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

Emma Byrne BA1, Vanessa Barnwell MD2, Ryan Sweeney MD2

1 Drexel University College of Medicine
2 Allegheny General Hospital, Pittsburgh, PA

Introduction

A cavitary lesion identified on chest x-ray introduces a broad differential of infectious causes, such as cavitary pulmonary metastasis, mycobacteria, fungi, or high-order bacteria (including Nocardia), and non-infectious causes, such as sarcoidosis or granulomatous with polyangitis. 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
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  - CT showed no evidence of pulmonary embolism or cavitation
  - Patient was on rivaroxaban

- Three weeks later, patient presented to ED with
  - new onset palpitations, found to be in atrial fibrillation with rapid ventricular rate
  - New onset of syncope
  - CT demonstrated a new right cavitary lung lesion
  - CT venography 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).

Hospital Day 1:

- Patient was afebrile, hypoxic, and tachycardic, endorsing difficulty breathing and a productive cough.
- labs: WBC 12.97, procalcitonin 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 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

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 pulmopulmonary pathogen—retrospective reports have shown E. coli represents only 2.7% of isolated pathogens in Empyemas [2]
  - Most common pathogen is N. meningitidis and non anerobes 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 dermatitidis 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