



Multidermatomal herpes zoster triggered by psychological stress in an immunocompetent young adult: a rare case report and clinical insights

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Introduction and Importance: Herpes zoster (HZ), a reactivated varicella zoster virus infection arising from dormant viral latency after initial chickenpox, manifests as localized skin rashes along dermatomes. Multidermatomal involvement, especially in immunocompetent individuals, is rare. The potential link between psychological stress and HZ reactivation remains underexplored. The authors present a case of multidermatomal HZ triggered by psychological stress in a young immunocompetent adult.

Case presentation: A 26-year-old male presented with vesicular lesions spanning C5, C8, T1, and T2 dermatomes, triggered by psychological stress. The disease exhibited a unique midline-crossing presentation. The Varicella zoster virus IgM test result was positive. Treatment included acyclovir, pain management, and stress reduction strategies, yielding complete resolution within 3 weeks.

Clinical discussions: The case highlights a distinctive multidermatomal HZ presentation, defying conventional dermatomal restrictions. Psychological stress potentially influenced viral reactivation. Immunocompetence and stress interplay merit further exploration. Multidermatomal HZ necessitates prompt clinical recognition and comprehensive evaluation. Antiviral therapy and integrated stress management may contribute to successful outcomes.

Conclusion: This case underscores the rare occurrence of multidermatomal HZ in an immunocompetent young adult triggered by psychological stress. The atypical presentation and potential role of stress in viral reactivation emphasize the complex interaction between the nervous and immune systems. Integrated clinical management, stress reduction strategies, and antiviral therapy were effective in resolving the condition. Further research is warranted to elucidate the mechanisms underlying stress-induced viral reactivation and its clinical implications.

Keywords: herpes zoster, immunocompetent, multidermatomes, psychological stress

Introduction

Herpes zoster (HZ), a reactivated varicella zoster virus (VZV) infection arising from dormant viral latency after initial chickenpox, is characterized by a cranial nerve or sensory root ganglion-centered resurgence. The virus disseminates orthodromically through the sensory nerve root to innervated tissue, such as skin, manifesting as distressing blistering skin rashes typically localized

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HIGHLIGHTS

- Herpes zoster (HZ), a reactivated varicella zoster virus infection arising from dormant viral latency after initial chickenpox, manifests as localized skin rashes along dermatomes.
- Multidermatomal involvement, especially in immunocompetent individuals, is rare and the potential link between psychological stress and HZ reactivation remains underexplored.
- Reactivation of latent infections such as HZ is attributable to several stressors like advancing age, and immunosuppressive states, which may act as predisposing risk factors or may even precipitate the infection, are directly linked to reduced cellular immunity.
- A chronic course of psychological stress, not necessarily severe acute stress, might cause reactivation of the varicella zoster virus infection by depressing the cell-mediated immunity.
- Timely diagnosis and management, including antiviral therapy and stress reduction strategies, contributed to the successful resolution of symptoms.
- The interplay between psychological stress and immune response in HZ reactivation is intriguing, emphasizing the importance of considering stress as a potential trigger in clinical practice.

to a singular dermatome. Notably, these lesions exhibit distinctive confinement, rarely crossing the midline^[1].

Multidermatomal involvement of HZ refers to a rare occurrence, particularly in immunocompetent individuals, where the reactivated VZV affects multiple adjacent dermatomes^[2]. While HZ is often observed in older adults, individuals with compromised immune systems, and those on immunosuppressive therapies, its occurrence in young, immunocompetent individuals is considered rare^[3,4]. The incidence of HZ has been reported as 0.8–0.9% (8–9 per 1000) person-years among older adults aged 50 and above, while it ranges from 0.3 to 0.5% (3–5 per 1000) person-years among adults in the age group of 20–30 years rates pertaining to immunocompetent populations. Moreover, the association between psychological stress and the onset of HZ remains an intriguing and scarcely documented phenomenon^[3,5].

This article presents a unique case of multidermatomal HZ infection in an immunocompetent young adult, triggered by a period of pronounced psychological stress and highlights the potential interplay between psychological stress and the reactivation of VZV, shedding light on the intricate relationship between the nervous and immune systems. The work has been reported in line with the CARE criteria 2017^[6].

