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Multidermatomal herpes zoster in an immunocompetent, fully vaccinated 17-year-old female: a case report

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Abstract

Background Herpes zoster, commonly known as shingles, results from the reactivation of varicella zoster virus, typically occurring in older adults. The advent of varicella vaccination has caused a decline in primary varicella infection cases; however, herpes zoster still occurs, albeit rarely, in fully vaccinated children.

Case presentation This report presents a case of herpes zoster in a fully vaccinated 17-year-old white American female, highlighting the importance of considering herpes zoster in immunocompetent, vaccinated children. The patient presented with a rash along multiple dermatomes, which spread despite antiviral treatment. After completion of the antiviral treatment, the rash eventually receded, and she was left with no residual symptoms.

Conclusion This case underscores the need for clinicians to recognize and manage uncommon diseases such as herpes zoster in the pediatric population, regardless of vaccination status, to prevent adverse outcomes. Although this patient did not have any residual symptoms, mortality, or morbidity, there could be a high probability for complications if there becomes optical or meningeal involvement.

Keywords Herpes Zoster, Varicella, Vaccination, Shingles, Chicken pox

Background

Herpes zoster (HZ), more commonly known as shingles, results from reactivation of varicella zoster virus (VZV) that remains latent within sensory ganglia after primary infection of VZV [1]. It results in a painful, vesicular rash in a dermatomal fashion. There has been a significant decline in the number of cases of primary varicella infection with the adoption of the varicella vaccine. As of 2006, the effectiveness of a single-dose vaccine to prevent disease was 85%, while the currently recommended two-dose regimen was 98% effective [2]. HZ primarily occurs in older adults who have had a primary infection of VZV, but it occurs very rarely in children [3]. It is even more rare in children who are fully immunized and immunocompetent. Vaccinated children can have reactivation of either vaccine-type VZV or wild-type VZV. Wild-type VZV can infect immunized children without producing clinical disease, remaining latent in dorsal sensory ganglia [3, 4]. Data on the risk of vaccine-strain VZV reactivation are limited, especially in the incidence of HZ after the implementation of the two-dose vaccine in 2006.

While the varicella vaccine is highly effective in preventing HZ and blunting its infectious course, there are still cases of HZ in those who have been fully vaccinated in accordance with the Center for Disease Control (CDC) guidelines. Children that were fully vaccinated and presented with HZ were more likely to be under the age of 10, have lower pain associated with infection and the rash was most likely to appear in the lumbosacral region

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[6]. Regardless of vaccination status, wild-type virus was more likely to be isolated than the vaccine strain in cases of HZ [7–13].

In this report, we present a case of HZ along multiple dermatomes in a fully vaccinated child. This case demonstrates the small minority of HZ cases that occur in immunocompetent, fully vaccinated children. While it has become increasingly uncommon with the high rates of vaccination, this case shows the importance of considering HZ as part of the differential diagnosis even in immunocompetent, fully vaccinated children.

Case

A previously healthy, 17-year-old white American female individual with a noncontributable past medical history brought to an outpatient pediatric clinic by her mother in January with an erythematous rash on the anterior aspect of her neck with overlying vesicles. The rash had been present for 2 days, and she described it as cramping, tingling, and itchy but denied headaches, nausea, vomiting, fevers, myalgias or arthralgias. She has no known sick contacts and no other lesions or rashes. She denied addition of new foods, supplements, skin care products, or detergents. She did not take any prescriptions or supplements and had no known allergies. She completed all her vaccination series as recommended by the CDC schedule. She did not have a reaction after either of her varicella vaccinations. Family history is notable for a brother with keratosis pilaris, a mother with plaque psoriasis, and a cousin that had a case of varicella shortly after his initial varicella vaccination. Physical examination showed vesicular lesions overlying an erythematous base on the anterior neck with various vesicular macules of various diameters in the C2 and V3 dermatomal distributions. Bilateral tympanic membranes and external ear canals were without lesions. No ocular involvement was detected; extraocular eye motion was intact, and pupils were equal and reactive to light. At that time, she was prescribed 1 g oral valacyclovir to be taken every 8 hours for seven days and topical 5% acyclovir with bacitracin 500 U/g to be applied every 12 hours for seven days for the diagnosis of probable VZV on the basis of the appearance of the lesions.

