Lecture Notes
Examining the Cardiac System

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Main Symptoms

Dyspnoea
Orthopnoea
Paroxysmal Nocturnal Dyspnoea
Chest Pain
Cough/Haemoptysis
Oedema
Palpitations
Syncope
Dyspnoea: Types

Dyspnoea: at rest or on effort

Orthopnoea: dyspnoea on lying flat, pt needs extra pillows

Paroxysmal nocturnal dyspnoea (PND): dyspnoea which wakes pt from sleep at night, pt sits on edge of bed or goes to window, often described as feeling of suffocation
Dyspnoea

Severity/Grading: mild, moderate, severe

Pattern: exertion, continuous/intermittent, rest/sleep

Time course: onset, duration, progression

Variability: diurnal, aggravating or relieving factors

Associated symptoms: cough, chest pain
Cardiac Pain 1

Site: central & retrosternal

Character: tightness, heaviness, discomfort

Radiation: either arm, wrist, hand, throat, jaw, back or epigastrium
Cardiac Pain 2

Severity: suggests myocardial infarction

Time course: angina short: mins, infarct: hours

Duration: days, weeks, months & years

Agg factors: exertion, excitement, exercise, meal, cold

Relieving factors: rest, glycerol trinitrate

Other factors: dyspnoea, sweating, nausea, vomiting, syncope & past history of similar pain
Cough Characteristics

Productive/non productive: sputum or not
Pattern: continuous/intermittent, night/day
Associated features: pain, dyspnoea

Time Course
Onset: sudden or gradual
Duration: when started, how long it’s going on
Progression: getting worse or better
Sputum

Type: white, yellow, green, rusty, pink, frothy, bloodstained, purulent, plugs

Amount: a little or a lot

Smell/Taste: odourless/foul
Oedema: Ankle Swelling

Can be: a symptom or a sign

Occurs: in heart failure but also in other conditions

Time course: onset, duration, progression

Variability: diurnal; worse in pms & better in ams

Associated symptoms: dyspnoea, cough, (chest pain)
Palpitations

Definition: subjective awareness heart beating in chest

Can be due to: normal or irregular heart beats

Terms used: thumping, pounding, racing, fluttering, dropped or missed beat

Patient can usually: tap out sensation experienced

Time course: onset, frequency, duration & regularity
Cardiac Syncope

Definition: loss of consciousness of cardiac origin

Presyncope: feeling of dizziness or impending syncope

Main Causes
• Arrhythmias: heart block & tachy-arrhythmias
• Outflow obstruction: aortic stenosis, cardiomyopathy
• Drugs: beta-blockers, alpha-blockers, hypotensives
Key Points

- History very important for cardiac diagnosis
- Pts with significant disease may be asymptomatic
- PND is most often caused by pulmonary oedema
- Oedema mostly caused by congestive cardiac failure
- Ask what the patient means by palpitations
Past Medical History

Illnesses, Hospitalizations, Operations:  
- month/year
- active or inactive, treatment or not

Cardiac Diseases:
- Congestive Cardiac Failure (CCF)
- Rheumatic heart disease/Rheumatic fever
- Hypertension
- Diabetes (DM)
- Kidney disease
Family History

Heart Disease: CCF, Ischaemic, Hypertension

Inherited & Acquired Risk: lipidaemia, DM, shared lifestyle, passive smoking
Social History

Cigarettes: 20 cigs/day/30 yrs = 30 pack yrs

Alcohol: type, quantity & duration

Occupation: workplace exposure

Lifestyle: food & calorie intake, exercise, sports
The Cardiac Examination

Undress: to waist

Position: at 45 degrees or sitting

Inspection: from side & front/end of bed
General Inspection

Patient is well or unwell: *e.g. dyspnoea, cyanosis, pain*

Breathing pattern: normal or abnormal

Abnormal:
- dyspnoea: using accessory muscles of respiration
- tachypnoea: $>18/min \ (n = 14-18/min)$

Cyanosis: peripheral and/or central
Examination

Peripheral examination
- Hands & legs
- Pulses
- BP
- Head & Face
- Abdomen

Cardiac examination
Peripheral Examination

Hands/Fingers: clubbing, cyanosis, anaemia, temperature, sweating, splinter haemorrhages

Pulses palpate: radials, brachial, carotid, femoral, popliteal, dorsalis pedis & post tibial

Head/face examine:
conjunctiva for anaemia
lips for cyanosis: peripheral
tongue for cyanosis: central
The Peripheries

Blood pressure (BP): record BP lying & standing (if necessary)

Abdomen examine for: hepatomegaly & ascites

Oedema check: legs & sacrum
The Pulse

Rate

Rhythm

Volume

Character

Other radial present
Radial pulse
The Pulse

Rate N = 60-100/min: >100 = tachycardia, <60 = bradycardia

Normal increase on insp & decrease on exp: sinus arrhythmia

Volume & Character: use carotid artery (*but radial will do in most cases*)

Know normal before being able to recognize abnormal
The Pulse: Rhythm

Rhythm is either: regular or irregular

Irregular pulse can be: regular or irregular

Regular irregularity: 1 in 4 dropped beats in 2nd degree ht block or 1 in 2 in Pulsus Bigemini

Irregular irregularity: e.g atrial fibrillation, ectopics
The Pulse: Volume 1

Volume is the movement imparted to finger & felt when gently palpating the pulse.

