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PBL-II

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Congestive Heart Failure

What is CHF?

Definition

- Abnormality of cardiac function that leads to the inability of the heart to pump blood to meet the body's basic metabolic demands or when it can do so only with an elevated filling pressure

Epidemiology

- Prevalence
  - Affects nearly 5 million Americans currently, >500,000 new cases diagnosed each year
- Cost
  - Annual direct cost in >10 billion dollars
- Incidence increased with age
  - Effects 1-2% of patient from 50-59-years-old and 10% of patient over the age of 75
- Frequency
  - It is the most common inpatient diagnosis in the US for patients over 65 years of age
  - Visits to their family practitioner on average 2-3 times per year
- Gender
  - Men> women in those between 40 and 75 years of age
  - The sexes are equal over 75 years of age
  - 5- year survival rates are estimated to be 59% in men and 45% in women.

Pathiophysiology

Physical Exam

- Anxious
- Pale
- Clammy
- Dyspnea
- Tachypnea
- Confusion
- Edema
- Hypertension
- Diaphoretic
- Rales
- Ronchi
- Tachycardia
- S_3 Gallop
- JVD
- Pink Frothy Sputum
- Cyanosis
- Displaced PMI

Classification of Heart Failure: ACC/AHA Stage vs NYHA Class

ACC/AHA Heart Failure Stage	NYHA Functional Class
A. At risk for heart failure but without structural heart disease or symptoms	None
B. Structural heart disease but without heart failure	I. Asymptomatic
C. Structural heart disease with prior or current heart failure symptoms	II. Symptomatic with moderate exertion III. Symptomatic with minimal exertion
D. Refractory heart failure requiring specialized interventions	IV. Symptomatic at rest

Hunt SA et al. *Circulation*. 2001;104:2996-3007.
Farrell MH et al. *JAMA*. 2002;287:890-897.

Comparison of COPD, CHF Pneumonia

	COPD	CHF	Pneumonia
Cough	Frequent	Occasional	Frequent
Wheeze	Frequent	Occasional	Frequent
Sputum	Thick	Thin/white	Thick/yellow/ brown
Hemoptysis	Occasionally	Pink frothy	occasionally
PND	Sometimes after a few hours	Often within 1 hour	Rare
Smoking	Common	Less common	Less common
Pedal edema	Occasional	Common with chronic	none

	COPD	CHF	Pneumonia
Onset	Often URI with cough	Orthopnea at night	Gradual with fever, cough
Chest Pain	pleuritic	Substernal, crushing	Pleuritic, often localized
Clubbing	Often	Rare	Rare
Cyanosis	Often and severe	Initially mild but progresses	May be present
Diaphoresis	May be present	Mild to heavy	Dry to moist
Pursed Lips	Often	Rare	Rare unless COPD

