SIGNS AND SYMPTOMS OF CARDIOVASCULAR DISEASES

Ewa Szczerba
SYMPTOM

any morbid phenomenon
(a symptom in relation to disease) or departure from the normal in structure, function, or sensation, experienced by the patient and indicative of disease
SIGN

any abnormality indicative of disease, discoverable on examination of the patient; an **objective** symptom of disease, in contrast to a symptom which is subjective
Cardinal symptoms of heart disease

- Dyspnea
- Chest pain or discomfort
- Cyanosis
- Syncope
- Palpitations
- Oedema
- Hemoptysis
- Cough

Braunwald – *Heart disease* 6th edition
Dyspnea

- Laryngotracheitis
- Bronchial asthma
- Pneumothorax
- Pulmonary fibrosis and emphysema
- Foreign body
- Congenital heart disease (interventricular septal defect)
- Pulmonary infarction
- Lobar pneumonia
- Subphrenic abscess
- Congestive heart failure
DYSPNEA

- Pulmonary congestion
- Reduced cardiac output

Acute / Chronic
At rest / on exertion
Exacerbating / relieving factors
Body position – ortopnoe?
Accompanied by other symptoms?
**Dyspnea**

**Physical examination:**
- Evidence of airways obstruction?
- Hyperinflation?
- Assess air movement and quality of breath sounds
- Signs of volume overload?
- Evidence of DVT?
- Edema?

**Additional exams:**
- BNP/NT-pro-BNP
- Arterial blood gases
- Chest X-rays
- ECHO?
- CT scan?
Chest pain
Chest Pain

• **History is very important**

• Points to note in the history
  – location
  – radiation
  – character
  – aggravating factors
  – relieving factors
  – time relationships
    • duration, frequency and pattern of occurrence
  – setting in which it occurs
  – associated factors
Chest Pain or Discomfort

• although a cardinal manifestation of heart disease, also originates from
  – Non-cardiac intrathoracic structures
    • aorta, pulmonary artery, bronchopulmonary tree, pleura, mediastinum, oesophagus and diaphragm
  – tissues of the neck and thoracic wall
    • skin, thoracic muscles, cervicodorsal spine, costochondral junctions, breasts, sensory nerves and spinal cord
  – subdiaphragmatic organs
    • stomach, duodenum, pancreas and gallbladder
Differential diagnosis of chest pain according to location

