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Optic Neuritis in Herpes Zoster Ophthalmicus

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Background: Optic neuritis in herpes zoster ophthalmicus (HZO) has been reported rarely. We report two cases of HZO optic neuritis with detailed magnetic resonance imaging study and treatment responses.

Cases: One patient presented with anterior optic nerve involvement, and the second presented with retrobulbar optic neuritis. Contrast enhanced T_1-weighted images were obtained in these 2 patients. Intravenous acyclovir and oral prednisolone were given simultaneously.

Observations: Magnetic resonance imaging revealed peripheral enhancement of the optic nerve sheath complex on T_1-weighted scan. Both patients recovered their vision within 3 months following the start of treatment.

Conclusions: Magnetic resonance imaging is helpful for the diagnosis of HZO optic neuritis. Systemic acyclovir and steroid are effective in the treatment of HZO optic neuritis. **Jpn J Ophthalmol 2000;44:550–554**

Key Words: Acyclovir, herpes zoster ophthalmicus, magnetic resonance imaging, optic neuritis, steroid.

Introduction

Herpes zoster ophthalmicus (HZO) results from the reactivation of latent varicella-zoster (VZ) virus from the trigeminal ganglion.[1] Optic neuritis in HZO is a well-documented, but rarely reported disease.[2–4] It is usually manifested as a gradual vision loss at 1 or 2 weeks following the skin rash. Relative afferent pupillary defect is apparent in most cases. Ophthalmoscopy may reveal a normal optic disc, or an edematous hyperemic disc.[2,4] Magnetic resonance (MR) imaging may show peripheral enhancement of the optic nerve sheath complex on T_1-weighted postenhancement images.[3] Pathologic examination demonstrates periaxial infarction of the optic nerve.[3] The visual prognosis for HZO patients is usually very poor.[2,3] We report on 2 patients with HZO optic neuritis, in whom peripheral enhancement of the optic nerve sheath complex was demonstrated on MR imaging. Visual recovery was good in these 2 patients following systemic acyclovir and steroid treatment.

Case Reports

Case 1

A 72-year-old male patient developed ophthalmoplegia and blurred vision in the left eye 2 weeks after the eruption of skin lesions over the dermatome of the left ophthalmic branch (V_1) of the trigeminal nerve. One year prior he had experienced an attack of herpes zoster over the left L2–L3 area. He had had pulmonary tuberculosis and chronic liver cirrhosis with gallstone, and an essential tremor involving head and both hands. He was otherwise healthy and had undergone cataract surgery in both eyes 1 year prior. His vision was 6/6 OD and 6/6.7 OS when measured 4 months before his visit to our hospital. He was admitted to the dermatologic ward and received intravenous acyclovir (250 mg) every 8 hours for 2 days, based on the diagnosis of herpes zoster over the left V_1. After 2 weeks of hospitalization, he noticed blurred vision and ophthalmoplegia in the left eye.

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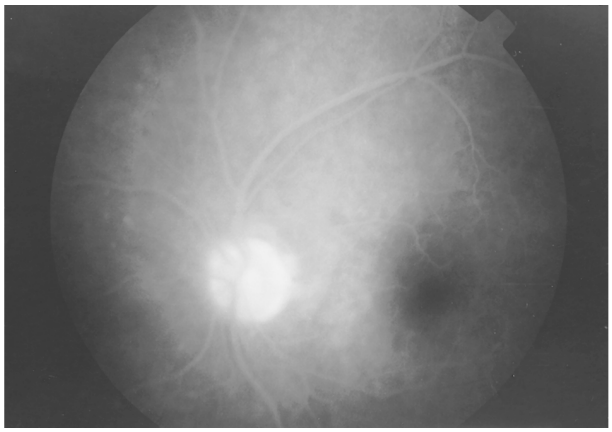

Figure 1. Case 1: Fluorescein angiography showed late staining of optic disc in left eye.

Ophthalmic examination revealed partial ptosis of the left eyelid. Extraocular movement examinations revealed nearly complete ophthalmoplegia in the left eye, with only a minimal degree of residual adduction. His vision was 6/6 OD and 2/60 OS. Slit-lamp biomicroscopy revealed diffuse punctate lesions on the left cornea and quiet anterior chamber. The pupil was dilated and nonreactive to direct light stimulation in the left eye. Relative afferent pupillary defect was apparent in the left eye. Ophthalmoscopy showed drusen over the bilateral nasal retinas and mild swelling of the left optic disc. Fluorescein angiography showed late staining of the left optic disc (Figure 1). Visual field of the left eye demonstrated peripheral constriction, especially in the inferior meridian (Figure 2). Computed tomography scan revealed swelling of the optic nerve, but failed to demonstrate enhancement after contrast medium injection. Magnetic resonance imaging study showed an enhanced optic nerve sheath behind the left eyeball on T_1-weighted image (Figure 3). Results of color Doppler study were normal in the left central retinal artery, posterior ciliary artery, and ophthalmic artery. Laboratory examinations revealed a positive enzyme-linked immunoabsorbent assay (ELISA) test for anti-VZ virus IgG and IgM, and a negative serologic test for syphilis and HIV. Results of a neurologic examination were normal, except for the zoster involvement of cranial nerve V and the essential tremor of bilateral upper extremities.