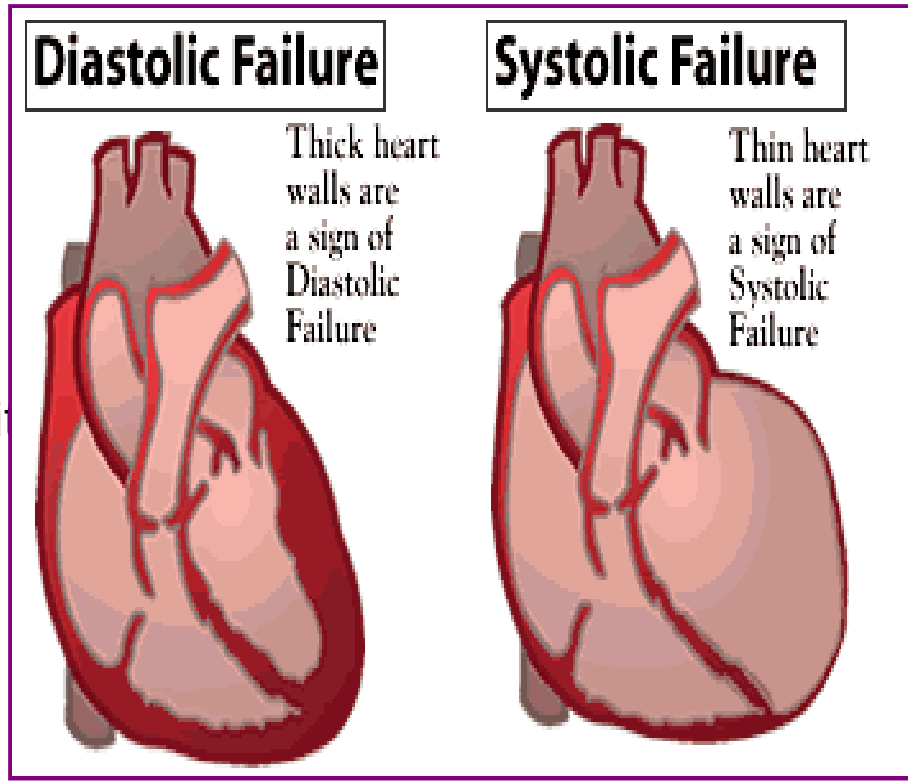
Precipitating Causes

- Common
  - CAD (70%)
  - Systemic Hypertension
  - Idiopathic
- Less Common
  - Diabetes Mellitus
  - Valvular Disease

- Rare
  - Anemia
  - Connective Tissue Disease
  - Viral Myocarditis
  - Hemochromatosis
  - HIV
  - Hyper/Hypothyroidism
  - Hypertrophic Cardiomyopathy
  - Infiltrative Disease including amyloidosis and sarcoidosis
  - Mediastinal radiation
  - Peripartum cardiomyopathy
  - Restrictive pericardial disease
  - Tachyarrhythmias
  - Toxins
  - Trypanosomiasis (Chagas' disease)

Systolic vs. Diastolic

- Diastolic dysfunction
  - EF normal or increased
  - Hypertension
  - Due to chronic replacement fibrosis & ischemia-induced decrease in distensibili
- Systolic dysfunction
  - EF < 40%
  - Usually from coronary disease
  - Due to ischemia-induced decrease in contractility
- Most common is a combination of both



Evaluation

- History: risk factors for ischemic heart disease, family history
- Physical exam: S3, JVD more specific signs of HF than rales, peripheral edema

