MRAD 204: Radiographic Technique I

Chest

Blood Pressure

- **Defining blood pressure**
  - “Push” or force of blood in the blood vessels
  - Exists in all blood vessels—highest in arteries, lowest in veins
  - Blood pressure gradient—causes blood to circulate; liquids can flow only from areas of high pressure to areas of low pressure
    - Low or nonexistent blood pressure gradient is fatal if not reversed
    - Hypertension (high blood pressure) can cause a blood vessel to rupture

Factors that Influence Blood Pressure

- Blood volume—the larger the volume, the more pressure is exerted on vessel walls
- Strength of heart contractions—affect cardiac output; stronger heartbeat increases pressure; weaker beat decreases it
- Heart rate—increased rate increases pressure; decreased rate decreases pressure

Fluctuations in Blood Pressure

- Blood pressure varies within normal range from time to time
- Central venous pressure—influences pressure in large peripheral veins
- Venous return of blood to the heart depends on five mechanisms
  - A strongly beating heart
  - An adequate arterial blood pressure
  - Valves in the veins
  - Pumping action of skeletal muscles as they contract
  - Changing pressures in the chest cavity caused by breathing

Hypertension

- Hypertension is also called high blood pressure.
- It is the leading cause of strokes and CHF.
- Blood pressure is a function of cardiac output (the amount of blood pumped per minute by the heart) and the total peripheral resistance, which reflects the condition of the walls of the blood vessels throughout the body.

Classification of Hypertension

Blood Pressure (BP) Classification			
Classification	**Systolic BP**		**Diastolic BP**
Normal	less than **120**	and	less than **80**
Prehypertension	**120-139**	or	**80-89**
High blood pressure			
Stage 1 hypertension	**140-159**	or	**90-99**
Stage 2 hypertension	greater than or equal to **160**	or	greater than or equal to **100**

Hypertensive Heart Disease

- In hypertensive heart disease, long-standing high blood pressure causes narrowing of systemic blood vessels and an increased resistance to blood flow.
-
- The left ventricle is forced to assume an increased work load, which initially causes hypertrophy (double thickness of normal wall).

Coronary Artery Disease

- Coronary artery disease is the narrowing of the lumen of one or more of the coronary arteries.
- The most common cause is atherosclerosis – the deposition of fatty material on the inner arterial wall.
- It results in oxygen deprivation of the myocardium and ischemic heart disease.

Coronary Artery Disease

- Predisposing factors to coronary artery disease:
  - Hypertension
  - Obesity
  - Smoking
  - High-cholesterol diet
  - Lack of exercise