Case presentation

A 26-year-old male presented to the Dermatology Outpatient Department with chief complaints of eruptive lesions over the anterior chest, medial aspect of the arm, forearm palms of the right hand, and right upper back for four days which followed skin rashes with a burning sensation over the involved areas. The patient reported a heightened psychological stress state for 1 week due to a work-related overburden before the commencement of the disease process. There was no significant past or family history except for the occurrence of chickenpox when he was 8 years of age. At the time of the presentation, he was afebrile, cardinals were within normal limits. His blood pressure was 120/70 mmHg, pulse rate was 88 beats per minute, respiratory rate was 18 breaths per minute, and oxygen saturation was 98% in room air. His systemic examinations were normal. He had no history of weight loss, or recurrent infections and no any findings suggestive of immunocompromised states. On local examination, multiple papular and vesicular lesions were present over the right anterior axillary fold (Fig. 1), medial aspect of the arm (Fig. 2), forearm (Fig. 3), and palm of the right hand (Fig. 4). Similar lesions were also present over the anterior chest wall below the suprasternal notch (Fig. 5) and right upper back (Fig. 6). The lesions were corresponding to C5, C8, T1, and T2 dermatomes. The lesions over T1 were crossing the midline. VZV-specific IgM antibody came out to be positive, while other laboratory investigations were unremarkable. The diagnosis of multidermatomal HZ triggered by psychological stress was made. The patient was prescribed tablet acyclovir 800 mg five times a day for 5 days, topical antibiotic ointment mupirocin twice daily for 1 week to prevent secondary infection, analgesic like tablet pregabalin 75 mg as per the need and was advised to use vaseline over the affected area. Notably, a comprehensive stress management strategy was incorporated into the treatment plan to mitigate psychological stress, potentially curbing viral reactivation and recurrence.



Figure 1. Lesions over the right anterior axillary fold corresponding to C5 dermatome.

With the support of a trained psychologist the implementation of stress-alleviating strategies played a pivotal role in symptom management and recurrence prevention for the patient. These included counseling for emotional support, stress reduction techniques (e.g. deep breathing, progressive muscle relaxation, mindfulness, and yoga), promoting work-life balance, emphasizing dietary balance and hydration, ensuring restful sleep through sleep hygiene, fostering social connections, and engaging in enjoyable activities. These measures collectively aided in stress management and significantly contributed to the patient's recovery.

The patient came for a follow-up after 3 weeks, during which all the lesions faded over the affected region.

Discussions

The presented case of multidermatomal HZ in an immunocompetent young adult underscores the exceptional nature of such occurrences.

HZ is a unilateral dermatomal disease, often affecting a single sensory nerve. Preceding skin manifestations, a prodromal phase of pain or itch occurs. Erythematous macular and vesiculopapular phases follow, appearing within days as described in the above case. Lesions of all phases manifest over one dermatomal distribution without crossing the midline^[7].

However, multiple adjacent dermatomes can be affected by viral reactivation which deviates from the conventional pattern of



Figure 2. Lesions over medial aspect of right arm corresponding to the C8 dermatome.



Figure 3. Lesions over the medial aspect of right forearm corresponding to the C8 dermatome.

clinical manifestations in rare instances as observed in this case^[2]. This intriguing dermatomal distribution of lesions in our patient, spanning C5, C8, T1, and T2, with some lesions crossing the midline raises questions regarding the factors that contributed to such extensive viral spread.

Predominantly, specific cell-mediated immunity critically suppresses latent VZV reactivation, averting HZ^[11]. Although reasons for suppression failure remain incompletely understood, factors such as aging, immunosuppressive therapies, and compromised immune states consistently correlate with VZV reactivation, leading to HZ or shingles^[8]. Individuals previously exposed to the VZV during childhood are susceptible to reactivation of the latent virus which may be a significant risk factor in our patient^[9].

Multidermatomal HZ, involving three or more adjacent dermatomes, is infrequent and indicative of immunosuppression. Immunocompromised individuals may manifest lesions across contiguous, noncontiguous, bilateral, or atypical dermatomes. While the occurrence of multidermatomal involvement is limited among the immunocompromised, it is even rarer in those with intact immune function^[2]. Various explanations exist for the propensity of multidermatomal Herpes zoster virus (HZV) infections in cervical dermatomes. One theory involves VZV reactivation in a dorsal root ganglion, with spread to nearby ganglia based on distance and vertebral anatomy. However, this does not explain trigeminal nerve involvement. Another idea is peripheral nerve-to-nerve spread, benefiting from rich cervical

innervation and potential nerve overlap. Whether VZV spreads between ganglia or peripheral nerves remains uncertain. Cervical region involvement is likelier due to nerve length differences. Shorter sensory nerves in cervical and trigeminal areas could aid virus transit to the skin, unlike longer thoracic and lumbar nerves. Overall it involves a complex interplay between viral loads, their spread, nerve pathways, and the immune response^[10].

