Chest Radiology Interpretation: Findings of Tuberculosis

Get out your laptops, smart phones or other devices...

- pollev.com/chestradiology

Case #1
Reading the TB CXR

● Be systematic!
● Start centrally and work outwards
● Normal or abnormal
● If abnormal, consider technique as cause
● Describe the finding(s)
● Consider the significance of the finding(s)

- Mediastinum
- Hila
- Lungs
- Pleura
- Bones
Lymphoma

Abnormal

Normal

Metastatic disease (unknown primary)

Abnormal

Normal
Lung Cancer

Heart

- <55% thoracic diameter
- Technique important
- Larger in:
  - AP film
  - Poor inspiration
  - Rotation
  - Children
- True enlargement
  - Chamber enlargement
  - Pericardial effusion
  - Mass

Artifactual cardiomegaly
Lung

Pleura

TB Empyema

Don’t forget about the bones
Inspiration: (≥10 posterior ribs)
Categories of lung opacities

- 1. Nodule(s) or mass(es)
- 2. Alveolar, airspace, consolidation
- 3. Interstitial (diffuse lines or nodules)
- 4. Airways (circular or tubular)
Nodule ≤ 3cm, Mass > 3 cm

Consolidation

ARDS

- Confluent opacity
- Fluffy around the periphery
- Air bronchograms
<table>
<thead>
<tr>
<th>Interstitial disease</th>
<th>Normal</th>
<th>Nodular</th>
<th>Reticular</th>
</tr>
</thead>
</table>

- Normal
- Nodular
- Reticular

<table>
<thead>
<tr>
<th>Miliary TB</th>
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<table>
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<tr>
<th>Idiopathic pulmonary fibrosis</th>
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</table>

- Miliary TB
- Idiopathic pulmonary fibrosis
Airways disease

- Circular
- Tubular
Questions

- Could this be TB? (the answer is always yes)
- Is TB the most likely diagnosis?
- If so, what form of TB does the radiology suggest?
- Is active disease likely or unlikely?
- What are possible alternative diseases to produce the radiographic pattern?
Key points

- TB patterns overlap with each other
- TB patterns overlap with other diseases
- If there is an abnormality, it could be due to TB
- You must know the classic TB patterns
- But, if it doesn’t fit into a typical TB pattern, it is unlikely to be TB
- It’s all about likelihood!
- Clinical-radiographic correlation

Case #3
Reactivaton TB- radiology

- Location
  - Apical/posterior segments upper lobes
  - Superior segment lower lobes
  - Isolated anterior disease very unusual
- Presence of cavities
- Pleural disease
- Volume loss/scarring early in disease
- Diff dx: fungal, bacterial infections
Is this likely TB?
Right Lung

RLL

RML

RUL

Lobar anatomy

Diaphragm

Obscured

Diaphragm

Clear

Heart

Border

RLL pneumonia

? Which lobe is involved
Lobar anatomy

RUL

RML

RLL

Right Lung

RML pneumonia

Clear Diaphragm

Obscured Heart Border

? pneumonia
Prior reactivation tuberculosis

- Upper lobe scarring
  - Volume loss
  - Retraction of hila superiorly
  - Band-like (linear) opacities
  - Architectural distortion
- Asymmetric > symmetric
- Bronchiectasis
- Cystic changes
- Diff dx: fungal, sarcoid, pneumoconioses
Warning signs

- Consolidation outside areas of fibrosis
- Consolidation with cavitation
- Lower lobe abnormalities
- Non-calcified nodules (ill-defined)
- Change from prior CXR

Reactivation TB
Case #5

Solitary nodule/mass - the top 5

- Granuloma
- Hamartoma
- Solitary metastasis
- Bronchogenic carcinoma
- Lots of others
So you see a nodule on CXR…

- 1. Look for old films
- 2. Is diffuse calcification present?
- 3. Get a CT scan

When to get a CT scan?

- Questionable CXR findings
- Further characterization of CXR findings
- Concern for cancer
Role of CT scan for nodules

- 1. Attempt to prove they are definitively benign
  - Benign pattern of calcification (diffuse, central, ring-like, popcorn)
  - Fat
  - ≥2 years of stability

Features of benign nodules include:

<table>
<thead>
<tr>
<th>Benign patterns of calcification</th>
<th>Presence of fat</th>
<th>Long term stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffuse</td>
<td>Hamartoma</td>
<td>Initial CT</td>
</tr>
<tr>
<td>Central</td>
<td></td>
<td>24 month follow-up</td>
</tr>
<tr>
<td>Ring-like</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popcorn</td>
<td></td>
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</tbody>
</table>

Hamartoma
Irregular calcification: adenocarcinoma

Role of CT scan for nodules

1. Attempt to prove they are definitively benign
   - Benign pattern of calcification (diffuse, central, ring-like, popcorn)
   - Fat
   - ≥2 years of stability

2. Determine likelihood of nodule being benign or malignant
   - Low likelihood -> CT follow-up
   - High likelihood -> immediate action (e.g. biopsy)

Suspicious features of nodules include:

- Large size
- Spiculated borders
- Growth

The size threshold above which malignancy is likely demonstrates geographic variability, depending upon the prevalence of endemic granulomatous infection.
Size and likelihood of cancer

Follow-up recommendations

Old tuberculosis
Bronchogenic carcinoma

Case #6

Ghon focus
Primary tuberculosis

- Difficult radiologic diagnosis
- Mimics other diseases
- Findings
  - Nonspecific consolidation
  - Nodule
  - Lymphadenopathy
  - Cavitation unusual
- LAD more common than with 2° TB (particularly kids + HIV)
Miliary pattern CXR

- Miliary tuberculosis
- Fungal infection (histo, cocci, blasto)
- Metastases
- Sarcoidosis
Metastases

Case #10

Pleural + pericardial disease

- Primary or secondary
- May be only manifestation in 1° TB
- Empyema more common in secondary
- Adults >> kids
Suspected pleural effusion

Case #11
Case #11

Lymphoma

Leukemia

Germ cell tumor

Bacterial mediastinitis

Fungal infection

Tuberculosis
Lymphadenopathy with TB

- Kids >> adults
- Primary >> secondary
- Asymmetric (right > left)
- Most common locations
  - Hilare
  - Right paratracheal
- Necrosis very common

TB lymphadenitis

Case #12
Conclusions

- Be systematic when reading CXR
- Typical TB patterns
- Mimics of TB
- Get a CT scan when appropriate