Intravenous acyclovir (500 mg) every 8 hours was given for 10 days and changed to oral acyclovir for 1 week. Oral prednisolone (40 mg) twice a day for 4 days was started 1 day after the initiation of systemic acyclovir and was tapered over the next 2 weeks. Extraocular movement improved gradually with residual limitation of abduction. There was two-prism diopter residual esotropia in primary position. By 3 months, his vision recovered to 6/8.6 OS and the visual field recovered to normal in the left eye.

Case 2

A 69-year-old male patient developed eye pain OD and facial erythematous vesicles over the right ophthalmic branch (V_1) of the trigeminal nerve beginning on November 28, 1997. He was admitted to a local hospital and received intravenous acyclovir (250 mg) every 8 hours for 5 days, then tapered to oral acyclovir (400 mg) twice a day for 2 days. He had a history of duodenal ulcer, hypertension, and ischemic heart disease. He visited our hospital on

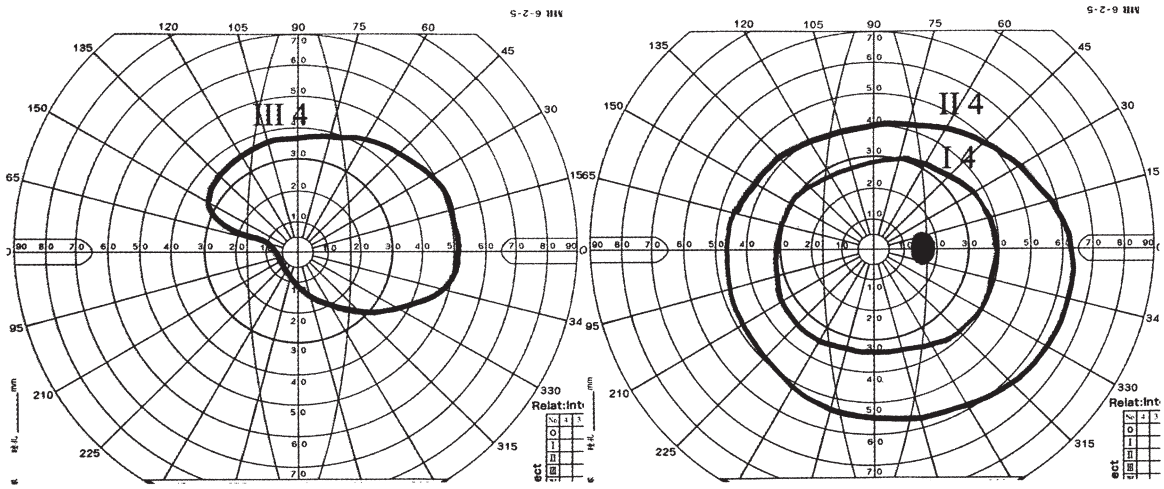

Figure 2. Case 1: Visual field examination showed peripheral constriction in left eye, especially in inferior meridian.

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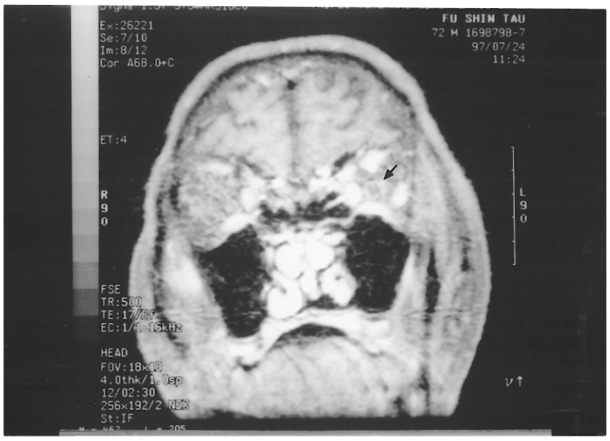

Figure 3. Case 1: Magnetic resonance imaging showed enlarged and well-enhanced left optic nerve sheath (arrow) after contrast injection on T_1-weighted coronary image.

December 10, 1997, because of persistent eye pain and blurred vision OD.