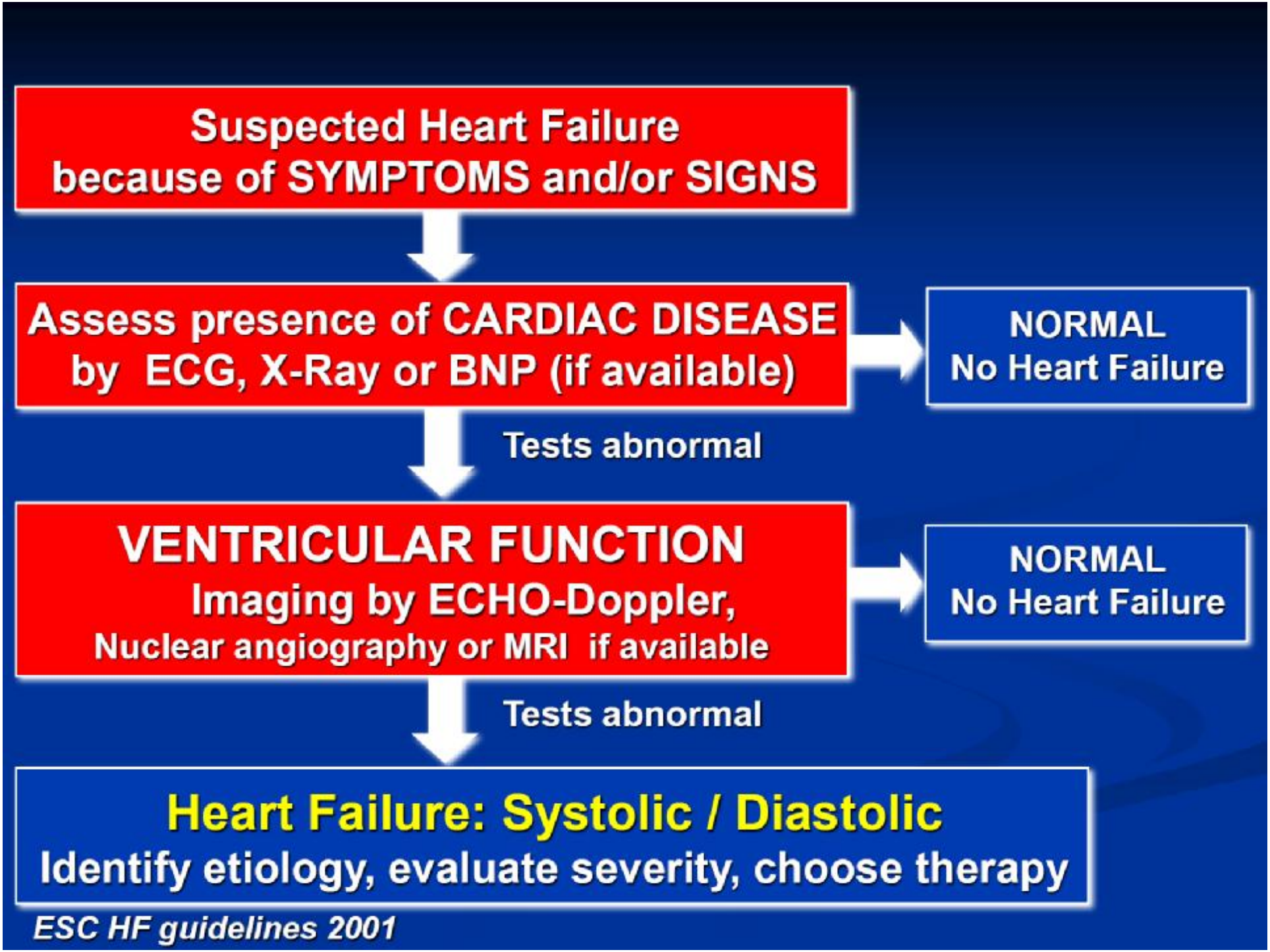
Exam

- Major Criteria
  - Paroxysmal nocturnal dyspnea
  - Neck Vein Distention
  - Rales
  - Cardiomegaly
  - Pulmonary Edema
  - S3 Gallop
  - Hepatojugular Reflex
- Minor Criteria
  - Ankle edema
  - Nocturnal Cough
  - Dyspnea on ordinary exertion
  - Hepatomegaly
  - Pleural Effusion
  - Tachycardia >120bpm

Confirming the Presence of Heart Failure

CXR-cardiomegaly and pulmonary edema; Kerley's B Lines

- Laboratory Values
- BNP
  - Maybe inc by age, female gender, CRI, pulm disease, hyperthyroid, obesity, steroid use
- Electrocardiogram/ECHO
  - Anterior Q waves, LBBB, LVH


Suspected Heart Failure
because of SYMPTOMS and/or SIGNS
Assess presence of CARDIAC DISEASE
by ECG, X-Ray or BNP (if available)
NORMAL
No Heart Failure
Tests abnormal
VENTRICULAR FUNCTION
Imaging by ECHO-Doppler,
Nuclear angiography or MRI if available
NORMAL
No Heart Failure
Tests abnormal
Heart Failure: Systolic / Diastolic
Identify etiology, evaluate severity, choose therapy
ESC HF guidelines 2001

