Plain Film Cardiac Dx I: Heart Size and Shape

Laureen M. Sena, MD

1. Which of the following systemic to pulmonary shunts is typically associated with left heart volume overload?
   A. PAPVC and VSD
   B. PDA and VSD
   C. ASD and PDA
   D. ASD and PAPVC

   **Correct Answer: B**

   **Rationale**
   Only shunts past the level of the mitral valve will involve the left atrium in the shunt pathway, leading to left atrial enlargement from volume overload.

   **Reference**

2. With levocardia and {S,D,S} normal segmental anatomy, filling in of the retrosternal clear space is associated with enlargement of which of the following structures?
   A. LV
   B. RA
   C. RV
   D. LA
   E. Coronary sinus

   **Correct Answer: C**

   **Rationale**
   The RV is the most ventral of the cardiac chambers

   **References**
3. A 4-year-old male is referred due to neck swelling, headache and neck ache. Important findings on this chest x-ray include
   A. a mediastinal mass causing superior vena cava syndrome.
   B. increased parahilar markings and peribronchiolar thickening consistent with bronchial inflammation.
   C. cardiomegaly and venous congestion compatible with heart failure.
   D. cardiomegaly and increased arterial vascularity compatible with a shunt.

   **Correct Answer: D**

   **Rationale**
   The lungs are hyperinflated, the heart is enlarged with a bulging main pulmonary artery segment, and the pulmonary arteries are enlarged and tortuous. These are all findings that indicate shunt vascularity from a left to right shunt such as that seen in a large VSD, ASD, PDA, or in other rarer cases, such as with coronary arteriovenous fistula, or aortopulmonary window (the diagnosis in this case). Answer A is incorrect. Absence of mediastinal mass makes this a poor choice. Answer B is incorrect. Although there is increased parahilar opacity, it is not primarily due to increased interstitial markings or atelectasis. Additionally, cardiomegaly is not seen in isolated pulmonary viral illness. Answer C is incorrect. Both cardiomegaly and venous congestion are present but this answer doesn’t explain the enlarged pulmonary artery segment of the cardiac silhouette or the large, tortuous vessels of the central pulmonary arteries.

   **References**

4. A male of 37 weeks gestational age born to a group B streptococcus positive mother at a community hospital has worsening respiratory distress and O2 saturation at 8 days of age. What is the most likely diagnosis?
   A. Neonatal pneumonia of the right lung
   B. Total anomalous venous return
   C. Hypogenetic lung syndrome
   D. Right upper lobe atelectasis

   **Correct Answer: C**

   **Rationale**
   Hypogenetic lung (aka scimitar syndrome) almost always results in a hypoplastic right lung, a major clue to the diagnosis. The constant feature, however, is anomalous pulmonary venous return to the systemic circulation that may manifest as a scimitar vein. Answer A is incorrect. Neonatal pneumonia is often bilateral and presents earlier. Answer B is incorrect. The left lung looks completely normal. There is none of the overexpansion or venous congestion to be expected in total anomalous venous return that is developing a gradient. Answer D is incorrect. Right upper lobe atelectasis can cause shift of the cardiomeediastinal silhouette, but nearly always causes a opacity along the right superior mediastinum toward the apex.
Lines/Devices: Weird, Wild and Wacky
Paul Thacker, MD

5. With reference to the provided chest radiograph, which of the following is true?

A. Subclavian access is associated with a greater risk of intra-arterial catheter placement than IJ access.
B. Intra-carotid placement is the least common complication of internal jugular vein access.
C. Bilateral pleural effusions are a rare complication of left internal jugular catheter placement.
D. Ultrasound-guidance has not been shown to be superior to landmark technique for IJ access.

Correct Answer: C

Rationale
Although rare, bilateral pleural effusions may result from IJ catheter placement with the proposed mechanism being migration of the catheter tip through the vein wall and into the mediastinum. Answer A is incorrect. Compared to IJ access for central catheter placement, subclavian access is associated with a lower risk of intra-arterial catheter placement: 3.0% for IJ access versus 0.5% for subclavian access with a relative risk of 4.7. Answer B is incorrect. Outside of procedural failure (when the proceduralist is unable to access a vessel), intra-arterial placement is the most common complication of IJ central catheter placement. Answer D is incorrect. Although a few studies have found no difference between ultrasound-guidance and using anatomic landmarks, a meta-analysis and multiple reviews have demonstrated a higher success rate with ultrasound-guided IJ placement.

