

Heart failure (HF): 1st lecture 2018/11/17

The heart act as pump deliver the blood to Systemic and pulmonary circulation

Definition of heart failure

It is Inability of the heart to maintain adequate amount of cardiac output, to meet the metabolic need of the body or can do so only at the expense of **elevated ventricular filling pressure.**

The incidence of heart failure increases with advancing age ,the prevalence is about 1% in those aged 50–59 years to over 10% in those patients over 80 years. Almost all forms of heart disease can lead to heart failure but the most common causes are coronary artery disease and uncontrolled severe hypertension. Heart failure is a syndrome and an accurate diagnosis is important because treatment of the underlying cause may reverse heart failure or prevent its progression while untreated heart failure generally carries a poor prognosis; approximately 50% of patients with severe heart failure will die within 2 years because of either pump failure or malignant ventricular arrhythmias. HF continues to be a major cause of morbidity and mortality. In the United States, approximately 56,000 deaths each year are primarily caused by HF. Patients with untreated or poorly managed HF are at high risk during dental treatment for complications such as cardiac arrest, cerebrovascular accident, arrhythmia and myocardial infarction. The dentist must be able to identify these patients on the basis of history and clinical findings and refer them for medical diagnosis and management, and work closely with the physician to develop a dental management plan that will be effective and safe for the patient.

The Most common causes of heart failure include:

- Coronary heart disease (angina and infarction).
- Hypertension(untreated or uncontrolled hypertension)
- Valvular heart disease.
- Congenital heart disease
- Myocarditis
- Infective endocarditis.
- Cardiomyopathy.

Coronary heart disease accounting for 60% to 75% of cases. More than 75% of patients with HF having a long-standing history of hypertension.

pathophysiology and Complications of heart failure

Heart failure mean inability of the heart to function efficiently as a pump, HF may involve one or both ventricles. Most acquired disorders that lead to HF result in initial failure of the left ventricle which is often followed by failure of the right ventricle. By the time most patients are seen for medical treatment, failure of both sides of the heart usually has occurred.

- **Type of heart failure** :there are Left side heart failure , Right side heart failure & biventricular failure or Systolic & diastolic heart failure.

When the heart fail to provide sufficient cardiac output there will be:

- 1) Local changes involving the heart..
- 2) Neurohormonal changes.

These compensatory changes occur in the cardiovascular system to maintain adequate blood flow to the vital organs of the body.

- **Local changes** include : changes in ventricular size, shape, and mass(dilatation and or hypertrophy) .This process is known as remodeling which also occurs in response to myocyte loss, such as in myocardial infarction.
- **The neurohormonal changes include :**
- **A) The sympathetic nervous system activation** result in
- Vasoconstriction.
- Increasing heart rate.
- Ventricular contractility.

- **B) Activation of the renin-angiotensin-aldosterone system:** which lead to
- stimulating arterial vasoconstriction through production of angiotensin II.
- Aldosterone secretion will expand the intravascular volume by retaining sodium and water.
- release of vasopressin will enhance free water absorption by the kidney.

The drawback of these neurohormonal changes activation of these systems is associated with several deleterious effects including:

- Elevation in ventricular filling pressures, which may result in pulmonary and/or systemic venous congestion and edema.
- These maladaptive changes are responsible for many of the symptoms and signs associated with congestive heart failure.

The causes of left side heart failure include:

- Mitral valve disease (MS&MR).
- Aortic valve disease (AS&AR).
- Coronary artery disease. (MI, angina P.).
- Myocardial disease. (cardiomyopathy).
- Systemic arterial hypertension.
- Congenital heart disease (PDA).
- Arrhythmias (tachyarrhythmia, rapid AF, CHB).
- Toxic substance alcohol, Daunorubicin.

The left ventricular failure associated with pulmonary congestion. the clinical features of left side heart failure include:

- **Symptoms** are predominantly:
- fatigue.
- exertional dyspnoea. *صعوبة التنفس الجهدية*
- orthopnoea. *صعوبة التنفس عند الخلق*
- paroxysmal nocturnal dyspnoea, the signs of left side heart failure:

- the signs include: Tachycardia, pulsus alternans.
- Cardiomegaly is demonstrable with a displaced apical impulse.
- Auscultation reveals a left ventricular third or fourth heart sound that, with tachycardia, is described as a gallop rhythm.
- Digitation of the mitral annulus results in functional mitral regurgitation.
- Crackles are heard at the lung bases. bilateral fine end insp crackles. start at the base of lung.
- In severe left heart failure the patient has pulmonary edema

Right side heart include Right atrium & Rt. ventricle, Tricuspid valve & pulmonary valve.

