CLINICAL VIGNETTE

Pneumonia in a Patient with COPD and Rheumatoid Arthritis

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A 70-year-old man presented to the emergency room for right sided pleuritic chest pain for 4 days, dyspnea and cough for 2 days, and lack of energy. Initially the cough was productive of clear sputum, but at the time of admission it was productive of dark green sputum. He admitted to slipping and falling in the shower about 4 days prior and landing on his right chest. No fever, chills, or sweats. Past medical history included moderate COPD (Gold Stage 2), nocturnal hypoxemia (on oxygen at 2 liters per minute for sleep), pneumonia (2 years prior secondary to Haemophilus parainfluenzae), atelectasis of the left lower lobe (2 years prior status post bronchoscopy that cleared up on subsequent chest imaging), stable right sided lung nodule, heart failure with preserved ejection fraction, GERD, constipation, depression, hyperlipidemia, hypertension, BPH, osteopenia, mild OSA (not using CPAP), and difficult to control rheumatoid arthritis. Social history was notable a 26-pack year tobacco smoking history, having quit 11 years prior. He denied alcohol or illicit drug use. He lived at home alone and was independent. Current medications for the rheumatoid arthritis included hydroxychloroquine 200 mg twice daily, leflunomide 20 mg daily, and prednisone 5 mg. He had been taking abatacept 125 mg subcutaneous once weekly for about 1 year, but it was stopped 8 months prior due to a hospital admission for pneumonia. He was on adalimumab for 4 to 5 years, but that was stopped before starting the abatacept due to frequent episodes of pneumonia including a prolonged episode of pneumonia and atelectasis 2 years prior. Other medications included albuterol, aspirin, bupropion, citalopram, fluocinonide cream, fluticasone nasal, fluticasone/salmeterol inhaled, folic acid, furosemide 40 mg daily, gabapentin, hydrocodone/ acetaminophen, lidocaine patch, linaclotide capsule, loratadine, omeprazole, oxybutynin, potassium chloride, pravastatin, and terazosin. He had no known drug allergies. In the emergency room the oxygen saturation was in the low 80s on ambient air. On exam he was uncomfortable, alert and oriented x 3, was normocephalic,. He had no elevation of JVP, but had increased heart rate with regular rhythm, and reduced breath sounds with increased respiratory rate with no wheezing, rhonchi, or crackles. His abdominal exam was soft, non-tender with normal bowel sounds, and he had no peripheral leg edema, clubbing, or cyanosis. Chest X-ray showed findings supportive of COPD, interstitial lung disease, and a right sided nodular density. EKG showed sinus rhythm with a rate of 90. Nasopharyngeal swab for Influenza A and B was negative. In the ED, he was started on 50% face mask oxygen and given IV methylprednisone, ceftriaxone and oral azithromycin. He was admitted to the step down unit and started on Solumedrol 40 mg IV every 12 hours, ceftriaxone, and levofloxacin. Due to significant hypoxemia, he was started on maximum high flow oxygen. The arterial blood gas (ABG) was not done, but the venous blood gas (VBG) showed pH 7.42, PCO2 39, PO2 36, HCO3- 25. On hospital day 2 he remained hemodynamically stable, and oxygen requirements were still near maximal at 90% on 60 liters per minute high flow oxygen. On hospital day 3 O2 requirements had not improved, so ceftriaxone was replaced with cefepime due to prior history of organisms in the lungs resistant to ceftriaxone. He gradually improved and was weaned off high flow oxygen on hospital day 5 and was discharged home on hospital day 7 without the need for O2 (other than his usual nocturnal oxygen). Sputum specimen submitted on hospital day 2 showed an adequate specimen with gram stain 4+ PMNs and no organisms on gram stain. Culture showed a rare amount of Staphylococcus aureus sensitive to cefazolin, levofloxacin, oxacillin, tetracycline, trimethoprim + sulfamethoxazole, and vancomycin. It was resistant to clindamycin, erythromycin, and penicillin G. Blood cultures were negative after 5 days. The cefepime was discontinued on hospital day 5 and he was discharged home on cephalexin to complete a 10-day course of antibiotics for pneumonia.

This patient was empirically started on ceftriaxone and azithromycin in the emergency room. Due to the rapidly worsening hypoxemia and the need for ICU care, he was switched to ceftriaxone and levofloxacin at the time of admission. Due to a history of a drug resistant pseudomonas infection, the ceftriaxone was switched to cefepime. Based on the 2007 IDSA/ATS guidelines[1] he was initially started on ceftriaxone and azithromycin for empiric antimicrobial therapy (Inpatient, non-ICU treatment). He was admitted to the progressive care unit on high levels of O2 and felt to be essentially ICU status, so the admission orders were for ceftriaxone and levofloxacin (Inpatient, ICU treatment). Due to persistent significant hypoxemia and leukocytosis 2 days after admission, the ceftriaxone was switched to cefepime to cover a possible Pseudomonas infection. Ultimately the sputum grew methicillin sensitive Staphylococcus aureus. Due to his significant improvement and the sensitivities, antibiotic coverage was narrowed at the time of discharge.

