Round Pneumonia

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Case 1: Mr. H

Mr. H is a 45-year-old man who presents with a 4 day history of full-body myalgias, headaches and fever to 103°F. He also complains of sharp left-sided chest pain worse on deep inspiration.
Other Relevant Information

- **ROS**: otherwise negative
- **PMH**: asthma, one episode of pneumonia 6m ago requiring hospitalization
- **SH**: Nonsmoker, no IVDU, occasional EtOH.
- **PE**: T=101.6°F, HR=120. Crackles heard in mid-lung field on the left. Otherwise wnl.
- **Labs**: WBC 19.7, otherwise WNL.
A chest X-ray was obtained...
Mr. H, Chest Radiographs

This was called a LLL pneumonia, cannot rule out infarct or malignancy. Do you agree?
The lateral view suggests the mass is in the lingula.
The patient went on to have a CT scan... Why?
The Solitary Pulmonary Nodule

Has a lengthy differential…

- Neoplastic (malignant or benign)
  - Bronchogenic carcinoma
  - Metastasis
  - Lymphoma
  - Carcinoid
  - Hamartoma
  - Connective tissue and neural tumors - Fibroma, neurofibroma, blastoma, sarcoma

- Inflammatory (noninfectious)
  - Rheumatoid arthritis
  - Wegener granulomatosis
  - Sarcoidosis
  - Lipoid pneumonia

- Congenital
  - Arteriovenous malformation
  - Sequestration
  - Lung cyst

- Miscellaneous
  - Pulmonary infarct
  - Round atelectasis
  - Mucoid impaction
  - Progressive massive fibrosis

In this case, we are most worried about differentiating

**Pneumonia**
(based on clinical presentation)

and

**Bronchogenic carcinoma**
(the most concerning possibility)
Mr H, CT with IV contrast

- Superior lobar bronchus
- Inferior lobar bronchus
- R intermediate bronchus
- Major fissure
Mr H, CT with IV contrast

- Superior division Lingular bronchus
- Inferior lobar bronchus
- R intermediate bronchus
- Major fissure
- Superior fissure
Mr H, Coronal CT with IV contrast

5.6 x 2.9 cm peripheral area of consolidation in the lingula
Treatment started for CAP

- Mr H was started on Levofloxacin 500 mg PO QD for clinical pneumonia.
- His CXR and CT could not rule out malignancy.
- He clinically improved and returned for a follow-up Chest X-ray two months later…
Mr. H, Follow-up Chest Radiographs (2 months later)

The lesion has resolved. The pleural thickening on the left is unchanged in 4 yrs.
Case 2: Mr. G.

Mr G is a 75 yo man who presented to the emergency department with a fever to 104°F and chills x 1 day, and mild shortness of breath.
Other Relevant Information

- **ROS**: otherwise unremarkable
- **PMH**: CAD s/p MI (1y ago), Hypertension, permanent pacemaker
- **SH**: 20 pack-year smoking history, quit 30y ago
- **PE**: VS are stable, rest of exam is normal
- **Labs**: WBC of 20.9, otherwise WNL
As part of a fever workup, a chest X-ray was obtained…
Mr. G, Chest Radiographs

2.5 cm poorly-defined nodule
Left Upper Lobe
What should the next step be?

- Clinical presentations suggestive of respiratory tract infection.
- Chest radiograph findings are atypical for (but not inconsistent with) pneumonia.
- Again, the major concern is “benign vs malignant?”
The patient went on to have a CT scan…
Mr G, CT without contrast
Mr G, CT without contrast
Mr G, CT without contrast
Mr G, CT without contrast

Tethering of the major fissure
Mr G, CT without contrast
Mr G, CT without contrast – Soft Tissue Window

Air bronchogram
Findings

- Findings may be consistent with round pneumonia, but are suggestive of invasive adenocarcinoma with bronchioloalveolar component. Also consider post-obstructive pneumonia.

- Pt was started on Levofloxacin 500mg PO QD for 14 days.

- He was scheduled for CT-guided biopsy but, after clinical improvement, this was postponed.
Mr. G, Follow-up Chest Radiographs (2 weeks later)
Though still present, the nodule has partially resolved. A follow-up in 4w was recommended.
Round Pneumonia

- First reported in the radiology literature in 1954 (though it was mentioned in the surgical literature in 1940).
- Describes any pneumonia presenting as a nodule or “coin lesion”
- It is rare, it accounts for less than 1% of “coin lesions” of the lung
Varied Clinical Presentations

- Presentation may be with **acute or subacute symptoms** of community-acquired pneumonia
- Symptoms may also be **mild**, mimicking a viral syndrome or bronchitis
- Patients may even be completely **asymptomatic**.
Radiologic Features

- On Chest films: Rounded lesion. **Air bronchograms** may be present. They are only present in 17% of patients with round pneumonia and are not generally helpful because they can also be seen in adenocarcinoma and bronchioloalveolar carcinoma.

- Recent Chest films are often helpful. 2-3cm masses that appeared in the last 2-6 weeks are more likely infectious than neoplastic.

- On CT: heterogeneous mass of soft-tissue attenuation that can have **spicules, air bronchograms, pleural thickening** and **satellite lesions**.
Pediatric Round Pneumonia

- Round pneumonia is more commonly a disease of children. It is a diagnosis considered in younger patients with classic clinical picture of pneumonia and a coin lesion on chest film.
- Children rarely get a CT if the clinical picture fits.
A typical presentation for this would be a very high fever in a child.
Theories on Formation

- Round pneumonia may result from an infectious focus that spreads centrifugally through the pores of Kohn and canals of Lambert, or by destroying the walls of alveoli.

- However, children have underdeveloped pores of Kohn and canals of Lambert, suggesting that in children, the “roundness” may actually occur because the lack of interalveolar pathways limits the spread of the organism.

- Round pneumonia may also represent incomplete resolution of a lobar pneumonia.
Relevant Anatomy

- **Pores of Kohn:** openings in the alveolar walls connecting adjacent alveolar lumens
- **Canals of Lambert:** connections between terminal bronchioles and adjacent alveoli
- They allow for collateral ventilation and also are a means of bacterial spread in the lungs.

Adapted from http://www.mevis.de/~hhj/Lunge/ima/InfKohnP.htm
The Offending Agents

- Usually *Streptococcus pneumoniae*
- There are also reports of *Klebsiella pneumoniae*, *Mycobacterium tuberculosis*, and *Coxiella burnetii* (Q fever) presenting with a round pneumonia.
Treatment

- Standard treatment with antibiotics that cover *Strep. pneumoniae* pneumonia should suffice.
- Always order a follow-up chest film to document resolution of the lesion, and to rule out a malignant process.
When to Consider Round Pneumonia

- Suspect round pneumonia in an adult patient who present with a pulmonary mass, especially if s/he has respiratory infection symptoms, is a young nonsmoker, and has no other findings to suggest malignancy. A recent normal chest radiograph is also helpful.

- Remember! Any patient with a pulmonary nodule that does not decrease in size or resolution after antibiotic treatment should be further assessed with bronchoscopy or transthoracic needle biopsy.
41-year-old female nonsmoker with fever and bibasilar rales.
References

- http://oac.med.jhmi.edu/Pathology/Idmicro/Bacteria/137B.html
- http://www.mevis.de/~hhj/Lunge/ima/InfKohnP.htm
- Beth Israel Deaconess Medical Center PACS system.
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