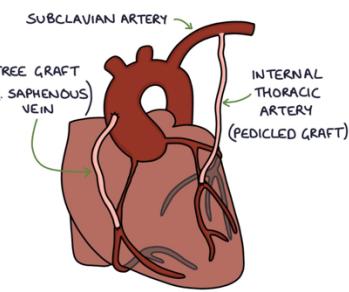


CARDIOTHORACIC SURGERY

CORONARY ARTERY BYPASS GRAFT (CABG)

Indications	Procedure	Types	Complications
<ul style="list-style-type: none"> Angina (stable or unstable) Myocardial infarction 	<ol style="list-style-type: none"> Cardiopulmonary Bypass – takes blood from vena cava or RA into external machine that conducts gas exchange before putting blood back into ascending aorta (heparin added to prevent clotting) Cardioplegia (heart temporarily stopped with high dose K infusion) – once bypass fully operational (restarted once bypass removed) Using graft blood vessel taken from elsewhere in the body (usually the saphenous vein) to bypass a blockage in a coronary artery. Depending on the affected areas, this may involve one, two, three or even four bypass grafts. Recovery period – ICU (discharge after 1 week, resume normal activities after 3 months) 	<ol style="list-style-type: none"> Saphenous vein (harvested from inner leg) Simple to extract BUT tendency to become stenosed (narrowed) over time in a process called intimal hyperplasia. The tunica intima layer in BVs becomes thickened, mostly due to increased pressure. (arterial grafts less affected by this than veins) Internal thoracic artery (aka internal mammary artery) – branch of subclavian artery Pedicled graft - left attached to subclavian artery and distal end attached to LAD Free graft - entirely separated Radial artery 	<ul style="list-style-type: none"> Death (2-3% in straightforward cases) Stroke (1-5% in straightforward cases) <p>Other complications:</p> <ul style="list-style-type: none"> Infection AKI Cognitive impairment MI AF

PROSTHETIC HEART VALVES

Indication	Valve Types																		
<ul style="list-style-type: none"> Aortic stenosis Mitral regurgitation  BIOPROSTHETIC  STARR-EDWARDS  TIKLING DISC  ST JUDE	<table border="1"> <thead> <tr> <th></th> <th>Bioprosthetic</th> <th>Mechanical</th> </tr> </thead> <tbody> <tr> <td>Types</td><td> Porcine Transcatheter Aortic Valve Implantation (TAVI) </td><td> <ul style="list-style-type: none"> St Jude medical (bileaflet) – best – reduces thrombus formation Starr-edwards (ball in cage) = high risk of clots Tilting disc = single leaflet – </td></tr> <tr> <td>Lifespan</td><td>10 years</td><td>> 20 years</td></tr> <tr> <td>Indication</td><td>Older pts</td><td> <ul style="list-style-type: none"> Younger patients </td></tr> <tr> <td>A/E</td><td>None</td><td> <ul style="list-style-type: none"> Lifelong anti-coag with warfarin (INR target 2.5-3.5) A click replaces S1 for metallic mitral valve A click replaces S2 for metallic aortic valve </td></tr> <tr> <td>Comp.</td><td> Unknown long-term outcomes Lower rates of IE </td><td> <ul style="list-style-type: none"> Thrombus formation (blood stagnates and clots) Infective endocarditis (infection in prosthesis) (gram +ve – staphylococcus, streptococcus, enterococcus) Haemolytic anaemia (blood gets churned up in the valve) </td></tr> </tbody> </table>		Bioprosthetic	Mechanical	Types	Porcine Transcatheter Aortic Valve Implantation (TAVI)	<ul style="list-style-type: none"> St Jude medical (bileaflet) – best – reduces thrombus formation Starr-edwards (ball in cage) = high risk of clots Tilting disc = single leaflet – 	Lifespan	10 years	> 20 years	Indication	Older pts	<ul style="list-style-type: none"> Younger patients 	A/E	None	<ul style="list-style-type: none"> Lifelong anti-coag with warfarin (INR target 2.5-3.5) A click replaces S1 for metallic mitral valve A click replaces S2 for metallic aortic valve 	Comp.	Unknown long-term outcomes Lower rates of IE	<ul style="list-style-type: none"> Thrombus formation (blood stagnates and clots) Infective endocarditis (infection in prosthesis) (gram +ve – staphylococcus, streptococcus, enterococcus) Haemolytic anaemia (blood gets churned up in the valve)
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HEART AND LUNG TRANSPLANT