Right side heart failure associated with systemic venous congestion

Causes of right side heart failure:

- Coronary heart disease.
- cor pulmonale (COPD).
- pulmonary embolism.
- Pulmonary hypertension.
- pulmonary & tricuspid valve disease.
- Congenital HD (atrial septal defect).

Clinical features

- **Symptoms:**
- Fatigue.
- breathlessness.
- anorexia and nausea abdominal pain and vomiting.

- Leg edema.

Physical signs

- elevated jugular venous distension more than 4cm above sternal angle (\pm v waves of tricuspid regurgitation)
- tender smooth hepatic enlargement.
- development of free abdominal fluid (ascites).
- Pleural effusion (transudates & commonly right-sided).
- dependent pitting edema.
- Dilatation of the right ventricle produces cardiomegaly and may give rise to left parasternal lift and functional tricuspid regurgitation.
- Tachycardia and a right ventricular third heart sound are usual.

Congestive heart failure (biventricular heart failure) Right and left ventricles

CLINICAL PRESENTATION

Dyspnea is the most common symptom of HF and usually is present only with exertion or physical activity it's a features of mild and moderate heart failure Exercise intolerance (e.g., inability to climb a flight of stairs) is one of the hallmark symptoms of HF while . Dyspnea at rest is an indication of severe HF. Orthopnea is positional dyspnea, which is precipitated or worsened by a recumbent or semirecumbent position Most patients with mild to moderate HF do not exhibit orthopnea when treated adequately. Paroxysmal nocturnal dyspnea (PND) is an attack of sudden, severe shortness of breath that awakens the patient from sleep, usually within 1 to 3 hours after the patient goes to bed, and resolves within 30 minutes after the patient arises, from bed often gasping for air. Both orthopnea and PND are relatively specific indicators of HF. . Fatigue (especially muscle fatigue) is a common, nonspecific symptom of HF. However, rales (or crackles), representing alveolar fluid, are a hallmark of HF when present. Chest radiographs may reveal enlargement and displacement of the cardiac silhouette or abnormalities of the pulmonary vasculature. Evidence of pleural effusion also may be seen . some patients complain of leg edema. Dependent edema (swelling of feet and ankles after standing or walking) and Report of weight gain or increased abdominal girth (fluid accumulation; ascites. other symptoms include right upper quadrant pain (liver congestion) with anorexia, nausea, vomiting, constipation (bowel edema)

signs

- Cheyne-Stokes respiration (hyperventilation alternating with apnea during sleep).
- Jaundice, Cyanosis
- Pulsus alternans.
- raised venous pressure (elevated jugular venous pressure) Distended neck veins.
- edema.
- enlarged tender liver and Large Ascites.

- Enlargement of the heart. **Cardiac murmur** and gallop rhythm.
- Inspiratory rales (crackles)
- Peripheral

Complications of heart failure:

- 1) Cardiac cachexia.
- 2) Renal failure.
- 3) Electrolytes disturbance.
- 4) impaired liver function.
- 5) Thromboembolism. DVT & and PE.
- 6) Arrhythmia.
- 7) Sudden death.

Investigations: A) blood tests

- full blood count.
- liver biochemistry.
- urea and electrolytes.
- cardiac enzymes in acute heart failure to diagnose myocardial infarction.
- thyroid function.
- Natriuretic peptide (B-type NP (BNP) or N terminal (NTproBNP)). A normal plasma level excludes heart failure and is a useful screening test in the investigation of patients with breathlessness.

Count - liver - thyroid - cardiac - urea

B) CXR show cardiac size enlarged and evidence of pulmonary congestion.

C) **Electrocardiogram(ECG)** may show evidence of ischaemia, hypertension or arrhythmia.

D) **Echocardiography:** . Two-dimensional & Doppler echo establish.

Diagnosis of heart failure An ejection fraction of ≤ 0.55 is generally accepted as evidence for systolic dysfunction . They may also reveal the aetiology (valve disease, regional wall motion abnormalities in ischaemic heart disease, cardiomyopathy, amyloid). may detect intracardiac thrombus.

CT or coronary angiography for detection of coronary artery stenosis or obstruction.