- **Retrosternal**: Myocardial ischemic pain, Pericardial pain, Esophageal pain, Aortic dissection, Mediastinal lesions, Pulmonary embolization.
- **Shoulder**: Myocardial ischemic pain, Pericarditis, Subdiaphragmatic abscess, Diaphragmatic pleurisy, Cervical spine disease, Acute musculoskeletal pain, Thoracic outlet syndrome.
- **Interscapular**: Myocardial ischemic pain, Musculoskeletal pain, Gallbladder pain, Pancreatic pain.
- **Arms**: Myocardial ischemic pain, Cervical/dorsal spine pain, Thoracic outlet syndrome.
- **Right Lower Anterior Chest**: Gallbladder pain, Distention of the liver, Subdiaphragmatic abscess, Pneumonia/pleurisy, Gastric or duodenal penetrating ulcer, Pulmonary embolization, Acute myositis, Injuries.
- **EpiGastric**: Myocardial ischemic pain, Pericardial pain, Esophageal pain, Duodenal/gastric pain, Pancreatic pain, Gallbladder pain, Distention of the liver, Diaphragmatic pleurisy, Pneumonia.
- **Left Lower Anterior Chest**: Intercostal neuralgia, Pulmonary embolization, Myositis, Pneumonia/pleurisy, Splenic infarction, Splenic flexure syndrome, Subdiaphragmatic abscess, Precordial catch syndrome, Injuries.
Chest pain
<table>
<thead>
<tr>
<th>Condition</th>
<th>Location</th>
<th>Quality</th>
<th>Duration</th>
<th>Aggravating or Relieving Factors</th>
<th>Associated Symptoms or Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td>Retrosternal region; radiates to or occasionally isolated to neck, jaw, epigastrium, shoulder, or arms (left common)</td>
<td>Pressure, burning, squeezing, heaviness, indigestion</td>
<td>&lt;2–10 min</td>
<td>Precipitated by exercise, cold weather, or emotional stress; relieved by rest or nitroglycerin; atypical (Prinzmetal's) angina may be unrelated to activity, often early morning</td>
<td>S₃ or murmur of papillary muscle dysfunction during pain</td>
</tr>
<tr>
<td>Rest or unstable angina</td>
<td>Same as angina</td>
<td>Same as angina but may be more severe</td>
<td>Usually &lt;20 min</td>
<td>Same as angina, with decreasing tolerance for exertion or at rest</td>
<td>Similar to stable angina, but may be pronounced; transient heart failure can occur</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>Substernal and may radiate like angina</td>
<td>Heaviness, pressure, burning, constriction</td>
<td>≥30 min but variable</td>
<td>Unrelieved by rest or nitroglycerin</td>
<td>Shortness of breath, sweating, weakness, nausea, vomiting</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>Usually begins over sternum or toward cardiac apex and may radiate to neck or left shoulder; often more localized than the pain of myocardial ischemia</td>
<td>Sharp, stabbing, knifelike</td>
<td>Lasts many hours to days; may wax and wane</td>
<td>Aggravated by deep breathing, rotating chest, or supine position; relieved by sitting up and leaning forward</td>
<td>Pericardial friction rub</td>
</tr>
<tr>
<td>Aortic dissection</td>
<td>Anterior chest; may radiate to back</td>
<td>Excruciating, tearing, knifelike</td>
<td>Sudden onset, unrelenting</td>
<td>Usually occurs in setting of hypertension or predisposition, such as Marfan syndrome</td>
<td>Murmur of aortic insufficiency, pulse or blood pressure asymmetry; neurologic deficit</td>
</tr>
</tbody>
</table>
## Chest pain

<table>
<thead>
<tr>
<th>Clinical Feature</th>
<th>Location</th>
<th>Description</th>
<th>Onset</th>
<th>Aggravating Factor</th>
<th>Associated Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary embolism (chest pain often not present)</td>
<td>Substernal or over region of pulmonary infarction</td>
<td>Pleuritic (with pulmonary infarction) or angina-like</td>
<td>Sudden onset; minutes to &lt;1 hr</td>
<td>May be aggravated by breathing</td>
<td>Dyspnea, tachypnea, tachycardia, hypotension, signs of acute right ventricular failure, and pulmonary hypertension with large emboli; rales, pleural rub, hemoptysis with pulmonary infarction</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>Substernal</td>
<td>Pressure; oppressive</td>
<td>Similar to angina</td>
<td>Aggravated by effort</td>
<td>Pain usually associated with dyspnea; signs of pulmonary hypertension</td>
</tr>
</tbody>
</table>
## Chest pain

