Case of Cavitary Lung Lesions Following Pharyngitis

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Our Patient: Initial Presentation

17 yo M presents with one-week history of pleuritic chest pain, worse with inspiration
Two lung lesions in the anterior lung fields suggestive of cavitations (yellow). Mild blunting of the costophrenic angles (blue) consistent with atelectasis or acute pleural effusion.
Cavitary Lung Lesion

- **Pulmonary cavitary lesion**
  - Air-containing area surrounded by definitive wall
  - Wall thickness of at least 4mm
  - Sometimes mistaken for cysts which are thin-walled air-containing lesions
  - Cavity may also contain blood, pus, fluid, or debris
Cavitary Lung Lesions on CXR and CT

- Imaging
  - CXR
    - Initial test of choice for all cardiopulmonary complaints
    - Defined area of increased lucency surrounded by rim of density
    - Limitations: small lesions may be missed, limited characterization
  - Chest CT
    - 10-20 times more sensitive for evaluation of lung nodules of all types
    - Provides more detail of lung parenchyma
    - Provides better characterization and localization of lesions
Our Patient: Nodular Lesions on Axial Chest CT

- Axial Chest CT
  - Non-cavitary peripheral lung nodule in right upper lobe
  - Evolving cavitation within nodule along left major fissure
Our Patient: Cavitary Lesions on Axial Chest CT

- Peripheral cavitary lung lesion in the left lobe
Our Patient: Cavitary Lesion on Coronal Chest CT

- **Coronal CT**
  - Peripheral cavitary lung lesion in the left upper lobe

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Differential Diagnosis

- **Differential Dx for cavitary nodules**
  - C – Carcinoma – typically squamous, mets, lymphomas
  - A – Autoimmune – Wegener’s granulomatosis, rheumatoid nodules
  - V – Vascular – emboli (septic or bland)
  - I – Infection – lung abscess, bacterial pneumonia, fungal pneumonia, TB, hydatid cysts (parasitic infections)
  - T – Trauma – lung laceration
  - Y – Young (congenital) – cystic adenomatoid malformation, sequestration, bronchogenic cyst
Narrowing the Differential of Cavitary Lung Lesions

- Characterization of cavitary lung lesions
  - Focal or multifocal v. diffuse
  - Wall thickness
  - Contour of inner lining (irregular or smooth)
  - Nature of contents
  - Location

- Clinical parameters
  - Rapidity of disease process
  - Clinical context

Our Patient: History and Physical Exam

- **HPI Continued**
  - 1 week of sore throat, fever, pain, rigors
  - Throbbing HA, hematuria, n/v/d
  - Right flank pain
  - Bilateral knee pain

- **Physical Exam**
  - VS: T 37.1 BP 124/68 P 80 RR 20 O2Sat 95%RA
  - Erythematous, exudative oropharynx, shotty LAD
  - Diminished breath sounds over right lung base
  - CVA tenderness bilaterally
Our Patient: Lymphadenopathy on Coronal Chest CT

- Coronal Chest CT
  - Peribronchial lymph node in the mediastinum

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Our Patient: Cavitary Lung Lesion on Axial Chest CT

- Axial Chest CT
  - Medial cavitary lung lesion in right lobe anterior to pericardium
Our Patient: Cavitary Lung Lesion on Axial Chest CT Lung Window

- **Axial Chest CT**
  - Medial cavitary lung lesion anterior to pericardium at the end of pulmonary vessel

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Our Patient: Cavitary Lung Lesion on Axial and Sagittal Chest CT

- Same medial lung cavitation anterior to the pericardium
- Inferior section showing intact pericardium
Our Patient: Lab Results

- **CBC**
  - WBC 9.14, RBC 4.28 (Hct 36.7%), Plt 452

- **Urine**
  - Turbid, pH 7.0, 2+ blood, 10-20 RBC/hpf

- **Blood culture**
  - Positive for gram negative rods

**Diagnosis??????**
Lemierre’s Disease

- Also known as post-anginal sepsis characterized internal jugular vein septic thrombophlebitis
- Characteristically seen in adolescents or young adults
- Sepsis following a tonsillar or peritonsillar infection
- May also be preceded by mastoiditis, cellulitis or odontogenic infection
- Spread via lymphatic and venous systems into the lateral pharyngeal space
Lemierre’s Disease Continued