Negative Prognostic Factors

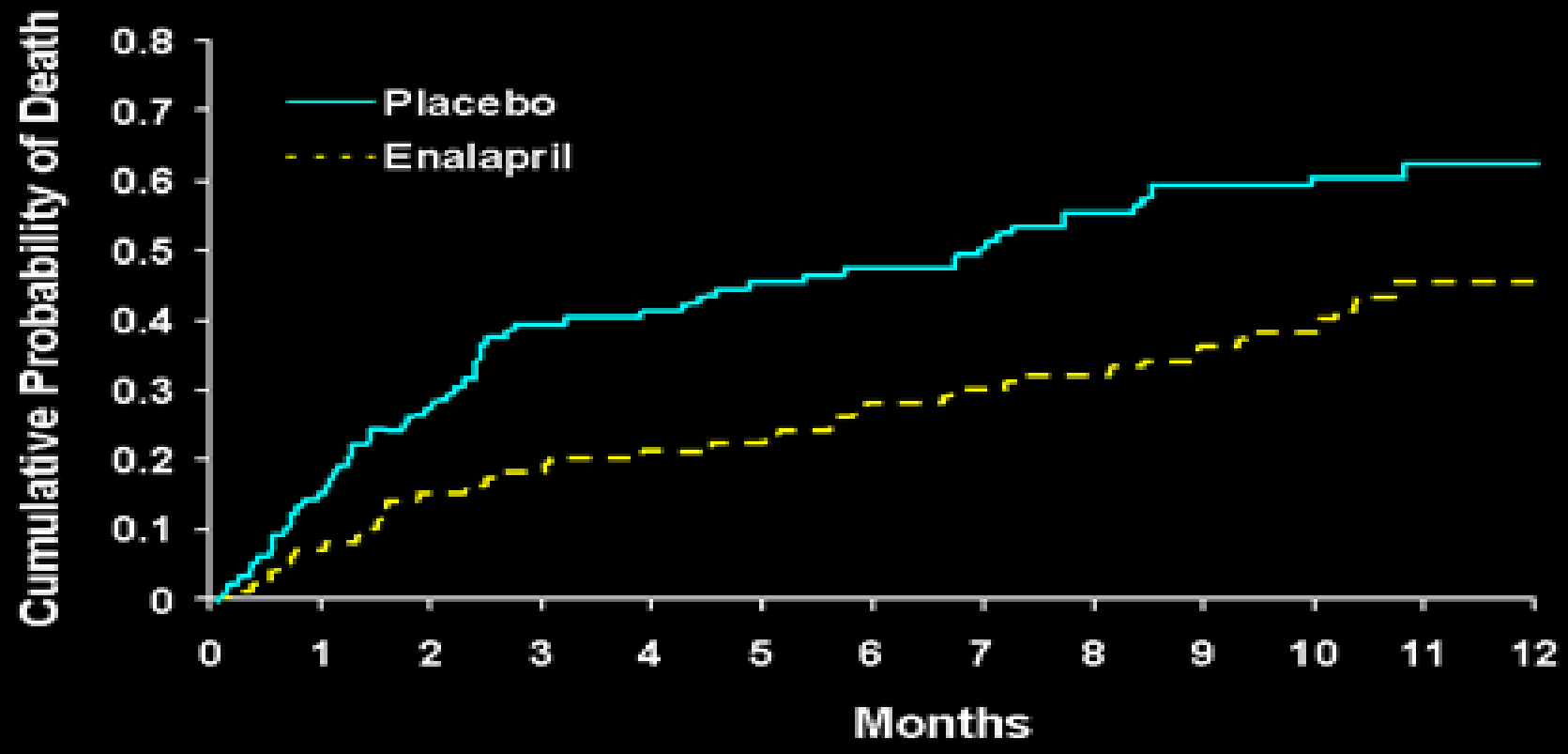
- Clinical
  - Increased Age, Diabetes, Smoking
- Laboratory
  - Hyponatremia, Elevated neurohormones
- Hemodynamic
  - Reduced EF, Increased Pulm Cap Wedge Pressure
- Electrophysiological
  - A-fib, A-flutter, Ventricular ectopy, V-tach

Treatment

ACE-I

- CONSENSUS-Enalapril 2.5-40mg (188 days) vs placebo
- Pts were already taking digoxin and diuretics
- 253 Patient with NYHA Class IV
- Dec mortality at:
  - 6 months -40%
  - 1 Year – 27%

- SOLVD-Enalapril 20mg/day (41 mo)
- 2569 Patients with and EF <35%
  - Earlier stages of HF even asymptomatic
  - NYHA Class II-III
- All cause mortality dec by 16%
- Morality rate from HF dec by 16%



Adapted from The CONSENSUS Trial Study Group. *N Engl J Med.* 1987;316:1429-1435.

Angiotensin-Receptor Blockers

- Comparable to ACE inhibitors
- Reduce all-cause mortality
- Suitable alternative for patient with adverse events (angioedema, cough, hyperkalemia) occur with ace-i

ACE + ARB

- CHARM-Added (Lancet 2003)
  - 2548 NYHA II-IV; LVEF < 40%
  - CV death, hospital admission
  - NNT=25
  - Second study found no benefit
- But 23% discontinued due to side effects (increased cr, hypotension, hyperkalemia)
- Currently Ace + Arb is not recommended

Beta-Blockers

- 34% reduction in all mortality with use of beta-blockers
- Decrease Cardiac Sympathetic Activity
- Use in stable, chronic disease (start as early as discharge-IMPACT-HF)
- Titrate slowly
- Contraindications-bradycardia, heart block or hemodynamic instability
- Mild asthma was not a contraindication
- Work irrespective of the etiology of the heart failure

Initial and Target Doses of beta-blockers for HF

Medication	Starting Dose	Target Dosage
Bisoprolol	1.25mg daily	10mg daily
Carvedilol	3.125mg bid	25mg bid
Metoprolol CR/XL	12.5-25mg daily	200mg daily

Aldosterone Antagonists

- Spironolactone (Aldactone; RALES 1999)
  - Pts 1,663 Class III/IV, ACE, Loop,Dig, EF < 35%
  - Decreased all cause mortality of 30%, NNT=10
  - Hyperkalemia, gynecomastia
- Eplerenone (Inspra; EPHESUS 2003)
  - Pts 6,642 asym LV dysfunction, DM, or after MI
  - Dec CV mortality of 13%, NNT=43
  - Newer more selective inhibitor; fewer side effects
  - More pts on beta-blockers