### NONCARDIAC CAUSES

<table>
<thead>
<tr>
<th>Cause</th>
<th>Location</th>
<th>Description</th>
<th>Duration</th>
<th>Associated Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia with pleurisy</td>
<td>Localized over involved area</td>
<td>Pleuritic, localized</td>
<td>Brief or prolonged</td>
<td>Painful breathing</td>
</tr>
<tr>
<td>Spontaneous pneumothorax</td>
<td>Unilateral</td>
<td>Sharp, well localized</td>
<td>Sudden onset, lasts many hours</td>
<td>Painful breathing</td>
</tr>
<tr>
<td>Musculoskeletal disorders</td>
<td>Variable</td>
<td>Aching</td>
<td>Short or long duration</td>
<td>Aggravated by movement; history of muscle exertion or injury</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>Dermatomal in distribution</td>
<td>Burning, itching</td>
<td>Prolonged</td>
<td>None</td>
</tr>
<tr>
<td>Esophageal reflux</td>
<td>Substernal, epigastric</td>
<td>Burning, visceral discomfort</td>
<td>10–60 min</td>
<td>Aggravated by large meal, postprandial recumbency; relief with antacid</td>
</tr>
<tr>
<td>Peptic ulcer</td>
<td>Epigastric, substernal</td>
<td>Visceral burning, aching</td>
<td>Prolonged</td>
<td>Relief with food, antacid</td>
</tr>
<tr>
<td>Gallbladder disease</td>
<td>Epigastric, right upper quadrant</td>
<td>Visceral</td>
<td>Prolonged</td>
<td>May be unprovoked or follow meals</td>
</tr>
<tr>
<td>Anxiety states</td>
<td>Often localized over precordium</td>
<td>Variable, location often moves from place to place</td>
<td>Varies; often fleeting</td>
<td>Situational</td>
</tr>
</tbody>
</table>

Dyspnea, cough, fever, dull to percussion, bronchial breath sounds, rales, occasional pleural rub

Dyspnea; hyperresonance and decreased breath and voice sounds over involved lung

Tender to pressure or movement

Vesicular rash appears in area of discomfort

Water brash

Right upper quadrant tenderness may be present

Sighing respirations, often chest wall tenderness
Cyanosis
Cyanosis

- Both: a symptom and a physical sign
- Results from an increased quantity of reduced hemoglobin

Central cyanosis - decreased arterial oxygen saturation due to right-to-left shunting of blood or impaired pulmonary function

Peripheral cyanosis – secondary to cutaneous vasoconstriction due to low cardiac output or exposure to cold air
Cyanosis
Cyanosis

- **Hypoxia**
- Congenital heart disease with right-to-left shunt
- Pulmonary embolism
- Pulmonary edema
- Pulmonary disease (oxygen diffusion and alveolar ventilation abnormalities)
- Hemoglobinopathies
- Decreased cardiac output
- Vasospasm
- Arterial obstruction
- Pulmonary arteriovenous fistulas
- Elevated hemidiaphragm
- Neoplasm (bronchogenic carcinoma, mediastinal neoplasm, intrahepatic lesion)
Syncope
Syncope

• Loss of consciousness resulting most commonly from reduced perfusion of the brain.
• Cardiac syncope:
  • Rapid onset without aura, convulsive movements, urinary incontinence
  • Consciousness regained promptly

Tachyarythmias, bradyarythmias, orthostatic hypotension, vasodepressor syncope, aortic stenosis...
Palpitation

Patient’s description: pounding, jumping, racing, or irregularity of the heart beat
Palpitations

• Unpleasant awareness of the forceful or rapid beating of the heart

Tachycardia, atrial fibrillation, ectopic beats, augmented stroke volume due to valvular regurgitation, sudden onset of bradycardia...
Palpitations

- associated with drug use
  - tobacco, coffee, tea, alcohol, epinephrine, aminophylline, MAOI

- on standing
  - postural hypotension

- middle aged women, associated flushes and sweats
  - menopausal syndrome

- associated with normal rate and rhythm
  - anxiety state
Oedema
Oedema

- Both lower extremities (symmetrical).
- Most pronounced in the evening.
- Preceded by a weight gain of 3-5kg
- Accompanying symptoms: dyspnea, pulmonary congestion.
- REMEMBER: In recumbent patients oedema of cardiac origin is present in the back, abdomen, sacrum area
Oedema

• Causes of peripheral oedema
  – Cardiac failure
  – Chronic venous insufficiency
  – Hypoalbuminaemia – nephrotic syndrome, liver disease, protein losing enteropathy
  – Drugs
    • retaining sodium (fludrocortisone, NSAID)
    • increasing capillary permeability (nifedipine)
Pitting oedema
Pitting oedema
Cough

