Pseudoaneurysms**: pulsatile haemotoma around vessel wall in communication with lumen. **Popliteal**: 50% also have AAA, 50% bilateral. Risk acute limb ischaemia (→ embolectomy, fem-dist bypass). AAA repair: symptomatic,>5.5cm, >1cm inc/yr, complications. EVAR reduced perioperative mortality (but endograft failure)

- **Venous exam**: saphen varix at SFI (2 fingers below+ lateral to pubic tubercle) – blue tinge, disappears lying flat, cough impulse. Chevier’s sign = tap proximal + feel distal impulse. Auscultate for AVM + tourniquet test, **Perthes test** (for deep venous occlusion): high tourniquet + 5m walking → swelling + pain.

- **Varicose veins**: CEAP classification: clinical signs (1-6 + symptom/asymptom), etiology, anatomy, pathophysiology. Mx. scleroTx, endovenous laser, ligation (Trendelengburg = saphenofemoral, SSV in pop fossa, Subfascial endoscopic perforator)

- **Chronic venous insufficiency**: DVT destroys valves, with narrowed veins >> venous HTN [Lipodermatosclerosis: HTN > extravasation with poor tissue oxygenation > fibrosis of skin + subcutaneous fat. Venous obstruction → proximal leg swelling = Champagne bottle appearance]. lx. Duplex, venography, ambulatory venous pressures

- **Diabetic foot**: syndrome of PVD, small vessel disease, neuropathy + infection. **Wagener classification** of ulceration (0:pre-ulcer, 1: superficial, 2: FT, 3: osteomyelitis/abscess, 4: gangrene, 5: beyond salvage). Ax. 55% neuropathic, 10% ischaemia, 35% mixed. Complication: gangrene (Mx debride, Benzylenicillin + Clindamycin), gas gangrene (Mx, hyperbaric O2, metro)

<table>
<thead>
<tr>
<th>Ulcers</th>
<th>Venous (HTN)</th>
<th>Arterial (ischemia)</th>
<th>Neuropathic (local ischaemia + pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Gaiter area, especially over medial malleolus – may be ++large</td>
<td>Pressure points + anterior tibia, between toes</td>
<td>Pressure points – base of 1/5th metatarsals, heel</td>
</tr>
<tr>
<td>Surrounding veins</td>
<td>Ecema, Haemosiderin, Lipodermatosclerosis, Atrophie blanche, Varicostles, Warm</td>
<td>Pale,Troichi changes (loss of hair, shiny skin) ,PVD – red/absent distal swelling</td>
<td>Numb, absent ankle jerks, Charcot’s joints</td>
</tr>
<tr>
<td>Base</td>
<td>Slough + Granulation tissue (pink), Shallow</td>
<td>Necrotic, deep, Non-granulating</td>
<td>Deep w bone exposed</td>
</tr>
<tr>
<td>Edge</td>
<td>Slipping + purple/blue</td>
<td>Punched-out</td>
<td>Punched out</td>
</tr>
<tr>
<td>Discharge</td>
<td>Seropurulent</td>
<td>Serous or purulent</td>
<td>Serous or purulent</td>
</tr>
<tr>
<td>Pain</td>
<td>Painful at first</td>
<td>Painful</td>
<td>Painless</td>
</tr>
<tr>
<td>Extras</td>
<td>BM testing, insulin injection marks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>4 layer compression if ABPI&gt;0.8 (non-adherent/wool &gt; crepe &gt; blue line &gt; cohesive strong), Pentoxifyline PO, split-thickness skin grafts</td>
<td>Analgesia, RF modification, avoid b-B, IV prostaglandins, lumbar sympathectomy + L1/L4 paravertebral ganglia chemica ablation</td>
<td></td>
</tr>
</tbody>
</table>

- **Lymphoedema**: collection of interstitial fluid – blocked/absent lymphatics. **DDx BILATERAL** = R heart/liver failure, nephrotic syndrome, venous insufficienty, myxedema. **UNILATERAL** = venous, DVT, infection. Primary: Milroy's, Secondary = post radioTx, cancer, infection (TB, filariasis), trauma. **Mx. Grade 3 compression,raise leg, surgical debulking + bypass**
UROLOGY Imaging: US (hydrenephrosis, renal stones, masses), CT urogram w contrast (urethelial filling defects). Spiral non-contrast CT KUB (renal calculi), Triple phase CT w contrast (evaluating renal tumours), Cystoscopy (smokers, occupational Hx, Hx pelvic radioTx, dye exposure)

- Zwik referral: frank haematuria, persistent haematuria w dysuria or LUTS, female retention w pain + haematuria
- Mx of renal calculi: <5mm ➔ Diclofenac 75mg PO, >5mm ➔ Nifedipine, Obstructed + pyrexia ➔ JJ stent (hollow plastic tube, placed in the ureter (retrogradely or anterogradely) under GA to bypass obstruction in the ureter. Curved at either end to hold in place), >10mm + pain/renal insufficiency ➔ uretroscopy + laser/stone removal with Dormier basket, <20mm in prox ureter/kidney ➔ electroshock wave lithotripsy, >20mm in renal pelvis ➔ percutaneous nephrolithotomy under GA

- Nephrostomy: radiological procedure used to drain the kidney, inserted by interventional radiology. In a sick patient, consider you might want a patient in theatre (closer to ITU) therefore JJ stent may be better
- Ileal conduit: located in the RIF, drains clear urine into the bag
- Radical cystectomy with R sided ileal conduit (also L sided drain) – for T2/T3 bladder TCC (muscle/fat) + adjuvant chemo + surveillance cystoscopy. PC TCC bladder: painless haematuria, voiding irritability, recurrent UTI. MAN: bladder, prostate + pelvic LN. WOMAN: bladder, uterus, fallopian tube, cervix, ant vagina + pelvic LN

Scrotal pathology
- Can’t get above it ➔ inguinoscrotal hernia. Tender ➔ torsion (or torted hydatid of morgagni – look for blue dot), epididymo-orchitis, strangulated hernia
- Separately palpable + transilluminable ➔ epididymal cyst (retention of tubule ofrete testis/epididymis)
- Separately palpable + solid ➔ varicocele, spermatocele, sperm granuloma, epididymitis
- NOT separate + transilluminable ➔ hydrocele. NOT separate + solid ➔ tumour, orchitis, haematocele
- Varicocele: dilated veins of pampiniform plexus, bag of worms, dragging sensation. L side commoner (testicular vein longer + more vertical). Mx. Scrotal support, transfemoral radio-embolization of vein + surgical clipping
- Hydrocele: collection of fluid within tunica-vaginalis (patent). Mx. Lord’s repair (plication of sac) or Jaboulay’s (eversion)

THYROID 85% of neck lumps are LN: infection (EBV, tonsillitis), or malignancy (lymphoma, mets), 8% are goitres

**Anterior Δ:** ant margin SCM, midline, ramus of mandible
- Pulsatile: carotid aneurysm, tortous artery, chemodactoma (carotid body tumour @bifurcation, move laterally not vertically. Sx from pressure – dizziness + syncope. lx. Splaying on Doppler)
- Non-pulsatile: branchial cyst (embryological remnant, <20yrs, +/- abscess/flush, “glairy fluid w cholesterol crystals”. Mx Abx, surgical excision), laryngocele (cystic dilatation of laryngeal saccule, exacerbated by blowing), goitre, parotid tumour

**Posterior Δ:** post margin SCM, ant margin trapezius, mid 1/3 clavicle: LNs, cervical ribs (overdevelopment transverse process C7, red radial pulse on abduction/external rotation arm, +/- vascular/neuro Sx), pharyngeal pouch (herination of pharyngeal mucosa through Kilians dehiscence = between thyro and crico-epiglottal muscles – regurg, halitosis, gurgling. Mx: excision + crico-epiglottal myotomy), cystic hygromas (congenital multiloculated lymphangioma arising from jugular lymph sac – infant, inc when child cough/cries, ++ transilluminable. Mx. Hypertone saline sclerosant)

Midline: <20yrs ➔ thyroglossal cyst (persistent thyroglossal duct – between foramen caecum + thyroid – subhyoid/suprahoid. Moves up on tongue protrusion. Mx. Sistunk’s op = excision) dermoid cyst (inclusion of epidermis along skin fusion line, contains hair follicles/sebaceous glands. CT to establish extent). >20yrs ➔ thyroid isthmus, ectopic tissue