Indications	Procedure	Types	Complications
<p>Heart transplant MAINLY FOR CHF secondary to:</p> <ul style="list-style-type: none"> IHD CM CHD <p>Lung transplant MAINLY FOR:</p> <ul style="list-style-type: none"> COPD CF PHTN Pulm. fibrosis 	<p>Cold-ischaemic time = time between death of donor and transplant needs to be as short as possible (under 6 HRS)</p> <ol style="list-style-type: none"> Operation begins BEFORE transplant arrives cardiopulmonary bypass started and cardioplegia with high-dose K once donor heart implanted → bypass stopped and cardioplegia stopped Cardioversion or temporary pacing may be used to treat arrhythmias that occur Recovery phase → ICU (chest drain left in- prevent pneumothorax) <p>Survival is approximately:</p> <ul style="list-style-type: none"> 85% at 1 year for heart or lung transplants 75% for heart transplants at 5 years 50% for lung transplants at 5 years 	<ol style="list-style-type: none"> Single lung transplant (lateral thoracotomy incision) Double lung transplant – one lung then the other NOT at same time (clamshell incision) Heart transplant (midline sternotomy incision) Heart-lung transplant 	<p>Organ rejection → lifelong immunosuppression</p> <ul style="list-style-type: none"> A/E of steroids (DM, OP, Cushing's) Opportunistic infection Skin cancer Post-transplant lymphoproliferative disorder (type of NHL) <p>Specific complications after a heart transplant</p> <ul style="list-style-type: none"> Cardiac allograft vasculopathy (CAV) - Narrowing of carotid arteries in donor heart No ischaemic symptoms felt as donor heart not innervated <p>Specific complications after a lung transplant are:</p> <ul style="list-style-type: none"> Primary graft dysfunction (PGD) - within 3 days causing APO, alveolar damage and hypoxia Bronchiolitis obliterans syndrome (BOS) - within 1 year → damage to bronchioles Dehiscence of the bronchial anastomosis, = air leakage into mediastinum and is life-threatening

CONGENITAL CARDIAC CONDITIONS

	ASD	VSD	Coarctation of aorta
Define	<ul style="list-style-type: none"> • Acyanotic CHD • defect (a hole) in the septum between the two atria 	<ul style="list-style-type: none"> • Acyanotic CHD • defect (a hole) in the septum between the two ventricles 	narrowing of the aortic arch, usually around the ductus arteriosus
Types	<ul style="list-style-type: none"> • Patent foramen ovale, where foramen ovale fails to close (not strictly classified as an ASD) • Ostium secundum, where septum secundum fails to fully close, • Ostium primum, where septum primum fails to fully close → AV septal defect 	<ul style="list-style-type: none"> ➤ Genetic association (Down's and Turner's) ➤ Post-myocardial ischaemic event 	<ul style="list-style-type: none"> ➤ Genetic association (Turner's) reoccur later after previously being treated in childhood.
Sx	<ul style="list-style-type: none"> • SOB secondary to PHTN and R-sided HF • Atrial fibrillation or atrial flutter • Stroke in the context of venous thromboembolism <p>In patients with a lifelong asymptomatic ASD, the clot can travel from the right atrium to the left atrium across the ASD. This means the clot can travel to the left ventricle, aorta and up to the brain, causing a large stroke.</p>	<p>Asympmtomatic</p> <ul style="list-style-type: none"> ➤ Usually picked up on newborn checks and antenatal scans 	<p>Uncontrolled HTN in adulthood</p> <ul style="list-style-type: none"> • Left ventricular heave due to left ventricular hypertrophy • Underdeveloped left arm where there is reduced flow to the left subclavian artery • Underdevelopment of the legs
character	<ul style="list-style-type: none"> • mid-systolic, crescendo-decrescendo murmur loudest at upper LSE • fixed split 2nd heart sound. 	<p>pan-systolic murmur in left lower sternal border in 3rd and 4th intercostal spaces</p> <p>DDx: MR, TR, VSD</p>	<p>systolic murmur below left clavicle (left infraclavicular area) and below left scapula</p>
Ix	<ul style="list-style-type: none"> • ECHO 	<p>ECHO</p>	<ul style="list-style-type: none"> ➤ Radio-radio delay / radio-femoral delay ➤ 4 limb BP cuff ➤ CT angiography
Rx	<ul style="list-style-type: none"> • small and asymptomatic = watchful waiting • percutaneous transvenous catheter closure (via the femoral vein) or open-heart surgery • lifelong anti-coags (e.g. aspirin, warfarin or DOACs) 	<ul style="list-style-type: none"> • percutaneous transvenous catheter closure (via the femoral vein) or open-heart surgery • ABx prophylaxis due to higher risk of IE 	<ul style="list-style-type: none"> • asymptomatic = watchful waiting • Percutaneous balloon angioplasty (stretching the stenosis), potentially with a stent inserted • Open surgical repair • Cardiologist referral – HTN management

