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Rare case of pulmonary syphilis

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Abstract

Syphilis is a well known bacterium that has a great response to antibiotic treatment. Even though it is well known it can present with a wide array of symptoms. If left untreated, Syphilis will progress through primary, secondary, latent, and tertiary stages. In Secondary Syphilis, the bacterium can become disseminated and could potentially affect any organ. In Tertiary Syphilis, the central nervous system could be affected. These issues could be very detrimental to the patient and could be debilitating. In the past 20 years there has been a slight increase in the numbers of Syphilis seen in the U.S. which could be due to increasing number of men who have sex with men and increasing HIV numbers. The case discussed below entails a young HIV positive female who fulfilled all the guideline recommendations for Pulmonary Syphilis and responded very well to treatment. Pulmonary Syphilis is rare but due to its potential to cause widespread damage, it needs to be taken into consideration whenever an immunocompromised or high-risk patient presents with positive serology, respiratory symptoms, and imaging evidence. Due to its good response to treatment, if detected early patients can be treated appropriately and effectively in a time efficient manner.

Keywords: Syphilis; Empyema; Secondary syphilis; Pleural effusions.

Abbreviations: CT: Computerized Tomography; MSM: Men who have Sex with Men; BAL: Bronchial Alveolar Lavage; PCR: Polymerase Chain Reaction; CDC: Center of Disease and Control.

Introduction

First discussed in 1492 Europe, Syphilis has become a global issue with a distribution higher in low- and middle-income countries. The highest prevalence is in Africa, and there are an estimated 5.6 million new cases every year worldwide [1]. In the United States, there was a syphilis outbreak in the 1990s, but since then the rate has decreased to 2.1 cases per 100,000 in 2000 and 2001 which was the record low [2]. The rates of primary and secondary syphilis have since risen. This increase is secondary to a large population of Men who have Sex with Men (MSM) [2]. In the past 15 years the incidence of primary and secondary syphilis has increased in every region, race, ethnicity, and age group [1].

Syphilis is caused by a bacterium otherwise known as *Treponema pallidum* which is characterized as a gram negative, motile spirochete [1]. It can be transmitted sexually between partner and partner, from mother to child, and rarely through blood transfusions [3]. Once infected, this bacterium can potentially damage any organ in the body. Pulmonary involvement has is rare [4] and this is what was found in the patient discussed below. It is known as "the great imitator" due to its various presentations and risk of serious complications and must be reported to a state or local health agency.

If left untreated, syphilis progresses through primary, secondary, latent, and tertiary stages [4].

It can be a severe and debilitating infection, however with increased awareness, appropriate screening, and it's good response to antibiotics, patients can be treated appropriately and effectively in a time efficient manner. Some patients can present in a unique manner that warrants an elaborate workup. The patient discussed below presented with rash, fevers and SOB and was found to have Syphilic empyema further suggesting the potential for syphilis to damage many different organs and have unique presentations.

Case Presentation

Patient was a 26-year-old female with a medical history of Pseudotumor Cerebri, Asthma, Obstructive Sleep Apnea, Non-alcoholic Fatty Liver Disease, Polycystic Ovarian Syndrome, Hidradenitis Suppurativa, BRCA gene positive history, and HIV positive. As an outpatient she had been found to have an undetectable HIV RNA viral load; however, was also found to have Syphilis with an RPR titer of 1:128 which was done as routine HIV surveillance. After this diagnosis of Syphilis, she later developed fevers and shortness of breath. She presented to the emergency department where vital signs showed an afebrile patient with a heart rate of 110 bpm, blood pressure of 107/66, and respiratory rate of 20 with an oxygen saturation of 90% on room air. Supplemental oxygen was given via a nasal cannula at a rate of 2L and her oxygen saturation rose to 95%. Physical exam showed erythematous papules on wrists and dorsum of hands as well as clear breath sounds and heart sounds. Further workup was initiated.

A chest X-ray showed a moderate right sided pleural effusion with airspace disease seen in the right middle and lower lobes (Figure 1). A Computed Tomographic (CT) of the chest was done and noted an effusion with loculated infiltrate in the right mid lung (Figure 2). Due to her history of HIV as well as prior MRSA infection there was a concern for *S. Aureus* pneumonia. Empiric antibiotics were started with Vancomycin, Cefepime and Azithromycin. She was admitted to the hospital for Acute Hypoxic Respiratory Failure secondary to pneumonia.