**Goitre DDX:** Diffuse: simple colloid (iodine def, autoimmune), Graves’, thyroiditis (Hashimoto’s, De Quervain’s, Subacute lymphocytic post-partum). Multinodular: colloid, ++ cysts, ++ adenoma. Solitary: dominant nodule, adenoma, cyst, malignancy

**Thyrotoxicosis DDX:** Graves, DeQuervains, Plummer’s disease (multinodular), toxic nodule
- Graves: ophthalmopathy (exophthalmic, upgaze palsy), dermopathy (pretibial myxedema = excess glycosaminoglycans in the dermis and subcutis of the skin > swelling +lumpy), thyroid acropatchy, ++ AI disease. +ve anti-TSH receptor, inc technetium99 uptake
- DeQuervain’s thyroiditis: preceding URTI, acutely painful goitre, fever, pain on swallowing, transient hyperthyroid Sx with inc T3/T4 then hypothyroid phase. Low uptake technetium99
- Mx. Beta-blockers (Sx), anti-thyroid (carbimazole – inhibits thyroid peroxidase. SE = BM suppression), radiiodine ablation, surgery

**Thyroid surgery complications:** reactionary haemorrhage > haematoma + airway compromise, laryngeal oedema, recurrent laryngeal nerve palsy (R side more common = oblique ascent), hypoparathyroidism (hypocalcaemia), thyroid storm (pyrexia, agitation, > coma, acute abdo, HF + AF. Mx propranolol IV, carbimazole > Lugol’s iodine, IV hydrocortisone)

**Other thyroid conditions**
- Simple colloid goitre: puberty/pregnancy, long Hx, asymptomatic smooth enlargement in the neck. TSH high, T4 normal
- Plummer’s syndrome: age >60, long-standing goitre, rapid onset hyperthyroid Sx
- Toxic solitary adenoma: large solitary nodule, hyperthyroidism + no stigmata of Graves disease
- Toxic multinodular goitre: irregular lump, hyperthyroidism + no stigmata of Graves disease
- Hashimoto’s thyroiditis: Hypo Sx with intermittent episodes of hyperthyroidism, AI disorders, associated w non-Hodgkin’s lymphoma
- Lingual thyroid: flattened, strawberry-like lump at the base of the tongue
- Mumps: neck/parotid + scrotal swelling, fatigue + fever. SVC syndrome: gross facial, neck + hand swelling (Pemberton’s sign: facial flushing and vein distension on arm lifting)
- Anaplastic Ca: elderly, recurrent laryngeal nerve palsy > hoarseness + stridor, lymphadenopathy
- Papillary Ca (70%): non-tender hard lump, cervical lymphadenopathy, FNA >> orphan Annie eyes + Psammoma bodies
- Medullary Ca: high T4, raised PTH. Follicular Ca (25%): lung + bone metastases
SUPERFICIAL LESIONS (See detailed notes for pictures)

- **Hypertrophic scar**: confined to wound margin, flexor surfaces/skin creases, soon after injury + regress, 8-20yrs, M=F
- **Keloid**: scar extends beyond wound margins, earlobes/neck/chest/back, months after injury + continues growing, F>M, black/hespanic. Mx: non-surgical = pressure Tx, topical silicone gel sheets, intralesional steroid/LA. Surgical: revision
- **Dercums disease**: ++ painful lipomas, peripheral neuropathy, obese post-menopausal women
- **Sebaceous cyst**: epithelial lined, containint keratin, @sites of hair growth
- **Gardener's syndrome**: FAP + thyroid tumours, osteomas, dental abnormalities, epidermal cysts
- **Ganglion**: related to synovial lined structure, 90% dorsum hand/wrist. DDx bursae, cystic protrusion from synovial cavity. Mx: Aspiration + 3wks immobilization. Surgical excision > 50% recurrence, risk NV damage
- **Neurofibroma**: benign nerve sheath tumour arising from schwann cells – pedunculated nodules of a fleshy consistence. NF
t1 = von Recklinghausens (AD, Chr 17) - >6 café-au-lait spots, freckling, NF, Lisch nodules (iris). Mx excision if ?malignant
- **Papilloma**: overgrowth of all layers of the skin w central vascular core (skin tag)
- **Pyogenic granuloma**: rapidly growing haemangioma on the hands, face, gums + lips +/- seropulent discharge. Hx prev trauma, common in pregnant. Mx. Curettage w diathermy of the bases
- **BCC**: pearly, rolled edges +/- telangiectasia. Mx Mohs surgery. SCC: crusty scaly ulcer +/- bleeding. Mx excision + radioTx
- **Actinic keratosis**: crusty warty pre-malignant lesions. Mx. 5FU. Bowens disease: red/brown plaques elderly female legs
- **Melanoma (ABCDE checklist)**: types: superficial (80%), lentigo maligna (face/scalp, elderly), acral lentiginous (palms/soles, black/Asian), nodular (younger, poor prog). Breslow depth: <1mm >75% 5yrs, >4mm = 50% 5yrs. Mx excision w margin

BREAST SURGERY Inspect axillae (LN dissection), arm (lymphedema), abdomen (DIEP/TRAM flap), back (lat dorsi flap)

- **Peau d’orange**: lymphedema of the breast due to inflammatory breast cancer
- **Paget’s disease of the nipple**: eczematous changes secondary to invasion with malignant cells within the skin
- **Triple assessment**: Hx/exam, Imaging (<30 → US, 50-70 → mammography, 30-50 → both), core biopsy +/- FNAC
- **Mastectomy**: (>4cm, multifocal, nipple, pt choice) Simple = breast alone, Modified = breast, pect minor + axilla
- **Drains**: axilla + surgical site – left for 3-5d or until <50ml/d.
- **Surgical complications**: haematoma, frozen shoulder, long-thoracic nerve palsy, lymphedema
- **Chemo**: 5-FU, Epirubicin, Cyclophosphamide (pre-meno, node +ve, high grade). EndoTx: Tamoxifen (SERM), Anastrazole (aromatase inhibitor – reduce risk endometrial Ca in post-meno). Bone mets: deep XR Tx, bisphosphonates, opiates

<table>
<thead>
<tr>
<th>Reconstructive techniques</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implants (+ tissue expansion)</td>
<td>Simpler</td>
<td>Cosmesis, requires ++ skin, breast lies higher. Late: capsular contracture, leakage, infection</td>
</tr>
<tr>
<td>Myocutaneous flaps (autologous)</td>
<td>Good for little remaining skin/muscle</td>
<td>++ blood loss, ++ op time/complications. Late: flap necrosis</td>
</tr>
</tbody>
</table>

- **Lat dorsi flap**: pedicled (w skin, fat, muscle + thoracodorsal A) +/- implanted – look under arm!
- **Deep inferior epigastric perforator flap (DIEP)**: skin + fat from tummy, no muscle (reduced pain + risk of hernia)
- **Transverse rectus abdominus (TRAM)**: pedicled (inf epigastric A) or free (attached to internal thoracic A), combined tummy tuck, no implant. Cl if poor circulation: smoker, obese, PVD, DM, abdo surgery. Risk of hernia
- **Gynaecomastia**: Complete exam with external genitalia, thyroid, evidence of CLD, visual fields, drug Hx.
- **Ax. Prescription drugs** (spironolactone, digoxin), CLD/thyrotoxicosis (increased peripheral aromatization of oestrogen), hypogonadism (testicular atrophy → reduced androgen production), oestrogen secreting stromal tumours.
- **Ix. Testicular Ca** (AFP, beta-HCG), hypogonadism (testosterone + LH), prolatinoma (PRL), TFTs, LFTs
PACES Summary Notes: Cardio

**Impalpable apex:** COPD, obesity, pericardial effusion, dextrocardia. **Pulm HTN:** JVP, L heave, loud P2, PSM TR, pulsatile hepategaly, oedema + ascites. **HS:** 1: mitral valve, 2: aortic valve, 3: rapid ventricular filling dilated LV, 4: atrial contraction against stiff ventricle

**ECG findings:** RVH = tall R in V1, deep S in V6 (cor pulmonale), LVH = deep S in V1, tall R in V6 (HTN, AS, HOCM). **RA hypertrophy** (pulm HTN, TS) = peaked P (P pulmonale). **LA hypertrophy** (MS) = broad, bifid P (P mitrale). **Axis:** Positive in I, Ii + aVF = normal. Positive in I + aVF, negative in II = **LAD.** Positive in I + II, Negative in aVF = **RA.** Rate: 300/no of squares between QRS. **ST elevation (>1mm limb, >2mm chest):** acute MI, pericarditis, vent aneurysm.

