Atypical Presentation of *Neisseria meningitidis*

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Keywords

Meningococemia · Sepsis · *Neisseria meningitidis* · Meningitis · Gastroenteritis · Pneumonia

Abstract

Neisseria meningitidis is an organism that can cause life-threatening infections of the meninges and blood. We present two patients with atypical presentation of meningococemia without neurological or dermatological findings, and without evidence of infection on spinal fluid analysis. Both patients attended the Emergency Department with sepsis. The first patient presented with symptoms of a lower respiratory tract infection and had right-sided infiltrates on his chest X-ray, prompting the initial diagnosis of pneumonia. The second patient presented with abdominal pain and loose stools, suggesting gastroenteritis. Both patients' blood cultures came back positive for *Neisseria meningitidis*. They received intravenous antibiotics and were discharged a week after admission in a stable condition without any complications. This case series highlights that *Neisseria meningitidis* can present without classical findings and should be considered in the differential diagnosis of respi-

ratory tract infections as well as gastroenteritis in order to provide early treatment and prevent irreversible complications.

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Introduction

Neisseria meningitidis (NM) is a gram-negative commensal organism that inhabits the nasopharynx. It is capable of causing disease from occult bacteremia to life-threatening meningitis, sepsis, and multi-organ failure leading to death. NM is the most common cause of meningitis in children and young adults in the USA, and the second most common cause in adults after *Pneumococcus* [1]. The classic triad of meningitis – fever, headache, and neck stiffness – presents in only up to 21.1% of all patients [2]. 95% of the patients present with at least two of the following: fever, neck stiffness, altered mental status, and a rash [3]. Less than 10% of all patients present with meningococemia alone [4], presenting a diagnostic challenge in patients who present without any of the classic signs and symptoms. With

an overall mortality of over 18% [1], it is important to recognize atypical presentations of NM in order to deliver early treatment and prevent irreversible complications and death. We present two patients who attended the Emergency Department (ED) due to symptoms of lower respiratory tract infection and gastroenteritis, respectively, and grew NM on blood culture, without any signs or symptoms of meningism and a negative lumbar puncture.

Case Presentation Series

Patient A

History of Present Illness

A 40-year-old Asian man, known case of diabetes mellitus type 2 for the last 6 years and controlled on an oral antidiabetic regime, presented to the ED with a 2-day history of high-grade fever and chills associated with a dry cough. The fever did not respond to paracetamol. There was no chest pain or shortness of breath. There were no urinary or bowel changes. No skin rash, joint pains, nausea, vomiting, headache, photophobia, loss of consciousness, or seizure activity was reported.

His past medical history was positive for diabetes mellitus type 2 (HbA1c 7.3%) that was controlled with oral hypoglycemics. There was no history of any surgery. The patient was a never-smoker and non-alcoholic. He worked as a driver for a tourism company in Dubai. His family history was positive for diabetes on both maternal and paternal sides but was otherwise insignificant.

Vitals

His vitals revealed a blood pressure of 127/82 mm Hg, heart rate of 109 bpm, respiratory rate of 14/min, temperature of 39.2°C, and oxygen saturation on room air of 99%.

Physical Exam

His chest examination revealed right-sided, infrascapular, coarse crepitations, with equal air entry bilaterally. His neurological exam was intact, without any signs of meningism, and Glasgow coma scale score was 15/15. There were no skin rashes.

Investigations

His labs showed an elevated white blood cell count (19.1) with neutrophilia (84.5%), elevated procalcitonin (2.1), and raised CRP (286). He was negative for influenza and malaria. His spinal fluid analysis was within normal limits, and no organisms were seen. His chest X-ray revealed right-sided infiltrates. His blood cultures were sent and came back positive for NM after 48 h. A second set came back positive for the same.

Management

Following the results of his blood cultures, the patient was admitted to the Infectious Disease Unit and was started on intravenous (IV) ceftriaxone 2 g daily. The patient received a total of 7 days of IV antibiotics. His inflammatory markers subsided, he was hemodynamically stable, and his general condition improved. The repeat blood cultures showed no growth.

Outcome

The patient was discharged on day 8 of admission without any further complications.

