

BRIEF ARTICLE

Herpes Zoster in a 2-Year-Old Child After a Single Dose of Varicella Vaccine

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ABSTRACT

In this report, we describe a rare case of an immunocompetent 2-year-old child who developed herpes zoster (HZ) in the same dermatomal distribution as the vaccination site received several months prior. Although most cases of HZ caused by the vaccine-strain virus follow a mild disease course, affected patients are contagious to household members and may nevertheless develop severe complications such as herpes ophthalmicus and meningoencephalitis. Consideration of this entity and associated complications is critical for dermatologists when evaluating similar appearing eruptions.

INTRODUCTION

The varicella-zoster virus (VZV) is known to cause two forms of infection: primary varicella, characterized by widespread crops of pruritic vesicles and pustules in different stages of development on the trunk and extremities and herpes zoster (HZ), characterized by a unilateral dermatomal vesicular eruption after reactivation of latent virus in dorsal root ganglia with subsequent dermal spread via peripheral nerve pathways.^{1, 2} While the majority of cases are mild and self-limiting, severe complications such as secondary bacterial skin infections, meningoencephalitis, and pneumonia may occur in infants, adults, and immunocompromised persons.^{1, 2}

Nationwide adoption of childhood vaccination against the varicella-zoster virus (VZV), which began as a single dose program with live attenuated virus in 1995, has dramatically reduced disease burden and contributed to a 93% decreased varicella associated mortality between 1994-

2006.¹ Although rare, at 15-93 per 100,000 person-years, the incidence of breakthrough varicella (defined as infection with wild-type varicella >42 days after vaccination) and post-vaccination HZ in children led to the implementation of a two-dose series in 2006.³ Further evaluation revealed that only 50% of breakthrough varicella or post-vaccination HZ are attributable to wild-type VZV, with the Oka vaccine-strain virus identified in the remaining cases.⁴ Furthermore only 1% of pediatric HZ cases were identified in immunocompetent children.⁵

We report an unusual case of an immunocompetent 2-year-old child who developed herpes zoster in the same dermatomal distribution as the vaccination site received eight months prior.

CASE PRESENTATION

A 32-month-old immunocompetent girl presented with a three-day history of pruritic eruption involving the trunk. The eruption

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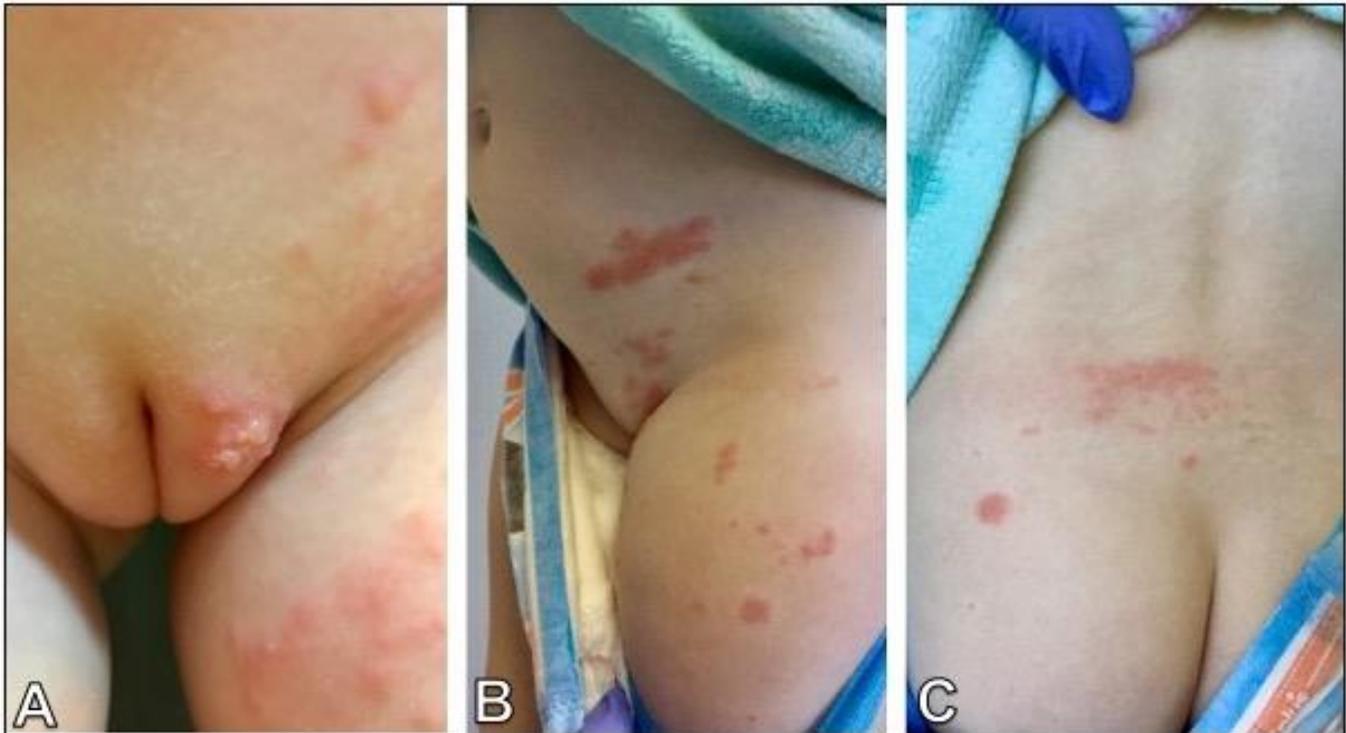