Due to severe and worsening hypoxemia after admission from the emergency room, he was started on high flow oxygen. At his worst, he was on 100% O2 at 60 L/min. Although an arterial blood gas (ABG) was not ordered, a venous blood gas (VBG) showed a PCO2 of 39, so he did not appear to have hypercarbic respiratory failure. He did not require intubation and mechanical ventilation, and non-invasive positive pressure was not

needed. In 2015 Frat et al demonstrated that there was no difference in intubation rates in 310 patients with hypoxemic respiratory failure who received high-flow oxygen, standard oxygen, or noninvasive ventilation. There was a significant difference in favor of high-flow oxygen in the 90-day mortality.[2] Matthay emphasized in his editorial that in a post hoc adjusted analysis that included 238 patients with severe initial hypoxemia (PaO2:FIO2 <200 mm Hg), the intubation rate was significantly lower among patients who received high-flow O2 than among patients in the other two groups.[3] Therefore, high flow O2 was an effective treatment for this patient.

The patient had known difficult to control rheumatoid arthritis and moderate COPD. For the rheumatoid arthritis, he took leflunomide, hydroxychloroquine, and prednisone. He had been on abatacept (a biologic DMARD (disease-modifying anti-rheumatic drug)) for about 1 year, but it was stopped due to pneumonia 8 months prior to this admission. Previously during an episode of bilateral lower lobe pneumonia and subsequent left lower lobe atelectasis 2 years prior he had been on adalimumab. It was subsequently discontinued, and abatacept was started. Since he was no longer on abatacept for this episode of pneumonia, it appeared that the pneumonia was due at least in part to the right sided rib fractures that occurred at home from a fall in the shower. He likely developed atelectasis as a result of the pleuritic chest pain, and this likely led to pneumonia. Although he was not on abatacept during this episode of pneumonia, it is important to keep in mind the pulmonary risk of this biologic DMARD. In the 2006 ASSURE trial it was proven that abatacept in combination with synthetic DMARDs was well tolerated and improved physical function and physician- and patient-reported disease outcomes. However, abatacept with biologic background therapies was associated with an increase in the rate of serious adverse events.[4] This patient was on 2 non-biologic (synthetic) agents (hydroxylchloroquine and leflunomide) and corticosteroids (prednisone) at the time of admission. In the ASSURE trial it was also noted that serious adverse events were more common in patients on leflunomide and abatacept compared with patients on leflunomide plus placebo.[4] The authors of the study left a recommendation to use abatacept with caution and close monitoring of respiratory status in patients with rheumatoid arthritis and COPD due to observed higher frequency of adverse events and serious adverse events in these patients compared with patients on placebo.[4]

Figures

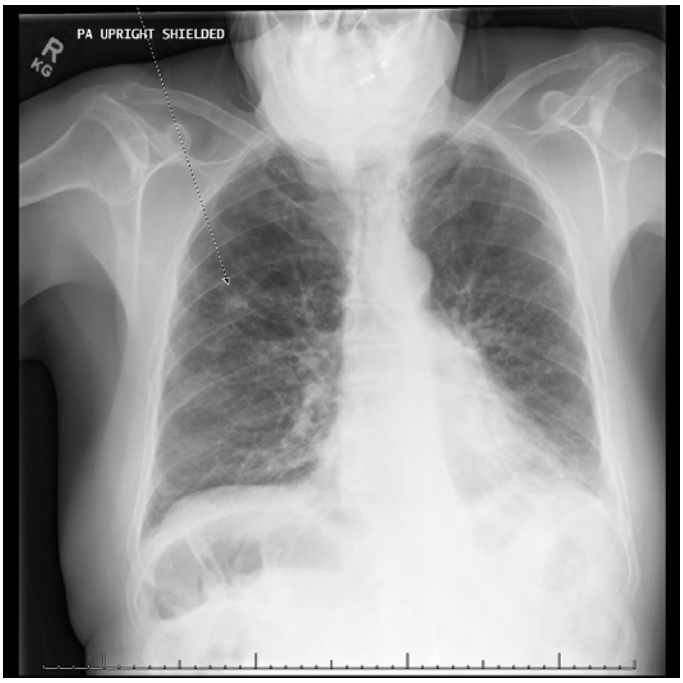

Figure 1 – Portable Chest X-ray on day of admission. It was notable for a known right nodular density and chronic changes, but there was no clear evidence of a pulmonary infiltrate.