Patient B

History of Present Illness

A 33-year-old Asian man, with no comorbidities, presented to the ED with a history of fever of 3 days' duration associated with throat pain and vomiting. The fever was measured to be 38°C at home. The content of the vomitus was food with small streaks of blood. He also had four episodes of loose motion without blood or mucus. Systemic review was insignificant for any other findings. The patient attended an outpatient clinic and was prescribed IV pantoprazole, intramuscular diclofenac, and IV domperidone. He had no significant past medical or surgical history. He worked as a computer technician. There was no history of recent travel. He had a 10 pack-year history of smoking and has recently quit. He consumed alcohol on occasions. His family history was insignificant for any diseases.

Physical Exam

Abdominal exam revealed generalized tenderness with guarding but no rigidity. His heart sounds were normal without any audible murmurs. His neurological examination was normal and did not reveal any signs of meningism. His Glasgow coma scale score was 15/15. An ear, nose, and throat exam revealed whitish pustules on the palatine tonsils without congestion. The chest was clear bilaterally, and there were no skin rashes.

Vitals

His vitals revealed a blood pressure of 121/79 mm Hg, heart rate of 112 bpm, respiratory rate of 24/min, temperature of 38.3°C, and oxygen saturation on room air of 96%.

Investigations

Laboratory investigations showed a raised white blood cell count (12.1), absolute neutrophil count (10.6), CRP (201.5), bilirubin (1.7), ALT (45), and procalcitonin (4.67). His chest X-ray appeared normal, and a CT scan of his abdomen revealed no significant abnormality. His stool and urine cultures came back negative. Blood cultures were positive for Gram-negative diplococci seen after 18 h, susceptible to ceftriaxone, meropenem, and penicillin G.

Management

The patient was admitted for further investigations and treatment. He received IV hydration, IV Rocephin (2 g), and symptomatic treatment. The patient was subsequently transferred to the Infectious Disease Unit, where he received a total of 7 days IV Rocephin. Over the course of his admission, his abdominal pain, fever, and inflammatory markers subsided. Repeat blood cultures showed no growth.

Outcome

The patient was discharged on day 7 of his admission without any further complications.

Discussion

NM may present with atypical signs and symptoms and, therefore, poses a diagnostic challenge for the physician. Given his history of cough with radiographic changes, Patient A was initially diagnosed with sepsis secondary to pneumonia. Patient B, on the other hand, was initially diagnosed with gastroenteritis in light of his abdominal pain and loose stools. Interestingly, neither patient had any classic signs of meningism – nuchal rigidity, photophobia, and headache. Furthermore, Patient A had a lumbar puncture that was negative for *Neisseria*. Both patients were only discovered to have had meningococemia following blood cultures. This led the authors to investigate the incidence and pathophysiology of meningococemia without meningitis. NM is present in the upper airways of approximately 10% of the population [5]. The rate of spread from one individual to another is increased in closed populations, such as in military recruits, student dormitories, and pilgrims performing the Hajj [6, 7]. There are many different serotypes of NM; however, only five strains are known to cause most disease: A, B, C, Y, and W135 [8]. Coureuil et al. [9] noted that the amount of bacteria shows a positive correlation with the extent of disease, suggesting the importance of early diagnosis and treatment.

Translocation of NM across the respiratory mucosa leads to invasive disease. The virulence of the organism can be attributed to multiple factors, including the expression of a polysaccharide capsule that helps the bacteria evade phagocytosis, adhesive proteins (such as pili) that help the bacteria attach to the membrane, iron sequestration, and endotoxin (lipooligosaccharide) leading to a systemic inflammatory response [6].

The most common presentation of invasive NM is meningitis [10]. Rare presentations have been reported, including septic arthritis (2–12%), pneumonia (5–15%), and pericarditis (5.9%) [11–13]. Gastroenteritis has been reported as an initial presenting symptom of invasive meningococemia in 25% of all patients [14]. A further

search of the literature would be helpful to identify host and pathogen factors that lead to a spectrum of disease caused by NM.

Conclusion

The learning point from this case series is that meningococemia should be considered in the differential diagnosis of sepsis secondary to lower respiratory tract infection and gastroenteritis despite a lack of neurologic and skin findings. It is important that the treating physician keep an open mind when approaching patients presenting with sepsis in order to prevent complications of fulminant meningococemia.

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Statement of Ethics

Patients have given their written informed consent to publish their case, including publication of images.

Disclosure Statement

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Author Contributions

All authors contributed equally in the write up of this case report.

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