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Case Report

Case Report and Literature Review: Isolated Trochlear Nerve Palsy due to Herpes Zoster Infection

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Keywords

Cranial nerve disease · Varicella-zoster virus · Trochlear nerve · Herpes zoster ophthalmicus · Endotheliitis · Antiviral agents

Abstract

Introduction: Trochlear nerve palsy (TNP) is a common cause of vertical diplopia resulting from superior oblique muscle weakness. While herpes zoster is a well-documented cause of cranial neuropathies, reports of TNP associated with herpes zoster infection remain limited. ***Case Presentation:*** We report a case of a 65-year-old patient with typical herpes zoster ophthalmicus on the left side of his face with subsequent corneal endotheliitis and isolated TNP. The MRI revealed a faint enhancement at the cavernous sinus on the same side as the TNP. Cerebrospinal fluid detected human herpesvirus 3, confirming the diagnosis. An intravenous antiviral was administered for 14 days with prolonged maintenance to prevent recurrence. Oral corticosteroids were also used as an adjuvant to reduce inflammation. After treatment, the uveitis subsided, and the vertical diplopia recovered partially. TNP from herpes zoster is a rare presentation. The underlying pathogenic mechanisms, including potential direct viral invasion, inflammatory responses, and possible vasculopathy affecting the trochlear nerve, are explored. ***Conclusion:*** TNP can be a rare neuro-ophthalmic complication of herpes zoster infection. Clinicians should maintain a high index of suspicion when assessing patients with cranial neuropathies in the context of herpes zoster. Prompt antiviral therapy and supportive measures can aid in the resolution of symptoms and alleviate potential long-term sequelae.

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Fig. 1. Patient's face with a herpetic rash along his left forehead.

Introduction

Herpes zoster infection, primarily caused by the reactivation of the varicella-zoster virus (VZV) latent in the sensory ganglia following primary varicella infection, can encompass a spectrum of ocular manifestations. Ocular involvement in herpes zoster, termed herpes zoster ophthalmicus (HZO), occurs when the ophthalmic branch of the trigeminal nerve is affected. It may cause numerous ocular complications, including keratitis, uveitis, scleritis, or retinitis [1, 2]. Cranial nerve palsy, one of the neuro-ophthalmic manifestations, could occur in isolated or combined forms [3]. Trochlear nerve palsy (TNP) is a rare but noteworthy neurological complication associated with herpes zoster infection caused by the VZV and reported by several authors [4–8]. Herein, we report isolated TNP, a rare complication in an immunocompetent 65-year-old male.

Case Report

A 65-year-old man presented with an erythematous rash on his left forehead and neuropathic pain for 10 days. He was diagnosed with HZO and was treated with 800 mg of acyclovir daily. Four days later, he had poor vision in his left eye with eye pain. Moreover, he had progressive binocular vertical diplopia. At the outpatient department, his vision was 20/30 in each eye. He had a red rash along his forehead (Fig. 1). His intraocular pressures by applanation were 17 and 31 mm Hg, respectively. A slit-lamp examination revealed a mild injected conjunctiva with blepharitis on his left eye. Fine keratic precipitates with 1+ cells were observed. Ocular ductions were full. Versions revealed slight left inferior oblique overaction. The Parks-Bielschowsky three-step test was performed, revealing 8 prism diopters (PD) of left hypertropia in the primary position. This increased to 10 PD in the right gaze and 6 PD in the left head tilt, suggesting left superior oblique muscle paresis (shown in Fig. 2). An excyclotorsion of 4° was detected.

Laboratory investigations included normal complete blood count (WBC 9,600/μL, PMN 71.1%, lymphocyte 22.9%, platelet 234,000/μL) and unremarkable C-reactive protein 0.8 mg/L. The erythrocyte sedimentation rate was 60 mm/h above the standard limit. A serological test for HIV was negative and nonreactive for VDRL and TPHA. A chest X-ray

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Fig. 2. Parks-Bielschowsky three-step test picture of the patient on the admission date.

showed no abnormalities. A lumbar puncture showed a normal opening pressure of 16 cm H_2O, with pleocytosis (RBC 100 cells/mm^2, WBC 20 cells/mm^2 with 100% mononuclear), and was negative for cytology. The cerebrospinal fluid polymerase chain reaction (PCR) for seven types of herpes revealed positive results for human herpesvirus 3 (HHV-3).

