



Bilateral optic neuritis with spine demyelination associated with influenza A H1N1 infection

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ARTICLE INFO

Keywords:

H1N1
Optic neuritis
Disc edema
Demyelination
MRI
Steroids

ABSTRACT

Purpose: To report a rare case of optic neuritis with spine demyelination following H1N1 virus infection.

Observation: A 66-year-old female presented with decreased vision in both eyes (left > right) following a recent episode of fever and flu. She was diagnosed as H1N1 infection confirmed by viral antigen analysis of throat swab. On examination, she had a profound vision drop in the left eye with optic disc edema. MRI brain and orbit revealed bilateral optic nerve and frontal dural thickening with a ring-enhancing lesion in the right frontal lobe. MRI spine showed long cord signals at T1-T7 suggestive of demyelination. The patient had a complete recovery of vision and visual fields after intravenous and oral steroids.

Conclusion/Importance: Influenza A virus can manifest with a wide range of symptoms including flu-like illness to neurological complications. This case highlights optic neuritis as a presenting feature of H1N1 infection.

1. Introduction

Optic neuritis is an inflammation of the optic nerve due to demyelinating, infectious, or non-infectious etiologies. A wide variety of viral, bacterial, parasitic, and fungal agents can cause optic neuritis, with variable clinical features.¹ Influenza virus can cause a range of symptoms from a flu-like illness to potential neurological complications like Guillain-Barré syndrome, meningoencephalitis, acute demyelinating encephalomyelitis (ADEM), etc. Herein, we describe a unique case of optic neuritis, likely secondary to H1N1 infection which had good vision recovery post-treatment.

2. Case report

A 66-year-old female presented with a 1-week history of diminution of vision and mild pain in the left eye. One month prior to visual symptoms, she was hospitalized for a low-grade fever, cough, dysuria, and poor bladder control. Her throat swab was positive for H1N1 by polymerase chain reaction technique. As she did not have any breathlessness she was treated conservatively at that time with intravenous fluids and oral oseltamivir 75mg twice daily for 5 days.

Her past history was significant for seizure disorder, thyroid disease as well as rheumatoid arthritis and was on clobazam 5mg once daily,

methotrexate 7.5mg once a week, levothyroxine 50mg once daily. The patient was wheelchair-bound following a leg fracture due to a recent history of fall 2 weeks prior.

On examination, her best-corrected visual acuity (BCVA) in the right eye was 20/25 and the left eye was counting fingers at 6 inches. Pupils were sluggishly reacting to light in both eyes and the left eye had a relative afferent pupillary defect. Extraocular movements were full. Colour vision testing by Ishihara chart was 21/21 in the right eye and 0/21 in the left eye. The anterior segment examination was unremarkable. Posterior segment was normal in the right eye and the left eye revealed optic disc edema with hemorrhages and tortuous retinal veins. Humphrey visual fields 30-2 showed generalized visual field constriction in the right eye (Fig. 1). She was unable to perform fields in the left eye due to profound vision loss. MRI brain and orbits without and with contrast (Fig. 2) demonstrated thickened enhancing bilateral intra-orbital optic nerves with associated T2 hyperintense signal on DWI (Diffusion-weighted imaging) suggestive of optic neuritis-likely acute. There was right frontal dural thickening with a ring-enhancing lesion in the right frontal lobe. MRI spine showed long segment intramedullary T2 hyperintense signal extending from C7-T1 up to T7. Laboratory tests showed an increase in the erythrocyte sedimentation rate (84mm at 1-h, normal reference range: 0–20 mm) and positive C-reactive protein (16.55mg/L, normal level: <6mg/L). Autoimmune and vasculitic blood

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<https://doi.org/10.1016/j.ajoc.2020.101001>

Received 20 March 2020; Received in revised form 12 October 2020; Accepted 7 December 2020

Available online 13 December 2020

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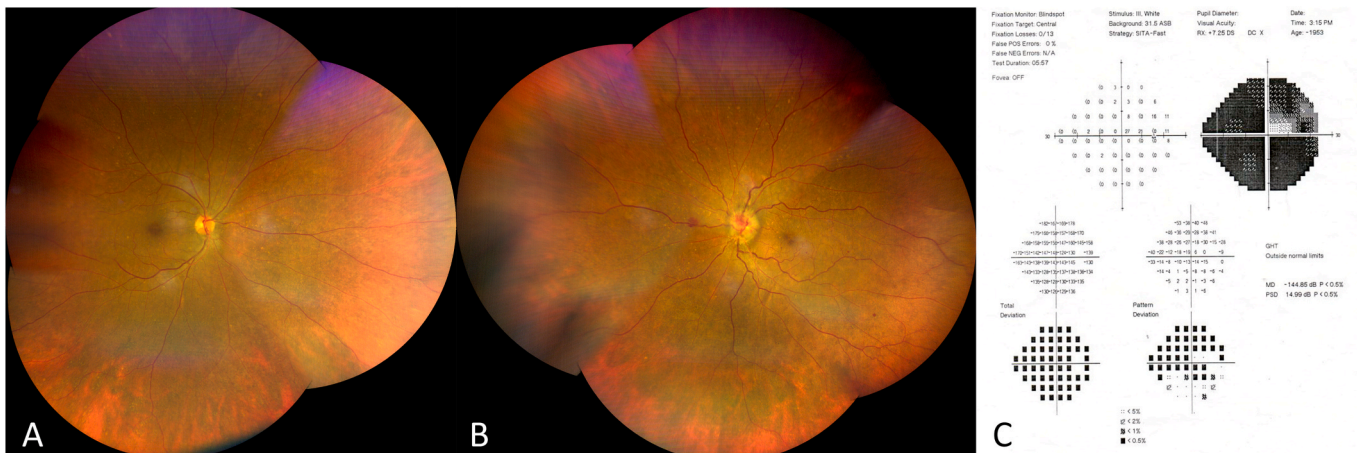


Fig. 1. Right and left eye fundus photo (A, B) showing normal right optic disc and disc edema with tortuous veins and retinal hemorrhage nasal to disc in the left eye. Humphrey visual field testing shows generalized constriction in the right eye (C).

