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Case Report

Disseminated vaccine-strain varicella as initial presentation of the acquired immunodeficiency syndrome: A case report and review of the literature

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ABSTRACT

Varicella-zoster virus (VZV) infections have declined in many industrialized countries due to vaccination with the attenuated Oka strain virus. Rare cases of severe, disseminated vaccine-strain VZV infection have occurred in the immunocompromised, although rarely in HIV-infected persons. We describe a man with previously-undiagnosed human immunodeficiency virus (HIV) infection who received VZV vaccination and subsequently presented to a combat hospital in Afghanistan with disseminated varicella, respiratory failure, and sepsis. The patient recovered with ventilator and hemodynamic support, intravenous acyclovir, and empiric antibiotic therapy. DNA sequencing detected Oka strain virus from patient blood specimens. Although safe in most populations, the VZV vaccine may cause life-threatening disease in immunocompromised patients. Improved detection of HIV infection may be useful in preventing such cases.

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1. Why is this case important?

The incidence of varicella-zoster virus (VZV) infection has declined in many industrialized countries due to the use of effective attenuated live-virus vaccines. Severe disease may occur in patients with immune defects, including co-infections caused by human immunodeficiency virus (HIV). Vaccination has been successful in reducing the burden of VZV-associated illness, but rare adverse events may occur. We present a case of disseminated vaccine-strain varicella in a patient with previously undiagnosed HIV infection, a previously unreported event in an adult patient.

2. Case report

A 23-year-old South Asian man presented with a rash and fever to a clinic at a military base in southern Afghanistan. He had been in good health until three days prior to presentation. The rash began as vesicular lesions on his trunk and spread over the next two days to involve his face and extremities. He was diagnosed clinically with varicella, prescribed symptomatic therapy with oral antipyretics and analgesics, and released with quarantine instructions to limit his contact with other employees.

The patient had recently been hired by a contract agency as a truck driver and had been in Afghanistan for six months. HIV testing seven months prior had been negative. He denied any prior history of varicella and was vaccinated against VZV after arriving in Afghanistan. He received the first dose of VZV vaccine (VariVax, Merck, Whitehouse Station, NJ, USA) one month before the onset of his symptoms and the second dose two days before his initial presentation.

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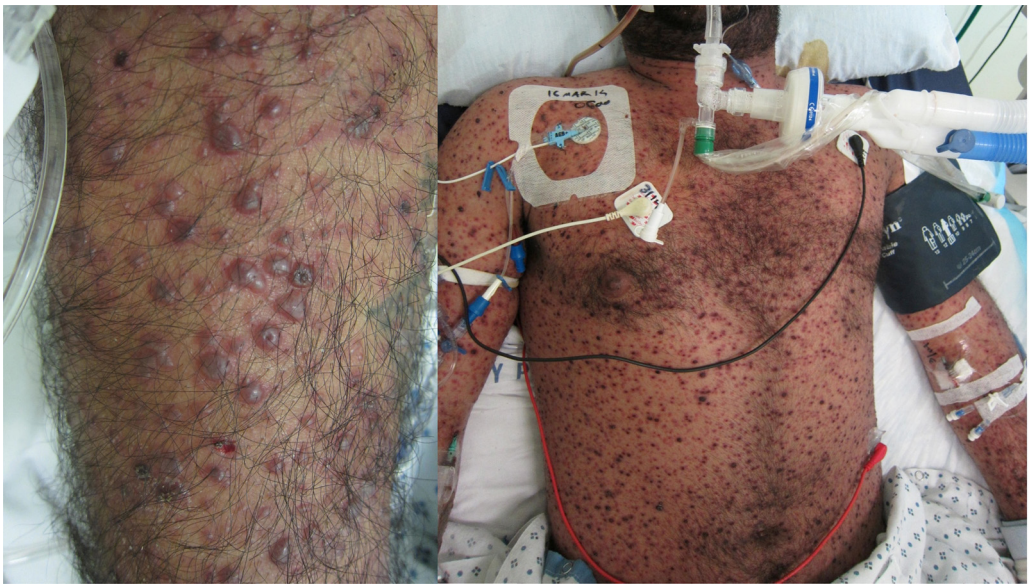

Fig. 1. Diffuse vesicular lesions due to varicella present on the patient's extremities (including the forearm, left), trunk, and face (not shown).

Four days later, the patient was brought to a United States military aid station at the same location with worsening symptoms. Vital signs demonstrated an oxygen saturation of 92% on room air and an oral temperature of 102.9 F. The vesicular rash covered his entire body and consisted of maculopapular lesions, clear vesicles, pustules with central umbilication, and scabs in various stages of healing (Fig. 1).