Hydralazine (Apresoline) and isosorbide dinitrate (Sorbitrate)

Hydralazine

- Reduces systemic vascular resistance by preferentially dilating arterioles

Isosorbide Dinitrate

- Preferential Venodilator-reduces ventricular filling pressure and treat pulmonary congestion

Reduces mortality – upto 28%

Poor tolerability->30% drop out of study

- flushing, headaches, gi upset, less frequently can cause positive ANA titers and lupus-like syndrome

Hydralazine (Apresoline) and isosorbide dinitrate (Sorbitrate)

- African-American Heart Failure Trial (A-HeFT)
  - advanced HF and a fixed dose of isosorbide dinitrate and hydralazine
  - Added to Standard B-blocker/Ace-I therapy
  - Some survival improvement

Digoxin

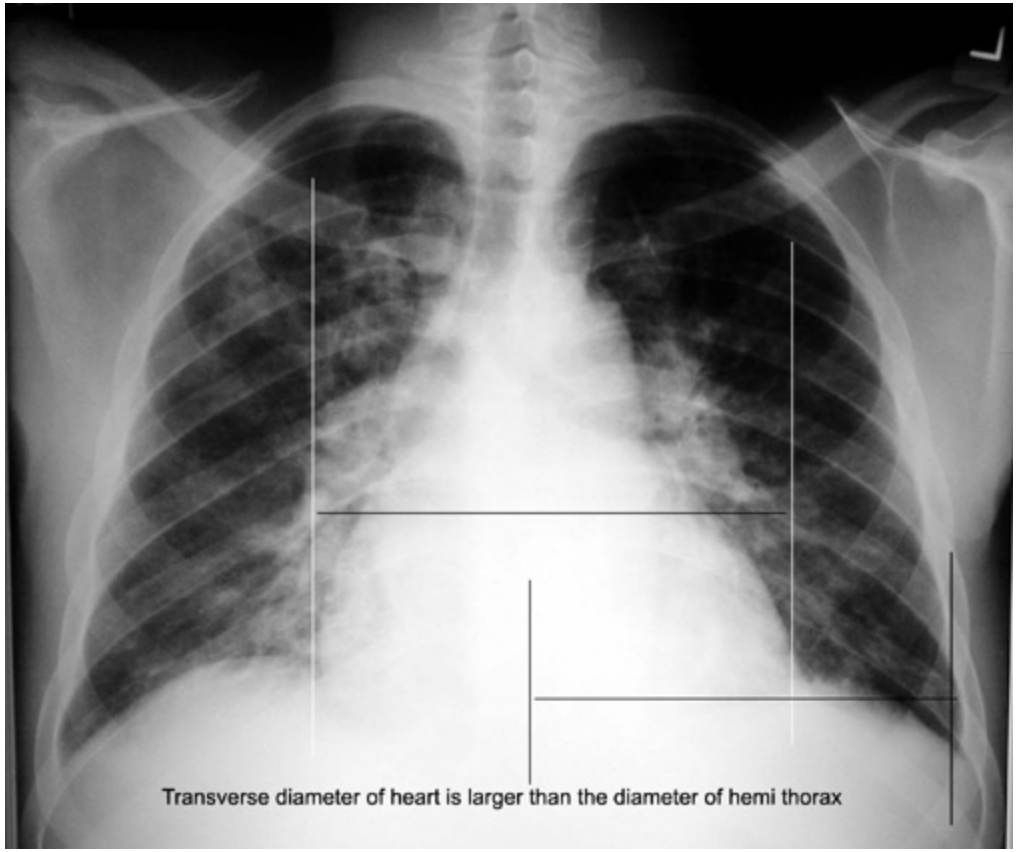
- May relieve symptoms, does not reduce mortality
- Pts taking digoxin are less likely to be hospitalized (25% reduction)
- More admissions for suspected digoxin toxicity

Loop Diuretics

- Mainstay of symptomatic treatment
  - Improve fluid retention
  - Increase exercise tolerance
  - No effects on morbidity or mortality

