Case Report

Purple Man Syndrome: Purpura Fulminans Secondary to Meningococcemia

Rikinder Sandhu, Raquel R Garcia, Nitin Bhanot, Thomas L Walsh, and Zaw Min*
Division of Infectious Disease, Allegheny General Hospital, USA

Abstract

Invasive meningococcal disease is a serious life-threatening infection. Skin rash is present in about half of the patients with meningococcal infection. However it could be easily missed if no thorough cutaneous examination is performed. Herein, we present a patient with invasive meningococcal serogroup B infection with diffuse cutaneous purpuric rash and ecchymoses, suggestive of purpura fulminans. Purpura fulminans is a telltale cutaneous manifestation of disseminated meningococcemia, and it is, unfortunately, an ominous late sign of infection. When present, the prognosis is grim with poor salvageable potential. We also describe how meningococcal serogroup B vaccines were introduced to the United States and their current indications of immunization.

ABBREVIATIONS

CSF: Cerebrospinal Fluid; WBC: White Blood Cell Count; INR: International Normalized Ratio; FDP: Fibrin-Degradation Product; MenB: Meningococccussero group B Vaccine

INTRODUCTION

Skin rash is a very common clinical presentation. The cause of the skin rash ranges from mild allergic reaction to a serious disease manifestation. Here, we describe an apparent immune competent middle-age patient who presented with disseminated skin purpura (purpura fulminans) from the fatal serogroup B meningococcemia.

CASE PRESENTATION

A 58-year-old male presented to the local emergency department secondary to lethargy and confusion. Per the patient’s fiancé, the patient had been battling an upper respiratory tract infection with a productive cough with tan-colored sputum for 2 weeks. The patient had also been having fevers every three to four days along with myalgia and diarrhea. His past medical history was significant for diabetes mellitus and hypertension. The patient lived on a farm and had two dogs, two cats, many cattle, and other wild animals. He was a hunter but recently had not been in contact with any animal carcasses.

Upon the presentation to the local hospital, the patient was confused and combated. His vitals showed temperature of 39.6ºC (103ºF), pulse rate of 128/minute, blood pressure of 114/58 mmHg, and respiratory rate of 36/minute. Oxygen saturation was 92% on 4L supplemental oxygen. The patient was subsequently sedated and intubated at the local facility. There was no skin rash noted on the admission. The initial laboratory studies revealed a white blood cell count (WBC) of 0.8 x 10³/mm³ (reference 4.4 - 11.3 x 10³) with 39% bands (reference 0 – 11). Creatinine was 1.4 mg/dL (reference 0.7 – 1.50), hemoglobin 13.1 g/dL (reference 12.3 – 15.3), and platelets 80,000/mm³ (reference 145,000 – 445,000). Blood cultures were drawn, and lumbar puncture was performed. Intravenous vancomycin and ceftriaxone were administered. Cerebrospinal fluid (CSF) studies demonstrated clear fluid, glucose 82 mg/dL, protein 39 g/dL, WBC 3/mm³ (reference 0-5) with 100% lymphocyte, RBC 2, and a negative Gram stain. The patient was then transferred to our facility for further management.

On arrival to our facility, the purplish purpuric rash was noted and it quickly became coalesced, diffuse and progressively generalised to the face (Figure 1), upper extremities (Figure 2 and 3), trunk (Figure 4), and lower extremities (Figure 5), suggestive of purpura fulminans. The repeat laboratory investigations illustrated creatinine 3.72 mg/dL, bicarbonate 12 mmol/L (reference 22-30), lactic acid 10.1 mmol/L (reference 0.7-2.1), WBC 6.13 x 10³/mm³ with 26% bands, platelets 26,000/mm³, D-Dimer >20 mcg FEU/mL (reference <5), fibrinogen 116 mg/dL (reference 212-479), and an INR 3.1 (reference 0.9 – 1.1). Vasopressor support, intravenous hydrocortisone, and continuous veno-venous hemodialysis were initiated. Intravenous gentamicin and doxycycline were added with the concern of tularemia or rickettsial infections considering his social history of hunting and animal contacts.
Blood cultures drawn at the local hospital showed Gram-negative diplococci, suspicious of *Neisseria meningitidis*. CSF cultures were negative for bacterial growth. Less than 24 hours of transfer, the patient succumbed to multi-organ failure and disseminated intravascular coagulation despite optimal medical management. The blood cultures were finally reported as *Neisseria meningitidis*, and the specimens were dispatched to the local county health department for further analysis. The isolate was identified as *Neisseria meningitidis* serogroup B. The appropriate post-exposure chemoprophylaxis was provided to the patient’s close family members and medical personnel at risk.