- Defined as an explosive expiration that provides a means of clearing the tracheobronchial tree of secretions and foreign bodies

pulmonary venous hypertension, pulmonary edema or infarction, compression of the tracheobronchial tree (aortic aneurysm)
Cough

• the nature of the sputum is often helpful
  – *pink frothy sputum* - pulmonary oedema
  – *clear white mucoid sputum* – viral infection or longstanding bronchial irritation
  – *thick, yellowish sputum* – infection
  – *rusty sputum* – pneumococcal pneumonia
  – *blood streaked sputum* – tuberculosis, bronchiectasis, Ca lung or pulmonary infarction
Hemoptysis

- The expectoration of blood or of sputum, either streaked or grossly contaminated with blood

pulmonary edema, pulmonary embolism, mitral stenosis, pulmonary infarction, TBC, carcinoma of the lung.
Neurological symptoms

Is it a stroke? Check these signs **FAST**!

- **Face**: Does the face look uneven?
- **Arm**: Does one arm drift down?
- **Speech**: Does their speech sound strange?

Then it's time to call 9-1-1!

Massachusetts Department of Public Health - HD2107 10/12

- Numbness
- Blurred vision
- Loss of balance
- Confusion
- Headache
Other symptoms

• Fatigue
• Nocturia
• Anorexia, cachexia, weight loss
• Hoarseness – compression of the recurrent laryngeal nerve (aortic anerysm, enlarged left atrium)
Fatigue

• non-specific
• common in patients with impaired cardiovascular function
• consequent to a reduced cardiac output
• associated with muscular weakness
• may be caused by drugs e.g. β-blockers
• may also result for excessive blood pressure reduction in patients with hypertension or heart failure
• caused by excessive diuresis or diuretic induced hypokalaemia
SIGNS – General appearance

• Position: sitting, supine, leaning forward?
• Skin – color, moist/dry?
• Oedema?
• Cyanosis – peripheral, central? Clubbing of the fingers and toes?
• Features of hyperlipidemia (corneal arcus, xanthelasma)
• Overweight? Fat tissue distribution?
• Features of genetic disorders, Marfan’s syndrome
Cyanosis of the leg
Finger clubbing
Finger clubbing
SIGNS

• Breathing
  – Number of breaths (tachypnoe?)
  – Diviation of trachea?
  – Symmetrical/asymmetrical movement of the chest
  – Duration of expiration/inspiration
  – Additional sounds - stridor?
Thorax auscultation
Crackles:
- Explosive, sharp, discrete bursts of interrupted sound.
- Their pattern is remarkably constant and cannot be destroyed by coughing.
- Crackles are divided into two types depending on their acoustic properties.

Wheezes:
- Continuous, high-pitched sound heard throughout respiration

Rhonchi:
- Low-pitched sounds
- Frequently disappear following a cough

Pleural rub:
- The sound produced by the motion of inflamed pleurae
- The two thickened surfaces produce vibrations as they move irregularly over each other.
Crackles

**Fine Crackles**

sounds like the crackling noise made when salt is heated on a frying pan.

On auscultation fine crackles are in general higher pitched, less intense and of shorter duration than coarse crackles.

The **probable mechanism** for the production of fine crackles is as follows. During inspiration, the air pressure on the "upstream" (mouth) side increases until it is able to overcome the forces that are closing the bronchiole. When this occurs, the airway snaps open as the pressure between the bronchiole and the alveolus is equalized. The resulting vibration in the airway causes a discrete, sharp sound of very short duration.

Fine crackles are usually appreciated only during inspiration.

**Coarse Crackles**

sound of water being poured from a bottle.

coarse crackles are in general lower pitched, less intense and of longer duration than fine crackles.

The bubbling sound of coarse crackles is produced when air passes over secretions in the larger airways (trachea and bronchi).