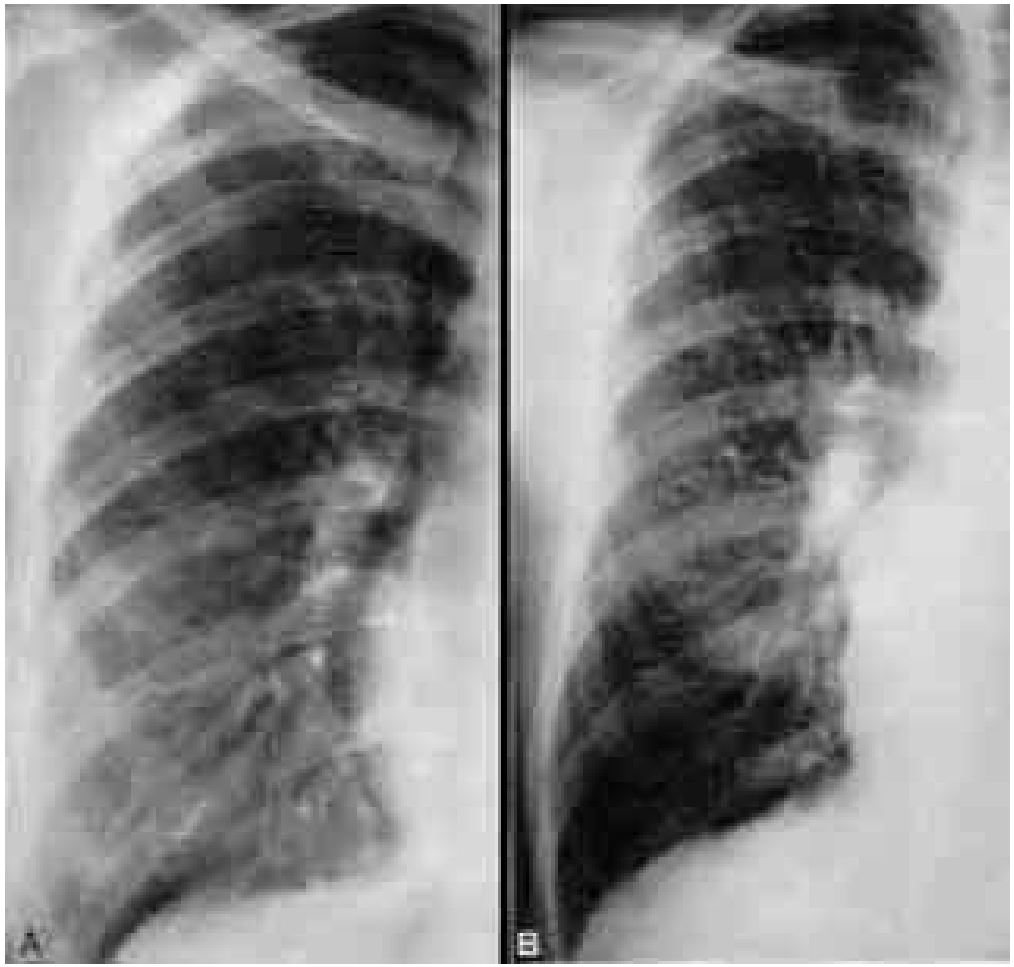
CXR Appearance of CHF

Cardiomegaly



Cardiac width is larger than half trans-thoracic diameter. Cardiothoraccic rartio >0.5.