**DISCUSSION**

*Neisseria meningitidis* is a Gram-negative aerobic diplococcus. In 2011, the rate of invasive meningococcal disease was 0.3 per 100,000 populations in the United States [1]. *N. meningitidis* is transmitted via direct contact with respiratory secretions and colonizes in mucosal surfaces of the nasopharynx [1]. The most virulence factor of *N. meningitidis* is the presence of polysaccharide capsule that enables organisms to resist phagocytosis by the host immune system [2]. The persons at risk of invasive meningococcal infection include nasopharyngeal carriage, functional or anatomical asplenia, complement component deficiencies, eculizumab therapy, microbiologists, military recruits, and college students living in residence halls [3]. *N. meningitidis* is classified into serogroups according to immunologic reactivity of the capsular polysaccharide [4]. Of the 13 different types of polysaccharide capsules, six serogroups cause most cases of invasive meningococcal disease globally (A, B, C, W-135, X and Y) [4]. In the United States, 39% of meningococcal infections are secondary to serogroup B, followed by serogroup Y (30%), and C (25%) [5]. However, the vaccination against serogroup B meningococcus was only approved in 2014 for use in the United States.

Four clinical syndromes are most commonly associated with the invasive meningococcal infection, namely meningitis (40-65%), meningococccemia without meningitis (20-30%), meningitis with systemic meningococcemia (7-12%), and primary pneumonia (10%) [5-7]. Serogroup B or C is usually responsible for patients with meningococcemia and meningitis while serogroup Y causes the primary meningococcal pneumonia [2,5]. Serogroup B accounted for the four recent meningococcal meningitis outbreaks in the United States college campuses [8,9].
Three clusters of serogroup C meningococcal meningitis among men who have sex with men have been reported in the United States from 2012 to 2015 [10].

Patients with meningococcemia typically present with acute onset of fever, generalized muscle ache, cold extremities, skin color changes, and shock [2,7]. Cutaneous rash could start with petechiae or purpura, and is present in 40-80% of cases of meningococcemia, but it is usually subtle and may be missed in the early stage of disease [7]. Thus, it is essential to have thorough physical examination in patient with suspected meningococcal infection. These lesions could progress quickly and coalesce into diffuse widespread purplish non-blanching rash (purpura fulminans), secondary to thrombosis of blood vessels with subsequent vascular damage and rupture from septic vasculitis and disseminated intravascular coagulation [2,11]. These widespread skin ecchymoses manifest in the late stage of meningococcal infection, and when present, the chance of survival of the patient is unlikely. Purpura fulminans is classically associated with fulminant meningococcemia, but it has rarely been reported in patients with other infections such as gonococcemia, *Escherichia coli* septicemia, and rickettsial infection [11,12].

A high clinical index of suspicion is essential for the early diagnosis and therapy. The third generation cephalosporins (ceftriaxone or cefotaxime) are the preferred antibiotic therapy of meningococcal infection [2]. Antimicrobial chemoprophylaxis is recommended to intimate or household contacts and individuals exposed to oral secretions [2]. The overall fatality of invasive meningococcal disease is 11.3% [5]. Case-mortality rate is the highest in patients with meningococcal pneumonia (15.9%), followed by meningococccemia (13.2%) and meningococcal meningitis (9%) [2,5]. In the United States, vaccines which cover meningococcal serogroups A, C, Y, and W-135 have been widely available [3]. Two outbreaks of meningococcal serogroup B meningitis in the United States college campuses in 2013 have led to the fast-track approval of 2 serogroup B vaccines (MenB), MenB-FHbp and MenB-4C, by the United States Food and Drug Administration in October 2014 and January 2015, respectively [8]. In 2016 United States adult immunization schedule, MenB vaccine is recommended for use in persons who are at increased risk of serogroup B meningococcal disease (e.g., anatomical or functional asplenia, complement component deficiencies, microbiologists, persons live in an area with an outbreak, and young adults aged 16 to 23 years) [3]. Our patient had diabetes mellitus and did not have any of those risk factors.

**CONCLUSION**

A detailed cutaneous examination is essential in patients with suspected meningococcal infection since the initial manifestation of the skin rash is subtle. Generalized purpura fulminans is a late skin manifestation and when present, the patient is almost always not salvageable. The recent approval of MenB vaccine use in the United States may have improved the morbidity and mortality of the persons at risk of meningococcal infection. Universal meningococcal vaccination to include persons without risk factors may be warranted in the future given the gravity of the disease and high mortality rate.

In summary, widespread use of meningococcal vaccination, heightened clinical vigilance of the disease, early recognition of skin rash, and immediate administration of the effective antibiotic therapy would have an impact on the reduction of mortality and improvement of clinical outcome in patients with invasive meningococcal disease.

**CONFLICT OF INTEREST**

Dr. Bhanot received honorarium for Speaker’s Bureau of Astellas and for article review for Postgraduate Institute for Medicine. All other authors declare no conflicts of interest.

**REFERENCES**


**Cite this article**