

Cardiothoracic Teaching

Ventilatory Failure

Increased pCO₂ means ventilatory failure, reduced pO₂ means respiratory failure

Pulmonary causes – COPD

Non-pulmonary:

- *Central* – medulla, congenital, iatrogenic (e.g. opiates), metabolic alkalosis
- *Peripheral* – trauma, Guillan-Barre, MND, syringomyelia, polio, phrenic crush
- *Neuromuscular* – Myasthenia Gravis
- *Muscular* – Duchenne's muscular dystrophy, myotonic dystrophy, myositis, malnutrition, electrolyte imbalance
- *Chest wall* – scoliosis, kyphosis, trauma, thoracoplasty
- *Others* – obesity, hypoventilation

Treat – (cautious) O₂, treat underlying disease, NIPPV/CPAP, invasive ventilation

Chest X-Ray

- Heart, mediastinum including lung hila
- Lungs, pleura
- Bones, soft tissues of chest wall
- Review areas
 - Above clavicle
 - Below diaphragm
 - Axillae
 - Behind heart

'Silhouette sign' – loss of a border implies physical contact

Lobes are wedges – expect to see variation in density on plain film in cases of consolidation or collapse

Kerley B lines – lymphatics draining to pleura, seen in pulmonary oedema or lymphangitis carcinomatosa. 0.5-1.0cm long

Lung Cancer

25% of cancer deaths, 6% of all deaths. Poor prognosis – 5 year survival ~5% in UK. Presents with local, metaplastic, paraneoplastic effects, or incidentally.

Histology:

- Non-small cell
 - 30-40% Squamous
 - 25-30% Adenocarcinoma
 - 10-15% Undifferentiated large cell
- 20% Small cell

Metastasises to:

- Lung (same or contralateral)
- Brain
- Bone
- Liver
- Adrenals (usually asymptotically)

Paraneoplastic syndromes:

SIADH (small cell). Na^+ reduced, symptomatic if below 125. Treat with fluid restriction.

Eaton-Lambert syndrome (small cell)

Hypercalcaemia (usually squamous) PTH-like hormone produced.

Staging by CT, although PET scanning becoming more common.

Local tumours are operable (small cell type rarely operable)

- $\text{FEV1} > 2\text{L}$ – safe to perform pneumonectomy
- $\text{FEV1} < 1.5\text{L}$ – lobectomy

Radiotherapy has some use

Chemotherapy has some use, but limited

Ischaemic Heart Disease

Testing

Exercise tolerance test (Bruce protocol)

Aim for $\text{HR} = 0.9 \times (220 - \text{age})$

Look for ST depression/downsloping, most accurate in V_5

~70% sensitivity/specificity

C/I (absolute):

Known unstable angina

Arrhythmia

Severe aortic stenosis

Uncontrolled hypertension

C/I (relative):

MI in last five days

Hypertension

Nuclear medicine (MIBI scan)

Stress echo (stress with dobutamine)

MRI

CT

Angiogram

Interventions

Cholesterol (reduce total, increase HDL:total ratio)

Smoking

Hypertension

Diabetes

Invasive

Stent/PTCA (Percutaneous Coronary Interventions – PCI)

As yet, no RCT has demonstrated survival benefit from PCI

CABG (usually use Left Internal Mammary for single vessel)

Pharmacological – prognostic improvement

Aspirin

Statin

ACE inhibitor

Clopidogrel (if aspirin C/I)

Beta blockers

Tyrofiban (platelet glycoprotein 2B3A antagonist)

Pharmacological – symptom improvement

GTN

Long acting nitrates

Ca²⁺ channel blocker

K⁺ channel opener

Morphine

CABG

Indicated for:

- Symptom relief after medical therapy fails
- Prognostic benefit in
 - Left main stem disease
 - Three vessel disease
 - Any vessel disease with poor LV function

Angiography

1. Identify the organ – NB the heart moves as it beats.
2. Identify the artery - left coronary bifurcates after 1", right doesn't
3. If left, sort out LAD and circumflex - LAD will always be the more anterior vessel
4. Views will usually be left or right anterior obliques. Sort out front and back of body (from spine if visible, curve of ribs), then orientate yourself as to whether view is from left or right.

Heart Failure

Systolic

- Ejection fraction <55%
 - 50-55% Borderline
 - 40-50% Mild
 - 30-40% Moderate
 - <30% Severe

Diastolic

- Signs and symptoms of heart failure, but normal ejection fraction

Drugs:

- Diuretic – reduce fluid overload
 - Sodium and fluid restriction help
- ACE inhibitors – reduce afterload (esp. LV)
 - Good for systolic failure
 -

- Beta blockers – reduce sympathetic outflow
 - Improve prognosis, may exacerbate symptoms
- Digoxin – inotrope
 - Symptomatic relief
 - Bradycardia – caution with beta blockers
- Spironolactone (consider)

NYHA (New York Heart Association) classification:

4 – Breathless at rest

3 – Breathless on light activity

2 – Breathless on daily activity

1 – Breathless on strenuous activity

0 – Asymptomatic

Transplant

Median survival 12 years

Criteria:

- NYHA 3 or 4 on maximal medical therapy
- Ejection fraction <30%
- <65 (biological age – fitter older people considered)
- No specific C/I (e.g. renal failure)

Tests

- VO_{2max} (14.5ml O₂/kg/min)
- Right heart catheter (Swan-Ganz)
- Wedge, RV, RA, Pulmonary arterial pressures
- Cardiac index (CO/BSA – aim for 1.5)

Valve Disease

Aortic stenosis:

- Slow rising pulse – moderate/severe stenosis
- Concentric hypertrophy, so no enlargement until failure
 - Heaving apex beat

Mitral regurgitation

- Volume overload causes dilatation and displaced apex beat
- Good LV function has heave
- Poor LV function no heave
 - Trouble if valve replaced as LV may not be able to pump into high pressure system

Aortic regurgitation

- Collapsing and fast rising pulse
- Need to 'sit up, breathe out' to hear early diastolic murmur
- Displaced apex beat
- Corrigan's sign – head nods with pulse
- Quincke's sign – capillary pulsation visible in nail bed. More visible if nail lightly compressed to give a pink/white boundary
- Low diastolic BP to give widened pulse pressure
- Pistol shot femoral pulse (compress while auscultating)

Mitral stenosis

- Lean to left, use bell to hear rumbling mid-diastolic murmur
- Valve has opening snap
- Tapping apex beat
- Increased risk of emboli – need anticoagulation
- Surgery if symptomatic (dyspnoea, syncope, angina)
 - Balloon, surgery to repair or replace

Pulmonary murmurs

- Often innocent (e.g. due to increased blood flow in pregnancy)
- If a thrill is felt, never benign

Tricuspid regurgitation

- May be seen in RVF as right heart dilates
- Pansystolic murmur, often inaudible

Useful tips

Only reasons to treat someone are for symptomatic relief or prognostic improvement. Only indication for surgery is failure of maximal medical therapy.

Symptoms are usually general to most heart disease, and have limited use in narrowing down the diagnosis.