

**PART 1**  
Examination Techniques

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# 1 Examination Techniques

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## 1.1 COMMON CONDITIONS TO BE LOOKED FOR ON THE EXAMINATION

1. Arrhythmias ■
2. Valvular pathology ■
3. Endocarditis ■
4. Heart failure ■
5. Ischaemic heart disease ■
6. Inherited cardiac conditions ■
7. Poor perfusion/shock ■
8. Anaemia ■

## 1.2 CLINICAL EXAMINATION – PERIPHERIES

**Table 1.1** Elements to be undertaken prior to examining the patient

Item	Detail
1. Appropriate hand hygiene	Wash hands with soap and water or alcohol hand rub
2. Introduce yourself	Full name and job title
3. Confirm patient identity	Check full name and date of birth, verify against wrist band
4. Gain permission for the examination	Explain your role and what the examination will involve
5. Enquire about pain	Particularly chest and shoulder pain
6. Position the patient	45° on examination couch or bed
7. Expose the patient appropriately	Entire chest (women can leave bras on) Remember to cover patient when not examining the chest itself

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*Clinical Guide to Cardiology*, First Edition. Edited by Christian F. Camm and A. John Camm.  
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**Table 1.2** Examination features from the end of the bed

Item	Detail
1. Does the patient look well?	<ul style="list-style-type: none"> <li>• Sitting up and talking, or reduced consciousness?</li> <li>• Difficulty breathing?</li> <li>• Severe cyanosis?</li> <li>• Pallor?</li> <li>• Sweating?</li> </ul>
2. Are there any obvious scars?	<ul style="list-style-type: none"> <li>• Midline sternotomy</li> <li>• Lateral thoracotomy</li> <li>• Saphenous vein harvest scar</li> <li>• Pacemaker/ICD device or scar</li> </ul>
3. Lines in and out of patient	<ul style="list-style-type: none"> <li>• IV infusions</li> <li>• Catheters</li> <li>• Oxygen</li> </ul>
4. Patient monitoring	<ul style="list-style-type: none"> <li>• Continuous ECG</li> <li>• Pulse oximetry</li> <li>• Haemodynamic monitoring (e.g. blood pressure)</li> </ul>
5. Any medications around the patient	<ul style="list-style-type: none"> <li>• Glyceryl trinitrate (GTN) spray or inhalers</li> <li>• Drug infusions</li> <li>• Warfarin (or anticoagulation cards/booklets)</li> </ul>

**Table 1.3** Examination findings in the nails

Item	Conditions
1. Clubbing	■ / ■
2. Splinter haemorrhages	■
3. Capillary refill time >2 seconds	■
4. Peripheral cyanosis	■ / ■
5. Nicotine stains	■

### Box 1.1 Stages of clubbing

1. Fluctuation and softening of the nail bed
2. Loss of normal nail bed angle (Lovibond's angle)
3. Increased convexity of the nail fold
4. Thickening of the whole distal finger
5. Striations and increased shine on nails and surrounding skin

**Table 1.4** Examination findings in the hand

Item	Conditions
1. Tendon xanthomata	■ / ■
2. Osler nodes	■
3. Janeway lesions	■
4. Palmar crease pallor	■
5. Temperature	■
6. Bruising (anticoagulation or antiplatelet agents)	■

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**Table 1.5** Examination findings in the wrist

Item	Conditions
1. Pulse rate	■ / ■
2. Pulse rhythm	■
3. Radio-radial delay	■
4. Radio-femoral delay	■
5. Collapsing pulse	■
6. Blood pressure	■ / ■ / ■ / ■

**Table 1.6** Examination findings in the eyes

Item	Conditions
1. Corneal arcus	■/age
2. Conjunctival pallor	■
3. Petechial haemorrhages	■
4. Xanthelasma over eyelids	■
5. Roth spots	■
6. Lens dislocation	■

**Table 1.7** Examination findings in the mouth

Item	Conditions
1. Hydration status	general
2. Dentition	■
3. Central cyanosis	■ / ■
4. High arched palate (Marfan's)	■

**Table 1.8** Examination findings in the neck

Item	Conditions
1. Carotid pulse – character	■ / ■
2. JVP	■

**Box 1.2** How to examine the JVP

1. Located between heads of sternocleidomastoid
2. JVP has double pulse (rather than single found in carotid)
3. JVP can be occluded
4. JVP may be made more visible by lowering angle of the bed
5. Hepato-jugular reflux
6. Height measured from the sternal angle (angle of Louis)

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### Box 1.3 Central pulse character

1. **Slow rising:** aortic stenosis
2. **Small volume:** tachycardia, volume depletion, cardiogenic shock, aortic stenosis
3. **Bounding:** CO<sub>2</sub> retention, Paget's disease, aortic regurgitation
4. **Collapsing:** aortic regurgitation
5. **Pulsus bisferiens:** combined aortic stenosis and regurgitation

