Cardiac Radiography

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Duke Radiology
Overview

- Basic Concepts
- Technique
- Normal anatomy
- Cases
Technique
3 Standard Views

Posterior-Anterior (PA)

Anterior-Posterior (AP)

Lateral
Magnification
Cardiac Anatomy
1. R brachiocephalic v./ SVC
2. Ascending Aorta
3. R atrium
4. IVC
5. L brachiocephalic v./ L subclavian a.
6. Aortic arch
7. Main pulmonary a.
8. L atrial appendage
9. L ventricle
23-year old male with acute chest pain
Where is the abnormality?

D. It's normal
Where is the abnormality?

D. It’s normal
Where is the abnormality?

D. It’s normal
What is the most likely diagnosis?

A. Mediastinal mass
B. Aortic dissection
C. Pulmonary embolism
D. Lymphadenopathy
Chambers
Cardiac Chambers

1. L Atrium
2. R Atrium
3. L Ventricle
4. R Ventricle
Heart Size

Cardiac Index:

A

B

A

B
Heart Size

Cardiac Index:

A

B

Normal: ≤ 50%
Heart Size

Volume -> Dilation

Pressure -> Hypertrophy
Left Atrium

- Big left atrial appendage
- Retrocardiac double density
- Elevated left mainstem bronchus
Left Atrium

- Big left atrial appendage
- Retrocardiac double density
- Elevated left mainstem bronchus
Left Atrium

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Left Atrium

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Left Atrium

- Big left atrial appendage
- Retrocardiac double density
- Elevated left mainstem bronchus
Left Ventricle

- Enlarged left heart border
- Apex moves down and leftward
Left Ventricle

- Enlarged left heart border
- Apex moves down and leftward
Left Ventricle

- Enlarged left heart border
- Apex moves down and leftward
Right Atrium

- Divide hemithorax into thirds
- Right heart border is $> \frac{1}{3}$
Right Atrium

• Divide hemithorax into thirds
• Right heart border is $> \frac{1}{3}$
Right Atrium

- Divide hemithorax into thirds
- Right heart border is $> \frac{1}{3}$
Right Ventricle

- Elevated cardiac apex
- “Boot-shaped” heart
Right Ventricle

- Elevated cardiac apex
- “Boot-shaped” heart
Right Ventricle

- Elevated cardiac apex
- “Boot-shaped” heart
/Valves
Valves

- Tricuspid
- Mitral
- Aortic
- Pulmonic
Valves
Valves
Valves
Which valve is calcified?
Which valve is calcified?

A. Aortic
B. Pulmonic
C. Mitral
D. Tricuspid
Heart Size

Volume ➔ Dilation

Pressure ➔ Hypertrophy
Valve Disease

- **Stenosis**: Valve doesn’t fully open
- **Insufficiency**: Valve doesn’t fully close
- **Normal Directional Flow**
- **Reversed Directional Flow**
Mitral Insufficiency

- Left atrium dilates
- Left ventricle dilates (over time)
- Normal pulmonary vasculature
Mitral Insufficiency - Acute MI
Mitral Stenosis

- Left atrial hypertrophy/dilation
- Dilated pulmonary veins, then arteries
- Dilated right ventricle
Mitral Stenosis
Aortic Insufficiency

- Left ventricle dilates
- Aorta may eventually dilate due to increased LV volumes
Aortic Insufficiency
Aortic Stenosis

- Left ventricle hypertrophy/dilation
- Post-stenotic dilation of ascending aorta
- Pulmonary vessels are normal
Aortic Stenosis (& Insufficiency)
Pulmonic Stenosis

- Right ventricle hypertrophy/dilation
- Post-stenotic dilation of pulmonary artery
Pulmonic Stenosis
Pericardium

Anatomy:
- Visceral
- Space
- Parietal
Pericardial Effusion
Vasculature
Vasculature

- Thoracic Aorta
- Pulmonary Arteries
- Pulmonary Veins
2 days later

2 days later
4 days later

Pulmonary Edema

4 days later
Interstitial

Kerley B Lines
Cases
What surgery has this patient had?
What surgery has this patient had?

A. AVR  
B. Cardiac Txp  
C. CABG  
D. Lung Txp
What surgery has this patient had?

A. AVR
B. Cardiac Txp
C. CABG
D. Lung Txp
What surgery has this patient had?

A. AVR
B. Cardiac Txp
C. CABG
D. Lung Txp

C. CABG
Which tube/line is malpositioned?
Which tube/line is malpositioned?
Which tube/line is malpositioned?
R Mainstem Intubation
R Mainstem Intubation
52-year-old male with chest pain and dyspnea.
52-year-old male with chest pain and dyspnea.
Q Which chamber is abnormal?
Which chamber is abnormal?

A. Left atrium
B. Left ventricle
C. Right atrium
D. Right ventricle
Which chamber is abnormal?
Which chamber is abnormal?

A. Left atrium
B. Left ventricle
C. Right atrium
D. Right ventricle

B. Left ventricle
Left Ventricle Aneurysm
54-year old male with chest pain and dyspnea
Which is the next most appropriate step in management?
Which is the next most appropriate step in management?

A. Biopsy
B. PET-CT
C. CTA
D. Surgical resection
Which is the next most appropriate step in management?

A. Biopsy
B. PET-CT
C. CTA
D. Surgical resection
Which is the next most appropriate step in management?

A. Biopsy
B. PET-CT
C. CTA
D. Surgical resection

C. CTA

Correct answer: C. CTA.
Aortic Arch Pseudoaneurysm
Conclusions

- Learn what is normal
- Be systematic in your interpretation
  - Contours, Chambers, Valves
- Physiology predicts pathology
CARDIAC RADIOGRAPHY

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