Other full case

Painful ophthalmoplegia with simultaneous orbital myositis, optic and oculomotor nerve inflammation and trigeminal nucleus involvement in a patient with herpes zoster ophthalmicus

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Summary

Viral infection is a rare cause of painful ophthalmoplegia. We report on a 67-year-old patient who developed painful double vision after a vesicular skin rash on the left forehead. MRI disclosed simultaneous inflammatory lesions in all extraocular muscles, the second and third cranial nerve, as well as pathological signal intensity along the spinal trigeminal tract and nucleus within the medulla oblongata and the pons. Cerebrospinal fluid and serum tests for varicella zoster were positive. The patient was treated effectively with intravenous acyclovir and methylprednisolone. Simultaneous lesions in various neighbouring neural structures may be characteristic for the highly neurotropic behaviour of the herpesviridae and should be considered as a cause of painful ophthalmoplegia that can be depicted by appropriate imaging.

BACKGROUND

Painful ophthalmoplegia includes such diverse aetiologies as Tolosa-Hunt syndrome, aneurysm, ophthalmoplegic migraine and temporal arteritis but an infectious factor, although rare, should always be considered. The interesting point about the present case is the MRI of simultaneous affection of extraocular muscles, optic nerve and, most remarkably, trigeminal nucleus within the brainstem, indicative of the high neurotropism of the varicella zoster virus.

CASE PRESENTATION

A 67-year-old woman developed an intensively itching vesicular rash in the left forehead 40 days prior to admission. A diagnosis of herpes zoster ophthalmicus (HZO) infection was made at that time by a dermatologist and she was started on oral acyclovir for 7 days. As the rash faded and finally disappeared during the next 3–4 weeks, intense pain in the left V1 area appeared and, the last 10 days prior to admission, she gradually noticed left ptosis of the left upper eyelid and diplopia for which she was referred to us and admitted in our clinic. Upon examination she was afebrile and in good general condition. Some degree of oedema was present in the left forehead and eyelid. Complete ophthalmoplegia with ptosis was noted in the left eye, which was unable to perform any vertical, horizontal and oblique movement. The pupil was dilated and unresponsive to light and accommodation. Visual acuity was normal in the right but only 2/10 in the left eye. Hypesthesia was noted in the area of V1. Mild left conjunctivitis was also noted, but keratitis or uveitis were not present.

INVESTIGATIONS

MRI scan of the brain and orbits revealed fusiform enlargement and paramagnetic enhancement of left orbital muscles (figure 1A), enhancement of the left optic nerve sheath (figure 1B) and a small area of increased signal intensity in the left brainstem from the medulla up to the midpons (figure 1C). Lumbar puncture revealed mild lymphocytic pleocytosis (30 cells) and mild protein elevation (62 mg/dl, normal values <45). Anti-varicella zoster virus (VZV) antibodies were elevated in the blood and in the cerebrospinal fluid (CSF). The serum/CSF ratio of anti-VZV IgG antibodies was markedly reduced (4.7) compared to ratios for albumin (90) and total IgG (195), which is diagnostic for intrathecal synthesis of anti-VZV IgG.

DIFFERENTIAL DIAGNOSIS

The skin characteristic skin rash along with the imaging and CSF findings excluded other causes of painful ophthalmoplegia such as Tolosa-Hunt syndrome, temporal arteritis, aneurysm, diabetic microvascular palsy, ophthalmoplegic migraine, sarcoidosis, idiopathic intracranial hypertension and neoplasms.

TREATMENT

The patient was treated with intravenous acyclovir 720 mg three times daily for 10 days and intravenous methylprednisolone 500 mg/day for 5 days.

