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Case Report

Varicella pneumonia in an immunocompetent, unvaccinated man: A case report

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ABSTRACT

Varicella is a common vaccine-preventable disease that typically affects children aged 2–8 years and usually has a benign outcome. However, varicella infection in adults may cause serious complications, including varicella pneumonia. We report a case of varicella pneumonia in an immunocompetent, unvaccinated man in Japan.

A 50-year-old Egyptian man who had been living in Japan for 20 years was brought to the hospital with a 3-day history of fever and a 2-day history of rash and dyspnea. Chest computed tomography revealed an 8-mm-long nodule with a halo in the right S3 segment and mild ground-glass opacities in both lungs. A final diagnosis was made based on identification of varicella-zoster virus via positive immunochromatographic test and polymerase chain reaction from a blister fluid. The patient's pneumonia had improved with acyclovir for 10 days.

In Japan routine varicella vaccination in childhood (at ages 12 and 18 months) was introduced in 2014. However, in Egypt, where the patient spent his childhood, varicella vaccine is still not designated as a routine vaccination. The introduction of universal varicella vaccination in more countries and an increase in vaccination coverage are essential to reduce the number of cases of varicella infection, including varicella pneumonia.

Introduction

Varicella-zoster virus (VZV) is one of eight herpes viruses known to cause human infection and is distributed worldwide (Arvin, 1996). Varicella (chickenpox) is defined as the primary VZV infection. Varicella is a common vaccine-preventable disease (VPD) of childhood that typically affects children aged 2–8 years and usually has a benign outcome (Arvin 1996). However, varicella infection in adults may cause serious complications, including varicella pneumonia (Mirouse et al., 2017; Mohsen and McKendrick, 2003). Herein, we report a case of varicella pneumonia in an immunocompetent, unvaccinated man during the SARS-CoV-2 pandemic in Japan.

Case Report

A 50-year-old Egyptian man who had been living in Japan for 20 years was brought to the emergency department with a 3-day history of fever and a 2-day history of rash and dyspnea. He was on amlodipine, telmisartan, and vonoprazan treatment for hypertension. Although he had a history of measles and mumps in childhood, he had no history of varicella or vaccination against varicella. His ten-year-old son had been diagnosed with varicella two weeks before his symptoms started. He had a body temperature of 38.2°C, blood pressure of 150/90 mmHg, heart rate of 102 beats/min, and respiratory rate of 24 breaths/min with 91% oxygen saturation breathing room air. Physical examination revealed multiple erythematous vesicles on the head, trunk, and extremities (Figure 1. a). Laboratory tests showed elevated levels of C-reactive protein (5.17 mg/dL) and transaminases (aspartate aminotransferase, 99 U/L; alanine aminotransferase, 149 U/L), and acute renal impairment (serum creatinine level, 1.55 mg/dL). The serologic antigen/antibody test for human immunodeficiency virus was negative. Chest computed tomography (CT) revealed an 8-mm-long nodule with a halo in the right S3 segment (Figure 1. b) and mild ground-glass opacities and reticular shadows in both lungs. An immunochromatographic test (DermaQuick VZV, Maruho Co., Ltd., Japan) of a blister fluid sample for VZV antigen was positive. The patient was diagnosed with primary varicella with varicella pneumonia. After admission, intravenous acyclovir was initiated, with airborne and contact infection prevention and control (IPC) measures using a private room. His fever persisted for several days, despite the administration of acyclovir. It resolved on hospital day (HD) 8, and acyclovir was discontinued on HD 10. The vesicles gradually changed to pustules and then crusted. As the vesicles were completely

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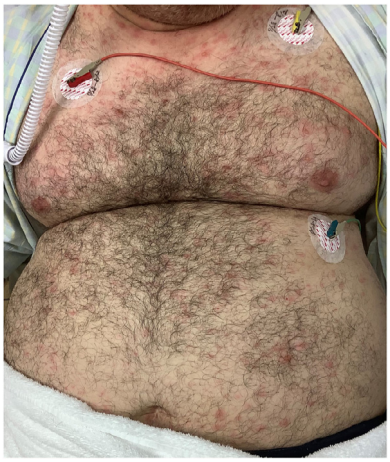

Figure 1. a. Multiple vesicles with erythema on the trunk on the day of admission.
b. Chest computed tomography showed a small nodule with a halo in the anterior segment of the right upper lobe (S3) and a smaller nodule can be seen in the subpleural area (arrow).
c. The patient's serial varicella antibody titer results measured by enzyme immunoassay (no units).