Corresponds to left ventricular stroke volume: may be normal, increased or decreased.

Increased: high output states e.g. fever, anaemia, thyrotoxicosis & aortic incompetence.

Decreased: shock, heart failure, aortic & mitral stenosis.
The Pulse: Volume 2

**Pulsus alternans (PA):** when alternate or every second pulse volume is weak; occurs in *severe heart failure*

**Pulsus paradoxus (PP):** exaggeration of usual decrease in pulse volume which occurs during inspiration \((n=\leq 15 \text{ mm Hg})\)

**PP** confirmed by measuring BP: a decrease of BP during inspiration of \(>15 \text{ mm Hg}\) is pathological; occurs in *severe asthma, pericardial effusion & tamponade*
The Pulse: Character

The character is what gives a pulse its distinctiveness on palpation.

Typically caused by valvular heart disease.
Abnormal Character Types

Anacrotic: slow rising pulse; occurs in aortic stenosis (AS)

Collapsing: in aortic incompetence (AI)

Bisferiens: double impulse palpable on each pulse: occurs in combination of AS/AI
The Jugular Venous Pulse 1

Inspect the patient lying: at 45 degrees

Look for a pulsation at the root of the neck

Inspect between the two heads of sternomastoid for the: internal jugular vein

Alternately you may use the external jugular vein but only if you can demonstrate that it’s open or patent

External jugular vein: drops at a right angle (90°) from angle of jaw/mandible
Method: start first with *inspection* of JVP followed by *palpation*

Inspect the root of the neck for a visible pulsation

If a pulsation is present the following characteristics will help you to differentiate a venous from an arterial pulsation (*see following slide*)
Is Neck Pulsation from Vein or Artery?

• **VEIN**
  - **INSPECTION**
    - diffuse
    - multiple wave form \((AcV)\)
    - varies with respiration
  - **PALPATION**
    - you can occlude it by pressing finger horizontally @ root of neck
    - positive hepatojugular reflux

• **ARTERY**
  - **INSPECTION**
    - localised
    - single wave form
    - no variation with respiration
  - **PALPATION**
    - you can’t occlude it by pressing finger horizontally @ root of neck
    - negative hepatojugular reflux
Palpating jugular venous pulse
Hepatojugular reflux
The Heart

Inspection

Palpation

Percussion

Auscultation
Apex Beat

**Apex beat:** defined as the outermost & downermost point of maximum cardiac pulsation

**Apex Beat:** lies normally in the 5th intercostal space (IS) within the mid clavicular line (MCL)
Palpating the apex beat
Valve Areas

Aortic area: lies in 2nd IS just to right of sternum

Pulmonary area: lies in 2rd IS just to left of sternum

Mitral area: lies over the apex in 5th IS within MCL

Tricuspid area: lies in 5th IS just to left of sternum
The Heart

Inspection

Palpation

Percussion

Auscultation
Inspection

Inspect anterior chest: from side & the front

Look for abnormalities of shape or lesions of chest wall: kyphosis, pectus carinatum/excavatum

Observe for: pulsations over the precordium

Localize the site: of the apex beat
The Heart

Inspection

Palpation

Percussion

Auscultation
Palpation

Carry out in cardiac position: sitting at 45°

Localize apex beat: by placing two fingers over visible pulsation, (may be necessary to check in lying position)

Check for thrills and/or heaves: by placing flat or palm of hand over following precordial areas:
- base of heart
- left parasternal area
- apical area
The Apex Beat

Site

Localized *or* diffuse

Character: *forceful, tapping, heaving, thrills*

Any other quality that strikes you
Palpation: **Thrills**

Thrill is a palpable murmur: indicates disease

Palpated best: in expiration and when chest wall is thin
Palpating for thrill at left sternal edge
Palpating for thrill at apex
Palpating for thrill at base of heart
Palpation: Thrills

Thrills at base of heart over AA & PA are: *systolic*

Thrills at left parasternal edge (2nd-4th IS) are: usually *systolic*: congenital heart disease (VSD)

Apical thrills: usually *diastolic*: mitral stenosis (MS)

Proto systolic & diastolic thrills are: usually due to *Patent ductus arteriosus (PDA)*
The Heart

