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Case Report
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Community-Acquired Pneumonia due to *Neisseria meningitidis* Serogroup B

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Abstract

Neisseria meningitidis can cause a wide variety of disease, the most common being meningococcal meningitis and meningococcemia syndromes; however, other presentations include epiglottitis, otitis media, pericarditis, septic arthritis, urethritis, conjunctivitis and rarely, community-acquired pneumonia. Outbreaks of pneumonia with this organism have been seen in the military. Positive respiratory sample cultures for *Neisseria meningitidis* may be considered colonization in the absence of a clinical picture of pneumonia. The site of colonization for *Neisseria meningitidis* is the Naso-oropharynx, and person-to-person transmission can occur by direct contact or through nasal-oral secretion droplets. The outcome in meningococcal pneumonia is generally good when antibiotics are administered early with a mortality rate of less than 10%. Due to its sensitivity to almost all antibiotics used for treating community-acquired pneumonia, the actual incidence of this pathogen as a causative agent for community-acquired pneumonia may be underestimated, since most patients diagnosed with community-acquired pneumonia are treated empirically. We describe an 84-year-old female who had a productive cough and malaise for 3 days, and subsequently presented to the emergency department after a fall. She was found to have a right lower lobe infiltrate on chest-X ray, and levofloxacin was initiated for pneumonia. Admission blood cultures ultimately grew *Neisseria meningitidis* serogroup B, and the patient completely recovered following a change to ceftriaxone. The local department of health was notified, and her family members were given rifampin prophylaxis according to guidelines.

Keywords: *Neisseria meningitidis*; Pneumonia

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Introduction

Neisseria meningitidis is a common cause of meningitis in both children and young adults; however, pneumonia is not a common manifestation of infection with this pathogen [1,2]. *Neisseria meningitidis* colonizes the nasopharynx of up to 10% of the population as asymptomatic carriers [3]. Patients who develop only meningococcal pneumonia with bacteremia, but without central nervous system involvement, usually recover with good outcomes and do not develop the catastrophic syndrome seen in meningococcemia. The diagnosis of meningococcal pneumonia is challenging given the lack of sensitivity of clinical cultures, and the duration of asymptomatic colonization prior to disease or eradication by the immune system is generally short [4].

Case Presentation

An 84-year-old female with a history of obstructive pulmonary disease, mitral valve prolapse, and diabetes mellitus was presented to the emergency department with a right hand and left wrist pain after falling at home. She reported that for the previous few days she had been having a productive cough with yellow sputum and was feeling weak with malaise, loss of energy, and mild dyspnea on exertion. She denied any headache, fever, sore throat, night sweats, or dizziness. The patient denied recent travel, sick contacts, or recent hospitalization. She was up-to-date on her vaccinations including pneumonia vaccine. Vital signs were: temperature 99°F (37.2°C), pulse 79 per minute, BP 118/56 mm Hg, respirations 20 per minute, oxygen sat 95% on room air.

Physical exam was noteworthy for bilateral scattered wheezing and bilateral rales at the bases of the lungs, right more than the left. Neurological examination was normal, and no nuchal rigidity was present. Chest-X ray and CT of the chest showed right lower lobe infiltrate (Figure1,2).

Laboratory data demonstrated WBC 11.9 (normal reference range 4.0-10.5 10^3/UL), with 90.7%

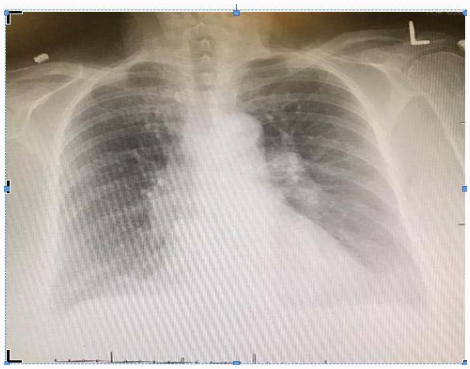

Figure 1: Chest-X ray: right lower lobe consolidation.

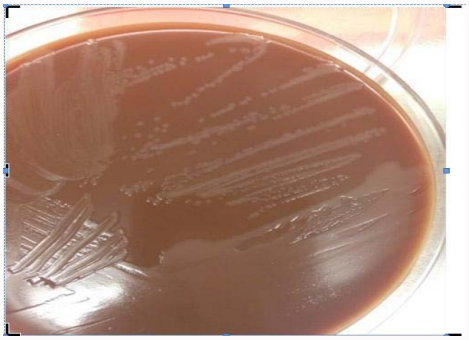

Figure 3: Blood culture media growing organism confirmed to be *Neisseria meningitidis*.

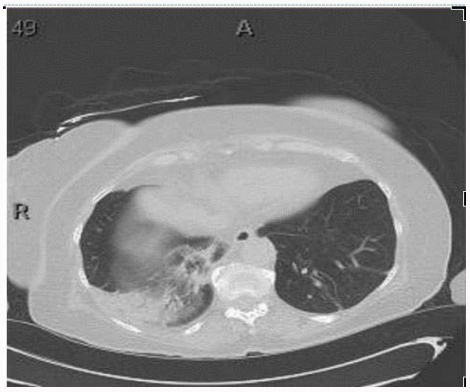

Figure 2: CT of the chest : right lower lobe consolidation.

