

Case Study

Needle-stick dengue virus infection in a health-care worker at a Japanese hospital

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Abstract: Needle-stick dengue virus infection in a health-care worker at a Japanese hospital: Kenji OHNISHI. Department of Infectious Diseases, Tokyo Metropolitan Bokutoh General Hospital—Objectives: About 160 patients in Japan were infected with dengue virus by mosquito's bites in the summer and autumn of 2014. In this report, I describe a case of occupational dengue virus infection by needle-stick injury from the 1990s to alert health-care workers to the fact that dengue virus is among the causative agents responsible for occupational infectious disease even in Japan. **Case:** A Japanese female in her thirties, a nurse at our hospital in Tokyo, was admitted to our hospital in January 1992 three days after the onset of fever, headache, and general malaise. She had never been overseas. Five days before the onset of her symptoms, she had pricked her finger with an injection needle used to draw blood from a febrile patient infected with dengue virus. She was diagnosed with dengue virus infection based on three findings: detection of the dengue virus genome in serum, isolation of dengue virus from serum, and serum samples positive for IgM antibodies against dengue virus. **Conclusions:** The patient contracted dengue virus infection via a needle-stick injury at our hospital. Although this occurred more than two decades ago, in 1992, health-care workers should still be mindful of the risk of dengue virus infection via needle-stick injury even in Japan.

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Key words: Dengue virus, Health-care worker, Needle stick

A long-term study of sharp injuries suffered by health-care workers in a university hospital in Japan reported the following: nurses and doctors accounted for 72.2% and 19.7% of sharp injuries that occurred;

54.4, 24.7, and 11.6% of the injuries occurred in the hospital wards, operating rooms, and outpatient clinic, respectively; and 55.9% of the injuries involving syringe-needle units occurred after use and before disposal¹⁾. A more recent prefectural survey in Japan revealed the following: 44.0% of responding institutions vaccinated for hepatitis B, 35.2% of responding institutions either used portable sharps containers or placed sharp object containers in every hospital room, and 47.8% of responding institutions required the use of gloves during injection and/or blood collection procedures²⁾. According to another report, 35% of persons infected with the hepatitis C virus in Japan contracted the causative organism through association with health-care works, in some cases via needle-stick injuries³⁾. These reports demonstrate that health-care workers, especially nurses and doctors, face a high risk of occupational blood-borne infection in Japan.

Dengue virus infection is an important mosquito-borne infectious disease, especially in tropical and subtropical areas. While the rate of dengue virus infection by needle-stick injury is currently unknown, reports of health-care workers infected via needle stick injury are rare around the world⁴⁾. Our patient, a Japanese nurse infected with dengue virus by needle-stick injury at a hospital in Japan, was cited in an earlier manuscript describing the usefulness of the direct reverse transcription polymerase chain reaction (RT-PCR) procedure for rapid diagnosis of dengue virus infection⁵⁾. By once more describing this patient, I hope to alert health-care workers to the fact that dengue virus is among the causative agents responsible for occupational infectious diseases even in Japan.

Case Report

A Japanese female in her thirties, a nurse at our hospital in Tokyo, was admitted to our hospital in the middle of January 1992 three days after the onset of fever, headache, and general malaise. Five days before the onset of her symptoms, she had pricked

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her finger with a disposable syringe with needle, an instrument lacking any safeguard mechanism, after drawing blood from a Japanese febrile male patient with a dengue virus infection contracted in the Philippines (the source patient). The source patient had a body temperature of 39.4°C at the time of the accident.

On admission, she had a body temperature of 37.7°C, blood pressure of 112/68 mmHg, pulse rate of 84/min, alert consciousness, and the following findings on blood examination: white blood cells 2,500/mm³, red blood cells 415 × 10⁴/mm³, hemoglobin 13.0 g/dl, hematocrit 37.7%, platelets 14.7 × 10⁴/mm³, aspartate aminotransferase 23 U/l, alanine aminotransferase 10 U/l, alkaline phosphatase 84 U/l, and C-reactive protein 3.4 mg/dl. She had never been overseas. She was diagnosed with dengue virus infection (dengue without warning signs) based on the following findings: detection of the dengue virus serotype 1 genome in serum by RT-PCR examination on day 3 of illness, isolation of dengue virus serotype 1 from serum on day 3 of illness, and serum IgM antibody titers against dengue virus of <100 and 12,800 on day 3 and day 18 of illness, respectively. Her condition improved after admission, and she was discharged on day 6 of illness.

Discussion

Several details of the case convinced us that the patient was infected with dengue virus through the needle-stick injury she incurred during routine work at our hospital. First, the 5-day period that elapsed between the needle-stick accident and onset of symptoms was compatible with the incubation period for dengue virus infection. Second, she had never been overseas, and patients with dengue virus infection were not endemic in Japan at that time. Third, we generally do not encounter adult mosquitos that transmit dengue virus in winter in Tokyo.

When my patient suffered her needle puncture, the body temperature of the source patient was high. Dengue virus can be assumed to be present in blood during the febrile phase, as dengue virus RNA can be detected during the febrile phase of infection⁶. We thus conclude that infection with dengue virus can be transmitted via needle-stick injury during the febrile phase in patients with dengue virus infection.

The consensus among most Japanese physicians was that Japan remained free from domestically transmitted dengue virus infection from the late of 1940s up to the summer of 2014. Then, in the summer and autumn of 2014, about 160 patients were infected with dengue virus via mosquito bites in Japan⁷. Although

we have yet to see whether dengue virus will be endemic in Japan after 2014, the number of imported cases is increasing throughout the country⁸). Japanese health-care workers should be aware of dengue virus infection.

In conclusion, Japanese health-care workers should recognize the risk of dengue virus infection through needle sticks even in Japan, especially when the source patients are in the febrile phase.

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