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Fig. 3. Magnetic resonance imaging revealed a subtle enhancement in the T1 phase with gadolinium (upper figure) and hypersignal T2 (lower figure) of the left cavernous sinus in the axial section.

Magnetic resonance imaging of the orbit with angiography demonstrated hypersignal T2 with faint enhancement of the left cavernous sinus (axial view shown in Fig. 3 and coronal view shown in Fig. 4). The trochlear nerve was not well defined due to neuroimaging quality.

In this case, the diagnosis was herpetic corneal endotheliitis with TNP. After a neurology consultation, the patient received 600 mg of intravenous acyclovir every 8 h for 14 days, then prolonged oral acyclovir of 800 mg twice daily for 1 year. The oral prednisolone was started for anti-inflammation at a dose of 5 mg/tab for four tabs three times a day for 5 days and slowly tapered for 1 month. For herpetic corneal endotheliitis, topical 1% Prednisolone acetate twice daily and topical 0.5% timolol were selected to control the inflammation and ocular pressure, respectively. Topical eye drops were slowly tapered upon uveitis and glaucoma specialist recommendations. Vertical diplopia was eliminated by patching.

One month later, the uveitis improved. The vertical diplopia was lessening. The alternate-prism cover test revealed left hypertropia, measuring six PD at a distance and two PD nearby. Inflammation and intraocular pressure were well controlled. The patient adapted his head posture to lessen the vertical diplopia (shown in Fig. 5).

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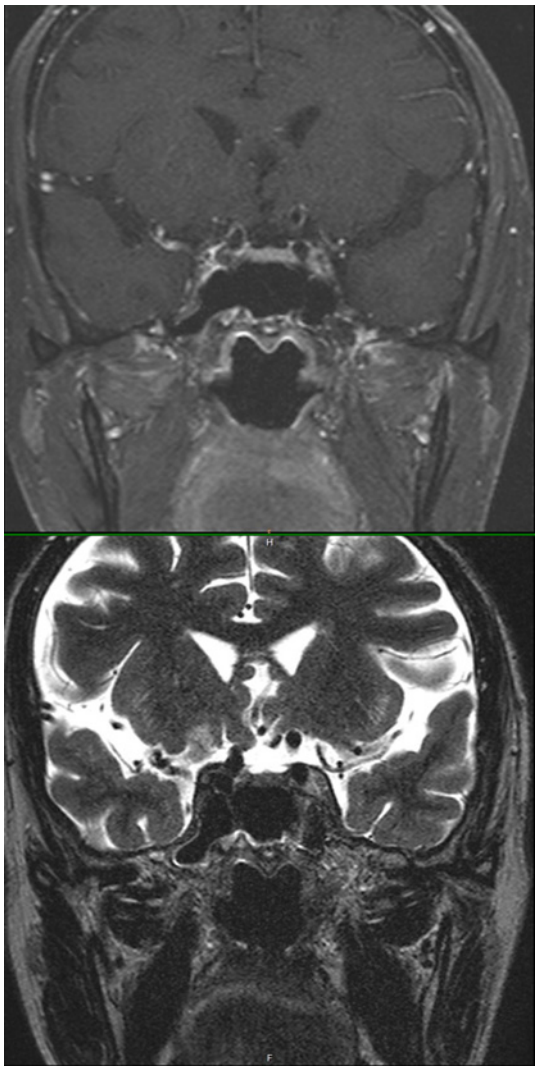

Fig. 4. Magnetic resonance imaging revealed a subtle enhancement in the T1 phase with gadolinium (upper figure) and hypersignal T2 (lower figure) of the left cavernous sinus in the coronal section.

Discussion

The diagnosis in this case was herpetic corneal endotheliitis with isolated TNP. The MRI showed a hyperintense signal on T2 and enhancement on T1 at the left cavernous sinus, on the same side as TNP. Furthermore, the PCR for CSF fluid detected HHV-3. This strongly suggested the cause was herpes zoster.

We searched PubMed using the term "varicella-zoster," which matched with "trochlear nerve palsy." We selected cases with a typical herpetic rash presentation before subsequent TNP. The summarized data are shown in Table 1. Most affected patients are usually older, except for one case report involving a 13-year-old. The onset of vertical diplopia was about 1–2 weeks after developing a herpetic rash. Cerebrospinal fluid had a mostly normal profile, except for the HHV detected by the PCR technique. There were unremarkable MRI findings, except in our case, with subtle cavernous sinus enhancement. The treatment regimens were variable. Incidentally, antiviral therapy, either oral or intravenous, was still the mainstay of the treatment. The outcomes of treatment were variable. The ocular alignment may partially or entirely recover.

