Short Communication

Meningococcal Meningitis with Meningococcemia: a Rare Sporadic Case in an Elderly Patient with No History of Contact with Infected Individuals

Harumi Gomi1*, Nahoko Unuma1, Koichi Nakao2, and Yuji Morisawa1

1Center for Clinical Infectious Diseases and
2Department of Neurology, Jichi Medical University, Tochigi 329-0498, Japan

SUMMARY: An 89-year-old Japanese woman with no history of contact with infected individuals developed meningococcal meningitis with meningococcemia. Compared with other countries, invasive meningococcal disease is relatively rare in Japan, with an annual incidence of a total of 10–20 cases for more than 2 decades; this represents approximately 1% of the corresponding incidence in the United States and United Kingdom. The most prevalent serotypes of the causative agent Neisseria meningitidis in Japan are serotypes B and Y. The patient in this study was also infected with a strain of serotype Y. The meningococcal vaccine has not yet been approved for use in Japan. The only possible transmission route in this patient was a visit by the patient’s grandchild a few days prior to the onset of symptoms. Due to its low incidence, clinicians do not have sufficient experience for managing this potentially fatal illness. This case highlights the need for considering a complete differential diagnosis of invasive meningococcal disease.

Meningococcal infection is potentially fatal (1) and has varying clinical manifestations; there are 4 major types: bacteremia without sepsis, meningococcemia without meningitis, meningitis with or without meningococcemia, and meningoencephalitic manifestation (1). Vaccination and postexposure prophylaxis are the main strategies used for the prevention of this potentially fatal disease. In Japan, the meningococcal vaccine has not yet been approved for clinical use. One of the major reasons is that fewer cases of this infection have been reported compared with those reported by other regions of the world (2,3). National data in Japan indicate that only 10–15 cases per year have been reported for the last 10 years (4). Between January 2005 and October 2013, a total of 115 patients (including 48 females) with meningococcal meningitis were reported in Japan; the ages of these patients ranged from 0 to over 85 years; most cases were reported among young children, adolescents, and older individuals aged 50–65 years (5).

In addition, the vaccination policy in Japan has been very passive over the last 2 decades because of the occurrence of the unexpected adverse events of aseptic meningitis due to the mumps vaccine. Given this sociocultural background, most medical professionals lack exposure to patients with meningococcal disease and remain unfamiliar with this potentially fatal disease. We report here a rare case of meningococcal meningitis with meningococcemia in an elderly patient with no clear history of contact with infected individuals in Japan.

An 89-year-old Japanese woman presented changes in mental status and abnormal behavior; she had a history of hypertension but no history of known complement deficiency or asplenia and stayed at home without frequent social contacts. She was in her usual state of health until 1 week prior to admission, when she noticed neck pain. One day later, she was visited by her 3-year-old grandson who exhibited upper respiratory symptoms, including a runny nose. The grandson stayed at her home for 3 days but without close contact with her. Two days prior to admission, she noticed that she had a runny nose and subjective fever, which prompted her to take over-the-counter medication for cold symptoms. One day prior to admission, she began to speak incoherently and presented abnormal behavior at home, as witnessed by the members of her household. Consequently, she was brought to the hospital by ambulance for evaluation.

On admission, the vital signs of the patient were recorded as follows: blood pressure of 200/122 mmHg, heart rate of 134/min, respiratory rate of 20/min, and temperature of 39.6°C. The patient’s general appearance indicated that she was combative and moving all extremities but failed to follow commands or to communicate cogently. Evaluation of the patient’s mental status revealed a Glasgow Coma Scale of E4V2M5. Physical examination revealed the patient’s pupils to be equal, round, and reactive to light and accommodation, a rigid neck, positive Kernig’s sign, deep tendon reflexes of 3/5 bilaterally, and bilateral myoclonus; the remainder of this physical examination was unremarkable. Laboratory data revealed a leukocyte count of 10,100/mm³, hemoglobin of 12.4 g/dL, platelet count of 125,000/mm³, creatinine of 0.84 mg/dL, bicarbonate of 21 mEq/L, serum glucose of 123 mg/dL, aspartate aminotransferase of 38 mU/dL, alanine transaminase of 19 mU/dL, lactate dehydrogenase of 326 mU/dL,
alkaline phosphatase of 333 mU/dL, and total bilirubin 1.13 of mg/dL. Examination of the cerebrospinal fluid (CSF) revealed a leukocyte count of 2,126/mm³, which consisted of 98.5% neutrophils, protein levels of 1,040 mg/dL, and undetectable levels of glucose. CSF was positive for meningococcal antigens, and cultures of CSF and blood samples obtained at the time of admission revealed the presence of Neisseria meningitidis. This identification was confirmed using the automated VITEC® 2 system (bioMérieux, Lyon, France). Antimicrobial susceptibility testing using E-test® (Sysmex-bioMérieux, Tokyo, Japan) revealed the minimum inhibitory concentrations of penicillin and ceftriaxone to be 0.1 µg/mL and <0.016 µg/mL, respectively. The strain was subjected to serotyping in the National Institute of Infectious Diseases in Japan using polymerase chain reaction and found to belong to serotype Y (6).

