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Case Report

Atypical pneumonia in an immunocompromised host

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ABSTRACT

Pneumonia is a common complication of patient with lung cancer. Various Pathogens have been reported to cause pneumonia in such patients, commonly involved organisms include bacteria (e.g. *S. pneumoniae*, *Klebsiella spp.*, *P. aeruginosa*, *S. aureus*), virus (e.g. CMV, *varicella zoster* virus, *respiratory syncytial* virus, parainfluenza and influenza viruses), fungi (e.g. *histoplasmosis*, *cryptococcosis*, *pneumocystosis*, *Aspergillosis*), opportunistic infections (e.g. *Aspergillus*, *Pneumocystis jiroveci*) and this list is progressively growing. Here authors are going to discuss a rare case of 61-year-old male patient of lung cancer suffering from pneumonia caused by *Chryseobacterium gleum*, *Stenotrophomonas maltophilia* and *Actinomyces naeslundii* and its management. Since these organisms are rarely known to cause pneumonia, so whenever we encounter such patients while authors consider common pathogens, authors should also keep in mind rare organisms especially when the pt fail to respond standard treatment.

Keywords: Lung cancer, Opportunistic infections, Pneumonia

INTRODUCTION

Pneumonia in patient with lung cancer can be alarming as mortality rate in such patient is more than 50%.[1] So prompt diagnosis of most likely pathogen and therapy based on drug susceptibility is required for favorable outcomes. The risk of infection especially opportunistic infections in such patient is further increased if patient is on chemotherapy and radiotherapy. *Chryseobacterium gleum*, *Stenotrophomonas maltophilia* are both gram negative bacilli, opportunistic organism rarely implicated in pneumonia and pose a challenge to treat them because of inherited resistant to standard antibiotics that cover gram negative organism.[2-4] *Actinomyces naeslundii* is a gram positive anaerobe which is part of normal flora of human mouth, digestive and genital tracts; pulmonary actinomycosis is the third most common type of actinomycosis.[5] Here authors present a case of 61-year-old male patient of lung cancer that presented with fever, productive cough and dyspnea for 5 days, basic labs along with sputum culture and bronchoalveolar lavage was ordered. Sputum Culture showed growth of yeast, *Chryseobacterium gleum* and *Stenotrophomonas maltophilia* while bronchoalveolar lavage of left lung grew *Actinomyces naeslundii*. Treatment was modified according to the sputum culture and bronchoalveolar lavage, patient improved significantly.

CASE REPORT

61-year-old male presented with complaint of fever for 5 days which was low grade, intermittent associated with productive cough and dyspnea. These symptoms were progressively worsening despite use of levofloxacin from last 2 days. Past medical history is significant for Pneumonia, chronic obstructive lung disease and non-small cell carcinoma of lung for which he has completed radiotherapy and is currently taking Opdivo (Nivolumab). He had been smoking for 40 years but now he has given up since 2010. Patient was a social drinker and denied

any use of illicit drugs. His home medications include symbicort, albuterol and oxycodone, opdivo, home oxygen and levofloxacin for current complaint.

On physical exam his temperature was 99.8˚F, pulse 101/min, respiratory rate 18/min, blood pressure 102/56 mmHg, Patient was in mild distress due to dyspnea. Examination of extremities showed trace pedal edema of lower extremities which is more on right side than left, without any calf tenderness. On auscultation of lung there was bilaterally decreased breath sounds and few crackles at the bases. Rest of the examination was within normal limits.

Complete blood count showed white cell count of 4200/mm, hemoglobin of 12 g/dl, and platelet count of 170,000 per mm, while basal metabolic profile was unremarkable. Rapid influenza test was negative. X-ray chest showed lung consolidation with some degree of effusion. *Streptococcus* and Urinary *Legionella* were negative. Doppler of lower extremity showed no evidence of deep vein thrombosis while CT angiogram was negative for pulmonary embolism. Sputum culture came positive for heavy growth of *Chryseobacterium gleum*, moderate growth of *Stenotrophomonas maltophilia* and Yeast was also isolated while culture of bronchoalveolar lavage from left lung showed growth of *Actinomyces naeslundii*.

The patient was started initially on levofloxacin along with oxygen, albuterol nebulization's, methyl prednisone i.e. for acute exacerbation of COPD but patient did not show any sign of clinical improvement, so Levaquin was replaced by ceftriaxone and azithromycin. Despite that no improvement was observed and vancomycin, piperacillin-tazobactam and levofloxacin were started on suspicion of hospital acquired pneumonia. Based on the results of sputum and bronchial washing culture Bactrim, fluconazole and amoxicillin were started and patient improved significantly.

DISCUSSION

Pneumonia remains one of the leading causes of death in patients of lung cancer despite the development of new antimicrobial drugs and new modalities to diagnose microorganism; this is due to the emerging resistance to antimicrobial agents, immunosuppression due to malignancy itself, use of antitumor therapy, delay in recognition organisms causing infection, not adopting proper preventive measures. New opportunistic infection and other rare organisms causing pneumonia are now being recognized; high index of suspicion, early recognition of involved pathogen and therapy based on susceptibility is required for favorable prognosis. In immunocompromised patient improper selection of antibiotic results in seven times increase in the mortality rate.[1] Here authors are going to discuss *Chryseobacterium gleum*, *Stenotrophomonas maltophilia* and *Actinomyces naeslundii* which have been rarely reported in the literature to cause pneumonia and are likely to be overlooked due to rarity.