Laboratory tests were drawn and ordered at the time of her initial visit to confirm this diagnosis, including a C-reactive protein (CRP), complete blood count (CBC), erythrocyte sedimentation rate (ESR), cytomegalovirus (CMV) immunoglobulin (Ig)G antibodies, VZV IgM and IgG antibodies and viral load, herpes simplex virus (HSV) 1 and 2 viral load, monkeypox viral load, and Epstein–Barr virus (EBV) profile. The only abnormalities were a VZV IgG level of 1304 (reference range: positive > 165) and a VZV viral load of 3.8 billion copies/mL, representative of a high viral load. VZV IgM antibodies were negative, as were the other viral load levels. Her CBC, CRP, and ESR were within normal limits.

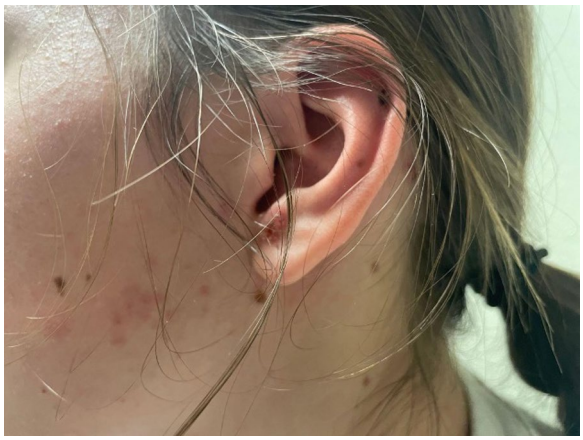

Fig. 1 Rash on external ear, day 4 after initial presentation

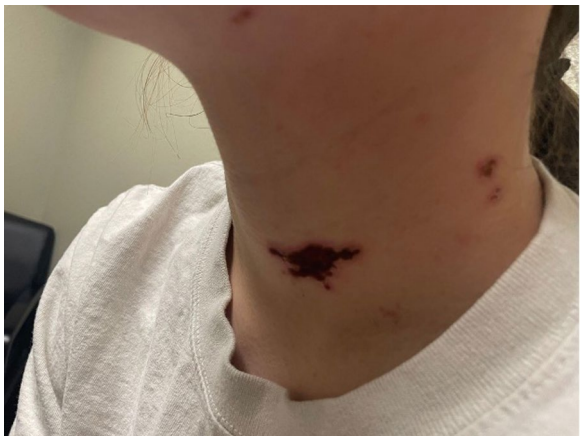

Fig. 2 Rash on anterior neck, day 4 after initial presentation

A total of 1 day after being seen in clinic, she presented to the emergency department owing to development of a fever, nausea and vomiting overnight. There, she had a temperature of 103.1 °F, blood pressure of 128/74, pulse of 87, respiratory rate of 17, and oxygen saturation of 97% on room air. They noted a vesicular rash and erythema extending from under the left ear to the left face and neck, with a notable spread from the C2 and V3 dermatome to the V2 dermatome. There was no rash on the tip of the nose or in the ear canal but there was a small vesicle near the left eye. She was discharged home with acetaminophen 1000 mg and hydrocodone/acetaminophen 5 mg/325 mg as needed for the pain. No labs or imaging were performed.

