Do you want to be an excellent Radiologist? - Focus on the thoracic aorta on lateral chest image !!!

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Purpose

• To be familiar with normal chest lateral plain radiograph and to improve reading skill

• To be aware of easily overlooked areas around the thoracic aorta via impressive cases and to increase lesion detection rate without unnecessary CT exam
Contents

• Normal chest anatomy in chest lateral image
• Divide into three compartment along the aorta
  • Ascending thoracic aortic area
  • Aortic arch area
  • Descending thoracic aortic area
• Impressive cases according to each compartment
• Limitation of lateral image to interpret
• Summary
Normal Lateral plain radiograph

- Distance between both posterior ribs: 1-3 cm
- **PWBI** (posterior wall of bronchus intermedius) is inferiorly crossing the LUL bronchus
Normal chest anatomy in chest lateral image

- Trachea
- Aorta
- Heart
- Diaphragm
- Spine
Normal chest anatomy on chest lateral image

- Radiolucent area
  - Retrosternal area
  - Retrocardiac area
  - Retrotracheal space
  - Inferior hilar window
Normal chest anatomy in chest lateral image

- **Hilum**
  - Right upper lobar bronchus
  - Left upper lobar bronchus
  - **PWBI**
    - 0.5~2mm (abnormal >3mm)
    - Oblique position
    - Pulmonary edema
    - Inflammatory disease
    - Direct invasion from primary cancer
    - Enlarged lymph nodes
    - Subcarinal mass
Divide into three compartment

① Ascending aorta area

② Aortic arch area

③ Descending aorta area
[Fig. 1] Incidentally diagnosed lung cancer in a 68-year-old woman with coronary arterial disease during routine follow up chest PA/lateral
Faint right suprahilar increased opacity (arrow) is visible on chest PA view. On lateral chest x ray, the density of ascending thoracic aorta shows abrupt discontinuity (compared with smooth density of aorta on previous lateral image) and well-defined mass-like density is visible at ascending aorta area (arrows). The lesion was finally diagnosed as adenocarcinoma via biopsy.
1. Ascending aorta area

[Fig. 2] Chest PA/lateral images in a 77-year old man with chest pain
A bulging soft tissue contour in medial portion of left upper lung zone (arrow) is visible on chest PA. On lateral view, the density of ascending thoracic aorta shows abrupt discontinuity with bulging mass-like opacity anteriorly (arrows). This lesion finally diagnosed as adenocarcinoma with mediastinal LN metastasis.
2. Aortic arch area

[Fig. 3] Incidentally detected lung mass on screening chest PA/lateral images in a 57-year-old man

On chest PA, about 4cm sized well-defined mass is visible in the left upper lung zone (arrow). On lateral view, focally increased opacity is visible at aortic arch area and the lesion is continued to posterior to aortic arch (arrows). Left upper lobectomy was performed and the mass finally diagnosed as adenocarcinoma.
2. Aortic arch area

[Fig. 4] Chest PA/lateral images in a 17-year-old man with cough and sputum
On chest PA, an ill-defined increased opacity is visible in the left suprahilar area (arrow). On lateral view, the aortic arch density is abruptly increased and the lesion is also visible in normally radiolucent retrosternal area (arrows). After the treatment with antibiotics, the lesion suspicious focal pneumonia was finally disappeared.
3. Descending aorta area

[Fig. 5] Chest PA/lateral views in a 66-year-old woman with pneumonia on left lower lobe

On chest PA, although subtle ill-defined increased opacities in left lower lung zone (arrow) is a suspicious finding, the overlapped breast shadow make difficult to diagnose. However, on lateral view, ill-defined increased opacities is clearly visible in the descending aorta area with reversed increased density (arrows). The impression was pneumonia and after the treatment with antibiotics, this lesion was finally disappeared.
3. Descending aorta area

[Fig. 6] Chest PA/lateral views in a 81-year-old man with hemoptysis
On chest PA, suspicious focal increased opacity is visible in medial portion of right middle lung zone (arrow). On lateral view, focal increased opacity in the descending thoracic aortic area is visible with bulging contour anteriorly (arrows). The lesion was finally diagnosed as lung cancer.
[Fig.7] Incidentally detected nodule on screening chest PA in a 66-year-old man
On chest PA, about 1.0cm sized well-defined nodule (red arrow) is visible in left middle lung zone. On lateral image, similar sized nodular lesion in posterior chest wall is visible (double arrow). On chest CT, there is no lung nodule in left lung except the nodular skin lesion (ie, epidermoid cyst) in left back (blue arrows).
[Fig. 8] Pneumonia in a 79-years-old man being treated with antibiotics
On initial chest PA (red box), ill-defined increased opacities are visible in right lower lobe (black arrow), which are also seen on lateral view (red arrow). After 2 days with antibiotics (blue box), these right lower lobe lesions show grossly no significant change on chest PA (white arrow), however, the lesions show decrease in extent on lateral view (blue arrow). This case shows the significance of the lateral view.
[Fig. 9] Chest pain in a 73-year-old man
On chest PA, pleural effusion and atelectasis are seen in left lower lung zone. Left hilar prominency (arrow) is vague due to mixed tortuous aortic shadow. On lateral view, a well-defined mass is seen in the left hilar/infral hilar area which can suspect lung cancer (double arrows); finally, with biopsy, it was finally diagnosed as squamous cell carcinoma.
Limitation of lateral image to interpret

- Technical problem
  - Different levels between the chest PA and lateral image

- Patient’s condition
  - Severe kyphosis, limited arm and shoulder movement

- Radiation dose
  - Increasing radiation dose

- Miscellaneous
Limitation of lateral image to interpret

[Fig. 10] Chest PA/lateral views in a 22-year-old woman
Because of patient’s tilting posture, the aorta does not clearly visible on lateral image.
In accordance with different position of both arms, a level of right nipple is different between PA and lateral view.
Familiarity with the normal radiographic findings of aorta as well as its easily overlooked surrounding structures, can be helpful in detecting potential lesions on lateral radiographs.

Major teaching points

- Smooth margin and continuous density of aorta has to be seen on the lateral chest image
- The lateral chest image can help to detect location of lesion which cannot be detected on chest PA
Clear space !!!

Smooth margin !!!

Continuous density !!!
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