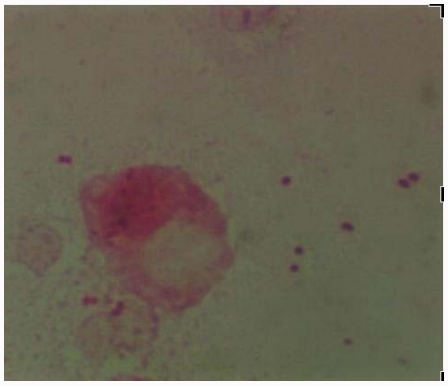

Figure 4: Gram-negative cocci organism in blood confirmed to be *Neisseria meninigitidis* serogroup B.

segmented neutrophils, 5.8% Lymphocytes, and 3.5 % Monocytes. Hemoglobin 10.9 g/dl, Hematocrit 31.7 percent, platelets 253, proBNP 231pg/ml (normal reference range <125 pg/ml), Na 131 mg/dl, Chloride 96 mg/dl. BUN 19 mg/dl, Creatinine 0.81mg/dl (normal reference range 0.6-1.30 mg/dl), urine Legionella antigen negative. Respiratory panel by PCR was negative for influenza. Blood cultures were obtained, intravenous levofloxacin was initiated, and the patient was admitted to the hospital. Sputum culture was not obtained as the patient had no sputum production at the time of admission. Gram-negative cocci were identified from the blood cultures on hospital day two and the organism was later confirmed to be *Neisseria meningitidis*, serogroup B (Figures 3,4).

Antibiotic adjustments were made and follow-up blood cultures were negative on ceftriaxone. The patient did not have any clinical evidence of meningitis. She remained stable during the hospitalization with improvement in appetite. She completed 7 days of ceftriaxone and was discharged on oral levofloxacin. Close contacts were given prophylaxis with rifampin 600 mg orally twice daily for 2 days, and the local department of health was notified. The patient had fully recovered upon outpatient visit a few weeks later.

Discussion

Neisseria meningitidis is a gram-negative aerobic Diplococci. Several subgroups of *Neisseria meningitidis* are identified including A, B, C, D, X, Y, Z, W135, BO and 29E [5]. Serotype Y and W135 are the most commonly seen in pneumonia [6,7]. The most common clinical presentation of this pathogen is meningitis and meningococcemia, (purpura fulminans and the Waterhouse-Friderichsen syndrome) and conjunctivitis, epiglottitis, pericarditis, septic arthritis and pneumonia occur less frequently [8,9]. Meningococcal pneumonia mostly occurs in people older than 40 [10]. A simultaneous outbreak of meningococcal infections and influenza has been described, providing evidence that influenza may predispose an individual to meningococcal pneumonia [11]. Two pathways for the development of meningococcal pneumonia are likely. The airway pathway includes micro-aspiration of colonized upper airway secretions or inhalation of airborne droplets contaminated with *Neisseria meningitidis* from an infected or colonized person. The blood pathway involves seeding the lung after primary bacteremia from the upper airway, and this is probably less common [12]. Confirming the diagnosis of pneumonia caused by *Neisseria meningitidis* is challenging due in part to the presence of this bacteria in the upper airways of up to 10% of the normal population as asymptomatic carriers [13]. Colonization of the airway does not reflect disease but precedes all forms of infections [14]. Person-to-person transmission of *Neisseria meningitidis* from respiratory droplets induced by coughing has rarely been reported; however, nosocomial infection is possible, and therefore respiratory isolation is required for a hospitalized patient with meningococcal pneumonia [15,16]. Meningococcal pneumonia is usually diagnosed by positive blood culture in the presence of community-acquired pneumonia [17].

The empiric uses of cephalosporins according to treatment guidelines for community-acquired pneumonia ensures that patients with *Neisseria meningitidis* pneumonia will be treated appropriately while awaiting culture results [18]. Fluoroquinolones also cover most *Neisseria meningitidis* isolates. Unfortunately, the opportunity for prophylaxis treatment of close contacts is missed with empiric treatment, and this probably contributes to maintaining

the number of asymptomatic carriers in the community [19].

Despite the high rate of bacteremia in meningococcal pneumonia, complications due to meningococcemia from the underlying pneumonia are not common, and the mortality rate is less than 10%. It has been noted that some patients with meningococcemia associated with meningococcal pneumonia may recover without antibiotics, suggesting that serotype differences of *Neisseria meningitidis* and host immunity play a major role in prognosis; however, all patients regardless of their level of illness should be treated with appropriate antibiotics [20]. Delay in recognition and treatment of *Neisseria meningitidis* infection can lead to devastating outcomes [21]. Clinicians need to be aware of more recent treatment guidelines since the antimicrobial susceptibility of *Neisseria meningitidis* has changed over the years. Cephalosporins are currently the drug of choice in treating this organism [22].

Conclusion

Recognition of *Neisseria meningitidis* as a possible cause of pneumonia is an important first step to prevent transmission of infection to close contacts, health care personnel, and other patients and to reduce the number of asymptomatic carriers of this pathogen in the community. A lower threshold to obtain clinical cultures may be of benefit in this endeavour, particularly in an outbreak. The public health department recommends a prophylaxis regimen with rifampin for household contacts and healthcare personnel who are involved in intubation, airway suctioning, or handling of oral secretions of patients of infected or colonized patients [23].

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