Inspection

Palpation

Percussion

Auscultation
Percussion

Percussion is not done routinely

Indication: suspected cardiac enlargement due to a pericardial effusion

Method: percuss perpendicular to the 3 borders of heart:
- right border
- left or oblique border
- inferior border
Percussing the inferior border
Percussing the oblique border
Percussing the right border
The Heart

Inspection

Palpation

Percussion

Auscultation
Auscultation

Use diaphragm or flat part for: high pitched murmurs; mitral incompetence

Use bell for: low pitched murmurs; mitral stenosis

Student should concentrate on: listening to the heart sounds first before turning attention to murmurs

Interpret auscultation findings in combination with findings obtained: on inspection & palpation
Normal Heart Sounds

First heart sound (closure of mitral & tricuspid valves) is heard best in mitral area. The loudest sound there is always the 1st heart sound.

Second heart sound (closure of aortic & pulmonary valves) is heard best in aortic & pulmonary areas. The loudest sound there is always 2nd heart sound.

2nd heart sound may be split into two sounds: A2P2
Listening

Listen in the mitral area: identify the first (loudest) heart sound

Listen in the aortic area & pulmonary areas: identify the loudest or second (loudest) heart sound & its splitting

Can I hear: added sounds or murmurs?
Auscultation at mitral area
Auscultation at aortic area
Added Heart Sounds

3rd & 4th

3rd HS occurs in diastole when ventricle is filling passively; can be normal: young adults, pregnancy

found in severe heart failure when accompanied by a tachycardia and heard as a gallop rhythm

4th HS occurs in late diastole as a result of atrial contraction; occurs in heart failure secondary to left ventricular hypertrophy & aortic stenosis
Added Heart Sounds

Opening Snap

Occurs in mitral stenosis due to opening of tight mitral valve

Heard best at apex with bell and with pt lying in left lateral position

Occurs after 2nd heart sound early in diastole

Associated with a loud S1 & mid diastolic rumble
Added Heart Sounds

Pericardial Friction Rub

heard best with diaphragm at left lower sternal edge

best heard with pt breathing out & leaning forward

occurs in pericardial inflammation

It is superficial scratchy sound often occurring in both systole & diastole: may vary with time & pt position
Listening for pericardial rub
Murmurs

Caused by turbulent blood flow due to either:

Abnormal valve/hole *e.g.* rheumatic valve disease *or* congenital heart disease

*or*

Increased blood flow through a normal valve *e.g.* anaemia, pregnancy, athletes
General Features

Location/Site

Timing/Duration

Loudness

Character

Radiation
Characteristics

Location/Site: where the murmur is heard best

Timing of the murmur: systolic, diastolic or both

Direction or radiation: in which the murmur is heard best or conducted
How to Time Murmurs

Timing of murmurs is done in two ways:

Synchronous *palpation* of carotid (systolic) pulsation & murmur auscultation together

or

*localizing & correct identification* of the heart sounds by: *auscultation*
Timing of heart murmurs by carotid palpation and auscultation
Auscultation 1

**Systole** starts with 1st heart sound (HS) i.e. closure of mitral & tricuspid valves and ends with 2nd HS i.e. closure of aortic & pulmonary valves. Any murmur occurring in between 1st & 2nd HS is **systolic** in timing.

**Diastole** is the interval between the 2nd & 1st heart sounds. Any murmur occurring in between 2nd & 1st HS is **diastolic** in timing.
Auscultation 2

**Apex:** It follows that if a murmur occurs after the loudest sound (1st HS) at the apex (mitral area) then it is likely **systolic in timing**, if it occurs before the loudest sound it is likely **diastolic in timing**

**Base of heart:** If a murmur occurs before the loudest sound (2nd HS) in the AA or PA then it is likely **systolic in timing**, if it occurs after the loudest sound it is likely **diastolic in timing**
Character of a murmur is hard to define

Murmurs are often described as:
- soft or harsh
- ejection
- blowing
- musical
- high or low pitched
- rumbling & machinery
Character: Examples

Mitral incompetence: blowing

Mitral stenosis: rumbling

Aortic incompetent: soft and decrescendo

Aortic stenosis: harsh ejection

Patent ductus arteriosus: machinery
Loudness: Six grades

Grade 1 barely heard: in optimum conditions

Grade 2 barely heard: in routine conditions

Grade 3 easily heard: no thrill

Grade 4 a loud murmur: thrill present

Grade 5 a very loud murmur: over precordium and thrill

Grade 6 extremely loud: heard without stethoscope
Key Points

• Apex beat displacement due to cardiac enlargement or mediastinal shift

• Use diaphragm for high pitched murmurs & bell for low pitched

• Third heart sound can be physiological but a 4th heart sound is always pathological

• Loudness of murmur is not always an index of disease severity

• **Position is important**: mitral stenosis is best heard in left lateral position & aortic incompetence with holding breath in expiration & leaning forward