Figure 1. Multiple vesicles on an erythematous base as well as erythematous papules coalescing into plaques along a dermatomal distribution on the (A) left labia majora (B) left lower abdomen and left anterior proximal thigh, and (C) left upper buttock and lower back.

first appeared on the left lower abdomen and left hip and subsequently spread to involve the left labia, thigh, and lower back. The patient's mother denied the presence of any systemic symptoms such as fever, cough, rhinorrhea, or diarrhea. Her first dose of varicella vaccine was administered to the left thigh at 14-months of age. There was no known exposure to chicken pox. Another child in the patient's daycare recently tested positive for SARS-CoV-2, however all household members including the patient tested negative twice for the virus.

Physical examination revealed multiple vesicles on an erythematous base as well as erythematous papules coalescing into plaques along a dermatomal distribution on the left lower abdomen, left labia majora, left anterior proximal thigh, left upper buttock, and left lower back. Differential diagnosis included herpes zoster, rhus dermatitis, skin

manifestations of SARS-CoV2 infection, impetigo, and Gianotti Crosti syndrome. Polymerase chain reaction (PCR) of fluid obtained from a de-roofed vesicle on the left buttock returned positive for varicella zoster virus. The patient was initiated on acyclovir 200 mg/5 mL oral suspension, 2.5mL three times daily for seven days. She was also started on topical fluticasone propionate 0.05% cream twice daily.

DISCUSSION

In this report, we describe the rare occurrence of immunocompetent childhood herpes zoster following a single dose of varicella vaccine occurring in the same dermatomal pattern as the vaccine injection site. The characteristics of this case are largely congruent with recent literature. The largest study to date of childhood post-

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vaccination HZ since implementation of the two-dose series by Weinmann et al (2013) revealed 83 cases, 50% of whom tested positive for the Oka vaccine strain at a median age of 2 years.⁶ The time to onset of eruption following vaccination ranged from 3 months to 11 years.⁶ New lesions stopped appearing within one week in 79% of cases with complete scabbing taking greater than one week in 71% of cases.⁶ All patients who tested positive for the vaccine strain were immunocompetent.⁶ Furthermore, up to 92% of HZ in 1-2-year-old patients were caused by the Oka vaccine-strain.^{2, 6}

Similar to the established pathophysiology of HZ in adult patients, the proposed mechanism of HZ in children is related to the reactivation of the live attenuated virus from dorsal root ganglia followed by viral axonal transport along peripheral nerve pathways to the skin.² The resultant cutaneous eruption of vaccine-strain HZ greatly favors lumbar or cervical dermatomes and corresponds with the most common injection sites of the thigh or upper arm, as in this case.^{5, 6} This contrasts to wild-type HZ eruptions, which most commonly present along thoracic dermatomes.^{5, 6} Although the course of post-vaccination HZ is generally considered milder than unvaccinated cases, the occurrence of severe complications including meningoencephalitis and HZ ophthalmicus are well documented.^{2, 4} These complications may precede or occur simultaneously to the rash and suggest a possible post-vaccination viremia or spread of the virus along posterior nerve roots to infect the meninges and brain.^{2, 4} Possibly attributable to the lack of reported cases, it remains uncertain whether such severe complications may occur following rash abatement.

As with other strains of VZV, children with vaccine-strain HZ are considered contagious

from the time of skin eruption until all lesions crust over. Transmission of the Oka strain from immunocompetent children with HZ to other adults or children is rare, but may occur within households.¹ This is consistent with other findings that one-dose vaccinated individuals are roughly half as contagious when compared to unvaccinated HZ cases.¹ In general, prognosis is excellent and patients may be treated with acyclovir to prevent scarring or when disease is extensive.⁵ Given the vast majority of reported childhood VZV cases have presented in those deemed immunocompetent, the occurrence of childhood post-vaccination HZ is generally not considered an indication for workup of underlying immunodeficiency.⁷

Although our patient did not undergo viral genotyping, positivity for the Oka vaccine-strain is highly likely given the lack of known VZV exposure, unique lumbar distribution in the same dermatome as vaccine injection, and known predominance of the vaccine-strain in 1-2-year old patients with HZ.^{2, 6} This diagnosis was further supported by twice negative SARS-CoV2 testing, which may also present with a papulovesicular varicella-like exanthem, and lack of contact with irritant or allergic substances.⁸ Despite the generally favorable prognosis, increased awareness among pediatricians and dermatologists for post-vaccination HZ is warranted to differentiate from mimickers such as SARS-CoV2 infection and initiate appropriate treatment and precautions. Longitudinal follow-up of these patients is warranted to assess the incidence of HZ as adults and development of post-vaccination infection after receiving other live-attenuated viruses.

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