Aspergillosis and *E. coli* Presenting as a Cavitary Lesion in the Setting of Immunosuppression and Pulmonary Infarct

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Introduction

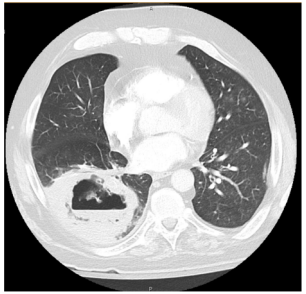
A cavitary lesion identified on chest x-ray introduces a broad differential of infectious causes, such as cavitating pulmonary metastasis, mycobacteria, fungi, or high-order bacteria (including *Nocardia*), and non-infectious causes, such as sarcoidosis or granulomatosis with polyangiitis. Immunocompromised patients are at greater risk for invasive organisms and complications.

Case Report

65-year-old male with PMH of COPD, OSA, syringomyelia, MI, PAD, and urothelial cancer presented to a local hospital with difficulty breathing and a cough.

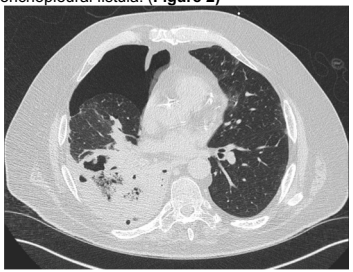
Initial Presentation at Referring Hospital

- Three weeks prior to presentation
  - Patient presented to ED and was found to be in atrial fibrillation with rapid ventricular rate with DVT in right lower extremity
  - CT showed no evidence of pulmonary embolism or cavitation
  - He was started on rivaroxaban
- Three weeks later, patient presented to ED with
  - new onset palpitations, found to be in atrial fibrillation with rapid ventricular rate
  - CXR demonstrated a new right cavitary lung lesion
  - CT abdomen/pelvis revealed thrombi in the distal right pulmonary artery and segmental branches as well as a right cavitary lung mass with ground glass opacities **(Figure 1**).



At Allegheny General Hospital (AGH)

- Patient was afebrile, hypoxic, tachycardic, endorsing difficulty breathing and a productive cough (purple sputum)
- Denied fevers, chills, chest pain, palpitations, leg swelling.
- Physical exam was remarkable for expiratory wheezing throughout, saturating at 94% on 4L NC
- Labs: WBC 12.97, procal 0.47
- Predisposing factors:
  - History of syringomyelia, spanning from C5-T7, on 4 mg dexamethasone twice daily for four months with recent taper
  - Recently completed 5 rounds of gemcitabine for urothelial cancer
  - Travel to Russia in 2014
- Three serial acid-fast smears from sputum were negative
- Sputum culture grew E. *coli, Aspergillus fumigatus*, and *Candida albicans*
- Beta-D-glucan assay >500 pg/mL and galactomannan antigen test was elevated to 0.53
- Bronchoalveolar lavage fluid grew *Aspergillus fumigatus*
- Patient was started on voriconazole 300 mg BID for invasive *Aspergillus* and ampicillin-sulbactam for *E. coli* pneumonia, followed by a completion of a steroid taper.
- Hospital Day 7
  - Patient was noted to be hypoxic and dyspneic
  - CT chest demonstrated right pneumothorax with additional findings concerning for empyema vs. bronchopleural fistula. (**Figure 2)**



- Hospital Day 8:
  - Chest tube was placed on water seal
  - Fluid analysis showed Pleural/Serum Protein=0.55, Pleural LDH=2500, which was exudative by Light's criteria
  - Pleural Fluid grew gram-positive cocci, gram-negative lactose-fermenting rods
  - 180,000 RBCs present, suggesting hemopneumothorax.
- Hospital Day 14: Patient successfully completed a clamping trial of the chest tube, suggesting against a bronchopleural fistula
- Hospital Day 15: An additional anterior chest tube was placed to promote resolution of the hydropneumothorax
- Hospital Day 17: Both chest tubes removed
- Patient was diuresed as needed and transitioned to warfarin with an enoxaparin bridge.
- Hospital Day 20: Patient was discharged, treated with a total of 6 weeks of voriconazole and amoxicillin-clavulanate with close follow up with Pulmonology and Infectious Disease

Discussion

- An immunocompromised state increases the risk for invasive and opportunistic infections
- Incidence of invasive aspergillosis in immunocompromised patients has grown 4-fold in the last 13 years [1]
- This case demonstrated:
  - chronic steroid use made a patient vulnerable to pathogens developing in the same region of a pulmonary embolism and pulmonary infarct
  - *E.coli* remains a rare pleuropulmonary pathogen--retrospective reports have shown *E. coli* represents only 2.7% of isolated pathogens in Empyemas [2]
  - Most common pathogen is *Klebsiella pneumoniae* and common anaerobes include *Prevotella* species, *Fusobacterium nucleatum*, *Peptostreptococcus* species, and *Bacteroides* species
- Importance of Beta-D-Glucan and Galactomannan Antigen Assays
  - Beta-D-Glucan assay detects fungal cell wall component of *Candida* spp, *Aspergillus* spp, *Fusarium* spp, *Pneumocystis jiroveci*, *Coccidioides immitis*, *Histoplasma capsulatum*, and *Blastomyces dermatidis* with a 78% sensitivity and 98.4% specificity [3]
  - Galactomannan Antigen is an ELISA that detects the glycoprotein of *Aspergillus* hyphae
  - Assays results faster than fungal cultures, which helps direct therapy
- Important Challenges
  - Decision to hold empiric therapy until the confirmatory test, galactomannan antigen test, resulted in the setting of a positive Beta-D-glucan test
  - Considerations included:
    - Decreased sensitivity of galactomannan antigen once antifungal therapy has been initiated [4]
    - the adverse and fatal reactions related to Voriconazole and any drug interaction with dexamethasone or Unasyn [5]
- Clinical Considerations: Possible thrombogenic effect of aspergillus
  - Inflammation and hypersensitivity to invasive aspergillosis may act as catalyst for increased clot formation [6]

References

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