Following hospitalization of the patient, the drugs intravenously administered were 3.3 mg of dexamethasone and 2 g of meropenem in the Emergency Department, and subsequently, 2 g of ceftriaxone every 12 h, 1 g of vancomycin every 12 h, and 2 g of ampicillin every 4 h were intravenously administered. Dexamethasone administration was continued until day 5 of hospitalization. Antimicrobial therapy was adjusted to 2 g of ceftriaxone that was administered intravenously every 12 h as a single agent, which was continued until day 14 of hospitalization. The patient’s symptoms improved significantly on day 2 of hospitalization, with body temperature decreasing to 37°C and the absence of nuchal rigidity. Significant improvement was also observed in the mental condition of the patient such that coherent communication and orientation to person, place, and time were restored. The patient’s recovery was complicated by pseudogout of the left wrist and right ankle joints, which was treated with non-steroidal anti-inflammatory medication. The patient was subsequently transferred to a long-term care facility for rehabilitation on day 40 of hospitalization.

The patient’s household included her sons and daughter, who were in their 60s (Table 1). Among them, only her daughter exhibited upper respiratory symptoms without sepsis around the time of the patient’s hospitalization. All 3 household members were orally administered 500 mg of levofloxacin once for prophylaxis after nasal carriage to invasive disease is attributable to multiple factors. In addition, even individuals newly infected with the pathogen have been known to develop invasive meningococcal disease (1). The present study described the case of an elderly female patient who mostly stayed at home and did not have an active social history or a clear history of exposure to patients with invasive meningococcal diseases in the community. There were no local outbreaks of invasive meningococcal disease reported during the period of the patient’s clinical manifestation, as per the local Department of Health.

The highest incidence of meningococcal meningitis in Japan was observed during World War II, with a total of approximately 4,300 reported cases (4). After that, the incidence of the disease declined dramatically, with less than 10 and approximately 10–20 cases reported annually between 1988 and 1995 and between 1995 and 2004, respectively (4). Of the 184 reported cases of children with bacterial meningitis between 1986 and 1994, only 0.5% of the cases were caused by N. meningitidis (4). The most prevalent serotypes of N. meningitidis are serotypes B and Y in Japan (7). In the United States and the United Kingdom, the annual incidence of meningococcal disease has been 1,500 to 2,000 (2,3). In countries with a high prevalence of meningococcal diseases, an effective vaccine has been implemented for serotypes A, C, Y, and W137, and recently for serotype B (8).

The reason for the low incidence of meningococcal disease in Japan compared with the incidence in other developed countries is unclear. An epidemiological study performed in Japan between 2000 and 2003 showed that healthy carriers of N. meningitidis accounted for 0.4% (25 of 5,886 in 10 prefectures) of the participants (mostly adolescence and college students), which is less than 10% of the frequency in other developed countries (9).

It is noteworthy that a drastic reform of the infectious disease reporting system was implemented in Japan in 1999. Meningococcal meningitis was reported as “epidemic meningoencephalitis” until 1999. During the period from 1999 to 2012, cases of “meningococcal meningitis” confirmed by a laboratory test were required to be reported to the local Department of Health. Since 2013, “invasive meningococcal diseases,” including bacteremia without sepsis, meningococcemia without meningitis, meningitis with or without meningococcemia, and meningococcal meningitis have been considered as reportable diseases. Therefore, the total number of “invasive meningococcal diseases” throughout Japan is likely to have been greatly underestimated.

This case provides an important clinical warning that despite having no clear history of contact with infected individuals, with the exception of her grandchild’s visit a few days prior to the onset of symptoms, the patient developed invasive meningococcal disease or meningitis with meningococcemia accompanied by an encephalitic manifestation (1). The isolated strain of N. meningitidis belonged to serotype Y, which is consistent with the prevalence of this serotype in Japan. Since it is difficult to identify asymptomatic carriers or patients with asymptomatic meningococcemia, clinicians must be made aware that an important pathogen could cause bacterial meningitis or acute onset of severe sepsis. The recent legal changes in the reporting systems for patients

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**Table 1. Summary of household contacts**

<table>
<thead>
<tr>
<th>Household contact</th>
<th>Age</th>
<th>Sex</th>
<th>Past medical history</th>
<th>Upper respiratory symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grandson (visiting)</td>
<td>M</td>
<td>None</td>
<td></td>
<td>4 to 7 days prior to the patient’s admission</td>
</tr>
<tr>
<td>Son A</td>
<td>60’s</td>
<td>M</td>
<td>Hypertension</td>
<td>None</td>
</tr>
<tr>
<td>Son B</td>
<td>60’s</td>
<td>M</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Daughter</td>
<td>60’s</td>
<td>F</td>
<td>None</td>
<td>During the date of patient’s admission</td>
</tr>
</tbody>
</table>
Meningococcal Meningitis

with invasive meningococcal diseases should facilitate a more precise estimation of the incidence of invasive meningococcal diseases in Japan.

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Conflict of interest None to declare.

REFERENCES