**Table 1.9** Examination findings in the legs. This is often undertaken after examining the praecordium

Item	Conditions
Pitting oedema	■
Saphenous vein harvest scars	■

## 1.3 CLINICAL EXAMINATION – THE PRAECORDIUM

**Table 1.10** Inspection features of the praecordium

Item	Conditions
1. Scars	■ / ■ / ■
2. Pacemaker/ICD	■ / ■
3. Visible apex beat	■ / ■

**Table 1.11** Palpation features of the praecordium

Item	Conditions
1. Apex beat	■
2. Thrills	■ (aortic and pulmonary valve pathology)
3. Right ventricular heave	■ / ■

### Box 1.4 The apex beat

1. Most lateral and inferior precordial cardiac pulsation
2. Normal position – fifth intercostal space, inside mid-clavicular line
3. Lateral and inferior displacement represents LV dilation
4. Diffuse apex beat represents LV dilation
5. Tapping of the apex beat is seen in mitral stenosis
6. Double impulse is a sign of hypertrophic obstructive cardiomyopathy

**Table 1.12** Auscultation of the praecordium

Location	Valve auscultated
1. Apex	Mitral valve
2. Fourth intercostal (IC) space, left sternal edge	Tricuspid valve + aortic (regurgitation)
3. Second IC space, left sternal edge	Pulmonary valve
4. Second IC space, right sternal edge	Aortic (stenosis)
5. Axilla	Mitral (regurgitation)
6. Carotids	Aortic (stenosis) + carotid bruits

**Box 1.5** Auscultatory elements

- To be successful at auscultation, it is important to actively listen (ask yourself what you can hear)
- The auscultatory elements that make up each cardiac cycle must be identified
- When identified, each component should then be characterized:
  - 1. First heart sound:** mitral and tricuspid valve closure
  - 2. Second heart sound:** aortic and pulmonary valve closure
  - 3. Additional sounds:** S3, S4
  - 4. Murmurs**
  - 5. Non-valvular sounds:** e.g. pericardial rub
  - 6. Mechanical heart valve sounds**

**Box 1.6** Reinforcement manoeuvres

- 1. Rolled to left side:** for mitral valve murmurs
- 2. Hold breath in expiration:** left-sided murmurs
- 3. Hold breath in inspiration:** right-sided murmurs
- 4. Sit patient forward:** aortic regurgitation

**Box 1.7** The first heart sound

- Caused by blood hitting the closed mitral and tricuspid valves
- Represents the start of ventricular systole
- Usually a single sound
- Heard best at the cardiac apex
  - 1. Split sound:** bundle branch block
  - 2. Soft S1:** first-degree AV block, aortic regurgitation
  - 3. Loud S1:** mitral stenosis
  - 4. Variable intensity:** ventricular arrhythmias, variable AV block

**Box 1.8** The second heart sound

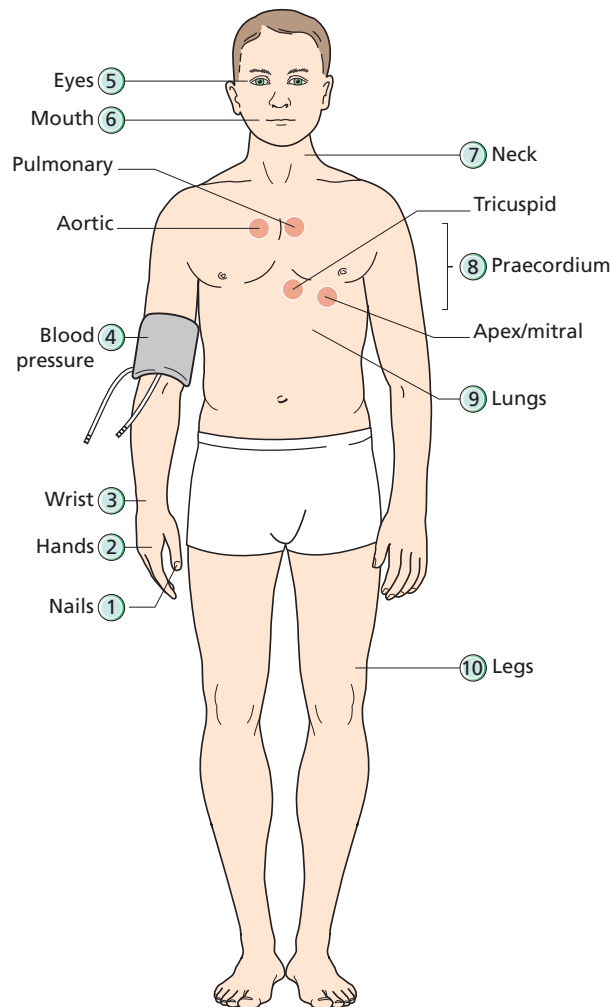
- Caused by blood hitting the closed aortic and pulmonary valves
- Represents the end of ventricular systole
- Heard well over the entire praecordium

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- Usually a split sound on inspiration
- Pulmonary component follows aortic
  1. **Widely split:** right bundle branch block
  2. **Fixed splitting:** atrial septal defects
  3. **Soft aortic component:** aortic stenosis

