Extensive Basal-Predominant Pulmonary Lucencies in Smokers:
Prevalence and High Resolution Computed Tomography Features

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May 30, 2015
Disclosure

- Dr. Daria Manos:
  - Boehringer Ingelheim
  - CSL Behring
  - HIT Global

- Dr. Horatiu Muller:
  - No conflicts of interest
Common Patterns of Pulmonary Lucencies

- Honeycombing
- Centrilobular emphysema (CLE)
- Paraseptal emphysema (PSE)
- Panlobular emphysema
- Cystic lung disease
Uncommon Pattern of Pulmonary Lucencies

- Unusual lucency pattern, not characteristic for any of the established types:
- Well-demarcated
- Involving peripheral 1/3 of lung
- Basal-predominant
- Features of honeycombing
- Features of emphysema
Radiological – Pathological Correlativity

Does this represent …

- Respiratory bronchiolitis with fibrosis
- Smoking-related interstitial fibrosis
- Respiratory bronchiolitis–interstitial lung disease (ILD) with fibrosis
- Airspace enlargement with fibrosis

…?
Radiological – Pathological Correlativity

From Reddy et al., 2013
Research Question / Objectives

Uncommon pulmonary lucency pattern, for which:

1) The radiological appearance only has limited description in the literature =>
Propose standardized criteria for defining the radiological appearance

2) The frequency in the target population has not been determined =>
Sample the frequency of occurrence in the target population (heavy smokers)
Methods

- Cohort: 320 asymptomatic smokers/ex smokers enrolled in the Pan Canadian Lung Cancer Detection Study (PCLCDS) at Queen Elizabeth II Health Sciences Centre
  - Current / former smokers, 50 - 75 years of age
  - Without history of lung cancer
  - With a smoking history of at least 30 pack-years
  - 3 year lung cancer risk ≥ 2%

- Multidetector-row CT scanner
  - Settings: 120 kVp, 40-50 mA, tube rotation time < 1 s
  - Contiguous images reconstructed in transaxial plane at up to 1.25-mm thickness
  - Reconstructed with high-spatial-frequency algorithm
Methods

- Baseline CTs were assessed for presence of
  - CLE
  - PSE
  - Panlobular emphysema

- Each CT was reviewed
  - By a fellowship-trained chest radiologist
  - By a radiology resident

- Both blinded to demographic information

- Results were correlated with smoking history
Basal Subpleural Emphysema (BSE): Definitory Imaging Features

**POSITIVE FEATURES**

1. Well-defined lucencies
2. Subpleural
3. Basal-predominant
4. Stacked (≥3 layers)
Basal Subpleural Emphysema (BSE): Definitory Imaging Features

NEGATIVE FEATURES

1. Not associated with honeycombing
2. Not associated with traction bronchiectasis
3. Appearance atypical for well-established emphysema
BSE: Definitory Imaging Features
BSE: Definitory Imaging Features
Results

- BSE pattern identified in 7 patients (3 ♂, 4 ♀)
- BSE represented 2.1% of total cases assessed
- Smoking: 20.8 - 97.5 pack-years (average 48.9)

- BSE:
  - Average cranio-caudal extent: 115 mm
  - Average axial depth: 45 mm
  - Size of individual lucencies: 4 - 25 mm
  - Almost all patients with BSE also demonstrated upper-lobe predominant PSE and CLE
Basal Subpleural Emphysema (BSE): rare but can be encountered in asymptomatic smokers.

Radiologists should be aware of this entity so that it is not misinterpreted as honeycombing / other forms of fibrosis.

The CT appearance and frequency of the pattern we have termed BSE has not been described previously but may represent a subtype of airspace enlargement with fibrosis.

The clinical significance of BSE might differ from that of honeycombing / common types of emphysema – however unexplored at this time.
BSE – Differential Diagnosis / Mimickers
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Honeycombing
BSE – Differential Diagnosis / Mimickers

Traction bronchiectasis
References