However, the current case exhibited a unique presentation, with lesions crossing the midline within the T1 dermatome. This unusual manifestation challenges the classical dermatomal restriction observed in HZ and underscores the complexity of viral dissemination patterns. Based on the physical and laboratory findings our patient was immunocompetent.

In the immunocompetent cohort, zoster occurrences were most frequent in trigeminal dermatomes and subsequently in thoracic dermatomes with associated symptoms like fever, vomiting, and headache with fever being the most prevalent symptom. Unlikely our cases showed the involvement of cervical and thoracic dermatomes with no other associated symptoms except for pain^[11].

While HZV infection is commonly linked to prior exposure to VZV during childhood, there remains a dearth of comprehensive elucidation concerning the precise factors that prompt VZV reactivation in immunocompetent individuals as they advance in age^[11]. Consequently, our presented case underscores a clinical perspective wherein psychological stress is identified as a potential trigger instigating VZV reactivation, consequently resulting in the manifestation of multidermatomal HZ infection.



Figure 4. Lesion over the medial aspect of right palm corresponding to the C8 dermatome.



Figure 5. Lesions over the anterior chest wall, just below the suprasternal notch, corresponding to the T1 and T2 dermatomes. The lesions of T1 are crossing the midline (midsternal line).

While psychological stress was identified as a potential risk factor for zoster, very rare instances have been reported with multidermatomal involvement in young and immunocompetent individuals which is unique in our study^[8]. Reactivation of latent infections such as HZ is attributable to several stressors like advancing age, and immunosuppressive states which may act as predisposing risk factors or may even precipitate the infection, are directly linked to reduced cellular immunity. The role of psychological stress in triggering latent infections is still debatable while it is believed to reduce cellular immunity and results in premature aging of the immune system, especially with long-term stress. Moreover, perceived psychological stress may be a modifiable risk factor for HZV which may play an important role in its long-term management^[5,8].

In addition to this, Schmidt *et al.*^[5], explain that a chronic course of psychological stress, not necessarily severe acute stress, might cause reactivation of the VZV infection by depressing the cell-mediated immunity which is consistent with increased risk of HZV in individuals in chronically stressful conditions like mood disorders as explained in the study by Irwin *et al.*^[12]. Unlike these explanations, our patient who was young and immunocompetent, experienced an acute condition of psychological stress following which he developed the infection supporting the potential role of psychological stress to cause HZV.

Age-specific incidence of HZ in immunocompetent individuals with greater incidence among older adults was reported in North

America, Europe, and Asia-Pacific region; however, there is a scarcity of research from other regions^[3]. Thus our case report adds on a valuable information regarding this rare incidence from our region.

In the case study by Leung and Barankin^[2], a 15-year-old Chinese boy presented with bilateral and symmetrical painful eruptions on the upper abdomen, following malaise and low-grade fever. Despite having had chickenpox at three years of age, he did not receive the varicella vaccine. Physical examination revealed vesicles/bullae along T7, T8, and T9 dermatomes. Laboratory investigations were unremarkable, and treatment with acyclovir led to the resolution of symptoms in 14 days, with subsequent dyspigmentation fading over 3 months. This rare presentation highlights the significance of considering HZ duplex bilateralis in young, immunocompetent individuals.

Similarly, Dube *et al.*^[13], reported a case of multidermatomal HZ ophthalmicus in an immunocompetent elderly male who presented with pustular, vesicular, and maculopapular eruptions on the right half of his face. Laboratory tests showed strong positive serological results for VZV IgG and IgM antibodies. Treatment with oral acyclovir, diclofenac, and topical medications led to lesion crusting and recovery within a week.

In contrast, our case presentation involves a young immunocompetent male with multidermatomal HZ triggered by psychological stress. The lesions affected different dermatomes, including C5, C8, T1, and T2, and crossed the midline.



Figure 6. Lesions over the right upper back corresponding to the C8 dermatome.

Treatment included antiviral therapy, pain management, and stress reduction strategies. These cases collectively highlight diverse presentations of HZ, the importance of antiviral treatment, and the potential role of psychological stress in triggering reactivation.