- **WPW** (accessory conducting bundle > SOB, palpitations + syncope): short, PR, slurred upstroke QRS = delta wave (V3/V4).
- **1st HB:** PR >200ms. **2nd Wenkebach/Mobitz I:** lengthening PR. **2nd Mobitz II:** 2:1 or occasional dropped p.
- **Regular SVT Mx:** TRANSIENT AV BLOCK, Mobitz II: 2:1 or occasional dropped p.
- **VT** (reg, >100bpm, QRS >120, no p/T): STABLE – correct electrolytes > amiodarone. UNSTABLE – sedate + DC cardioversion +300mg amiodarone over 30m
- **Atrial fibrillation:** DDx = multiple ventricular ectopics (becomes regular w inc HR). **Sig Neg:** murmur, ++T4, LVF, warfarin bruising
- **Ax:**: common
- **Ax** = infarction, myocarditis, mitral prolapse, digoxin, dilated cardiomyopathy, low K/Mg

**Heart failure:** syndrome of Sx/signs > inability of heart to meet physiological + metabolic demands. **LVF** = lung, **RHF** = body

**Framingham criteria** (2 major OR 1 major + 2 minor): MAJOR: PND, neck vein distension, S3, bibasal creps, cardiomegaly, acute pulm oedema (Mx. Sit up, 100% O2, IV frusenide + 2.5mg IV diamorphine), inc CVP, wt loss>4.5kg in 5d post Rx. **MINOR** = peripheral oedema, SOB on exertion, HR >120, nocturnal cough, hepatomegaly, pleural effusion.

- **LVF Ax:** IHD, dilated cardiomyopathy, valvular heart disease, HTN. **RVF Ax:** LVF, cor pulmonale (pulm HTN), tricu/pulm valve
- **NYHA Class:** 1 – no SOB, 2 – SOB on mod exertion, 3 - SOB on mild exertion, 4 – SOB at rest
- **Mx. 1st** = ACE-i, beta-block, loop diuretic (frusenide) [ACE =Sx/prog – Consensus 1 trial, BB=prog – MERIT 2, diuretic=Sx].
- 2nd = spiro (alold ast, K sparing), 3rd = Digoxin (inhbits Na-K-ATPase > inc Ca ++ myocyte contractility = Sx control).
- **Advanced Tx:** Ivabradine (sinus node inhibitor when LVEF <35%+ HR>70), CRT device (QRS >120ms), LVAD, transplant

**Pacemakers:** significant negatives: AF, LVF, valvular pathology, complications (infection, erosion)

- **Indications:** bradycardia (complete AV block, Mobitz II, +xSx), AF, HF (biventriicular), syncpe
- **Ix:** ECG (pacing spikes), CXR (visualize + count leads), Echo (LV function, valve pathology)
- **Types:** single lead (to and from RA/RV), dual lead (to RA and RV – allows maintenance of physiological response during exercise), biventriicular (RV/LV +/- RA – used for CRT in HF), implantable defibrillator (can be incorporated into any)
- **Complications** (lasts 5-10yrs): Insertion >bleeding, arrhythmias. Post > erosion, lead migration, pocket infection malfunction

**ACS:** STEMI= Sx + ECG findings, **NSTEMI** = Sx + troponin + NO ECG findings. **UA** = Sx + NO troponin+ NO ECG findings

- **Ix:** ECG, Functional (ETT, echocardiogram), anatomical (coronary angio, CT angio), bloods (trop, BNP, U&E)
- **Mx.** Conservative (RF modification), Medical (antiplatelets, statins, ACE-I, GTN), Interventional (PCI), Surgical (CABG)
- **Acute Mx.** 02, 5-10mg IV morphine + 10mg IV metoclopramide, 300mg aspirin + 300mg clopidogrel, enoxaparin (STEMI) or fondaparinux (STEMI), GTN + B-block, PCI or thrombolsis for STEMI. Discharge on beta-blockers + ACE-i
- **Complications:** ISCHAEMIC – angina, reinfarct, extension. MECHANICAL – failure, rupture (> cardiac tamponade (Beck’s Δ: inc BP, inc JVP, muffled HS + pulsus paradoxus), aneurysms, mitral valve dysfunction. EMBOLIC – LV mural thrombus. INFLAMMATORY – pericarditis, Dressler’s syndrome (autoAbs vs. myocyte sarclemma, recurrent pericarditis, anaemia ++ ESR. Mx. NSAIDs +/- steroids) ARRHYTHMIAS – tachycardias, bradycardias

**Hypertension Stage 1.** >140/90, **Stage 2.** >160/100, **Severe** >180/100, **Malignant** >180/110

- **Ax.** Essential, renal, endo (Cushing’s, +T4, phaeo, Conn’s), drugs (cocaaine, NSAIDs, CQP), Coa, pregnancy, overload
- **Ix.** 24hr ABPM, CV risk: glucose, lipids, end-organ damage: ECG (LV hypertrophy), urine dip (haematuria, Alb:Cr ratio), fundoscopy (Keith-Wagener: 1. Silver wiring. 2. Urinary 3. Flame haemorrhages/cotton-wool. 4. Papilloedema). **Specific Ax:** low K+, renin/aldost (Conn’s), 24hr urinary vanillylmandelic acid (phaeo), cortisol (Cushing’s), TFTs (thyrotocoxisosis)
- **Mx.** <80yrs, stage 1 + of (target organ damage, 10yr CV risk >20%, established CVD, DM, renal disease) or worse
- **1st line:** ACEI/ARB (<55) or CCB e.g. nifedipine (>55/black). 2nd line = A+C. 3rd = add thiazone diuretic (avoid with BB ++ DM)
CABG Indications: >50% LMS, >70% proximal LAD/circumflex + 3-vessel disease, disabling angina
- Harvest: saphenous vein (41% 10yr patency), internal mammary (83% 10yr patency), inferior epigastric, radial artery
- Prognosis: lasts 10-15yrs, 75% free of ischaemic events at 5yrs. Complications: death, arrhythmias, bleeding.

Murmurs
- **IX**: ECG (arrhythmias, LVH), bloods (FBG, U+E, BNP, lipids, glucose), CXR (calcified valve, LVH, cardiomegaly), Echo (severity, cause, LV function, other valves). **Gen Mx**: MDT, optimize CV risk, FU

- **Aortic stenosis**: ejection systolic murmur, R 2nd ICS (aortic), end-expiration (L sided), carotid radiation. **OE**: slow rising pulse, narrow pp, deceleration (LVF), signs of IE. **Sx** (<50% 5yr survival): angina, dyspnea, syncope (peak gradient >40mmHg)
  - Ax congenital bicuspid (+ root dilatation), acquired calcified. **Mx**: Replacement or TAVI. **DDx**: Sclerosis, HOCM, PS.

- **HOCM**: Harsh ESM @LLSR with increased by Valsalva, reduced by squatting. **OE**: jerky pulse, double apex beat. **Sx**: Angina, SOB, palpitations, exertional syncope/sudden death. **Ax** = LV outflow obstruction from asyssmetric septal hypertrophy. AD inheritance (50% sporadic), B-miosin chain mutation. **IX**: ECG > LAD/LVH, echo > ASH. **Mx** (medical (beta-blockers, amiodarone, antiagulate if AF), Surgical septal myomectomy, consider ICD)

- **Mitral regurgitation**: blowing PSM, apex, left lateral, end expiration. Axilla radiation +/- displaced apex, L parasternal heave, soft S1. **OE**: AF, LVF, signs of IE. **Sx** (25% 5yr survival): dyspnea, AF, HF. **Echo features of severity**: jet width >0.6cm, systolic pulm flow reversal, regurgitant vol >60ml. **Ax**: Leaflet (IE), annular ring (LVF), papillary rupture (MI), rheumatic fever, CT disorders (Marfan’s, ED). **Mx**: MVR, AF (rate control + antiagulate), reduce afterload (ACE-I, diuretics) **DDx**: AS, VSD, TR

- **Barlow syndrome**: mitral valve prolapse (5% all valve problems) > mid-systolic click +/- late systolic murmur. **Sx**: Atypical chest pain, palpitations, anxiety, panic attack. **Ax**: Primary myxomatous degeneration, MI, Marfan’s, ED, Turner’s.