References
6. Which of the following is NOT a useful radiographic signs to identify unintended intra-arterial vascular catheter placement on chest radiography?
   A. A leftward curve to the vertical segment of the catheter
   B. Catheter crossover at the level of the SVC when there are bilateral catheters
   C. Anterior angulation of the catheter tip on a lateral radiograph
   D. A catheter tip located farther to the left of midline than normally expected

   **Correct Answer: B**

   **Rationale**
   In a retrospective review by Taylor and Taylor, the authors found that in properly placed bilateral catheters, catheters uniformly crossed at the level of the SVC. Answer A, C, D are incorrect. In the same review, the authors found four useful signs suggesting inadvertent arterial placement: leftward curvature of the vertical segment of the catheter, lack of catheter crossover, anterior angulation of the catheter on a lateral radiograph, and left-sided catheter tip position.

   **Reference**

   **Getting a Good Chest Radiograph: How To**
   *Shailee Lala, MD*

7. The Exposure Index is:
   A. inversely related to mAS.
   B. the ideal exposure of the image receptor for a given exam type.
   C. the dose to the patient.
   D. a measure of the exposure of the image receptor for a given exam.

   **Correct Answer: D**

   **Rationale**
   Answer A is incorrect. EI is directly and linearly related to mAS. Answer B is incorrect. Target exposure index is the ideal exposure of the image receptor. Answer C is incorrect. The dose to the patient is dependent on many things, including technique, grid use, collimation, and source to image distance.

   **Reference**

8. The most common cause of unilateral hyperlucent lung is
   A. pulmonary agenesis.
   B. patient rotation.
   C. aspirated foreign body.
   D. scimitar syndrome.

   **Correct Answer: B**
Rationale
Technical factors are much more common than pathologic etiologies.

Reference

Secrets of the Experts: 5 Things I Learned the Hard Way in Chest Imaging
Beverley Newman, MD, FACP

9. What do you think is the most likely diagnosis in this 8 year old child with a cough?
   A. Normal Thymus
   B. Hodgkin’s lymphoma
   C. Neuroblastoma
   D. Vascular Ring

Correct Answer: B

Rationale
There is widening of the mediastinum by a large anterior mediastinal mass with irregular lobulated borders. There is moderate leftward displacement of the upper trachea and attenuation of the lower airway. There is also bulky bilateral hilar adenopathy. Even though Hodgkin’s disease is more common in teenagers, this diagnosis is the best choice for the CXR appearance. Answer A is incorrect. This degree of irregular mediastinal prominence as well as airway compression rule out normal thymus. Answer C is incorrect. This mass appears mostly in the anterior mediastinum and hila, not posteriorly as seen with neuroblastoma. The age is also atypical. Answer D is incorrect. The airway displacement is too marked and in the wrong location for a vascular ring. There are no other suggestive features, such as a right aortic arch.

References

10. Which of the following statements regarding bronchial atresia is correct?
   A. It is often associated with other congenital lung lesions.
   B. Mucoid impaction proximal to the point of atresia is a distinct characteristic.
   C. It is not a cause of lobar or segmental overinflation.
   D. The lung distal to the point of atresia is typically atelectatic.

Correct Answer: A
Rationale
Bronchial atresia is typically associated with and probably the root cause of a large percentage of congenital lung malformations. Answer B is incorrect. Mucoid impaction accumulates distal to the point of atresia. It is a characteristic feature. Answer C is incorrect. Air can reach the lung distal to the atretic airway via collateral pathways. The affected lung traps air and gets overinflated. Answer D is incorrect. The distal lung is usually aerated via collateral ventilation pathways unless there is complete pleural separation from the rest of the lung, as with extralobar sequestration.