During hospitalization she had progressive worsening of her shortness of breath with increased oxygen requirements, and progressive worsening of right lung infiltrate that was monitored with serial X-Rays. She did end up requiring BiPAP support and the Pulmonary and Critical Care services were consulted. A nasal swab was obtained which was negative for various viruses including *Parainfluenza, Respiratory Syncytial Virus, Human Metapneumovirus, COVID-19,* and *Influenza A* and *B*. Further investigation with a sputum sample for serology was also negative for typical and atypical bacterial sources including *B. Pertus-*

sis, C. pneumoniae, E. Coli, H. Influenza, Klebsiella, Proteus, Serratia, S. Aureus, S. Pneumoniae, S. pyogenes, P. Aeruginosa, Mycobacterium as well *Pneumocystis Jiroveci.*

Pulmonology services performed a thoracentesis and 1300cc of amber-colored fluid was removed. A chest tube was left in place for continued drainage. Post procedure X-Ray revealed a pneumothorax said to be secondary to the effusion. A Cardiothoracic Surgery specialist was consulted for possible decortication and the specialist recommended intrapleural dornase tPA. If that failed, then decortication/video-assisted thoracic surgery would be attempted. A bronchoscopy was performed for Bronchial Alveolar Lavage (BAL) fluid analysis and suctioning of secretions. BAL was also negative for the above-mentioned typical and atypical bacterial infections as well as *Blastomyces antigen, Histoplasmosis antigen and Galactomannan.*

Fluid analysis from the thoracentesis showed lymphocytic predominance and an immunohistochemical stain was difficult to interpret for Treponema pallidum but did show spirochetes. She was diagnosed with Secondary Syphilis presenting as Pulmonary Syphilis with empyema based on symptom presentation, radiographic evidence, and exclusion of other pulmonary diseases. The infectious disease team was following the case as well, and switched antibiotics to Penicillin four million units intravenously every four hours and ordered an echocardiogram to rule out infective endocarditis. A transthoracic echocardiogram and transesophageal echocardiogram were both negative for valvular vegetations. Work up also included negative blood cultures, fungal culture, and legionella. Gram stain and culture was positive for treponema in immunohistochemical stain. She was monitored with serial chest imaging to assess for improvement in pneumothorax and empyema post drainage and treatment. She responded well to this treatment and the chest tube was removed once the output was less than 100cc in 48hr. No surgical intervention was required. She completed a three-week course of IV Penicillin and was determined to be safe and stable for discharge home. She did qualify for home oxygen therapy as her oxygenation was dropping less than 92% with activity. She was scheduled for infectious disease follow ups for outpatient monitoring with computed tomography imaging.

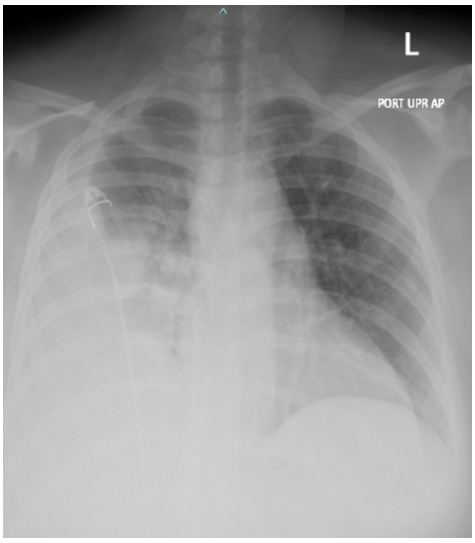

Figure 1: Chest X-ray showing large right sided pleural effusion.

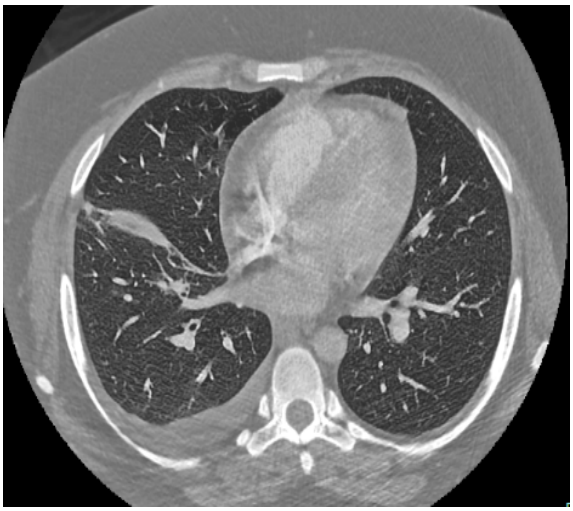

Figure 2: Chest CT without contrast showing right-sided pleural effusion with loculated infiltrate.

