Short Communication

Meningococcemia due to the 2000 Hajj-Associated Outbreak Strain (Serogroup W-135 ST-11) with Immunoreactive Complications

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SUMMARY: We present the first reported case of systemic infection with Neisseria meningitidis serogroup W-135 sequence type (ST)-11 in Japan. A 44-year-old woman presented with high fever, sore throat, and fatigue and was diagnosed with N. meningitidis bacteremia. The causative strain was identified as serogroup W-135 ST-11 by polymerase chain reaction and multilocus sequence typing. Approximately 1 month after treatment, she developed high fever, dyspnea, chest pain, and shoulder pain due to pericarditis, polyarthritis, and tenosynovitis, which are all relatively common immunoreactive complications of W-135 ST-11 meningococcal infections. This causative strain was the same as that responsible for an outbreak of meningitis among Hajj pilgrims in 2000. The strain is now found worldwide because it can attain a high carriage rate and has a long duration of carriage. We suspect that our patient’s infection was acquired from an imported chronic carrier.

Meningococcemia is rare in Japan, with an incidence of only approximately 10–20 cases per year since the 1990s. Neisseria meningitidis serogroup W-135 is particularly rare in Japan (1), although it is commonly found in Africa, including the area known as the “meningitis belt.” Serogroup W-135 sequence type (ST)-11 caused an outbreak of meningitis among Hajj pilgrims in Mecca in 2000 (2). To date, only one case of systemic W-135 meningococcal infection has been reported in Japan; however, it was not caused by type ST-11.

A 44-year-old woman presented with fever (40°C), sore throat, left shoulder pain, chest pain, fatigue, and non-productive cough without meningeal irritation. She had not traveled to any foreign country. She was admitted to a hospital and was subsequently administered ceftriaxone. Her symptoms improved, and she was discharged on the 6th day of illness. N. meningitidis was isolated from her initial blood and sputum cultures. The minimum inhibitory concentrations of penicillin G and ceftriaxone against this strain were 0.025 and 0.002 mg/ml, respectively. On the 15th day of illness, she developed high fever and was admitted to another hospital. Her symptoms did not improve with oral antibiotic treatment, and she was referred to our hospital on the 21st day of illness. Subsequently, her symptoms almost completely resolved after treatment with non-steroidal anti-inflammatory drugs and levofloxacin.

On the 31st day of illness, the patient developed high fever and chest pain and was readmitted to our hospital. She had tenderness of the left shoulder and bilateral sternoclavicular joint pain, and she was unable to abduct her left arm because of pain. Laboratory testing showed an elevated leukocyte count of 13860 cells/µl and C-reactive protein level of 18.3 mg/dl. Electrocardiography showed low QRS voltage and negative T waves on leads V1 to V4. Chest X-ray and chest computed tomography (CT) showed pericardial and bilateral pleural effusions (Fig. 1A, B). 18F-fluorodeoxy glucose (FDG) positron emission CT showed abnormal FDG uptake in the effusions, shoulder joints, sternoclavicular joints, hip joints, and greater trochanters (Fig. 1C). These findings and her medical history indicated a diagnosis of pericarditis, polyarthritis, and tenosynovitis after systemic N. meningitidis infection. We considered that her symptoms were not caused by pyogenic processes because there were no signs of localized infection. Further, we found no evidence of bacteremia, and the onset was too late for a primary infection. We treated her with ibuprofen without antibiotics, and her symptoms and clinical findings improved gradually. Blood cultures taken during hospital admission were negative, and she was discharged from our hospital on the 42nd day of illness. Her symptoms of arthritis and tenosynovitis continued to fluctuate and generally improved by intermittent use of ibuprofen. The causative agent was identified as N. meningitidis serogroup W-135 using the N. meningitidis antiserum test (DifcoTM; Difco, Detroit, Mich., USA) and polymerase
Fig. 1. (A) Chest X-ray showed an increased cardiothoracic ratio and bilateral blunting of the costophrenic angles. (B) Chest computer tomography showed a moderate amount of pericardial fluid. (C) 18F-fluorodeoxy glucose (FDG) positron emission computer tomography on admission to our hospital showed abnormal FDG uptake in the pericardium (arrows), pleural effusions, shoulder joints, sternoclavicular joints, hip joints, and greater trochanters (arrowheads) due to an inflammatory reaction.

chain reaction-based method (3) and ST-11 by multi-
locus sequence test (4). Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

Meningococcal disease generally occurs 1–14 days after direct contact with respiratory secretions of an asymptomatic carrier. This disease presents as meningitis in more than 50% of cases, whereas meningococcal bacteremia without meningitis is reported in approximately one-fourth of cases with systemic infections (5). Systemic meningococcal infection sometimes causes primary pyogenic pericarditis and arthritis, however, secondary reactive pericarditis and arthritis are rare. These reactive inflammatory complications are associated with type 3 immune complex hypersensitivity reactions and inflammatory cytokines. The risk factors for the development of these complications include severe disease, older age (more frequent in adolescents and adults), and a high inflammatory state during the primary infection (6). Although secondary reactions usually occur 6–16 days after the primary infection (6), our patient developed these complications after approximately 1 month. The late episode of fever appears to have been due to reactive complications. N. meningitidis serogroup W-135 causes both pyogenic and reactive pericarditis and arthritis more frequently than other serogroups (7). Although reactive pericarditis and arthritis have also been reported in N. meningitidis serogroup C infections (6), such complications appear to depend on ST or electrophoretic type (ET) and are reported to be associated with the ST-11/ET-37 clonal complex (8). However, it remains unknown why the ST-11 strain is associated with an increased frequency of extrameningeal complications.

According to the Neisseria Multi Locus Sequence Typing website (9), infections with N. meningitidis serogroup W-135 ST-11 strains have been reported worldwide. The highest frequencies have been reported in the “meningitis belt,” particularly in countries such as Mali and Gambia, as well as other regions including Canada, the United States, the United Kingdom, Chile, Taipei, and Indonesia. This strain became well-known following the global outbreak among Hajj pilgrims that began in Mecca in 2000 (2). This strain can attain a high carriage rate and has a long duration of carriage; 55% of carriers have been reported to remain positive for 5–6 months (2). After this outbreak, vaccinations against meningococcal serogroups A, C, Y, and W-135 were required for all travelers to Mecca during the annual Hajj. Although non-conjugated polysaccharide vaccines can prevent systemic meningococcal disease, they do not result in a reduction in asymptomatic carriers.

In Japan, the latest epidemiological data showed that the major N. meningitidis serogroups are B (57%) and Y (21%) (1), with very low carriage rates (25/5886, 0.4%) and no W-135 carriers (10). Considering that chronic carriers of W-135 meningococcus are very rare in Japan, this strain may have been transmitted to our patient by a carrier traveling from another country. Our patient reported that personal contact with foreigners several days before onset of her initial symptoms; however, we were unable to confirm if the infection was acquired from an imported chronic carrier. Physicians in non-endemic areas must be vigilant in considering the possibility of transmission from chronic carriers from endemic countries.
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Conflict of interest  None to declare.

REFERENCES