**Table 1.13** Examination findings on the back

Item	Conditions
Lung bases	■
Sacral oedema	■



**Figure 1.1** The examination circuit.



(See Audio Podcast 1.1 at [www.wiley.com/go/camm/cardiology](http://www.wiley.com/go/camm/cardiology))

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## 1.4 HOW TO PRESENT YOUR FINDINGS

### Safety first approach

#### Details

- An approach that works well when not sure of your findings
- Useful for objective structured clinical examinations (OSCEs) to ensure that information is not missed
- Discuss the positive findings (and key negatives) in the order that you examined
- Give a potential diagnosis after presenting findings

#### Example

I examined this 52-year-old patient. He presented with shortness of breath and leg swelling. On inspection he was clearly dyspnoeic but otherwise appeared well. He was alert. There was a well healed midline sternotomy scar. His pulse was regular at 80 bpm. His blood pressure was 110/80 mmHg. The patient was well hydrated. The JVP was raised by 8 cm. There were no additional peripheral signs elucidated. On the praecordium he had no additional scars. His apex beat was not inappropriately located. On auscultation S1 and S2 were both heard. Additionally a third heart sound was heard across the praecordium. There were no additional sounds. There were inspiratory crackles at the lung bases and some sacral oedema. A clear scar along the course of the long saphenous vein was seen on the left leg, this was combined with bilateral pitting oedema reaching the mid-calf.

In conclusion, this patient presents with shortness of breath and signs suggestive of heart failure.

### Ward-round based

#### Details

- An approach to be used when you are confident or pressed for time
- Give your suspected diagnosis first
- Discuss the examination findings that support the diagnosis and help to exclude others
- Discuss findings in the order of most supportive to least supportive of your diagnosis

#### Example

I examined this 52-year-old patient. He presented with shortness of breath and leg swelling. Examination revealed a patient with a clinical picture of congestive heart failure. This was supported by findings of inspiratory crackles at the lung bases, pitting oedema in the sacral region and bilaterally in the legs up to the mid-calf level. In addition, the JVP was raised to 8 cm above the angle of Louis. On auscultation S1 and S2 were clearly heard with the addition of a third heart sound. The patient has a history of coronary artery bypass surgery as supported by the midline sternotomy scar and long saphenous vein graft scar on the left leg. Given these findings, this suggests a history of heart failure potentially secondary to ischaemic heart disease.

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## 1.5 EPONYMOUS SIGNS AND SYMPTOMS

**Table 1.14** Eponymous signs in cardiology

Eponym	Details
Austin Flint murmur	Low-pitched rumbling murmur in mid-diastole due to aortic regurgitation causing mitral stenosis
Beck's triad	Three signs associated with cardiac tamponade: <ul style="list-style-type: none"> <li><b>i.</b> Low arterial blood pressure</li> <li><b>ii.</b> Distended neck veins</li> <li><b>iii.</b> Muffled heart sounds</li> </ul>
Corrigan's pulse	A large-volume pulse which collapses away due to aortic regurgitation – observed at the carotid
De Musset's sign	Rhythmic nodding of the head due to increased pulse pressure in aortic regurgitation
Duroziez's sign	Compression of the femoral artery with the bell of the stethoscope leads to an audible diastolic murmur – aortic regurgitation
Ewart's sign	Collection of signs at the left lung base due to pericardial effusion: <ul style="list-style-type: none"> <li><b>i.</b> 'Woody' dullness to percussion</li> <li><b>ii.</b> Increased vocal resonance</li> <li><b>iii.</b> Bronchial breath sounds</li> </ul>
Friedreich's sign	Significant drop in JVP during the diastolic phase due to constrictive pericarditis
Graham Steell murmur	Pulmonary regurgitant murmur heard in the left 2 <sup>nd</sup> intercostal space
Janeway lesions	Non-tender, small erythematous nodular lesions on the palms/soles indicative of endocarditis
Kussmaul's sign	Paradoxical rise in JVP on inspiration, indicative of reduced right ventricular filling (e.g. right heart failure or constrictive pericarditis)
Mayne's sign	A drop >15 mmHg in diastolic blood pressure when the arm is raised – aortic regurgitation
Müller's sign	Bobbing of the uvula due to wide pulse pressure of aortic regurgitation
Oliver's sign	Downward tug of the trachea during systole – aneurysm of the aortic arch
Osler nodes	Painful, raised lesions on the hands/feet caused by immune complex deposition and suggestive of infective endocarditis
Osler's sign	Falsely elevated blood pressure due to calcification of the vessels
Quinke's pulse	Alternating blushing and blanching of the fingernails – aortic regurgitation
Roth spots	Retinal haemorrhages with a pale fibrin centre caused by immune complex deposition and suggestive of infective endocarditis
Still's murmur	Innocent flow murmur
Watson's waterhammer pulse	As with Corrigan's pulse, but observed over the radial artery



For additional resources and to test your knowledge, visit the companion website at:



[www.wiley.com/go/camm/cardiology](http://www.wiley.com/go/camm/cardiology)