- **Mitral stenosis**: diastolic murmur, opening snap, L lateral, end expiration with BELL. **OE**: middle-age, F, malar flush, AF, tapping apex, L parasternal heave, loud S1, AF. **Sx**: SOB, palpitations, CR, RHF. **IX**: CXR > LA hypertrophy, ECG > p mitrale, AF. **Ax** = Rh fever. **Mx**: 1<sup>st</sup> = percutaneous balloon valvuloplasty (pliable + minimally calcified, CI if LA mural thrombus), surgical commissurotomy. **MVR**. **DDx**: AR, Austin-flint (rumbling MDM 2<sup>nd</sup> to regurgitant AR fluttersting mitral valve), PT, TS

- **Tricuspid regurgitation**: PSM LLSE in inspiration. **OE**: inc JVP, pulsatile hepatomegaly, RV heave. **Ax**: Rhf, IE, carcinoid. **Mx**: Rx cause, diuretics, ACEI, digoxin, TVR

- **Pulmonary stenosis** EM: EUS radiating to L shoulder, ejection click, soft P2. **OE**: dysmorphic, RV heave, ascites, oedema. **Sx**: SOB, fatigue. **Ax**: congenital (Turner’s, Rhf), carcinoid syndrome. **IX**: ECG > p pulmonale + RAD, CXR > prominent pulm A. **Mx**: Valvuloplasty or valvotomy

- **Tricuspid stenosis**: EMD LLSE in inspiration, **Ax** = Rhf. **Sx**: Fatigue, ascites, oedema. **Mx**: Diuretics, TVR

- **Pulmonary regurgitation**: decrescendo EDM @ USLSE. **Ax** pulmonary HTN. 2<sup>nd</sup> to MS > high pitched = Graham-steel

Valve replacement
- **Indications**: severity, HF, pt choice. 1<sup>st</sup> HS (w pulse) = mitral (+/- diastolic flow murmur. Abnormal = MR). 2<sup>nd</sup> HS = aortic (+/- systolic flow murmur. Abnormal = AR). **Scars**: midline sternotomy, left lat inferior thoracotomy (MVR, mitral valvotomy). **OE**: AF – suggest MS, Sig neg: IE, HF, anaemia (MAHA, GI bleed), bruising. **Echo**: regurgitation/stenosis, perivalvular leak, vegetations, LV function, other valves
- **Metallic** (ball + cage, tilting disc, bileaflet) – 20yrs, lifelong warfarin (INR 3-4) **Biologic**: older pts, child-breareing age, bleeding
- **Complications**: surgery (5 mortality), valve (thromboembolism, MAHA, IE, failure), antiag (bleeding, anaemia)
- **AS indications** severe Sx, EF <50%, undergoing CABB or other valve op. TAVI (transcatheter) – folded valve is deployed in the aortic root, inserted through the groin. Inc perioperative stroke risk but red major bleeding. Similar 1yr survival

Rheumatic Heart Disease
- Abs cross-reactivity following group A beta-haemolytic strep pyogenes infection (Aschoff bodies + Anitschow myocytes). **Jones criteria**: evidence of infection (throat culture, rapid strep Ag, inc ASOT titre, recent scarlet fever) + 2 major or 1 major + 2 minor. **Mx**: Benpen IM for 10 days, NSAIDs, oral pred (if 3<sup>rd</sup> degree HB/CFC), halidol/diazepam for choroedema
- **Major** = PACES (Pericarditis, Arthritis, Chorea, Erythemata marginatum = raised red edges with central clearing, Subcutaneous nodules) **Minor** = fever, inc ESR/CRP, arthralgia, prolonged PR interval, prev Rh fever
- **60% with carditis develop chronic Rh heart disease** > valve regurgitation > stenosis (mitral 70%)

2nd prophylaxis: carditis + valve disease = until 40yrs penV 250mg PO, carditis NO valve disease = 10yrs, NO carditis > 5yrs

Infected Endocarditis
- **Dx = Duke criteria**: 2 major, 1 major + 3 minor or ALL 5 minor
- **MAJOR**: ++ cultures (3 >12hrs apart), endocardial involvement (+ve echo, new valve regurg – 85% MR, 55% AR)
- **MINOR** (IE Petit Features): Immune (GN, oslers nodes, rot spots, RF), Embolic (septic infarcts, splinter haemorrhages, Janeway lesions), Predisposition (cardiac lesion, LVDU), Fever >38

Normal values >> Acute (Staph > 30% mortality) – RF: LVDS, IS (DM, CRF), IX: bloods, urine, ECG, echo. **Mx** fluclox + gent

Cardiac disease (disease/prosthetic valves) >> Subacute (Strep viridans – 6% mortality). **Mx** benpen + gent

Connective tissue disorders
- **Marfan’s**: AD, mutation in FBN1 gene Chr 5. **Clinical features**: cardiac (aortic aneurysm, root dilatation > regurg, MV prolapse), ocular (lens dislocation), MSK (high arched palate, arachnoadactyly, arm-span > heigh, pectus excavatum, scoliosis, joint hypermobility). Complications: ruptured aneurysm, spontaneous pneumothorax. Dx: 2/3 organ systems. **Mx**: Ortho referral, reduce cardio intense sport, beta blockers (slow root dilatation), surgery (when root >5cm)
- **Ehlers-Danlos**: hyperelastic skin, hypermobility, AR/MR, aneurysms, easy bruising/bleeding
ABS Finals Notes

PACES Summary Notes: Respiratory

**COPD**: airway obstruction (FEV1 <80%, FEV1:FVC >0.7), chronic bronchitis (excessive mucus prod with airway obstruction > cough/sputum most d, 3m, 2y), and **emphysema** (histological Dx. airway destruction distal to terminal bronchioles)

- **DDx wheezy chest**: granulomatous polyarteritis (saddle-nose, obliterative bronchiolitis), RA, post-lung Tx (chronic rejection)
- **Imp negatives O/E**: CO2 retention, malignancy. Cor pulmonale (inc JVP, oedema, RV heave, loud P, pansystolic TR)
- **Pink puffers** (emphysema): destruction of airway + capillary bed > inability to oxygenate > compensatory hyperventilation > breathlessness + normal O2, low CO2. >>> T1RF. **Blue bloaters** (chronic bronchitis): Reduced ventilation with inc. cardiac output >>> + VQ mismatch > high CO2, low O2 + polycythemia >>> T2RF
- **Ax**: environmental = smoking/industrial (apical), genetic = alpha 1 anti-trypsin def (basal)
- **Iv. Hb (polycythemia), WCC + CRP (IECOPD), alpha-1 antitrypsin (young, FHx), Echo (pulm HTN + cor pulmonale)**
- **GOLD Classification**: mRC dyspnoea score (1. Vigorous, 2. Stairs, 3. Walk slowly, 4. <100m, 5. Dressing). FEV1 (mod <80%, sev <50%, v. sev <30%) + no of exacerbations/yr

<table>
<thead>
<tr>
<th>Exacerbation risk (FEV1)</th>
<th>Symptoms</th>
<th>1st line Rx</th>
<th>Rx examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LOW = &gt;50%</td>
<td>Few</td>
<td>SABA/SAMA PRN</td>
</tr>
<tr>
<td>B</td>
<td>Many</td>
<td>LAMA/LABA</td>
<td>ipratropium bromide (SAMA), tiotropium (LAMA)</td>
</tr>
<tr>
<td>C</td>
<td>HIGH = &lt;50%</td>
<td>Few</td>
<td>ICS + LAMA/LABA</td>
</tr>
<tr>
<td>D</td>
<td>Many</td>
<td>ICS + LABA + LAMA (Thome neb/LTOT)</td>
<td>Symbicort (budesonide + formoterol), Seretide (salmetrol + fluticasone)</td>
</tr>
</tbody>
</table>

**Asthma**: Acute: mast-cell + Ag > histamine. Chronic: Th2 cells > mast cell + eosinophil > remodeling > bronchial hyper-reactivity