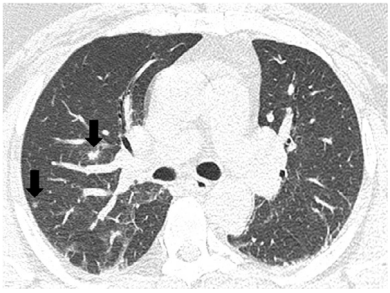

Figure 1. Continued

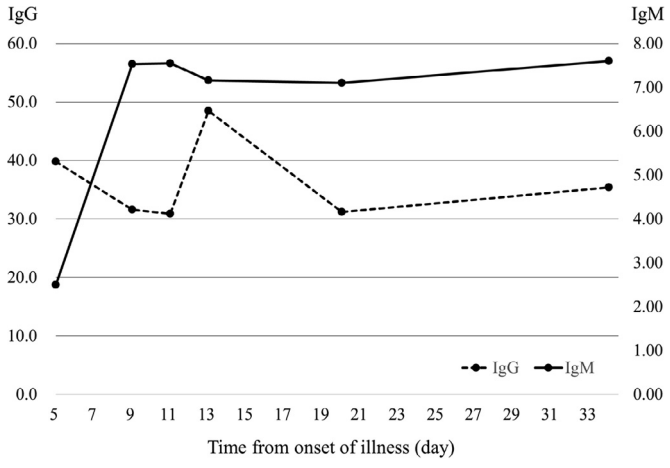

Figure 1. Continued

crusted on HD 10, airborne and contact IPC measures were discontinued. On HD 14, the patient's pneumonia had markedly improved, and he was discharged. VZV-DNA (6.5×10^7 copies/mL) was detected in a swab of vesicular fluid collected on HD 2 by real-time PCR (Inoue et al., 2012). Sequencing of the thymidine kinase gene and DNA polymerase gene of the detected VZV revealed no mutations related to acyclovir resistance. Serum VZV IgM measured by enzyme immunoassay (EIA) was 2.50, 5 days after onset (HD 2) and increased to 7.60 after 4 weeks, while VZV IgG remained at around 40 (Figure 1. c).

Discussion

Varicella pneumonia is a serious complication of varicella infection, more commonly seen in adults than in children, with an estimated mortality of approximately 10% (Mohsen and McKendrick, 2003). Both immunocompromised and immunocompetent individuals can develop varicella pneumonia (Mirouse et al., 2017). Typical lung CT findings include multiple nodules with a halo sign, bilateral consolidation, and ground-glass opacities, as in our case (Mirouse et al., 2017).

Varicella is a classical VPD. The estimated vaccine efficacy of two doses of single-antigen varicella vaccine is 98.3% (Kuter et al., 2004). The United States Advisory Committee on Immunization Practices recommends the implementation of a routine two-dose varicella vaccination program in children (Marin et al., 2007). Because the varicella vaccine was designated as a routine vaccination (at ages 12 and 18 months) in 2014 in Japan (Morino et al., 2018), Japanese people born before 2014 may remain susceptible to VZV if they have not had varicella. In fact, varicella case number per sentinel decreased by 88% in young children in 2017 compared to 2000. However, in Egypt, where the patient spent his childhood, varicella vaccine is still not designated as a routine vaccination (World Health Organization 2020) and the epidemiology of varicella in Egypt has not been published as far as we could find. With recent globalization, several cases of varicella have been reported in adults in Japan among long-term residents from other countries (Takaya et al., 2020). It is important to list varicella as a differential diagnosis, taking into account the overall vaccination coverage and prevalence in the community and age group.

We diagnosed the patient with primary varicella infection, rather than breakthrough infection, because he had no history of varicella infection or immunization. His VZV IgM level peaked 9 days after onset, while his IgG level was already high 5 days after onset. In a previous report using the fluorescent antibody to membrane antigen method (Baba et al., 1984), serum VZV IgM and IgG were detected by the second to fifth day after rash onset, and peaked 3 to 10 days and 9 to 10 days after the onset, respectively.

In conclusion, this was a case of varicella pneumonia in an immunocompetent man with no history of vaccination. The introduction of universal varicella vaccination in more countries and an increase in vaccination coverage are essential to reduce the number of cases of varicella infection, including varicella pneumonia.

Conflict of Interest

None.

Funding source

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Ethical approval

The patient provided written informed consent for the publication of his case details and images.

Authors contributions

NOkumura and MI designed the research, obtained clinical samples, contributed to data collection and verification, and wrote the manuscript. NOhmagari received research grants from NCGM, and reviewed the study design and manuscript. SF, and SY conducted the varicella virus detection assays, analyzed the data, and wrote the manuscript. WO, NI, KY, and MU reviewed the study design and the

manuscript. All the members contributed to the management or administration of the trial. All authors meet the ICMJE authorship criteria.

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