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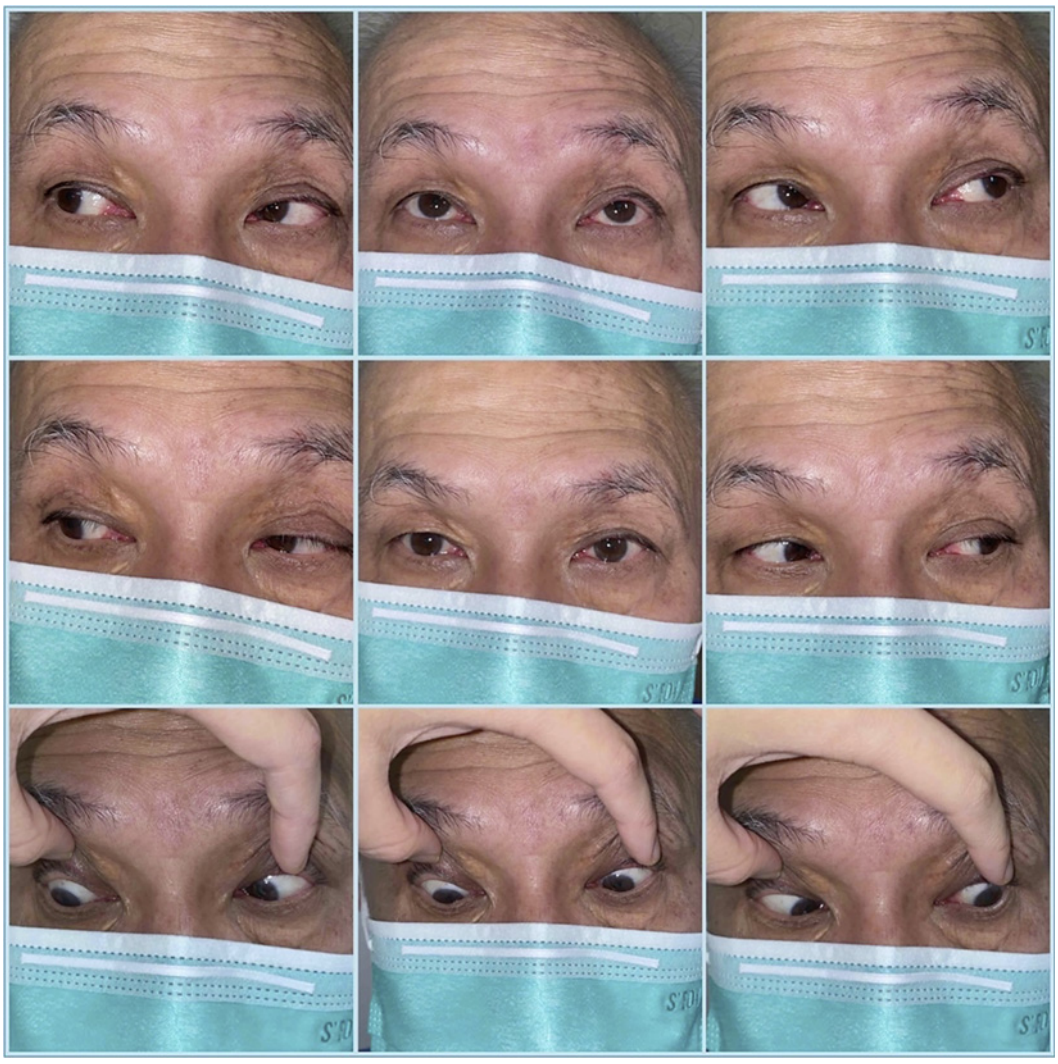

Fig. 5. Nine gaze positions of the patient at the 1-month follow-up.

Herpes zoster infection, stemming from the reactivation of the VZV, can lead to notable neuro-ophthalmic complications, with HZO being a prominent subtype. Typically, these complications arise within the ophthalmic division of the trigeminal nerve and often encompass severe painful vesicular eruptions on the forehead, eyelids, and tip of the nose (known as Hutchinson's sign) [1, 2]. Additionally, there is a risk of severe ocular issues, including keratitis, uveitis, scleritis, and even optic neuritis, which can threaten vision. Cranial nerve palsy is one of the neuro-ophthalmic manifestations, with isolated or multiple involvement [3].