Since air flows through the airways during inspiration and expiration, **coarse crackles are more likely to be detected during both phases of the respiratory cycle.**

The most common conditions associated with coarse crackles are congestive heart failure and pneumonia, Bronchiectasis.
SIGNS

• Palpation of the pulse
  – On which vessels? In what clinical settings?
  – Asculatation?
  – Pulse deficit
  – Regularity?
  – Tachycardia/bradycardia
SIGNS

• Upper and lower extremities
  – Skin color
  – Ulcerations/rash
  – Odema
  – Varices
  – Skin above pacemaker/ICD
SIGNS

• Abdomen:
  • Pathological murmurs, pulsations
  • Ascites
  • Hepatomegaly, splenomegaly
  • Hepato-jugular reflux
Typical distention of the internal jugular vein
Hepatojugular reflux
Examination of the praecordium and chest

• Look:
  – wounds, skin abnormalities, bone abnormalities, apex beat

• Palpate:
  – pain?
  – Praecordial thrill
Heart auscultation
Heart auscultation

- Aortic valve: 2nd-3rd right interspace
- Pulmonic valve: 2nd-3rd left interspace
- Tricuspid valve: Left sternal border
- Mitral valve: Apex
Heart sounds

- First heart sound is produced by the closing of the mitral and tricuspid valve
- Second heart sound is produced by the closing of aortic and pulmonic valve leaflets
Heart sounds

• Third heart sound is created by a sudden and rapid blood inflow to the ventricle in diastole (increased rate or volume of ventricular filling).
  – Impairment of ventricle function
  – AVR

• Fourth heart sound is created by the systole of the artia and is connected with an increased pressure in the atria. Occurs when diminished ventricular compliance increases the resistance to ventricular filling:
  – Systemic hypertension
  – Aortic stenosis
  – Hypertrophic cardiomyopathy
Heart sounds

A

S₄

Atrial or presystolic gallop (S₄)

B

M₁ T₁

Split first heart sound

C

EC

Aortic or pulmonary systolic ejection click (EC)

D

A₂ P₂

Split second heart sound

E

OS

Opening snap of mitral stenosis (OS)

F

S₃

Third heart sound (S₃)

EKG

Normal Heart Sounds

S₃ Gallop Rhythm

S₄ Gallop Rhythm

Both Gallop Sounds
Heart murmurs

- Isovolumic ventricular relaxation—as ventricles relax pressure in ventricles drops, blood flows back into cups of semilunar valves and snaps them closed.
- Late diastole—both sets of chambers relaxed. Passive ventricular filling.
- Atrial systole—atrial contraction forces a small amount of additional blood into ventricles.
- ESV (end-systolic volume) or minimum amount of blood in ventricles. ESV $= 65$ mL.
- EDV (end-diastolic volume). The maximum amount of blood in ventricles occurs at the end of ventricular relaxation. EDV $= 135$ mL.
- Ventricular ejection—as ventricular pressure rises and exceeds pressure in the arteries, the semilunar valves open and blood is ejected.
- Isovolumic ventricular contraction—first phase of ventricular contraction pushes AV valves closed but does not create enough pressure to open semilunar valves.
Heart murmurs

- Localization; side of maximal intensity
- Tone
- Timing
- Grade
- Radiation
- Relation to heart sounds (systolic, diastolic, continuous)
- Relation with posture and respiration
Heart murmurs - grade

• I - faint, heard only with special effort
• II – soft
• III – loud
• IV – loud with thrill
• V – audible with stethoscope barely touching the chest
• VI – murmur audible without the stethoscope
Heart murmurs

