Cardiac Exam

Introduction

- **W**ash hands, **I**ntroduce self, ask **P**atients name & DOB & what they like to be called, **E**xplain examination and get consent
- Expose and sit patient at 45^{o}

General Inspection

- **Patient:** stable, comfortable, alert, breathlessness, pallor, cyanosis, obvious scars on precordium, age (gives clues to pathology), syndromic features (e.g. Marfans get AR, Turners get AS, Downs)
- **Around the bed**: oxygen, medication, IV drips, ECG machine

Hands

- **Perfusion**: temperature, capillary refill, peripheral cyanosis
- **Nails**: clubbing (cyanotic congenital heart disease, IE), splinter haemorrhages (IE), Quincke's sign (visible pulsation of capillary bed) (AR)
- **Palms**: extensor tendon xanthomata (hyperlipidaemia), Osler's nodes (IE), Janeway lesions (IE)

Arms

- Inspect for bruising (anticoagulation)
- Radial pulse: rate (tachycardia >100, bradycardia <60), rhythm (irregularly irregular = AF/ventricular ectopics; regularly irregular = 2nd degree heart block), radio-radial delay and radio-femoral delay (aortic dissection/coarctation, aortic arch aneurysm)
- Collapsing pulse: ask if any shoulder pain then hold their arm straight down, holding their extended elbow with your left hand and palpating their radial pulse with flat fingers of your right hand (release pressure so you can just feel it). Then lift their arm upwards fast with your left hand. In a collapsing pulse, the first few pulsations feel much stronger (AR, PDA, AVM)
- Blood pressure (large pulse pressure = AR; narrow pulse pressure = AS)

Head and Neck

- **Face**: pallor (anaemia), malar flush (MS), ruddy plethoric complexion (polycythaemia), swollen cyanotic face (SVC obstruction)
- **Eyes**: conjunctiva for pallor (anaemia)/haemorrhages (IE), corneal arcus, xanthalasma (hyperlipidaemia)
- **Mouth**: central cyanosis under tongue, petechial haemorrhages (IE), poor dental hygiene (IE), high arched palate (Marfans)
- **Neck**
    - JVP height and waveform: turn head slightly and look for pulsation of the internal jugular vein. If you can't see it, perform the hepatojugular reflux test (apply pressure over RUQ) to see a transient JVP rise which confirms it is below clavicle (raised JVP = PQRST: **P**ulmonary hypertension/PE/PS/pericarditis/pericardial effusion, **Q**uantity of fluid i.e. overload, **R**HF, **S**CV obstruction, **T**amponade/TR)
    - carotid pulse character and volume (slow rising low volume = AS; bounding/collapsing = AR or PDA)
- **(Others:** Corrigan's sign (visible carotid pulsation) (AR), de Musset's sign (head bobbing in time with pulse) (AR)**)**

Chest

- **Inspection**: chest deformities (pectus excavatum/carinatum), scars – ask them to lift up arms ± breasts (midline sternotomy, thoracotomy, pacemaker scar near left shoulder), visible apex beat, distended veins over precordium (SVC obstruction)
- **Palpation**:
    - apex beat position: use whole hand, then localise to a finger. Now count down intercostal spaces with the other hand (impalpable = obese, muscular or hyperinflated chest; displaced = LV dilation e.g. MR or AR)
    - apex beat quality (heaving = high pressure pulsation in LVH e.g. AS or systemic hypertension; thrusting = large area pulsation in volume overload e.g. MR or AR; tapping = MS)
      Note: if you can't feel the apex beat, roll patient into left lateral position and feel in expiration to determine character
    - RV heave: place whole right hand over the patient's left parasternal area with a straight elbow (parasternal haeve = RV hypertrophy in pulmonary hypertension)
    - Thrills or palpable heart sounds: feel over valve areas with medial border of hand (AS most common; palpable P2 = pulmonary hypertension)
- **Auscultation**: auscultate all heart valves while palpating carotid artery (use the diaphragm unless otherwise stated).
  Note S1 and S2 intensity and any splitting, S3/S4, clicks/snaps, rubs, and murmurs (if murmur heard, note: site heard loudest, pulse timing, character, volume and radiation)
    - mitral valve: listen with patient lying (feel apex beat first and place stethoscope over it) **then** roll patient onto their left side (accentuates) **then** listen in the left axilla for radiation (MR) **then** listen with bell (while patient still rolled over) on expiration (MS low tones)
    - tricuspid valve

- pulmonary valve + specifically listen for loud P2 in this position (loud compared to A2 = pulmonary hypertension)
- aortic valve: listen with patient lying **then** sit patient up and forward and listen between rib 2 and 4 on left sternal edge on expiration (accentuates AR) **then** listen over right carotid artery for radiation (also check bruits while here) (AS)