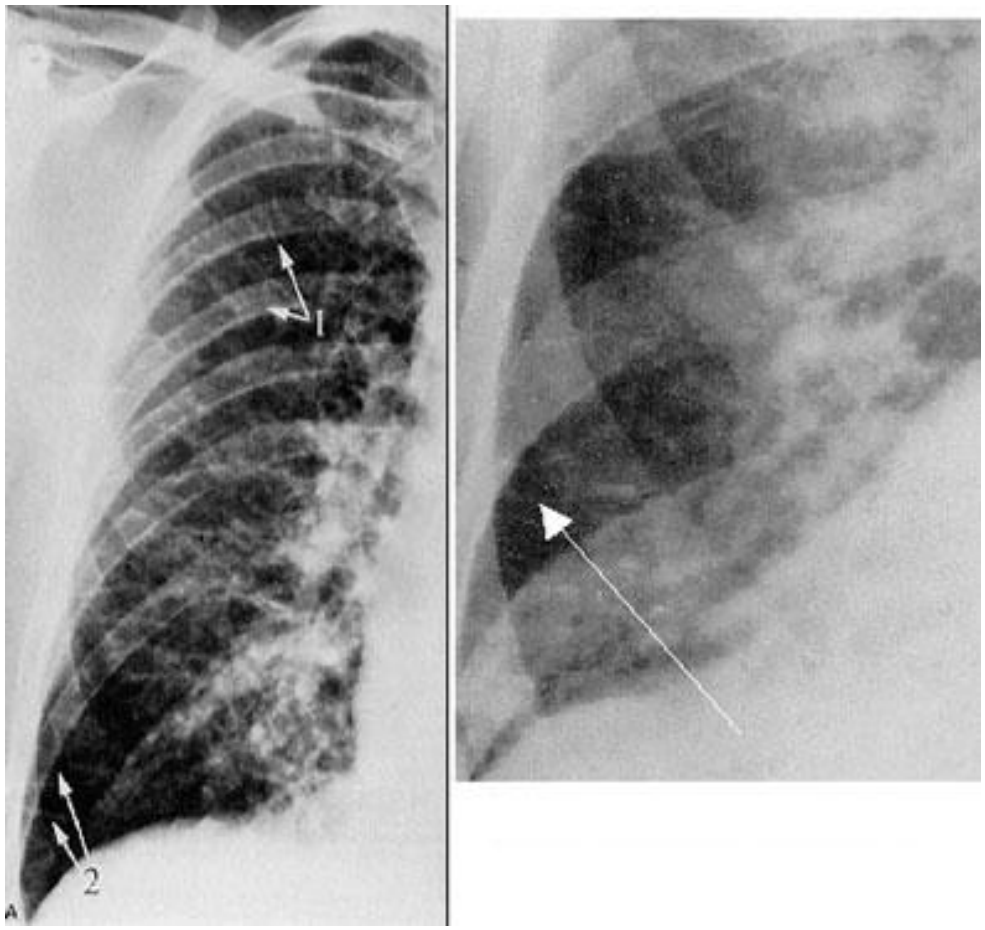
Cephalization



Cephalization occurs due to increased flow to the apices of the lung as a result of increased pulmonary venous pressure. They stand out because there is more blood in them, the pressure is higher, and there may also be some edema surrounding them.

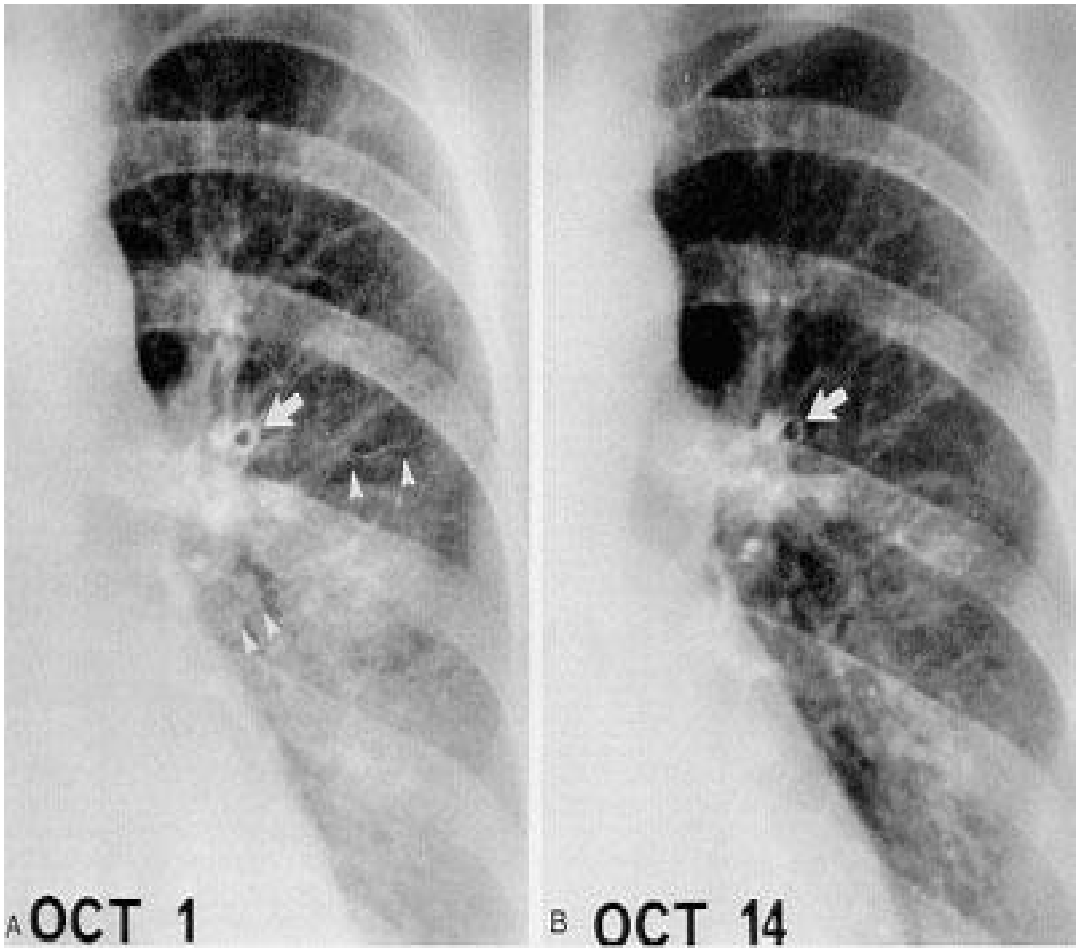
For it to be correctly described the patient must be upright when the film is obtained.