- **Control**: SABA use (check technique), peak flow diary (>20% diurnal variation), attacks, admissions + ITU, oral steroid (+ SE?). **Associated disease**: GORD (??dyspepsia), Churg-Strauss (??rare onset, rash, neuropathy), ABPA
- **DDx**: COPD (FEV1:FVC <0.75, but >15% improvement in FEV1 with beta-agonist), pneumothorax (acute)
- **Mx.**: **Step 1**: Salbutamol 2-4mg up to 4xd. **Step 2**: Beclometasone 400ug/d. **Step 3**: Salmeterol 50ug BD (+/- inc steroid to 800ug/d) **Step 4**: Stop LABA + trial of: 1000ug/d steroid, montelukast (leukotriene rec antag). **Step 5**: Oral pred 5-10mg OD
- **Life-threatening (PP CHEST)**: PEFR <33%, PO2 <92%, Cynosis, Hypotension, Exhaustion, Silent chest, Tachycardia
- **Acute Mx.**: 100% O2, back-to-back neb salbutamol 5mg + ipratropium 0.5mg, hydrocortisone 200mg, pred 40mg PO 7d, Doxy 200mg PO STAT + 100mg OD for 5d. BiPAP if pH<7.35, RR>30

**Pneumonia**: reduced expansion, dull percussion, bronchial breathing (insp = exp, gap between, focal course crackles, increased VR. D Dx. Collapse, effusion, IECOPD. **CUBR 65** (if XR changes + >65yrs): Confusion (AMT <8), Urea >7mM, RR >30, BP <90/60

**SMARTCOP (50yrs)**: SBP <90, Multilobar CXR, Albumin <35, RR >25, Tachycardia, Confusion, O2 low, pH <7.35

- **Mx.**: CAP (pneumococcus, haemophilus) > amoxicillin/benzylpenicillin or cephalosporin + clarithromycin, HAP (pseudomonas) > co-amoxiclav + vanc, aspiration (anaerobes) > co-amoxiclav, PCP (HIV) > co-trimoxazole, TB > RIPE, fungi > amphotericin, HSV > ganciclovir, clamydia/mycoplasma/ legionella > clarithromycin
- **Ix.**: Bedside: sputum MCS, urine (pneumococcal Ags, Hb = mycoplasma). **Bloods**: WCC, U+E (low Na = legionella), CRP, LFTs (mycoplasma/legionella), culture, paired sera (mycoplasma + legionella), ABG (T1RF). **CXR**: consolidation +/- air bronchograms (air-filled bronchi visible c/w pus filled alveoli), effusion, cavities (S. aureus), reticulonodular (mycoplasma)
- **Complications**: sepsis + MOF, parapneumonic effusion, abscesses (swinging fever, clubbing), resp failure, empyema (recurrent fever + turbid tap). **SIRS**: temp >38/<36, HR >90, RR >20, WCC >12/<4. **Pneumovax**: >65yrs, DM, hyposplenism, chevi, HIV

**Bronchiectasis**: Chronic infection of bronchioles > permanent dilatation > retained secretions > damage + recurrent infection.

- **Specific Ax.**: RA (rheumatoid hands), Yellow nail syndrome (yellow nails + lymphedema), CF (young pt), hypogammaglobulinaemia (plenomegaly), IBD (abdo scars), Kartagener’s (dextrodactyly). Hx childhood infection
- **PC**: cough ++ purulent sputum, mixed crackles shift with coughing, clubbing, wt loss +/- cor pulmonale, haemoptysis
- **Ix.**: Gold standard = High resolution CT shows signet ring sign (thickened dilated bronchi > adjacent vascular bundle), CXR > tramlines and ring shadows, Ig (hygammag), Aspergillus RAST (ABPA), Rhf, sweat test (CF), ciliary motility (Kartageners)
- **Complications**: Secondary amyloidosis (proteinuria), massive haemoptysis (mycotic aneurysm), pulmonary HTN
- **Mx.**: Pulm rehab + active cycle breathing, ciprofloxacin 7-10d for exacerbations, prophylactic azithromycin, nebulized bronchodilators. **Rx underlying cause**: CF: DNAase, pancreatic (Creon), ADEK vit. ABPA: steroids. Immune def: IVIG

**Cystic fibrosis**: mutation in CFTR gene on Chr 7 > reduced luminal Cl secretions and inc Na reabsorption >> viscous secretions. +++ resp infections: Young > S aureus, H influenza. Old > pseudomonas aeruginosa, Burkholderia cepacia (worse prognosis)

- **O/E**: clubbed, small, portacath/Hickman line/scars for long-term Abx, PEG for malabsorption, young (mean survival 35 yrs)
- **Systematic manifestations**: lungs (bronchiectasis), pancreas (DM, malabsorption), GIT (obstruction), liver (gallstones, cirrhosis), GU system (infertility), neonate (FTT, meconium ileus, rectal prolapse)
- **Ix.**: Immunoreactive trypsinogen (neonatal), Sweat test (Na and Cl >60mM – false +ve Addisons, hypoT4), faecal elastase
- **Mx.**: Physio, prompt Abx, mucolytics. **Rx systemic complications**: pancrease + ADEK, insulin, ursodeoxycholic acid, DEXA osteoporosis screening, immunizations. **Conservative**: fertility/genetic counselling. **Advanced**: LTO2, NIV, heart-lung Tx.
Lung cancer: Squamous (35%, squamous differentiation, M, smoking, central + local invasion, ++ Ca), small (20%, bronchi, SIADH), adenoCa (25%, F, far-east, peripheral w gland/mucin, extrathoracic mets early), large (10%), alveolar (1%)

- Complications: Local: SVC obstruction (facial oedema, plethoric, dilated chest veins, stridor), recurrent LN palsy (hoarse, bovine cough), Pancoast’s (Horner’s, claw hand, dorsal interossei wasting). Endocrine paraneoplastic: SIADH (euvoelaemic low Na), Cushing’s syndrome, carcinoid (serotonin > flushing, diarrhoea), Io HPT (= SCC, inc Ca, bone pain).

- Other: dermatomyositis (heliotrope rash, Gottron’s papules), acanthosis nigricans

- Collapse: tracheal deviation TOWARDS, dull PN, INCREASED VR. Effusion: deviation AWAY, STONY dull, REDUCED VR

- Ix: CXR (collapse, mass, hilar lymphadenopathy), contrast volume CT, determine cell type (spumtum, US guided biopsy), lung function tests (pneumoneumolet CI if FEV1<1.2L). Staging Ix: CT, PET, thoracoscopy/mediastinoscopy + LN biopsy

- Coin lesion DDx = FANGS: Foreign body, Abscess, Neoplasia, Granuloma, Structural (AVM)

- Mx: NSCLC (surgery, radioTx + platinum-based chemo, e.g. cetuximab EGFR or erlotinib TK), SCLC – chemo

- Palliative: brain (dexamethasone + radioTx), SVC (dexamethasone, stenting + radioTx), effusions (chemical pleurodesis), bone pain/cough (opiates).

Prognosis: NSCLC 50% 5 yrs without spread, SCLC 1.5yrs median survival treated

Respiratory failure

- Hypoxia: acute (SOB, agitation, confusion, cyanosis), chronic (polycythemia, pulm HTN, cor pulmonale).

- Hypercapnoea: headache, flushing, bounding pulse, flap, confusion

- Type 1 (PaO2 <8kPa, PaCO2 <6kPa – diffusion failure): cardiogenic pulm oedema, ARDS, pneumonia, lung haemorrhage, atelectasis. Mx. 100% O2, assisted ventilation if PaO2 <8kPa despite 60% O2

- Type 2 (PaO2 <8kPa, PaCO2 >6kPa – ventilation failure): red CNS, NM disease, inc WOB (COPD, fibrosis), inc physiological dead space (PE, hypovolaemia). Mx. Controlled O2 Tx, consider NIV if PaCO2 >1.5kPa + hypoxic

Pleural effusion:

- Asymptomatic reduced expansion, treachea displaced away, stony dull PN, reduced air entry, reduced VR. Signs of Ax: cancer, CCF, CLD, CRF, CT disease (RA hands, SLE rash)

- Exudate (protein >35g/L. Ax = inc. capillary permeability): infection, neoplasm, inflammatory

- Transudate (protein <25g/L. Ax = inc. capillary hydrostatic or red oncotic pressure): CCF, CRF, liver failure, Meig’s

- Lights criteria (effusion/plasma ratio: albumin >0.5, LDH >0.6, LDH >2/3 UL of normal serum LDH = EXUDATE

- Empyema (exudate with low glucose + pH <7.2): recurrent fever. Ax anaerobes, staph, gram neg. Assoc w. bronchial obstruction (carcinoma), recurrent aspiration, poor dentition, alcohol dependence