- Classically caused by Fusobacterium necrophorum
- Staph, Strep, Eikinella, Bacteroides are other causative organisms
- Sore throat, fever, rigors, productive cough w/ blood-tinged sputum, neck swelling along the sternocleidomastoid m.
- Reports of carotid rupture, dysphagia, Horner’s syndrome, and trapezius paralysis during initial spread to the internal jugular vein
- Metastatic abscesses to the lungs, pleura, joints, and soft tissues
- Pleuritic chest pain, dyspnea, hepatomegaly, jaundice, joint pain, encephalopathy, hematuria
Horizontal section below lingula of mandible (superior view) demonstrating bed of parotid gland

- Orbicularis oris muscle
- Buccinator muscle
- Buccopharyngeal fascia
- Facial artery and vein
- Pterygomandibular raphe
- Lingual nerve and superior pharyngeal constrictor muscle
- Masseter muscle
- Palatoglossus muscle in palatoglossal arch
- Palatine tonsil
- Palatopharyngeus muscle in palatopharyngeal arch
- Ramus of mandible
- Inferior alveolar artery, vein and nerve
- Medial pterygoid muscle
- Styloglossus muscle
- Facial nerve
- Retromandibular vein
- External carotid artery
- Parotid gland
- Stylopharyngeus muscle
- Stylohyoid muscle
- Sternoclidomastoid muscle
- Digastric muscle (posterior belly)
- Internal jugular vein, internal carotid artery and nerves IX, X and XII in carotid sheath
- Superior cervical sympathetic ganglion
- Longus capitis muscle
- Prevertebral fascia
- Buccopharyngeal fascia and retropharyngeal space
Peritonsillar Abscess on Head CT

- Head and Neck CT with contrast
  - Low-attenuation mass with a minimally enhancing wall in the right peritonsillar region
  - Associated edema, mild compression of the internal carotid and internal jugular vein, and deviation of the airway are present.

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Examination of Internal Jugular Vein

- **Ultrasound**
  - Test of choice: Cost effective, easily accessible, real-time evaluation, no radiation
  - Luminal for dilatation, filling defect and flow
  - Thrombophlebitis: Echogenicity within a dilated lumen; decreased compressibility

- **CT**
  - Rapid test, more sensitive in the evaluation of fresh thrombus and additional pathology
  - Better visualization of anatomy
  - Thrombophlebitis: Low attenuation of filling defect with soft tissue swelling
Our Patient: Internal Jugular Vein Ultrasound

IJV Ultrasound
- IJV lumen with and without compression
  - Normal lumenal diameter
  - Full compression with probe
- IJV flow for stasis or filling defect
  - Normal flow with no filling defects
Companion Patient: Thrombosed Internal Jugular Vein Ultrasound

IJV Ultrasound
- IJV lumen
  - Increased lumenal diameter
  - Echogenic foci within the lumen

IJV Ultrasound
- IJV examination for stasis or filling defect
  - Filling defect with disruption of flow

•Courtesy of Dr. D. Ferris, PACS Children’s Hospital Boston
Our Patient: Treatment and Outcome

Patient treated with long course of high dose antibiotic

Follow-up CXR was normal
Take Home Points

- Lemierre’s disease is an easily forgotten DDx even when characteristic signs and symptoms are present.
- Blood cultures and radiological examination of IJV and effected organs are essential to confirm diagnosis and assess the extent of disease.
- Our patient had a good outcome but most are fatal, though mortality has decreased in the era of antibiotic use.
Take Home Points Continued

- CT is the best imaging modality for characterizing cystic or cavitary lung lesions
- US is the most convenient, cost effective, and rapid imaging modality for evaluation of thrombus in vessels of the neck, especially in the pediatric population
- Neck CT is the test of choice when neck pathology such as abscess or tumor is suspected
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