Ophthalmologic examinations revealed crusted lesions over the right ophthalmic branch dermatome of the trigeminal nerve. Eyeball position was orthophoric. Extraocular movement showed a mild limitation of supraduction in both eyes. Corrected visual acuity was 6/15 OD and 6/7.5 OS. He could identify 8 plates OD and 12 plates OS of the Ishihara color vision test. Slit-lamp biomicroscopy showed marked conjunctival congestion OD and diffuse punctate keratopathy in the right eye. Anterior chamber was silent OU. Pupil light reflex was prompt in the left eye and sluggish in the right eye. Marked relative afferent pupillary defect was noted in the right eye. Bilateral lenses showed mild degree of nuclear sclerosis. Ophthalmoscopy revealed normal disc and macula in both eyes. Visual field testing revealed a central scotoma in the right eye. (Figure 4). Fluorescein angiography showed normal results in both eyes. Magnetic resonance imaging revealed a ring-shaped enhancement over the right optic nerve in the orbital region on T_1-weighted scan (Figure 5). Laboratory examinations showed a positive ELISA test for anti-VZ virus IgG, but negative for IgM. A serologic test for syphilis (rapid plasma reagin) was negative. T-cell subpopulation examination using flow cytometry identified CD3 (48%), CD4 (20%), CD8 (32%), and CD19 (20%).

Intravenous acyclovir, 250 mg every 8 hours, was given for 7 days and then changed to oral acyclovir, 400 mg twice a day, for 2 weeks. Oral prednisolone, 40 mg twice a day, was given for 5 days and then tapered gradually over the next 2 weeks. His visual acuity recovered to 6/6.7 OD within 1 month, and the relative afferent pupillary defect had disappeared. However, he still suffered occasionally from punctate keratopathy in the right eye.

Discussion

Herpes zoster ophthalmicus results from the reactivation of latent VZ virus from the trigeminal ganglion. Decreased cellular immunity is probably the leading cause of VZ virus reactivation, with humoral immunity intact in most patients during the reactivation.[1] Nonetheless, a disturbance of the symbiosis of the virus and host may also lead to reactivation of VZ virus and let the virus re-enter the lytic cycle.[2] Thus, the position of virus insertion (episomal or in-

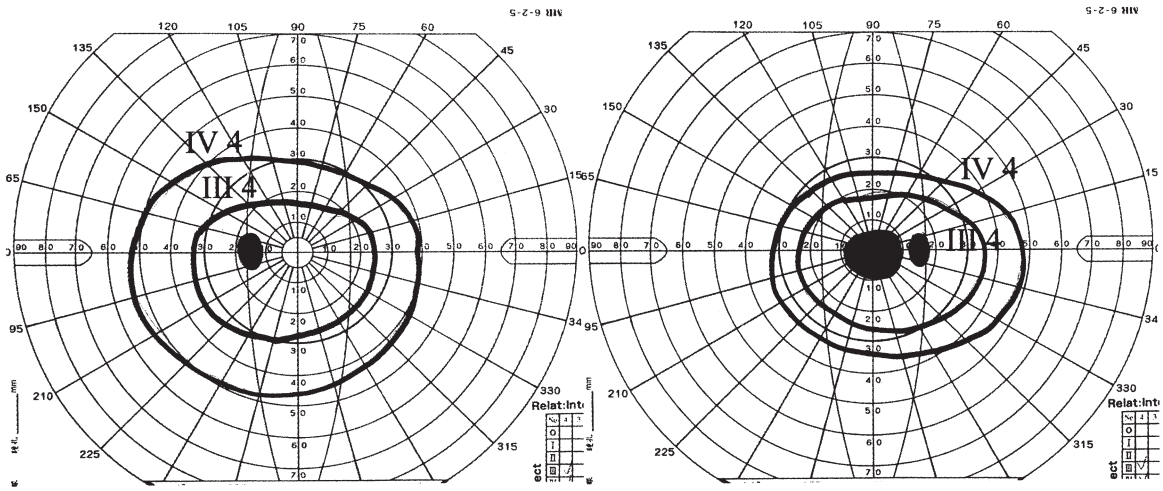

Figure 4. Case 2: Visual field testing revealed central scotoma in right eye.