- Mx. Rx cause, drainage if Sx (<2L/24h), IV Abx, intrapleural DNAse plus TPA, chemical pleurodesis or PleurX if recurrent

Sarcoidosis:

- F, afro-carribean. Often incidental CXR (bilateral hilar lymphadenopathy). Sx dry cough, SOB, chest pain

- Presentation = GRANULOMAS: General, Resp Sx + BHL (fine crackles lower zone), Arthralgia (+dactylitis), Urine (inc Ca), Low hormones, Opthalmalstic, restrictive cardioMyopathy, Abdo (hepatosplenomegaly), Skin (erythema nodosum, lupus pernio)

- Ix. Raised ESR, Ca, serum ACE. CXR > bilateral LN, biopsy > non-casing granulomas

- Mx. Acute > bed rest + NSAID. Chronic > pred 40mg/d for 6 weeks. Prognosis: 60% with thoracic responds within 2 years

Pulmonary fibrosis:

- Cyansis, clubbing, fine late inspiratory crackles (don’t shift on cough), AI signs, steroids Tx

- Ax. Idiopathic (honeycombing pattern), CT-associated (scleroderma, RA, LSE), sarcoid, hypersensitivity pneumonitis (extrinsic allergic alveolitis), drugs (amiodarone, nitrofurantoin, chemoTx (methotrexate, bleomycin)

- Ix. CRP/ESR, ANA, Rh factor, CXR (retinonodular changes), ABG T1RF, HRCT (bibasal = ITP, widespread ground-glass = Al, apical = sarcoidosis, ABPA, old TB), lung function (FEV1/FEVC >0.8 = restrictive, low TLC), BAL (lymphocytes = good, PMN/oesinophils = bad)

- Mx. Pulm rehab, LTOT, ABPA, anti-tussives, smoking cessation, Pirfenidone (anti-fibrotic used in IPF when FEV1 50-80%), immunosuppressives (sarcoid, CT), transplant. PROGNOSIS: 50% 5yr survival

- Upper zone = APENT: Aspergillosis, Pneumocinosis, Extrinsic allergic alveolitis, Negative sequoropathy, TB

- Lower zone = STAIR: Sarcoidosis, Toxins, Asbestosis, Idiopathic pulm fibrosis, Rheum (RA, SLE, scleroderma, Sjogrens)

Old TB: asymmetry (absent ribs), scars (thoracoplasty = rib removal to collapse lung, phrenic nerve crush for diaphragm paralysis in supravaculicular fossa), consolidation, tracheal deviation towards apex, red expansion. Microscopy = Ziehl-Neelsen, culture = Lowenstein-Jensen (gold standard lx)

- Drugs = RIPE: Rifampicin (SE: hepatitis, enzyme inducer, red/orange secretions), Isoniazid (peripheral neuropathy, hepatitis), Pyrazinamide (hepatitis, gout), Ethambutol (optic neuritis > loss of colour vision first). Rx = 2m RIPE, 4m RI

- Primary TB: organisms @ pleural surface > Ghon Focus, move to LN > Ghon complex. Fibrosis > calcified nodule

- Primary progressive: resembles acute pneumonia +/- lymphoehematogenous spread > extra-pulm/military TB

- Latent TB: infected but no clinical or CXR signs of active TB. Dx. Tuberculin skin test < IFN gamma release assay

- Secondary TB: reactivation due to red host immunity > tissue destruction > cavitation > caseating granulomas

Aspergillus infections:


Aspergillosis: IS patients, CXR shows consolidations + abscess. Aflatoxins > liver cirrhosis + HCC. Mx Voriconazole (30% mortality)

Pulm HTN (PA pressure >25mmHg): Ax. Left heart disease, lung parenchymal (hypoxo vasoconstriction), pulm vascular disease, hypoventilatiopn. Gold standard Ix. Right heart cathetarsisation. Complication = cor pulmonale (inc JVP, L parasternal heave, Graham Steel EDM, pan-syst TR, pulsatily hepatomegaly, oedema). Rx: LTOT, CCB e.g. nifedipine, ACE-I, BB, diuretics

OSA: intermittent collapse of pharyngeal airway during sleep. Ix. Polysomnography. Rx. CPAP at night. Comp: pulm HTN, T2RF
**PACES Summary Notes: Abdomen**

**Scars:** Mercedez-Benz: liver Tx, Whipple’s, oesophagectomy (+ back scar = liver Liver) **Midline laparotomy** (Layers: skin, camper’s fascia, scarpa’s fascia, linea alba, transversalis fascia, pre-peritoneal fat, peritoneum): emergency bowel, Kocher: open cholecystectomy or splenectomy, **Rutherford Morrison:** kidney Tx, **join:** nephrectomy, Lanz: transverse in Rif, McBurney’s: oblique in Rif, McEvoy: high horizontal inguinal, **Lockwood:** low horizontal inguinal, **vascular access:** vertical inguinal

**LAPAROSCOPIC:** sigmoid resection = LIF, 2 on the R. Right hemicolecetomy = Rif, 2 on the L. Lap Chole = Abdo port + 3 RUQ Whipple’s s for fit, no mets, tumour <3cm. removes head of pancreas, gallbladder, part of duodenum, pyloris, LNs. Common complication: delayed gastric emptying >> Mx. feeding

**Stomas:** artificial union between conduits or between a conduit and the outside, indicated for exreriorisation diversion, decompression, feeding or lavage. Early complications: haemorrhage, ischaemia, high output (>1 low K+) – Rx Loperamide +/- codeine, parastomal abscess, stoma retractions. Late complications: parastomal hernia (lateral), obstruction, dermatitis, prolapse, stenosis, fistulae, psychosexual

Urostomy (following total cystectomy): ileal conduit (incontinent) – ureters attached to portion of resected ileum which is exteriorised as spouted stoma), Indiana pouch (continent) – pouch created from 2st of resected bowel inc ileocaecal valve, ureters anastomosed to colon end + ileal >> spouted stoma)

**Hernias:** the abnormal protrusion of a viscus through its containing walls

- Define groin anatomy to pubic tubercle (2-3cm lateral to symphysis): above + medial = inguinal, below + lateral = femoral
- Spermatic cord: Penises Do Contribute To A Good Fun Sex Life = Pampiniform plexus, Ductus defrers, Cremasteric artery, Testiculare artery, Artery of the ductus deferen, Genitale branch of genitofemoral, Fascia, Sympathetic supply, Lymphatics
- Hesselbach’s Δ: inguinal lig (inferior), rectus abdo (medial), inferior epigastric artery (lateral)
- Inguinal canal: inguinal lig (inferior), transversalis + conjoint tendon (posterior), internal oblique (superior), external (ant)
- Contents of inguinal canal: Male (spermatic cord + ilioinguinal nerve), Female (round ligament uterus + ilioinguinal nerve)
- Deep inguinal ring: mid-point of ligament (ASIS – pubic tubercle). **Mid-inguinal point** (NAVY pass deep to ligament) > symphysis
- **Direct inguinal:** inferior to lateral epigastric vessels, young, patent processus defreralis > bowk hole process through deep inguinal ring, may extend into scrotum + strangulate. Direct: medial to inguinal ligament, elderly, weak Hesselbach Δ in posterior wall of canal. RF: chronic cough, constipation, obesity, prostate. Management: manage constipation, wt loss, elasticated corset. Lap if bilateral – Totally extraperitoneal or trans-abdominal pre-peritoneal. Open = Lichtenstein Tension Free Mesh. Complications: early (urinary retention, haematoma), late (recurrence, ischaemic orchitis, chronic paraesthesia)
- **Femoral:** through femoral canal, middle-age F, inferior and lateral to pubic tubercle. High risk obstruction + strangulation. Elective surgery = Lockwood (low incision), emergency surgery = McEvoy (high approach to allow inspection + resection)
- **Umibilical:** congenital, RF afro-carib or trisomy-21, usually resolves by 2-3yrs. Paraumbilical: middle-aged obese men, inc abdo pressure, defect through linea alba. Mx **Mayo mesh repair** (small defect > higher risk of strangulation)
- **Incisional** (through prev acquired defect) RF: pre-op comorbidities, intra-op (too small suture bites, placing drains through wounds), post-op (inc IAP, infection, haematoma). Mx. Manage RF, elasticated corset, Nylon mesh repair (open/lap)