TNP, a rare complication of herpes zoster infection [4–8], is characterized by the impairment or paralysis of the fourth cranial nerve, the trochlear. This condition often presents as double vision (diplopia), especially when attempting to gaze downward or inward. While less frequently encountered than other neuro-ophthalmic consequences of herpes zoster, it underscores the potential of the virus to affect various cranial nerves [9].

The pathogenesis of TNP resulting from VZV remains unknown. One proposed mechanism involves viral invasion of the trochlear nerve or its surrounding structures. Studies have suggested that VZV can infiltrate cranial nerves, potentially leading to nerve dysfunction. Additionally, inflammatory responses within the cavernous sinus, where the trochlear nerve

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Table 1. Cases report of trochlear nerve palsy due to herpes zoster infection

Authors	Case	Year	Age/ sex	Onset	MRI findings	Lumbar puncture	Treatment	Follow-up	Improvement
Grimson and Glaser [4]	1	1978	73/ F	2 weeks	NA	NA	NA	2 months	Full recovery
Grimson and Glaser [4]	2	1978	64/ F	2 weeks	NA	NA	NA	1 year	Partial recovery
Tsuda et al. [5]	3	2007	64/ F	10 days	Normal	Normal	IV acyclovir 750 mg/day for 14 days	3 months	Full recovery
Park et al. [6]	4	2011	83/ M	2 weeks	Normal	Positive VZV IgM and IgG	IV acyclovir 1,500 mg/day for 1 day and switch to oral due to renal problem	1 month	Partial recovery
Ryu et al. [7]	5	2014	13/ F	2 weeks	Normal	Normal	250 mg IV every 8 h for 7 days	2 months	Full recovery
Our case	6	2023	65/ M	10 days	Faint enhance at left cavernous sinus	Pleocytosis with positive VZV IgM and IgG	600 mg IV every 8 h for 14 days, oral prednisolone 1 mg/kg/day for 5 days, slowly taper	1 month	Partial recovery

MRI, magnetic resonance imaging; F, female; NA, not applicable; M, male; IV, intravenous; IgG, immunoglobulin G; IgM, immunoglobulin M; VZV, varicella-zoster virus.

resides close to other cranial nerves and vasculature, may contribute to nerve compression and impairment [10, 11]. Another hypothesis involves VZV-induced vasculopathy affecting the trochlear nerve's blood supply. In cases of herpes zoster, viral particles can infiltrate cerebral arteries and induce vasculitis or thrombosis, compromising blood flow to the adjacent cranial nerves. This vascular involvement may result in ischemia, inflammation, and subsequent nerve dysfunction [11, 12].

The management of TNP in the context of herpes zoster is not extensively documented. The treatment includes addressing the underlying viral infection while managing the associated symptoms. Systemic antiviral medications are commonly prescribed to reduce the severity and duration of the herpes zoster outbreak and remain the mainstay of treatment [2, 13], which may help alleviate trochlear nerve inflammation. Additionally, corticosteroids can be considered to reduce inflammation and swelling around the affected nerve [14]. Symptomatic management includes pain relief with analgesics because TNP can be painful [15], and prisms or patching may be used to manage the diplopia. The treatment plans should be formulated by healthcare professionals based on the patient's specific clinical presentation and needs.

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In this case of HZO, the patient's condition worsened despite therapeutic standard treatment. Clinical suspicion of more neurologic complications should be addressed in such cases [3]. Monitoring is mandatory in all HZO cases, especially in older adults. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see https://doi.org/10.1159/000535947).

Conclusion

A TNP is a rare presentation of the neuro-ophthalmic involvement of herpes zoster infection. Our case had a typical herpes zoster rash with subsequent corneal endotheliitis and isolated superior oblique muscle palsy. Early recognition and timely initiation of antiviral therapy are pivotal in alleviating symptoms and preventing long-term sequelae, especially in older adults. The mechanisms underlying TNP in the context of herpes zoster are not completely understood, emphasizing the need for further research to elucidate the pathogenesis and establish evidence-based guidelines for optimal management.

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Statement of Ethics

This study protocol was reviewed and approved by the Institutional Review Board of Royal Thai Army, approval number S078h/66_Exp. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Worapot Srimanan: study concept and design, manuscript drafting, and study supervision. Somboon Panyakorn: interpretation of imaging data and critical revision. All authors approved the final version of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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