He became progressively more dyspneic during evaluation, with the onset of hemoptysis. Oxygen saturation decreased to 84%. Fifteen liters per minute of supplemental oxygen were administered by facemask along with 2 g of intramuscular ceftriaxone and 800 mg of oral acyclovir (as intravenous acyclovir was not available at this location). He was then evacuated by helicopter to the NATO Role 3 Multinational Medical Unit at Kandahar Airfield (KAF), the military referral hospital for the region.

Upon arrival to KAF, he was tachypneic with a respiratory rate of 40 and a room air oxygen saturation of 80%. Blood pressure was 90/50 with a heart rate of 115, which remained abnormal after crystalloid resuscitation. Chest radiography revealed diffuse nodular bilateral airspace opacities (Fig. 2). Laboratory studies showed a leukocyte count of 7700 cells/μL with lymphopenia (14%, 1100 cells/μL), thrombocytopenia with 24,000 platelets/μL, a prolonged prothrombin time with an international normalized ratio (INR) of 1.3, serum sodium concentration of 127 mmol/L, alanine aminotransferase of 277 U/L, and aspartate aminotransferase of 226 U/L. A whole-blood rapid test for HIV infection (OraQuick ADVANCE, OraSure Technologies, Bethlehem, PA, USA) was positive and subsequently verified by reference laboratory confirmation. Additional whole blood and serum specimens were obtained and shipped frozen to the Applied Technology Center of the U.S. Air Force School of Aerospace Medicine (Wright-Patterson Air Force Base, OH, USA) for HIV and VZV strain characterization.

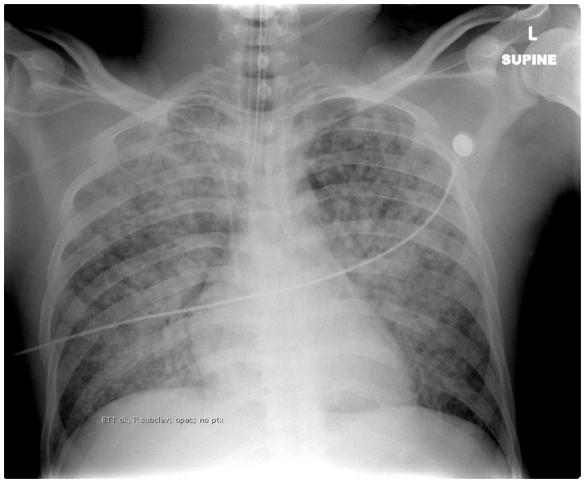

Fig. 2. Post-intubation anteroposterior radiograph, showing diffuse, bilateral nodular airspace opacities.

Endotracheal intubation and mechanical ventilation were instituted due to impending respiratory failure. Norepinephrine was started for hemodynamic support. Blood and sputum cultures were obtained, and the patient was placed on airborne droplet precautions in the intensive care unit. Intravenous acyclovir 10 mg/kg every 8 h was administered in combination with vancomycin, ceftriaxone, and azithromycin, as well as empiric trimethoprim-sulfamethoxazole and prednisone for coverage of *Pneumocystis jirovecii* pneumonia (PJP).

Over the following 48 h, the patient remained on mechanical ventilation with severe hypoxemia. Bronchoscopy revealed bloody secretions but no visible lesions within the airways. Blood and alveolar lavage bacterial cultures remained negative; viral culture was not available. Vancomycin and azithromycin were discontinued on the third hospital day, at which time he was afebrile and weaned from vasopressor support. He was extubated on the sixth hospital day.

At the U.S. Air Force Applied Technology Center, the patient's blood sample underwent total nucleic acid extraction using the IT Q-Flow 1-2-3 DNA Kit (BioFire Dx, Salt Lake City, UT, United States) per the manufacturer's protocol. The extracted nucleic acid underwent polymerase chain reaction (PCR) testing to amplify selected regions of both HIV-1 and VZV genomes (Table 1). Three of the assays used were designed in-house; the assay designated "VZV_lit4" is modified from an assay described previously [1].

PCR was performed using the QIAGEN One-step RT-PCR Kit (Qiagen, Valencia, California, United States) on a Biometra T-Professional Gradient Thermocycler (Biometra, Goettingen, Germany). Four PCR products (three VZV and one HIV) were obtained. Products were pooled and sequenced on the Roche 454 GS Junior next generation sequencer and accompanying software