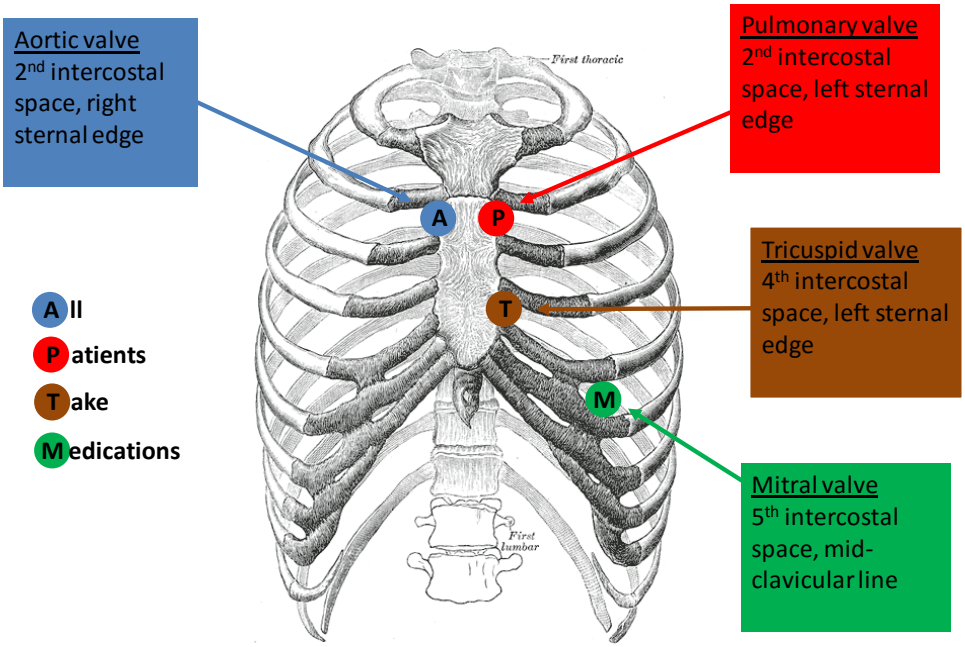
Murmurs: see murmurs page. Right valves heard better at height of inspiration, left valves at height of expiration. Never put stethoscope on top of breast – listen in inframammary fold. Systolic murmurs (e.g. MR, AS) radiate. Diastolic murmurs (e.g. MS; AR) are quiet and need a manoeuvre to accentuate them.

Finally

- Lung bases: auscultate for fine crackles while patient is still sitting from last test (pulmonary oedema)
- Legs: look for peripheral oedema by pushing on tibia for >10s then run finger over to feel for indent (RVF, hypoalbuminaemia) and look for vein grafting scar if patient had midline sternotomy (CABG)

To Complete exam

- Thank patient and cover them
- "To complete my examination, I would examine for peripheral pulses, feel for hepatomegaly (RVF), look at observation charts and dipstick the urine (haematuria in IE)"
- Summary and suggest further investigations you would so after a full history



Added/split heart sounds – *ADVANCED KNOWLEDGE*			
Sound		**Pathophysiology**	**Causes**
S4/atrial gallop		Pressure overload: atrial contraction into stiff hypertrophied ventricle	-LVH, hypertension, AS
S1 (AV valves close)	**Soft S1**	AV valves close with reduced velocity	-Reduced contraction pressure (severe heart failure) -Valves which don't close properly (MR) -Valves already partially closed at the end of diastole because atrial relaxation occurs before LV contraction (prolonged PR interval)
	Loud S1	AV valves close with higher velocity because they are wide open at end of diastole	-High atrial pressure (MS, AF) -Short diastole (short PR interval, tachycardia)
	Split S1	Asynchronous AV valve closure	-Can be normal but wide split may indicate RBBB or ASD
S2 (aortic/ pulmonary valves close)	**Soft S2**	Reduced aortic/pulmonary valve mobility	-AS, PS
	Loud S2	Valves close with higher velocity due to high upstream pressure	-Pulmonary hypertension (loud P2) -Systemic hypertension (loud A2)
	Split S2 on inspiration	Physiological: A2 closes first because P2 is slightly delayed by increased blood return to the right heart due to negative intrathoracic pressure	-Normal
	Wide split S2	Exaggerated split which increases during inspiration (A2 closes before P2)	-RBBB -Increased resistance to RV ejection e.g. pulmonary hypertension/PS
	Reverse split S2	Split which increases during expiration (P2 closes before A2)	-LBBB -Increased resistance to LV ejection e.g. systemic hypertension/AS
	Fixed split S2	No change with respiration	-ASD
S3/ventricular gallop		Volume overload: high volume of blood from atrium rapidly fills ventricle during passive filling phase of cardiac cycle	-LVF -Hyperdynamic states e.g. athlete, anaemia, fever, thyrotoxicosis