Discussion

Syphilis that affects the lungs is rare and diagnosis can be challenging. A report from 2018 estimated the prevalence of pulmonary syphilis disease at 1-12.5% percent in tertiary or congenital syphilis [4] and rare in secondary syphilis [1-5]. Another article published in 2006 was only able to identify nine cases of pulmonary involvement in the secondary stage since 1966 and of those, two were HIV positive [6]. When patients are present with cough and intermittent fevers there is a wide variety of differentials.

Coleman et al. proposed a guide to diagnose pulmonary syphilis [7]. This included history and physical findings typical of secondary syphilis, serologic tests positive for syphilis and pulmonary abnormalities seen radiographically with or without associated pulmonary symptoms or signs. A classic finding seen in secondary syphilis is the rash that presents on the palms and soles. Secondary syphilis is also the stage where disseminated infection can occur. Patients could have signs and symptoms related to the organ structures involved. In a patient with pleural effusion, skin rash, and positive serology for syphilis, it is important to consider pulmonary syphilis as one of the differentials [8].

Radiographs can help to guide work up but are largely non-specific. Syphilis can appear as multiple or solitary subpleural nodular opacities and rarely an infiltrate or pleural effusion [3,6,9]. Typically, other causes including atypical bacterial infections, fungal infections, or metastatic diseases are ruled out first. CT scans are typically indicated due to the variety of findings on chest radiographs and the need to rule out other possibilities [9]. Suspicion for pulmonary syphilis increases with poor response to empiric antibiotics and continued symptoms [8]. Any practitioner treating a patient with pertinent physical exam findings of Syphilis should be aware of the possible lung pathology during management [10]. Patients with positive HIV status or immuno-compromised state should acquire a more judicious work up.

Serology, immunohistochemistry, or Polymerase Chain Reaction (PCR) are typically used to diagnose [9]. Lung biopsy is not often required, and literature has shown that spirochetes seen directly on microscopy are a rare occurrence [9]. Immunostaining is more sensitive for diagnosis; PCR is another option and has been shown to be both sensitive and specific [6].

The treatment of choice for syphilis is penicillin [11]. Alternatives, in the case of allergy include Ceftriaxone, oral Amoxicillin plus Probenecid, and Azithromycin however these alternatives will not treat neurosyphilis or congenital syphilis. A single dose of long-acting Benzathine penicillin G can cure the primary and secondary stages. The current recommendation by the Center of Disease Control (CDC) is to give three doses of long acting Benzathine penicillin G [12]. In the case discussed above the patient developed an empyema. It is a Class 1 recommendation to perform thoracentesis with pleural drain placement in the treatment of early stage, minimally septate empyemas. Furthermore, it is a Class IIa recommendation to place small bore catheters for septate effusions [13]. Ongoing pleural drainage is regarded as a necessity for proper treatment.

The case above details a unique case of secondary syphilis diagnosed in an HIV positive female. Her presenting symptoms included cough, rash on her palms, and intermittent fevers. She subsequently deve-

loped shortness of breath and generalized weakness. Once on antibiotics, pulmonary symptoms did not improve. A recent outpatient screening test was positive for Syphilis, and this aided in diagnostic workup. She fulfilled the proposed guidelines of Pulmonary Syphilis recommended by Coleman et al. [7]. She was treated with chest tube placement for drainage and Penicillin G. She responded well to this treatment and recovered appropriately. It is important to acknowledge that Secondary Syphilis can potentiate to involve any organ and although rare, pulmonary complications can ensure.

Conclusion

Based on the proposed guidelines, the patient's diagnosis, and work-up suggested syphilis as the primary cause of the empyema. Due to the scarcity of pulmonary syphilis, it can be overlooked, and management can be obscured. Once diagnosed guideline driven management of syphilis and its complications have proven successful in the management of the pulmonary Syphilis.

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