Coronary Artery Disease

A

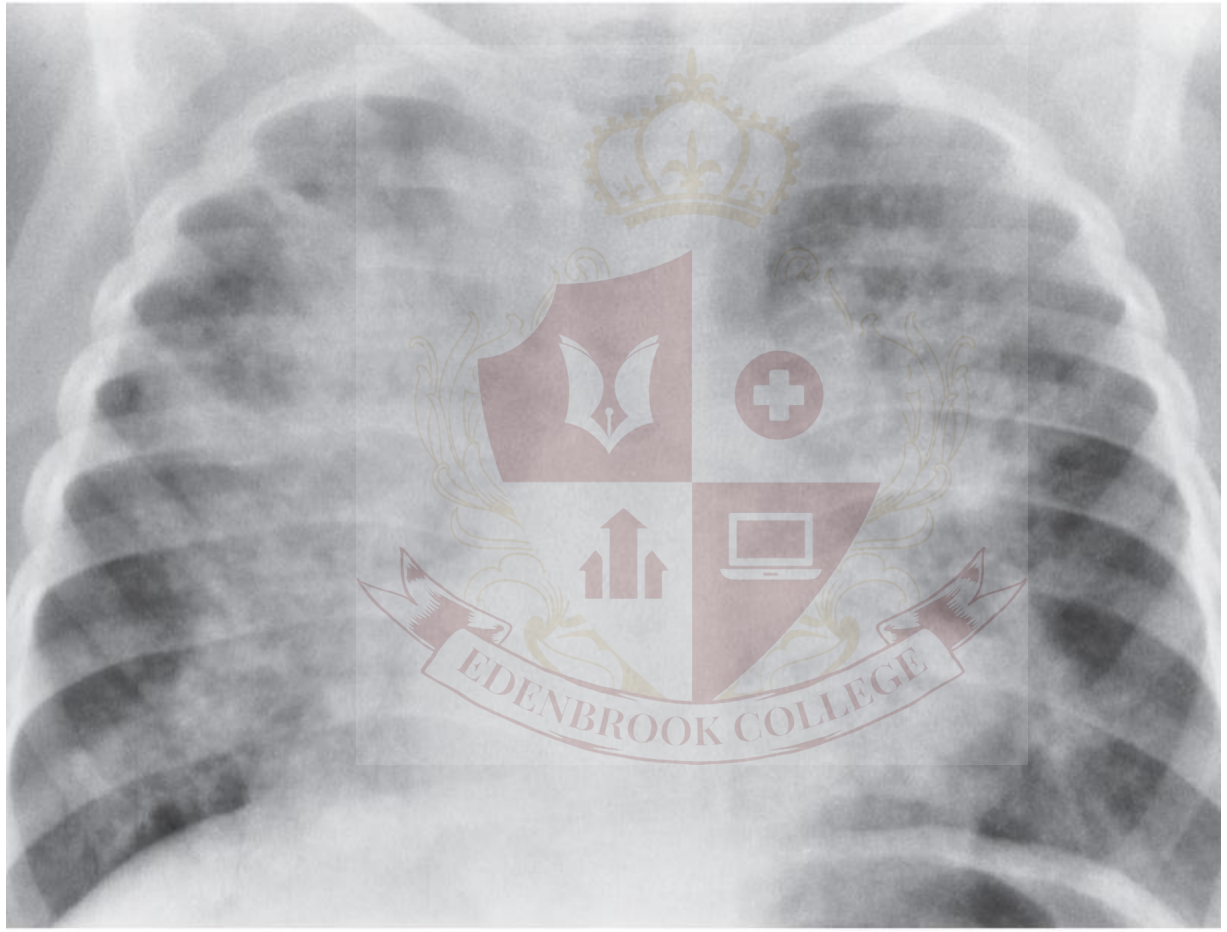


Copyright © 2016, Elsevier Inc.

Congestive Heart Failure (CHF)

- Congestive heart failure refers to the inability of the heart to propel blood at a rate and volume sufficient to provide an adequate supply to the tissues.
- Causes of CHF include:
  - Intrinsic cardiac abnormality
  - Hypertension
  - Any obstructive process that abnormally increases the peripheral resistance to blood flow

Congestive Heart Failure



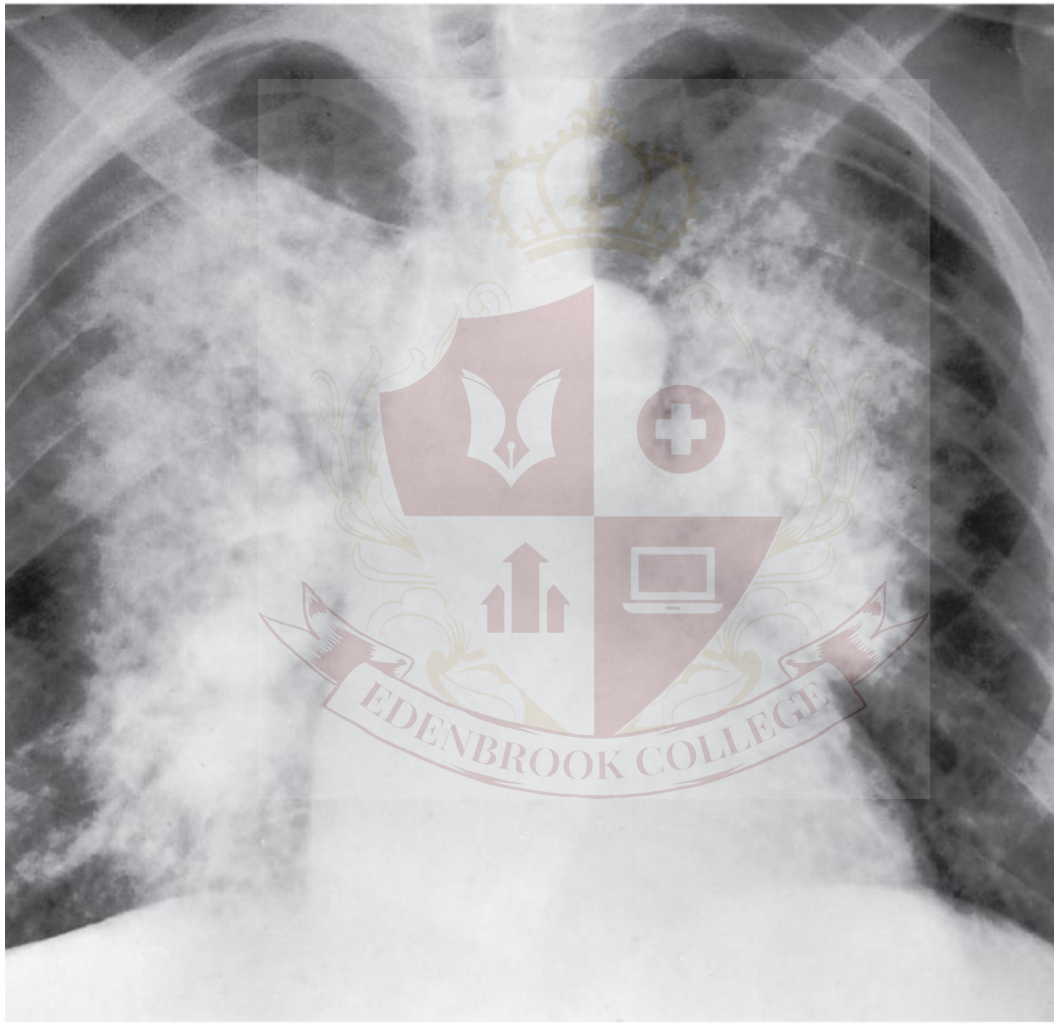
Copyright © 2016, Elsevier Inc.

Pulmonary Edema

- Pulmonary edema is an abnormal accumulation of fluid in the extravascular pulmonary tissues.

- Most common cause is an elevation of the pulmonary venous pressure.
  - It is usually due to left-sided heart failure.
  - It may also be caused by pulmonary venous obstruction or lymphatic blockade.

Pulmonary Edema – Chest Radiography



from Fraser RG, Pare JAP: *Diagnosis of diseases of the chest,* Philadelphia, 1979, Saunders.

Circulatory Shock

- Failure of the circulatory system to deliver oxygen to the tissues adequately, resulting in cell impairment
    - Cardiogenic shock—caused by heart failure