Radiologic Findings in Bronchiectasis

L. Renata Thronson, Harvard Medical School Year III
Gillian Lieberman, MD
Bronchiectasis

Bronchiectasis is an irreversible, chronic dilatation of diseased airways.
A 64 year-old male with recurrent pneumonia

and

A 44 year-old woman with cough and rales

PACS, BIDMC

PACS, BIDMC
Pathogenesis of Bronchiectasis

Environmental insult

Defective mucociliary clearance

Microbes persist in bronchi

Genetic susceptibility

Tissue damage

Chronic inflammation

Progressive lung damage

Colonization

Menu of tests

• Bronchography
  – The “gold standard”

• High-resolution CT
  – 1-2 mm collimation
  – Grenier *et al*: Se 96%; Sp 93%
  – Young *et al*: Se 98%; Sp 99%

• Chest x-ray
  – Inferior sensitivity and specificity
Bronchography

- Requires local anesthetic and bronchographic medium
  - potential for allergic reaction
- Exam limited to airways

http://radiology.rsnaajnl.org
CXR: Findings

- Indistinct vessel margins
- Tram lines
- Ring shadows
- Volume loss
  - Elevated left hemidiaphragm

PACS, BIDMC
HRCT: Findings

- Dilatation
  - Signet ring sign
  - Non-tapering airways
- Indirect signs
  - Mucous plugging
  - Lobar volume loss
  - Wall thickening
Signet Ring Sign

Airway

Pulmonary artery

PACS, BIDMC
Non-tapering airways

- Airways visible within 1 cm of the visceral pleura
- Tram lines
- Flaring
Mucous plugging

Morphologies of Bronchiectasis

- Cylindrical
- Cystic
- Varicoid
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DDX of Bronchiectasis

• Postinfectious
  – Bacterial
  – Mycobacterial
  – Viral
  – Fungal

• Post-transplantation
  – Chronic rejection
  – GVHD
DDX of Bronchiectasis

• Postinflammatory
  – Aspiration
  – Toxic inhalation

• Postobstructive
  – Tumor
  – Foreign body
  – Stricture
DDX of Bronchiectasis

• Impaired mucociliary clearance
  – Dyskinetic cilia syndromes
  – Cystic Fibrosis

• Inherited cellular or molecular defects
  – Alpha-1-antitrypsin deficiency
  – Cystic Fibrosis
DDX of Bronchiectasis

- Immune deficiency
  - Inherited
  - Acquired

- Collagen Vascular Disease
  - Rheumatoid arthritis
  - Sjogren’s syndrome
  - Ankylosing spondylitis
  - Marfan syndrome
  - IBD
DDX of Bronchiectasis

- Congenital bronchial abnormalities
  - Mounier-Kuhn syndrome
  - Williams-Campbell syndrome
  - Bronchopulmonary sequestration

- Miscellaneous
  - Asthma
  - Yellow-nail syndrome
  - Sarcoidosis
Diagnostic Pitfalls

Bronchiectasis

Interstitial disease

PACS, BIDMC

http://www.hospitalist.net/case1.html
Diagnostic Pitfalls

Signet ring?

Tram lines?

Diagnostic Pitfalls

Branching airway

Double shadow: heart and vessels

64 year-old man with recurrent pneumonia
64 year-old man with recurrent pneumonia

Ring shadow  Tram lines

PACS, BIDMC
64 year-old man with recurrent pneumonia

Varicoid dilatation

Mucous plugging

Airways visible at pleural margin

PACS, BIDMC
44 year-old woman with cough

Varicoid dilatation

Cystic dilatation
44 year-old woman with cough
Mounier-Kuhn syndrome

- Congenital bronchial abnormality
- ?Autosomal recessive
- Findings
  - Tracheomegaly
  - Bronchomegaly
Bronchiectasis and Situs Inversus

Courtesy of Phillip Boiselle, MD
Kartagener syndrome

- Primary ciliary dismotility
  - Recurrent respiratory infections
  - Decreased fertility
- Findings on CXR
  - Bronchiectasis
  - Situs inversus

Courtesy of Phillip Boiselle, MD
Cystic Fibrosis

- Upper lobe predilection
- Panlobar disease
- Marked cystic dilatation
  - Air-fluid levels may be seen within cysts

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Courtesy of Phillip Boiselle, MD
Postinfectious Varicoid Bronchiectasis

Focal bronchiectasis
Summary

- DDX of bronchiectasis is broad, but the diseases share a common pathogenesis
- Morphologies reflect degrees of severity
  - Cylindrical
  - Cystic
  - Varicoid
- Tests available
  - Bronchography
  - CXR
  - HRCT
Summary

• Radiologic findings
  – CXR
    • Volume loss
    • Mucous plugging
      – “gloved finger”
    • Inflammation
      – Indistinct vessel margins
      – Tram lines
      – Ring shadows
Summary

• Radiologic findings
  – HRCT
    • Wall thickening
    • Mucous plugging
    • Crowded bronchi ➔ lobar volume loss
    • Airway dilatation
      – Signet ring sign
      – Non-tapering small airways
References

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