HZV can be associated with several complications like meningitis, cellulitis, postherpetic neuralgia, etc. among which postherpetic neuralgia severely compromises the quality of life which is a common clinical sequela^[11]. Individuals with multidermatomal involvement may present with skin rashes, itching, painful vesicular eruptions, headache, and fever and with several remarkable clinical spectrums, timely identification, and early management of which put a significant impact on their physical and mental health. Furthermore, the atypical presentation of multidermatomal HZV deviating from its conventional pattern poses a clinical dilemma in clinical management^[14]. As described in our case the patient had no other symptoms as explained above except the painful vesicular skin lesions over multiple dermatomes and the history of perceived psychological stress.

It is not necessary to perform laboratory investigations for the diagnosis or treatment of HZV. Specific lab investigations may help to know the immune status and any comorbidities. HZV infection is primarily a clinical diagnosis. The level of VZV-specific antibody level, IgM usually peaks around the sixth to 10th day after the cutaneous lesions develop which varies upon the immune response of individuals^[15].

We performed the baseline investigations which were unremarkable and the level of IgM test result was positive for VZV. However, the diagnosis was primarily made based on the clinical presentations of atypical lesions.

The management of the presented case is notably challenged by the limited information available within treatment guidelines concerning atypical presentations. Nonetheless, a meticulous patient history encompassing prior varicella exposure, recurrence of infections, and utilization of immunosuppressive therapies associated with compromised immunity can significantly contribute to both the accurate diagnosis and effective management of the condition^[11].

The therapeutic objectives of HZV infection encompass pain mitigation in immunocompetent individuals and suppression of viral replication. Comprehensive medical and psychosocial evaluations play a pivotal role in confirming the diagnosis and formulating an effective treatment strategy. Early initiation of systemic antiviral therapy, specifically acyclovir, within the initial 72 h of rash onset, has demonstrated efficacy in the management of the condition^[1,15,16].

Treatment encompassed a multidimensional approach, including systemic antiviral therapy (tablet acyclovir 800 mg, five times daily for 5 days) to curtail viral replication, topical antibiotic (mupirocin) to prevent secondary infection, and analgesic intervention (tablet pregabalin 75 mg) for pain management. Concurrently, a strategic stress management regimen was integrated to alleviate psychological stress and potentially mitigate viral reactivation. Follow-up after 3 weeks revealed a favorable outcome, with complete resolution of lesions in the affected regions.

Behavioral interventions such as Tai Chi Chih (TCC) often encompass techniques geared towards improving overall health and well-being. In the study by Irwin *et al.*^[17], the research demonstrates the potential of TCC as a means to enhance VZV-specific immunity and health functioning in older individuals, a population at higher risk for HZ. This intervention, similar to stress relief measures, appears to positively influence VZV-specific cell-mediated immunity (CMI) as evidenced by a significant 50% increase postintervention. Moreover, improvements in health functioning, particularly in physical and role-related aspects, were observed in those who received TCC. These findings underscore the relevance of addressing behavioral change and stress reduction strategies as potential contributors to the prevention and management of HZ infections as a complementary therapy, which is supported by the favorable treatment outcome in our patient.

This case report's limitations include the absence of a control group and the need for larger longitudinal studies to establish the causal relationship between psychological stress and multidermatomal HZ. Investigating the underlying mechanisms and assessing stress reduction strategies' long-term effects on HZ recurrence is important. Future research could validate stress reduction interventions and explore their impact on postherpetic neuralgia prevention.

This case highlights psychological stress as a potential trigger for HZ in young, immunocompetent individuals. Integrating stress management into HZ treatment could enhance outcomes. The atypical presentation underscores the importance of considering stress-related triggers and adopting a comprehensive approach to patient care. Healthcare practitioners should recognize stress-immune interactions and tailor interventions, potentially leading to improved HZ management and reduced

recurrence. Further studies could refine therapeutic strategies and personalize treatments based on stress profiles.

Conclusion

In conclusion, this case report highlights a rare instance of multidermatomal HZ in an immunocompetent young adult triggered by acute psychological stress. While HZ typically presents as a unilateral dermatomal eruption, this case deviates from the conventional pattern by involving multiple dermatomes, including crossing the midline. The interplay between psychological stress and immune response in HZ reactivation is intriguing, emphasizing the importance of considering stress as a potential trigger in clinical practice. Timely diagnosis and management, including antiviral therapy and stress reduction strategies, contributed to the successful resolution of symptoms in this case. This case sheds light on the complexity of HZ presentation and its association with psychological factors in immunocompetent individuals. Further research is warranted to elucidate the mechanisms underlying stress-induced viral reactivation and its implications for clinical management.

Ethical approval

The study is exempt from ethical approval in our institution.

Consent

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

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Conflicts of interest disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Guarantor

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Data availability statement

Not applicable.

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