**Chronic liver disease:** chronic condition - progressive destruction + regeneration of the liver >> fibrosis and cirrhosis (histological de: cverison of liver architecture into structurally abnormal). Signs: palmar erythema, duopytren’s, xanthelasma, gynaecomastia, spider naevi (SVC, >4, central filling). Causes: Alcohol, NASH, hepatitis, (HH, AI hepatitis, methotrexate)

- **Liver screen:** ETOH (MCV, GGT, AST:ALT >2), viral serology, NASH (lipids), AI (anti-SM, pANCA), Ig (GG = AI, IgM = PBC), genetic (caeruloplasmin, ferritin, alpha1-antitrypsin), malignancy (AFP, Ca19-9), clotting, albumin
- **Complications:** Portal HTN: ascites, splenomegaly, varices, caput medusa + distended abdo veins. Decompensation: encephalopathy (asterixis, altered CNS), hypoalbuinaemia (ascites, leukonychia), coagulopathy (bruising), jaundice
- **Mx complications:** Ascites (Mx. fluid/salt restric, spiro, frusemide, tap + daily wt), bleeding (Mx. Vit K, FFP, platelets), encephalopathy (Mx. Avoid sedatives, lactulose + rifaximin), Varices (Mx. IV terlipressin, b-blockers, banding), Hypoglycaemia (Mx. Dextrose), Sepsis/SPB (PMN >250, Mx. Tazocin)
- **Portal HTN Ax:** pre-hepatic (splenic/portal vein thrombosis), hepatic (cirrhosis, sarcoidosis, myeloproliferative), post-hepat (RFH, Budd-Chiari) [Ascites: SAAG: >11g/L = portal HTN (transudate)]
- **Jaundice** [normal Br 3-17uM, visible @500M (3x UL)] Ax. Pre-hepatic haemolysis: SCD, AIHA. Hepatic: hepatitis (ETOH, viral), decompenated CLD, drugs (paracetamol, statins, anti-TB). Post-hepatic: gallstones, Ca head of pancreas, LN @porta hepatitis
  - US: dilated ducts (>6mm), gallstones, pancreatic mass or LNPathy
  - Post-op jaundice: pre-hepatic (haemolysis after a transfusion), hepatic (anaesthesitics, sepsis), post-hepatic (biliary surgery)
  - Ix: Pre-hepatic (inc cBR, LDG, coomb’s test, Hb electrophoresis), Hepatic (AST:ALT >2=eTOH, <1 = viral, inc GGT = eTOH), post-hepatic (inc cBR, inc ALP)
- **CLD Specific Mx.** HCV (IFN alpha + ribavirin), HBV (IFN alpha) PBC (ursodeoxyacetic acid), Wilson’s (penicillamine), HH (venesection, desferrioxamine), pruritis (cholestyramine + bile acid sequestrant)
- **Liver Tx.** Kings College Hospital criteria for acute failure – paracetamol = pH <7.3 after 24hrs, non-paracetamol = PT>100s
Organomegaly

- **Hepatomegaly Ax:** Common: CLD, CCF, carcinoma. Rare: infection, immune (PBC/PSC/AI), infiltrative.
  - Ix. CLD (Hx: EtOH, travel, RF), cardiac (Hx: SOB, PND, RF), haem (Hx: fatigue, bone pain, infections, wt loss)
- **Hepatosplenomegaly Ax:** haematologic (myeloproliferative, SCID), infection (malaria, leishmaniasis)
- **Splenomegaly Ax:** Haem – SCD, CML/CLL, myelofibrosis (pallor, bruising, purpura, LNs, cachexia), portal HTN (CLD signs), IE (splitter haemorrhages), Felty’s syndrome (RA hands), massive spleen (CML/CLL, amyloidosis, malaria). Ix.. Urine (haem = IE, protein = amyloid), WCC – CML, pancytopenia – myeloma, lymphocytosis – CLL, anaemia – haemolysis, film – malaria

Biliary: Cholesterol Gallstones (20%) formation = **Admirand’s Δ:** red bile salts, red lecithin, inc cholesterol

- **Complications:** GALLBLADDER (biliary colic, acute cholecystitis +/- empyema, chronic cholecystitis, mucocoele, carcinoma, Mirizzi’s syndrome = hepatic duct obstruction), COMMON BILE DUCT (obstructive jaundice, pancreatitis, cholangitis), GI TRACT (gallstone ileus – Rigler’s triad: pneumobilia, SBO, gallstone in RLQ)
- **Biliary colic:** spasms against stone impacted in Hartmann’s pouch (+ bile stasis > infection = cholecystitis. Mx. Cefuroxime + metronidazole). Empyema = autoamputation synchronous bile duct + cystic duct (cystic artery in the middle)
- **Chronic cholecystitis:** flatulent dyspepsia exacerbated by fatty foods. AXR: porcelain gallbladder, shrunken on US.
- **Charcot’s Δ:** rigors, RUQ pain + jaundice = ascending cholangitis (Ms. Cef, met + ERC) Calot’s Δ: liver edge, common hepatic duct + cystic duct (cystic artery in the middle)

Inflammatory bowel disease

- **Crohn’s:** Th1/17, 20s, ++ concordance, skip lesions, transmural, rose-thorn ulcers, cobblestones, fistulae, granulomas. Diarrhoea, abdo pain, wt loss, ++ arthritis, apthous ulcers, malabsorption (fat = steatorrhea, gallstones, B12 = megaloblastic anaemia, Vit D = osteomalacia, protein = oedema), RIF mass, perianal abscess, anal strictures
- **UC:** Th2, 30s, mucosal continuous, crypt abscesses, ++ pseudopolyps, clubbing, erythema nodosum, pyoderma gangrenosum, ankylosing spondylitis, sclerosing pericholangitis, toxic megacolon, carcinoma. Diarrhoea, blood +/- mucus, tenesmus + urgency
- **Complications:** Crohn’s (stoma complications, enterocutaneous fistulae, anastomotic leak, short-gut syndrome when <1-2m small bowel), UC (SBO, anastomotic stricture, pelvic abscess, toxic megacolon, CRC in 15% w pancolitis for 20yrs)
- **Ix:** Bloods, stool culture (exclude infective), AXR, contrast studies (Crohn’s = small bowel follow through, UC = gastrografin/Bar enema => lead pipe, thumbprinting), ileocolonoscopy + regional biopsy
- **Truelove/Witts Criteria severe UC = 2 Sx (BO >6x/d, large PR bleed), 2 Obs (HR>90, temp>37.8), 2 lab (Hb <10.5, ESR >30). Mx. IV corticosteroids > IV cyclosporin after 72hrs. Maintenance consider azathioprine/mercaptopurine (TPMT activity)
- **UC Mx:** consider mercaptopurine/azathioprine if >2 exacerbations in 12m requiring oral steroids, or not maintained
- **Proctosigmoiditis INDUCTION:** 1st = suppository +/- oral mesalazine, 2nd = oral pred (after 4w) > oral tacrolimus (after 4w), 3rd = vedolizumab. MAINTENANCE: topical +/- oral mesalazine. Left-sided/extensive: INDUCTION: 1st = high dose oral mesalazine + pred, 2nd = oral tacrolimus (after wk pred). MAINTENANCE: low dose oral mesalazine
- **Surgery for UC** (curative intent): ELECTIVE: protocolectomy with ileo-anal pouch (colon + rectum removed, ileal pouch anal anastomosis, diverting loop ileostomy for 3m) or irreversible panproctocolectomy (also FAP). EMERGENCY: subtotal colectomy w end ileostomy +/- mucus fistula (all colon removed, leaf distal sigmoid – reversed after 3 months)
- **Crohn’s INDUCTION:** 1st = prednisolone (budesonide/mesalazine if CI), add-on = azathioprine/mercaptopurine (TPMT activity, methotrexate if CI), biologics = adalimumab (12m or until failure). MAINTENANCE: azathioprine/mercaptopurine
- **Perianal disease (50%):** Ix. MRI, Rx. Metronidazole PO, steroids +/- infliximab, local surgery Acute severe: IV metronidazole
- **Surgery for Crohn’s** (never cure, avoid short-gut): ileoceleectomy, abcess drainage, defunctioning, subtotal colectomy