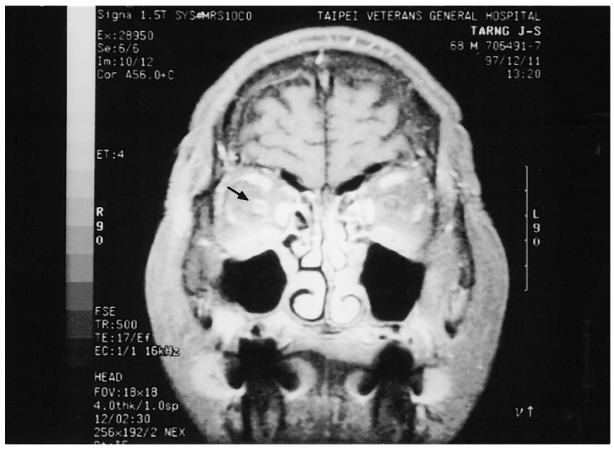

Figure 5. Case 2: Magnetic resonance imaging revealed ring-shaped enhancement over right optic nerve (arrow), extending from just behind eyeball to orbital apex (T_1-weighted coronary scan, contrast enhancement).

tegration), quantity of viral genome, and its proliferative potential will all affect the symbiosis and, therefore, the reactivation of VZ virus.[2] Whatever the causes of reactivation may be, the pathologic sequela of HZO may come from direct virus replication, immune complex deposit, or ischemic injury.[1,2] During the reactivation, VZ virus may spread along the ophthalmic branch of the trigeminal nerve from the cavernous sinus via the superior orbital fissure to the orbit. Replication of VZ virus on and around these target organs may cause direct injury or cause the infected cells to present viral antigens that may further induce immune complex deposit. An immune-mediated hypersensitivity reaction may supervene upon these target organs. Granulomatous angiitis, possibly due to immune complex-mediated type 3 hypersensitivity,[2] is the major pathologic finding in the cerebral angiitis and optic nerve infarction of HZO.[3] It may cause thrombosis of the vessel and induce ischemic injury to these target organs.

The ocular manifestations of HZO have been pleomorphic and potentially devastating. Ophthalmoplegia has been reported to be present in as high as 31% of cases with HZO. It usually resolved spontaneously in a few months.[2] Optic nerve involvement is a rare sequela in HZO and it may present as papillitis, retrobulbar neuritis, or optic nerve infarction.[4] Visual prognosis is usually poor in the optic neuropathy of HZO.[4] In our case 1, fluorescein angiography revealed mild papillitis, and the MR imaging study showed enhancement of the optic nerve sheath, which is localized within the anterior orbit. Orbital vessel Doppler study showed normal flow velocity in the ophthalmic, posterior ciliary, and central retinal arteries. Case 2 was found to have retrobulbar neuritis. Magnetic resonance imaging showed a ring-shaped enhancement of the optic nerve, which extended from immediately behind the eyeball to the orbital apex. Lexa et al[3] reported a patient with HZO complicated by optic nerve infarction. The MR imaging study also showed abnormal peripheral enhancement in the optic nerve sheath complex, which corresponded to the histopathologic finding of periaxial infarction of the optic nerve. Lee et al[5] proposed that the increased signal intensity seen in optic neuritis might represent a reactive edema of the nerve sheath or abnormal protein content of the fluid in the subarachnoid space. Peripheral enhancement of the optic nerve sheath complex and/or of the optic nerve itself might reflect either a periaxial infarction of the optic nerve or a reactive inflammatory change in the subarachnoid space. The finding of peripheral enhancement of the optic nerve sheath complex might be a good prognosis sign because the axial portion of the optic nerve might be spared.

Visual prognosis is usually poor in the optic neuropathy of HZO.[4] A patient with bilateral retrobulbar neuritis recovered partially in both eyes following acyclovir ointment and steroid eyedrop treatment.[4] Winward et al[6] reported a case with acute retinal necrosis combined with optic neuritis presumed secondary to VZ virus. Visual acuity was 20/60 six weeks after intravenous acyclovir (4 g per day) treatment.[6] Nevertheless, Chang-Godinich et al[7] reported a patient with ophthalmoplegia and presumed optic neuropathy who recovered her vision to 20/25 after 8 weeks of treatment with oral acyclovir (1,600 mg per day) and prednisolone (60 mg per day).[7] Both our patients recovered after intravenous acyclovir and oral steroid treatment. The better prognosis might reflect either the drug effects of acyclovir and corticosteroid or an intrinsically better prognosis in a patient with inflammation of the optic nerve and meninges, but without the ischemic injury of obliterative angiitis.

Acyclovir has been the drug of choice in the therapy of herpes zoster infection. The recommended dosage for acyclovir is 5–10 mg/kg administered intravenously every 8 hours.[8] The concomitant use of corticosteroid and an antiviral, though not contraindicated in an immunocompetent patient, remains controversial in consideration of the balance between the benefits of anti-inflammation and neuroprotection, on the one hand, and the hazards of further suppression of host immunity,[1] on the other hand. In one study, such regimens failed to affect postherpetic

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neuralgia, although resolution of acute neuritis was accelerated.[9] Thus, in a patient with the optic neuropathy of HZO, we suggest the use of oral steroid under the cover of simultaneous intravenous acyclovir treatment.

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