Cardiovascular radiology

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Cardiovascular Imaging

- Nuclear cardiology
- Echocardiography
- Cardiac magnetic resonance
- Cardiac computed tomography
Cardiac CT
Postero-Anterior (PA) View

- Pulmonary Arteries
  - Right

- Pulmonary Veins
- Pulmonary Arteries
  - Right
  - Left
Lateral View

- Left atrium
- Left ventricle
- Right ventricle
Cardiac Position and Situs

- Dextrocardia
- Situs solitus

- Dextrocardia
- Situs inversus

- Situs ambiguous
Chamber Enlargement

Right Ventricular Enlargement
- PA View: Rounding and upliftment of cardiac apex
- Lateral View: Retrosternal fullness (contact of anterior cardiac border greater than 1/3 of the sternal length)
Chamber Enlargement

- Left Atrial Enlargement
  - Lateral view:
    - Prominent posterosuperior cardiac border
    - Posterior displacement and upliftment of left mainstem bronchus
Heart failure

- Congestive HF is the result of insufficient output associated with high resistance to circulation or fluid overload.
- Left ventricular failure is the most common leading to decrease cardiac output and increase pulmonary venous pressure.
This will lead to dilatation of pulmonary vessels, leak of fluid into the interstitium, pleural space and into the alveoli, resulting in pulmonary oedema.
Clinical information
- Worsening exercise tolerance
- Chronic uncontrolled hypertension
- Rapid onset of shortness of breath
- Atrial fibrillation

Diagnosis
- Left ventricular failure with pulmonary oedema
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<td>Redistribution</td>
<td>PCWP 13-18 mmHg</td>
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<td>2</td>
<td>Interstitial edema</td>
<td>PCWP 18-25 mmHg</td>
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<td>3</td>
<td>Alveolar edema</td>
<td>PCWP &gt; 25 mmHg</td>
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Stages of CHF

Stage I redistribution...

In normal erect plain chest film the pulmonary vessels supplying the upper lung fields are smaller and fewer in no. than those supplying the lung bases.

With CHF there will be redistribution of pulmonary blood flow equal in upper and lower lobes and subsequently flow from the lower to upper lobe vessels.
Redistribution (upper lobe blood diversion)
Stage II interstitial oedema

fluid leak from the loaded vessels into the adjacent interstitium ... forming septal lines ... kerley lines ... horizontal lines seen near the costophrenic angles
Septal lines (Kerley B lines)
Alveolar oedema

- Fluid leak from the interstitium into the adjacent alveoli.
It is affected by gravity ...
and obstructive lung disease (fluid leak in the less obstructed lung region)
Cotton wool appearance of alveolar oedema
Pleural effusion

Pleural effusion is bilateral in 70% of cases of CHF. When unilateral, it is slightly more often on the right side than on the left side. There has to be at least 175 ml of pleural fluid, before it will be visible on a PA image as a meniscus in the costophrenic angle. On a lateral image effusion of > 75 ml can be visible. If pleural effusion is seen on a supine chest film, it means that there is at least 500 ml present.

On the left images of a patient who has bilateral pleural effusions. Notice that it is more evident on the lateral view.
Pulmonary embolism

- Hx. Post op., trauma, fracture, DVT, birth control pills, previous PE.
- Imaging evaluation, need CT scan with high dose i.v contrast...normal CXR do not exclude occurrence of early PE.
- CT scan showing filling defect
Male pt. presented with sudden onset of pleuritic chest pain
Aortic aneurysm

- Causes...
  1. Atherosclerosis *(most common)*
  2. Vasculitis
  3. Trauma
  4. Chronic aortic dissection
  5. Connective tissue disorder ex. Marfan syndrome
Role of imaging

1. Detection
2. Monitor growth rate
3. Pre op. surgical planning
4. Post Op. follow up
Imaging evaluation

- **CXR** ... showing mediastinal mass, enlarged affected segment, curvilinear calcification.
- **Thoracic U/S**... no role
- **Trans esophageal echo**... but due to invasive nature ... it is not used routinely.
- **Abdominal U/S** ...simple,,, safe,,, available,,, highly sensitive and specific detection rate.

- **Computed tomography** ...

  May detect rupture ...**calcification** ...

  Size of aneurysm ...intra luminal thrombi, relation to adjacent structure ex.. Bone erosion
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