SURGICAL MX OF

	CARDIAC TAMPONADE	Thoracic aortic aneurysms	PNEUMOTHORAX	LUNG CANCER
Cause	<ul style="list-style-type: none"> • Transudate (CHF, PHTN) • Exudate <ul style="list-style-type: none"> ◦ infection – TB, EBV, HIV , ◦ autoimmune –SLE, RA ◦ pericardial injury (post-op open heart surgery, trauma, MI) ◦ uraemia (secondary to AKI) ◦ cancer ◦ meds (MTX) 	<p>Dilatation of thoracic aorta:</p> <ul style="list-style-type: none"> ➤ ascending (>4.5cm) ➤ descending (>3.5cm) 	<ul style="list-style-type: none"> ➤ Spontaneous ➤ Trauma ➤ Iatrogenic, for example, due to lung biopsy, mechanical ventilation or central line insertion ➤ Lung pathologies such as infection, asthma or COPD 	See. Resp. notes
Specific signs	<ul style="list-style-type: none"> • Quiet heart sounds • Pulsus paradoxus (an abnormally large fall in blood pressure during inspiration, notably when palpating the pulse) • HypoTN • Raised JVP • Fever (with pericarditis) • Pericardial rub (with pericarditis) 	<ul style="list-style-type: none"> • Chest pain • Trachea or L bronchus compression – SOB, stridor • Phrenic nerve compression → hiccups • Oesophageal compression → dysphagia • Recurrent laryngeal nerve compression → hoarse voice 	See resp. notes	<p>See. Resp. notes</p> <ul style="list-style-type: none"> ➤ Posterolateral thoracotomy scar = lobectomy, pneumonectomy or lung volume reduction surgery for COPD <p>Nb: right-sided mini-thoracotomy incision = Mitral valve replacement</p>
Comp.	<ul style="list-style-type: none"> ➤ MI ➤ Trauma ➤ Aortic dissection type A 	<ul style="list-style-type: none"> ➤ Aortic dissection ➤ Ruptured aneurysm ➤ Aortic regurg (if aortic valve affected) 	<ul style="list-style-type: none"> ➤ Beware tension pneumothorax ➤ Recurrent pneumothorax ➤ Death 	Death
Ix	<ul style="list-style-type: none"> ➤ ECHO (Best) ➤ Percardiocentesis (fluid analysis) <ul style="list-style-type: none"> ◦ Protein ◦ Bacterial M/C/S ◦ Viral PCR ◦ Cytology and tumour markers for cancer 	<p>ECHO (Best)</p> <p>CT or MRI angiogram</p> <p>"Larger the aneurysm = the higher the risk of rupture"</p>	<p>ial Mx:</p> <ul style="list-style-type: none"> ➤ Erect CXR ➤ Chest drain in triangle of safety ➤ Large bore cannula in 2nd IC space MCL (tension pneumothorax) <p>Indications for surgical intervention:</p> <ul style="list-style-type: none"> ➤ Chest drain fails ➤ Persistent air leak in drain ➤ Recurrent pneumothorax <p>Video-assisted thoracoscopic surgery (VATS) can be used to correct the pneumothorax with pleurodesis (create inflammatory reaction in pleural lining so pleura sticks together and sealed to prevent further pneumothoraxes)</p> <ul style="list-style-type: none"> • Abrasive pleurodesis (direct physical irritation of the pleura) • Chemical pleurodesis (talc powder), to irritate the pleura) • Pleurectomy (removal of pleura) 	<p>MDT approach:</p> <p>SEE resp. notes for Mx</p> <p>Surgery types:</p> <ul style="list-style-type: none"> ➤ Segmentectomy ➤ Lobectomy ➤ Pneumonectomy <p>Methods to do this by:</p> <ul style="list-style-type: none"> ➤ Thoracotomy ➤ VATS (keyhole) ➤ Robotic <p>'minimally invasive VATS and robotic best as shorter recovery time and fewer comp.'</p> <p>Post-surgery considerations</p> <ul style="list-style-type: none"> ➤ Chest drain inserted to prevent pneumothoraxes ➤ Absent BS – pneumonectomy ➤ Absent BS locally – lobectomy
Mx	<ul style="list-style-type: none"> • Treat cause OR drain effusion • Needle pericardiocentesis (ECHO guided) • Surgical drainage • pericardial window I – fistula created to drain between pericardial space into pleural space 	<ul style="list-style-type: none"> • Surveillance with regular imaging to monitor the size • Lifestyle = stop smoking, eat healthy, exercise and control co-morbidities (HTN, HC, T2DM) • Thoracic endovascular aortic repair (TEVAR), with a catheter inserted via the femoral artery inserting a stent graft into the affected section of the aorta • Open surgery (midline sternotomy) = remove the section of the aorta with the defect in the wall and replace it with a synthetic graft 		