A total of 2 days after the initial clinic visit, the patient reported new-onset lethargy. The rash was still within the V2, V3, and C2 dermatomes (Figs. 1, 2, 3). Pediatric

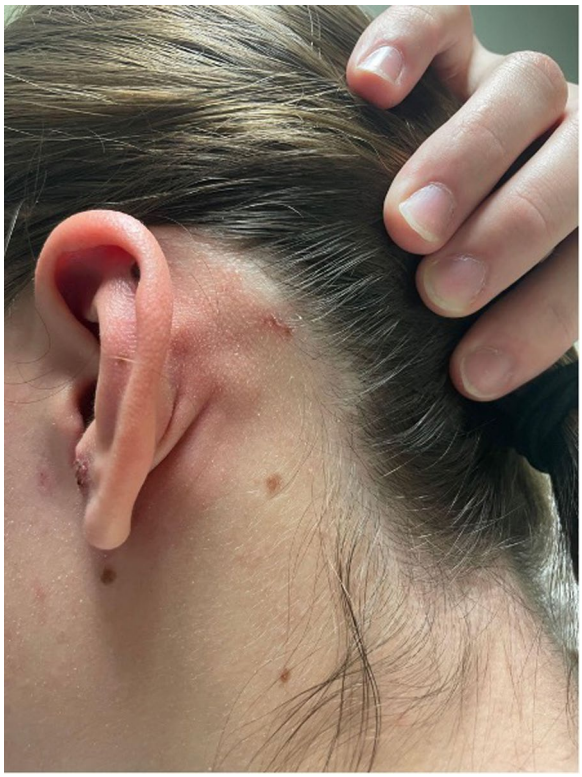

Fig. 3 Rash on posterior ear, day 4 after initial presentation

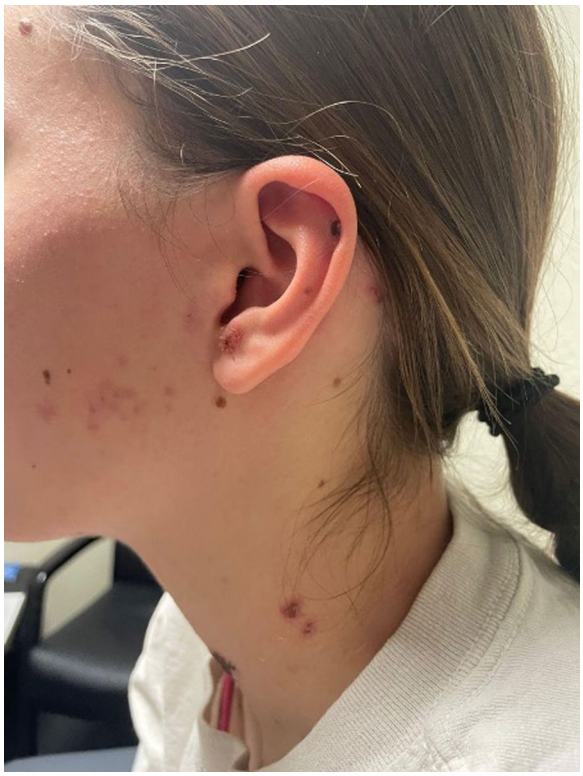

Fig. 4 Rash on external ear and lateral neck, 7 days after initial presentation

infectious disease was consulted at this time. They suggested the addition of swabbing for group A strep owing to the possibility of underlying bacterial skin infection, as well as HIV blood test, both of which were negative.

A total of 1 week after the onset of the rash, she was seen in the clinic. At this time, she had been taking the oral valacyclovir and using the topical acyclovir for 5 days. Her vitals were within normal limits; she no longer had a fever, nausea, vomiting, headache, or lethargy. On physical exam, the vesicles were present in the V2, V3, and C2 dermatome and had begun to scab over; they were no longer burning or cramping but remained itchy (Fig. 4). There were no new lesions or rashes and she did not demonstrate any vision changes, hearing loss, or focal neurological deficits. Labs were redrawn at this time; CBC and HIV remained within normal limits. Varicella viral load was undetectable at this time. On follow up, the patient reported complete recovery of the vesicular rash within 2 weeks of beginning antiviral treatment. She has no residual scarring or symptoms.