Kerley B Lines



These are short parallel lines at the lung periphery. These lines represent interlobular septa, which are usually less than 1 cm in length and parallel to one another at right angles to the pleural surface. They may be seen in any zone but are most frequently observed at the lung bases at the costophrenic angles on the PA radiograph, and in the substernal region on lateral radiographs

Peri-Bronchial Cuffing

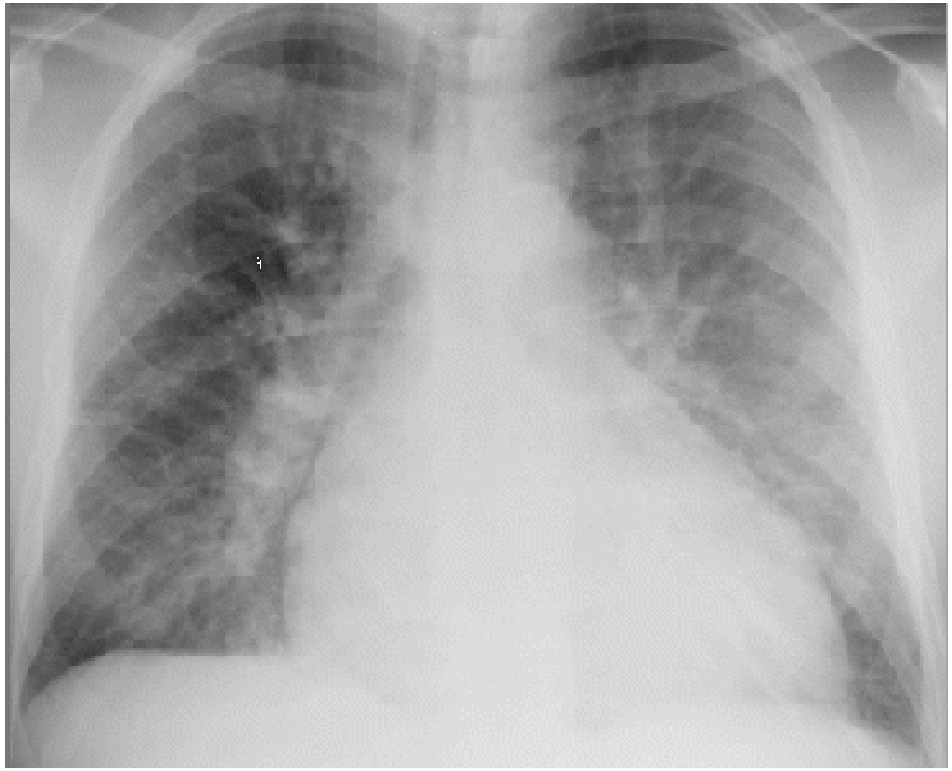


Occurs when excess fluid or mucus build up in the small airway passages of the lung causing localized patches of atelectasis. This causes the area around the bronchus to appear more prominent on an xray.

Pulmonary Effusions

Fluid accumulation in the pleural space. Usually a trasudative effusion in CHF.

Pulm. Interstitial Edema



Classical bat wing appearance is visible as bilateral hilar haze. Cardiogenic pulmonary edema occurs when the pulmonary capillary pressure exceeds 25 mm Hg.

Above this level, *interstitial* pulmonary edema occurs which manifests clinicallly as shortness of breath and tachypnoea.

Pulm. Alveolar Edema

As it progresses, alveolar edema occurs which manifests as dyspnoea with frothy blood stained sputum and bilateral basal crepitations. In more advanced stage, the crepitations (rales) extends through out the lung fields

ECG Appearance of CHF

Types of Rhythms Associated with CHF