Chryseobacterium gleum, a gram negative bacilli belongs to the family of *Chryseobacterium*, which is found mainly in soil and water, transmitted mainly through contaminated medical equipments involving liquids (e.g. respirators, intubation tubes, humidifier) and implanted devices like prosthetic valves and intra-venous cannulas; mainly affects immunocompromised patients in hospital setting and has been reported to cause meningitis, pneumonia, endocarditis, skin and soft tissue infections.[2] In 1st SENTRY antimicrobial surveillance program (1997 to 2011) only 50 cases were reported out of which only two were *Chryseobacterium gleum*, all of the fifty cases were isolated from hospitalized patients.[2]

Chryseobacterium species is resistant to clindamycin, aminoglycosides, tetracyclines, chloramphenicol, and erythromycin; first line therapy is newer quinolones (gatifloxacin, levofloxacin, garenofloxacin) followed by rifampicin. Trimethoprim-sulfamethoxazole, ciprofloxacin, and piperacillin-tazobactam also showed reasonable activity; vancomycin showed poor potency; however, combination therapy is recommended.[3] Data is limited on antimicrobial susceptibility due to smaller number of isolates. Preventive measures by hand washing, changing equipments used for humidifying gases may prevent infection.

Stenotrophomonas maltophilia, gram negative bacilli, isolated from aqueous associated sources can cause nosocomial or community acquired infection; hospital sources include Blood-sampling tubes, Central venous/arterial pressure monitors, Dialysis machines, Disinfectant solutions and hands of health care personnel. it is associated with Pneumonia, acute exacerbation of COPD, bacteremia, cellulitis/myositis and osteomyelitis.[4] Risk factors for S. maltophilia infection include malignancy, the presence of indwelling devices (e.g., catheters), chronic respiratory disease, immunocompromised patient and previous use of antibiotics; The World Health Organization classified *S. maltophilia* as one of the leading multidrug resistant organisms in hospital settings.[6]

Stenotrophomonas maltophilia showed resistance to, beta-lactams, cephalosporin, fluoroquinolones, aminoglycosides, carbapenems, and tetracycline; TMP-SMX and minocycline is the preferred treatment of *S. halophile*.[4] Ticarcillin-clavulanate, Tigecycline, Moxifloxacin, Levofloxacin is an alternate therapy to TMP-SMX but Combination therapy esp. TMP-SMX with moxifloxacin is preferred for serious infections or resistance to TMP-SMX.[7] Preventive measures to combat *S. maltophilia* infections includes avoidance of inappropriate use of antibiotics and regular cleaning and disinfection regimens for surfaces of medical equipment that comes in contact with fluid as respiratory therapy equipment and hemodialyzers.[8]

Actinomyces naeslundii, Gram positive anaerobic bacilli, belongs to the family of the Actinomyces species which is part of normal flora of human oral cavity and GI/GU tracts.[5] Most commonly causes Cervicofacial, abdominal/pelvic and pulmonary disease; Cervicofacial, abdominal/pelvic results from interruption in mucosal barrier while aspiration of oropharyngeal or gastrointestinal secretions leads to pulmonary actinomycosis along with poor oral hygiene, preexisting dental disease, and alcoholism predispose to pulmonary actinomycosis.[9] pulmonary actinomycosis begin as a focal pulmonary consolidation, lead to formation of peripheral mass which may or may not result in cavitation; it is difficult to diagnose because its close resemblance with malignancy, tuberculosis, or nocardiosis also it requires special conditions to culture. Prognosis of the pulmonary form of actinomycosis may be less favorable compared with the other commoner forms, such as cervicofacial and abdominal disease. Diagnosis requires prolong bacterial cultures in anaerobic conditions.[5,9] Penicillin G or amoxicillin are the first line therapy and require prolonged (approx 6- to 12-month) high doses (for better drug penetration in abscess and in infected tissues) while Piperacillin-tazobactam, imipenem, and meropenem can also be used, but should be avoided to prevent emergence of resistant flora whereas Macrolides and clindamycin can be used as second line drugs, it is not useful to combine amoxicillin with beta-lactam inhibitors as *Actinomyces spp*. do not produce beta-lactamases except if co-pathogens such as Enterobacteriaceae is involved. Patients who require surgical intervention have a better prognosis; surgery is indicated in patients who present with hemoptysis, who fail to respond to first line medications, or definite exclusion of lung cancer.[5] Preventive measures, such as reduction of alcohol abuse and better oral hygiene, change of IUD every 5 years may decrease the incidence of actinomycosis.

CONCLUSION

Chryseobacterium gleum, *Stenotrophomonas maltophilia* and *Actinomyces naeslundii* in the setting of lung cancer has rarely been documented to cause pneumonia. Because of the rarity of these organisms they are likely to miss resulting in increased mortality rate. Immunocompromised patients who present with pneumonia while looking for common organisms as a causative agent, rare organisms as mentioned above should also be looked for as their early recognition, targeted therapy and preventive measures will likely improve the prognosis in such patients.

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