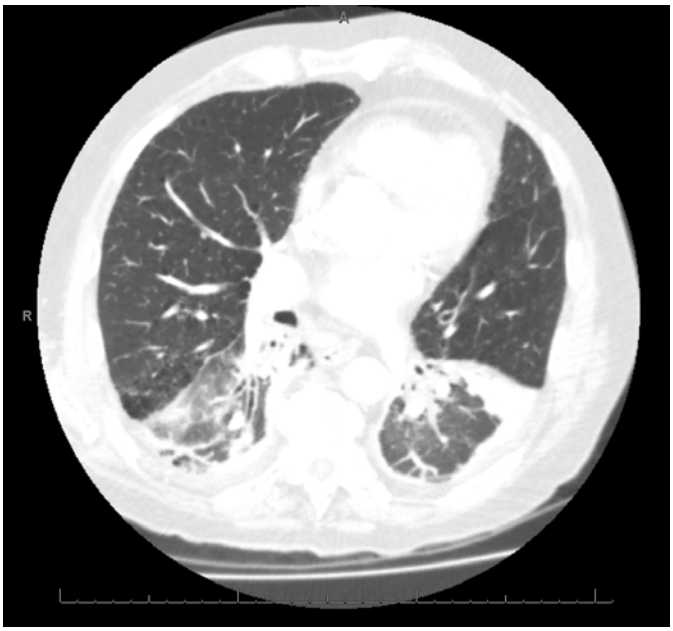

Figure 2 – CT Pulmonary Angiogram on hospital day 1 did not show evidence of pulmonary embolism, but bilateral lower lobe consolidation was noted.

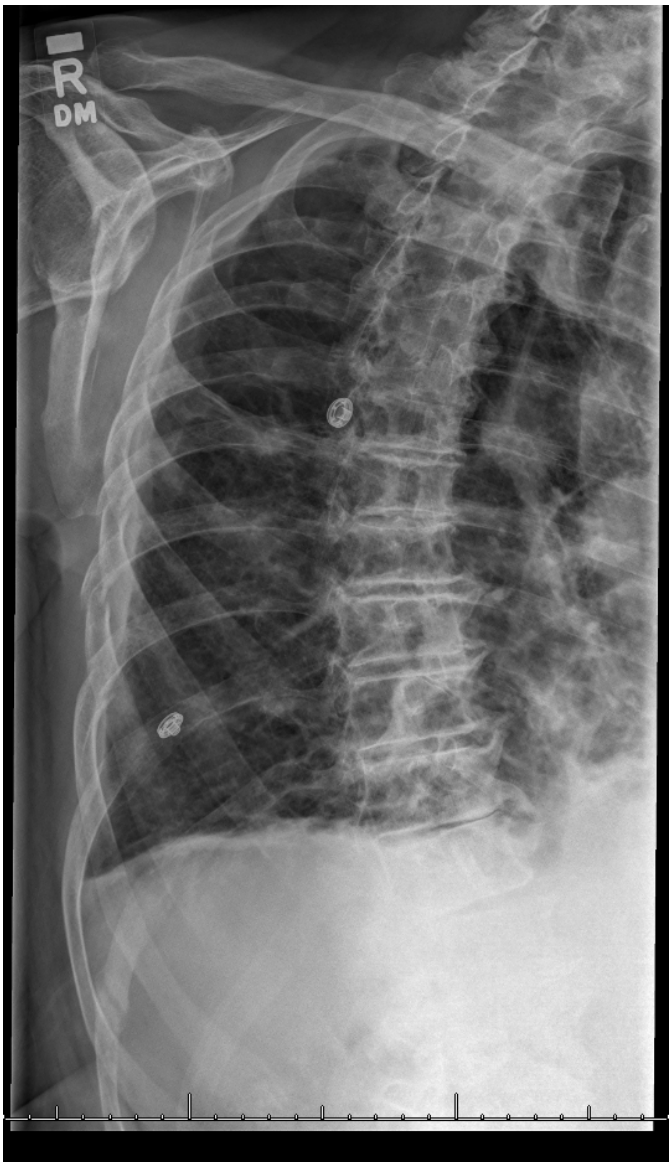

Figure 3 – X-Ray Right Rib Series on hospital day 5 demonstrated mildly displaced fractures of the right sixth, seventh, eighth, and ninth ribs and an apparent healing fracture of the right 11th rib

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