Discussion

The rashes in the case we observed appeared unilaterally in the trigeminal nerve area and one cervical dermatome, which were unrelated to the vaccination site. There are three cases that report on HZ involvement of the trigeminal nerve in children without a primary varicella infection, all of which isolated vaccine-strain VZV [14]. Early reports postulate that HZ rashes caused by vaccine-strain VZV are more likely to occur in the area where the varicella vaccine was administered and not along a dermatomal pattern [15, 16]. However, with the emergence of other reports, it appears that HZ caused by vaccine-strain VZV can occur owing to latency in any dorsal root ganglia in the body [5].

The treatment for HZ typically is with acyclovir, valacyclovir, or famciclovir, preferably within 72 hours of presentation of the rash. While they are all generally well tolerated and efficient in treatment of HZ, they each have their advantages and disadvantages. Acyclovir has poor oral availability, but intravenously administered acyclovir is generally utilized when patients are immunocompromised or in severe cases of disease. Valacyclovir has better oral bioavailability than acyclovir and can decrease the severity and duration of pain associated with postherpetic neuralgia. Advantages of famciclovir are its longer intracellular half-life compared with acyclovir and better bioavailability when compared with acyclovir and valacyclovir [12]. This patient was treated appropriately when given oral valacyclovir and topical acyclovir. She did not necessitate intravenous antiviral therapy because

of her immunocompetent status and nondisseminated disease. However, in the emergency department, an ocular evaluation was indicated given the close proximity of vesicles to her left eye to assess for ophthalmic involvement. Additional management at this time should have included thorough examination to rule out meningeal involvement, given her rapid onset of fever, nausea, vomiting, and lethargy. Given the rapid progression of viral meningitis, especially in the age group of the presented patient, a meningitis work up would have been appropriate, regardless of the treatment in progress for HZ. Aseptic meningitis associated with VZV infection is rare in immunocompetent patients of any age, and clinically, it is practically identical to other types of viral meningitides [13].

This case highlights an immunocompetent patient with no known underlying conditions, comorbidities, or illnesses. However, the presence of concomitant infection or a comorbid medical condition could worsen this clinical picture. Incidence of HZ in children increased with age and immunocompromised status. Those who are immunocompromised have a higher rate of herpes zoster ophthalmicus, which can lead to blindness if not identified and treated early. The serious ramifications in these patients again highlight the need to have a high clinical suspicion for an uncharacteristic presentation of HZ [18].

Conclusion

Cases of herpes zoster in the fully immunized pediatric population are not widely reported in the literature. We add to the literature with this case report which highlights the importance of applying clinical knowledge of uncharacteristic diseases in the pediatric population. Diseases that are often not attributed to pediatric patients as a result of widespread vaccination campaigns may have significant morbidity and mortality if not recognized and treated accordingly. Without overt clinical knowledge of their presentation, these diseases may be dismissed in favor of more characteristic pediatric pathologies. In recognizing and treating these diseases appropriately, the burden of disease for pediatric patients and pediatric providers is markedly reduced. Although international vaccine programs have markedly reduced the global burden of vaccine-preventable disease, it is important to recognize occurrences of these diseases in the pediatric population. In this case, the disease presented with an otherwise reassuring vaccination history. This may evidence the need to assess antibody titers in pediatric patients more routinely when a vaccine-preventable infectious disease is suspected. When faced with similar pediatric patients, it is important to make this consideration. HZ is a disease not widely reported among the pediatric population, but one which must be managed thoroughly to avoid worsening outcomes.

Abbreviations

HZ	Herpes zoster
VZV	Varicella zoster virus
CRP	C-reactive protein
CBC	Complete blood count
ESR	Erythrocyte sedimentation rate
CMV	Cytomegalovirus
HSV	Herpes simplex virus
EBV	Epstein–Barr virus
CDC	Center for Disease Control

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Author contributions

SW and SM contributed to obtaining patient information, images, and consent. KT, SW, and SM contributed to writing each section. All authors read and approved the final manuscript.

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Availability of data and materials

Not applicable.

Declarations

Ethics approval and consent to participate

Ethics approval and consent to participate were waived given that this was a case report.

Consent for publication

Written informed consent was obtained from the patient's legal guardian for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The authors declare that they have no competing interests.

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