<table>
<thead>
<tr>
<th></th>
<th>Diastole</th>
<th>Systole</th>
<th>Diastole</th>
<th>Systole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Heart Sounds</td>
<td><img src="chart1" alt="Waveform" /></td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td>Mitral Stenosis</td>
<td><img src="chart2" alt="Waveform" /></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitral Regurgitation</td>
<td><img src="chart3" alt="Waveform" /></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic Stenosis</td>
<td><img src="chart4" alt="Waveform" /></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic Regurgitation</td>
<td><img src="chart5" alt="Waveform" /></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• www.easyauscultation.com
## Symptoms and signs typical of heart failure (1)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical</strong></td>
<td><strong>More specific</strong></td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Elevated jugular venous pressure</td>
</tr>
<tr>
<td>Orthopnoea</td>
<td>Hepatojugular reflux</td>
</tr>
<tr>
<td>Paroxysmal nocturnal dyspnoea</td>
<td>Third heart sound (gallop rhythm)</td>
</tr>
<tr>
<td>Reduced exercise tolerance</td>
<td>Laterally displaced apical impulse</td>
</tr>
<tr>
<td>Fatigue, tiredness, increased time to recover after exercise</td>
<td>Cardiac murmur</td>
</tr>
<tr>
<td>Ankle swelling</td>
<td></td>
</tr>
</tbody>
</table>
## Symptoms and signs typical of heart failure (2)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Less typical</strong></td>
<td><strong>Less specific</strong></td>
</tr>
<tr>
<td>Nocturnal cough</td>
<td>Peripheral oedema (ankle, sacral, scrotal)</td>
</tr>
<tr>
<td>Wheezing</td>
<td>Pulmonary crepitations</td>
</tr>
<tr>
<td>Weight gain (&gt;2 kg/week)</td>
<td>Reduced air entry and dullness to percussion at lung bases (pleural effusion)</td>
</tr>
<tr>
<td>Weight loss (in advanced heart failure)</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Bloated feeling</td>
<td>Irregular pulse</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>Tachypnoea (&gt;16 breaths/min)</td>
</tr>
<tr>
<td>Confusion (especially in the elderly)</td>
<td>Hepatomegaly</td>
</tr>
<tr>
<td>Depression</td>
<td>Ascites</td>
</tr>
<tr>
<td>Palpitations</td>
<td>Tissue wasting (cachexia)</td>
</tr>
<tr>
<td>Syncope</td>
<td></td>
</tr>
</tbody>
</table>
## Traditional clinical classification of chest pain

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical angina (definite)</td>
<td>Meets all three of the following characteristics:</td>
</tr>
<tr>
<td></td>
<td>- substernal chest discomfort of characteristic quality and duration;</td>
</tr>
<tr>
<td></td>
<td>- provoked by exertion or emotional stress;</td>
</tr>
<tr>
<td></td>
<td>- relieved by rest and/or nitrates within minutes.</td>
</tr>
<tr>
<td>Atypical angina (probable)</td>
<td>Meets two of these characteristics.</td>
</tr>
<tr>
<td>Non-anginal chest pain</td>
<td>Lacks or meets only one or none of the characteristics.</td>
</tr>
</tbody>
</table>
### Classification of angina severity according to the Canadian Cardiovascular Society

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Ordinary activity does not cause angina such as walking and climbing stairs. Angina with strenuous or rapid or prolonged exertion at work or recreation.</td>
</tr>
<tr>
<td>Class II</td>
<td>Slight limitation of ordinary activity. Angina on walking or climbing stairs rapidly, walking or stair climbing after meals, or in cold, wind or under emotional stress, or only during the first few hours after awakening. Walking more than two blocks on the level and climbing more than one flight of ordinary stairs at a normal pace and in normal conditions.</td>
</tr>
<tr>
<td>Class III</td>
<td>Marked limitation of ordinary physical activity. Angina on walking one to two blocks(^a) on the level or one flight of stairs in normal conditions and at a normal pace.</td>
</tr>
<tr>
<td>Class IV</td>
<td>Inability to carry on any physical activity without discomfort, angina syndrome may be present at rest.</td>
</tr>
</tbody>
</table>

\(^a\)Equivalent to 100–200 m.
Thank you