OUTCOME AND FOLLOW-UP

During the next 4 weeks the skin rash gradually disappeared, while eye movements could be partly elicited in all directions. 5 months later, the symptoms showed

Figure 1 (A) Coronal MRI sections of orbits show oedema in the extraocular muscles on the left side. Fusiform enlargement of the muscle bellies is recognised on T1-weighted images, whereas increased signal intensity is seen on T2 images. Gadolinium enhancement is disclosed on postcontrast, fat-suppressed T1 images. The transverse diameter of the left medial rectus is 1.7 times larger than the diameter of the right medial rectus (0.7 and 0.42 cm, respectively). (B) Transverse T1-weighted images with fat suppression after gadolinium administration. Enhancement of the optic nerve sheath can be also recognised beside extraocular muscle enhancement and enlargement. (C). Transverse T2 sections of the lower brainstem. Increased signal intensity can be recognised in the area of the left spinal trigeminal nucleus and spinal trigeminal tract extending from the medulla oblongata to the midpontine level (arrowheads). (D) On follow-up 5 months later, improvement of extraocular muscle enlargement can be seen on a T1-weighted coronal image of the orbits. (E) The pathological signal within the brainstem has virtually disappeared (arrowheads).

marked improvement. MRI findings improved dramatically (figure 1D) and the pathological signal intensity in the trigeminal nucleus and tract became significantly smaller (figure 1E). The patient had no diplopia and the amplitude of all eye movements (saccades, smooth pursuit and vestibulo-ocular reflex) was normal. Left eye saccades, however, appeared slowed, probably as an expression of residual weakness.

DISCUSSION

Up to one-third of patients with HZO may develop partial or complete ophthalmoplegia.^{1 2} Patients are usually older than 50 years and ophthalmoplegia appears a few days to 5 weeks after the vesicular eruption, although it can precede the eruption by 3–10 days.^{3–5} This may be due to the involvement of one⁶ or all³ of the cranial nerves involved in ocular motility, the III nerve being the most commonly affected, followed by the VI and IV nerves. Concomitant involvement of the II, III, IV, V and VI nerves in various combinations suggests possible spread of the inflammation due to proximity with the V nerve at the orbital apex, superior orbital fissure or the cavernous sinus.^{1 7} Meningeal inflammation, microinfarctions due to occlusive vasculitis and nerve demyelination have also been suggested as possible causes of nerve involvement.^{3 8–10} On the other hand, intraorbital inflammation¹¹ and/or orbital myositis¹² have also been implicated as possible mechanisms of HZO-related ophthalmoplegia. Depending on the mechanism involved, contrast-enhancing nerves¹³ or enlarged, oedematous orbital muscles have been reported by neuroimaging.^{4 14}

Most of the patients reported in the literature have either nerve or muscle involvement. On the contrary, the present patient's complete ophthalmoplegia was due to simultaneous nerve involvement, orbital myositis and probably some degree of inflammation within the orbit as well. At least the III was involved since there was ptosis with pupillary dilatation and unresponsiveness to light. Significant orbital myositis was also present. The mildly impaired visual acuity accompanied by gadolinium enhancement of the left II within the orbit indicated inflammation in the intraorbital structures beyond the muscles.

An unusual finding in our patient was the increased T2 signal intensity observed in the area corresponding to the trigeminal nucleus. This has been described once,¹³ and may be due to inflammation, and possibly a local spread of the VZV within the brain stem, along the descending tract of V. This patient, however, had no simultaneous inflammation of intraorbital structures. No data exist on the fate of this lesion. In our patient it was partly reversible within 5 months. Focal non-enhancing brainstem hyperintensities in T2-scans have been described in patients with trigeminal zoster without extraocular muscle involvement,¹⁵ suggesting an anterograde migration of the virus from the gasserian ganglion to the trigeminal nuclei in the brainstem. Anterograde or retrograde transsynaptic spread is a well-known phenomenon observed in viruses with marked neurotropism such as rabies virus. This property is also used for histological tracing of neural pathways.¹⁶ Moreover, an association of trigeminal nucleus T2 hyperintensities with later

development of postherpetic neuralgia has been proposed.¹⁵ Our patient, however, did not develop neuralgia throughout the follow-up period of 8 months.

Learning points

- ▶ Herpes zoster is an uncommon, but treatable, cause of painful ophthalmoplegia.
- ▶ It can affect the skin in trigeminal areas, the extraocular muscles, the oculomotor nerve, the optic nerve and the trigeminal nucleus within the brainstem.
- ▶ Simultaneous demonstration of the above lesions on MRI (apart from the skin rash) may prove pathognomonic for this strongly neurotropic virus.

Competing interests None.

Patient consent Obtained.

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