Colorectal carcinoma: Dukes criteria for staging (A: bowel wall, B: through wall, C: regional LN, D: distant mets), Ix. CEA marker, Ba/gastrografin enema >> apple-core, flexi sig (access 65%), screening (Faecal occult blood 2yrs 60-75yrs, 1x flexi-sig 55-60).FAP: AD, APC gene, 5q21. Gardener’s: thyroid, osteomas, dental abnormalities, epidermal cysts, polyps. HNPCC: AD, Lynch 1=R sided CRC, Lynch 2= CRC + gastric, endometrial, prostate, breast. Peutz-Jeghers: mucocutaneous hyperpigmentation, multiple GI haemartomatosus polyps, inc Ca risk

**Colonic resections:** key principles: blood supply, lack of inflammation, no tension, clear margins, complete LNadenectomy
GI Histories

Alcoholism: Rx withdrawal – tapering regimen chlordiazepoxide PO, thiamine +/- lorazepam IM, baclofen/acamprosate to reduce cravings, disulfiram aversion therapy. Alcoholic hepatitis: Maddrey score predicts short term mortality

PBC: middle-aged F, pruritis, lethargy, +/- AI disease, subsequent liver failure. Other clinical feat: face pigmentation, osteoporosis, HSM, coagulopathy, ++ cholesterol, steatorrhoea. Ax = chronic granulomatous inflammation > cholestasis + intrahepatic bile duct destruction. +ALP, AMA+. IgM. Prognosis <2yrs from jaundice.

PSC: younger, male, jaundice, pruritis, fatigue, abdo pain, ++ IBD. Ax = inflammation, fibrosis, and strictures of the intra/extrahepatic ducts > 2b biliary cirrhosis > liver failure. Comp: bacterial cholangitis, inc cholangiocarcinoma. Rx: pANCA, beaded appearance on ERCP. Mx: transplant, Ca19-9 screening for cholangiocarcinoma + colonoscopy for CRC. Recurrence 30%

Coeliac: HLA-DQ2, CD8+ mediated response to gliadin in gluten, anti-endomysial IgA, anti-TTG Iga, anti-gliadin IgG (persists with exclusion diet), subtotal villous atrophy + crypt hyperplasia on duodenal biopsy. Mx = gluten-free diet

Abdo distension, colic, flatus, steatorrhoea, anaemia (red Fe/folate), bone pain/osteoporosis (red Vit D/Ca), petechiae/INR (Vit K), angular stomatitis (Vit B2), polyneuropathy (Vit B1/B6), IgA deficiency, Enteropathy associated T-cell lymphoma, hypoplasia (Mx pneumovax), dermatitis herpetiformis (extensor, pruritic – Mx dapsone), aphpus ulcers

IBS: disorder of enhanced visceral perception >> bowel symptoms for which no organic cause can be found. ROME criteria:

- Abdo discomfort/pain for >12wks + 2 of: relief by defecation, change in frequency, change in stool form
- +2 of: urgency, incomplete evacuation, bloating/distention, mucous PR, worsening Sx after food
- Exclusion criteria: >40yrs, blood stool, anorexia, wt loss, diarrhea @night. Lx. FBC, ESR, LFT, coeliac serology, TSH.
- Rx. FODMAP diet, bulking agents (eg. fybogel), antispasmodics (eg. mebeverine), amitryptilline, CBT

Dysphagia:

- Achalasia (degeneration of Auerbach’s myenteric plexus >> reduced peristalsis + failure of LOS relax) – liquid/solid dysphagia, regurg, substernal cramps, comp: oesophageal SCC, Lx Ba swallow >> dilated tapering oesophagus, manometry >> reduced peristalsis. Mx. Medical (CCB, nitrates), interventional (balloon dilatation), surgical (Heller’s cardiomyotomy)
- Pharyngeal pouch: posterior outpouching between crico- and thyro-pharyngeal components of the inf pharyngeal constrictor (through Killian’s dehisence). CP: regurgitation, halitosis, gurgling. Rx. Excision + endoscopic stapling
- Diffuse spasm: Ba swallow > corkscrew oesophagus. Nutracker: intermittent, increased pressure with normal peristalsis
- Oesophageal Ca: dysphagia solids > liquids. RF: smoking, EtOH, Barrett’s. Lx. Ivor-Lewis oesophagectomy (abdo + R thoraco)
- GORD: OGD indications = 55 Persistent ALARMS: >55, Persistent Sx, Anaemia, Loss of wt, Anorexia, Recent onset progressive, Mlaena, Swallowing difficulty. Rx. PPI > H2RA > Nissen fundoplication (mobilise gastric fundus around LOS


Enlarged kidneys Bilateral: ADPKD, bilateral RCC (5%), amyloidosis. Unilateral: cyst, RCC, hydronephrosis, compensatory hypertrophy [Complete exam: external genitalia (hydrocele 2nd to RCC), urine dip, CVS [mitral valve prolapse]]

- ADPKD: PKd1 gene on Chr16 85%. 30-50s, HTN, pain, mass, urinary Sx. Extra-renal: hepatic cysts, intracranial Berry aneurysms (>SAH), MV prolapse (mid systolic click + late systolic murmur)
- Mx. General (inc water, red Na/caffeine, monitor U&E + BP, genetic counselling, MRA screen for Berry aneurysm), medical (ACE-i), surgical (nephrectomy, transplant), Rx complications (ESRF in 70% by 70yrs)

CRF Complications: CRF HEALS – CV disease, Renal osteodystrophy, Fluid, HTN, Electrolyte disturbances, Anaemia, Leg restlessness, Sensory neuropathy (Uraemia: fatigue, weakness, anorexia, vomiting, restlessness legs, pruritis, bone pain, pericarditis)

- Ax. Common (DM, HTN), ADPKD, drugs, TB, sarcoid, CTD (SLE, scleroderma), amyloid, myeloma
- Investigations: URINE: blood, myoglobin, protein, nitrite, cells, casts (RBC = glomerular, WBC = interstitial nephritis, tubular = ATN), Bence-Jones proteins. BLOODS: FBC, U&E, bone profile, CRP, CK, ESR, clotting, urea + creatinine, glucose, immunology (ANA, dsDNA, complement, ANCA, anti-GBM), myeloma (lg), ABG (acidosis, ++K), BIOPSY
- ABCDEF of Mx: Anaemia (EPO), Bones (cholecalciferol, 1-alkalacalcidol, calcichew), CV RF (statins, ACE-I), Diabetes (insulin, gliclazide), Enoxaparin, Frusemide
- Nephotoxic drugs: NSAIDs, Abx (gent, tetracyclines, vac, acyclovir), anaesthetics, ACE-I, contrast (last 24-72hrs?), cisplatin (> haemorrhagict cystitis), cyclosporine, methotrexate

Transplant immunosuppression: pre-op campath, short-term pred, long-term tacrolimus/ciclosporin (calcineurin inhibitor)

- Complications: post-op (bleeding, thrombosis, infection, urinary leaks), CV disease (HTN, atheroma), drug toxicity
- Rejection: hyperacute (minutes – AB0), acute (<6mo – cell mediated, fever + pain. Mx methylpred), chronic (interrstitial fibrosis + tubular atrophy > gradual + Cr + proteinuria). Monitoring: LFTs (ciclosporin), glucose (tacrolimus), drug levels.
- Gum hypertrophy DDX. Drugs (ciclosporin, phenytoin, nifedipine)

Replacement Tx: Dialysis (when GFR <15ml/min) Urgent dialysis: AEIOU (acidosis, electrolyte, intoxicants, overload, uraemia)

Complications: CVd, infection, malnutrition, amyloidosis, renal cysts

- Pulm oedema: sit up high flow O2, morphine 2.5mg IV, frusemide 250mg IV, GTN spray. HyperK: 10ml 10% calcium gluconate, 10u insulin in 50ml 50% glucose, salbutamol, Ca resonium (Peaked T > prolonged QRS/p loss > sine wave)
- AV fistula: steal syndrome (distal ischaemia + red pulses), stenosis (occlude vein 1-2cm above fistula + look for pulsation = stenosis, high pitch bruit or absence of thrill distal to fistula). A: high flow, low recirculation, low infection
- Haemodialysis (AV fistula or Tessio) counter-current flow on semipermeable membrane, with reduced hydrostatic pressure of diasylate. Comp: disequilibrium syndrome (1/E) – rapidchanges in plasma osmolarity >> cerebral oedema
- Peritoneal: Tenckhoff catheter, uraemia solutes diffuse across peritoneum. ~3l/d with 4h dwell times. Less haem instability