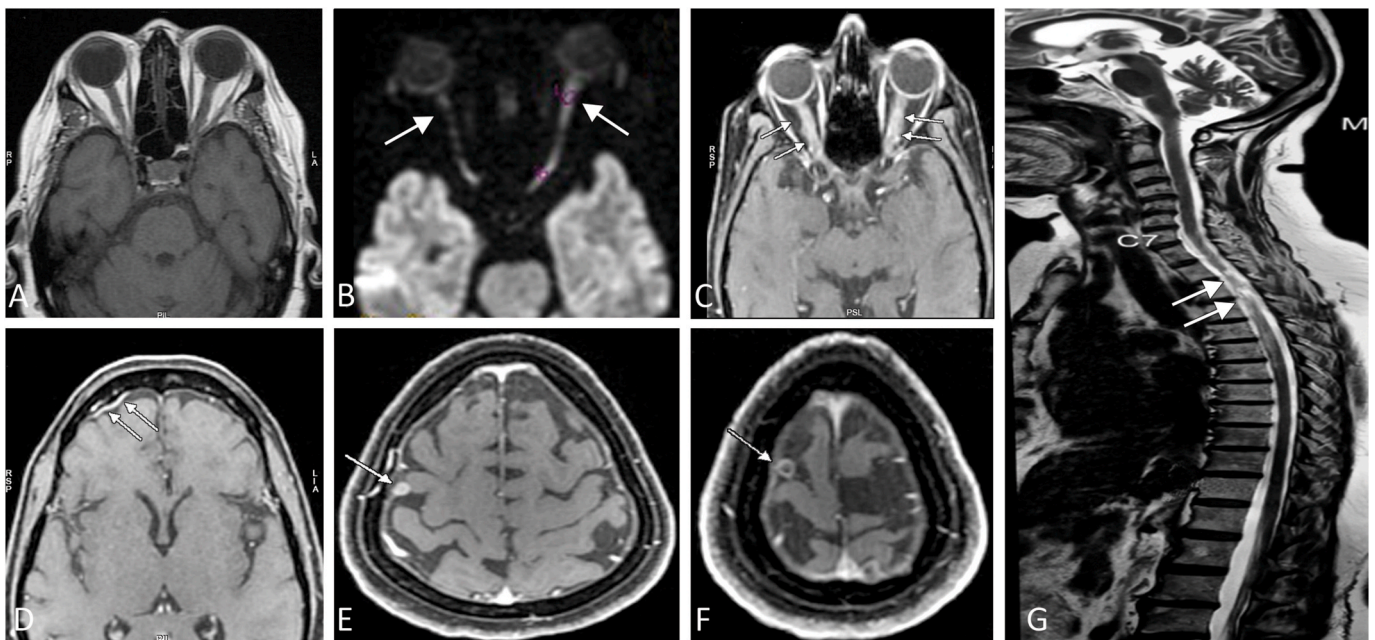


Fig. 2. MRI brain and orbit-thickened bilateral intraorbital optic nerves suggestive of optic neuritis with a bright signal on DWI and moderate enhancement post-contrast (A, B, C). Focal nodular right frontal dural thickening (D). Small ring-enhancing lesion abutting right frontal cortex –probably cysticercosis (E, F). MRI spine revealed intramedullary T2 hyperintense signal from C7-T1 up to T7 suggestive of demyelination (G).

workup including NMO-MOG was negative.

The patient was referred to a neurologist for further CSF analysis and to rule out signs of central nervous system demyelination. CSF biochemical analysis revealed elevated glucose (115mg/dL) while protein and cell count was normal. CSF culture was negative for organisms and no oligoclonal bands detected. Subsequently, she received intravenous methylprednisolone 1gram for 3 days followed by tapering oral steroids along with methotrexate 7.5mg weekly and albendazole 400mg/day for 2 weeks. Her visual acuity improved to 20/25 in the right eye and 20/30 in the left eye at one-week follow-up and left eye showed resolving disc edema with constricted visual fields (Fig. 3).

One month later, she was asymptomatic and bladder control was better following treatment. Her BCVA was 20/20 in both eyes with normal color vision, fundus, and visual fields (Fig. 4). The patient was advised continued follow-up care with neurology.

3. Discussion

The association between H1N1 infection and its ocular manifestations including optic neuropathy has been previously studied but the precise pathogenesis remains unknown. H1N1 influenza is an acute respiratory infectious disease caused by influenza virus.² Patients with influenza present with flu-like symptoms such as fever, headache, chills, upper respiratory tract symptoms (cough, sore throat, rhinorrhea, watering eyes, red eyes, shortness of breath), myalgia, arthralgia, fatigue, vomiting, abdominal pain, and diarrhea.³

Influenza viruses belong to the family of Orthomyxoviridae which are enveloped with surface projections or spikes containing glycoproteins that allow the virus to attach to host cells and initiate infection. One of the remarkable features of the influenza virus is the frequency with which antigenic changes occur.⁴ Swine influenza is caused by five influenza A subtypes - H1N1, H1N2, H2N3, H3N1, and H3N2. It spreads from person to person, either by inhaling the virus from an infected

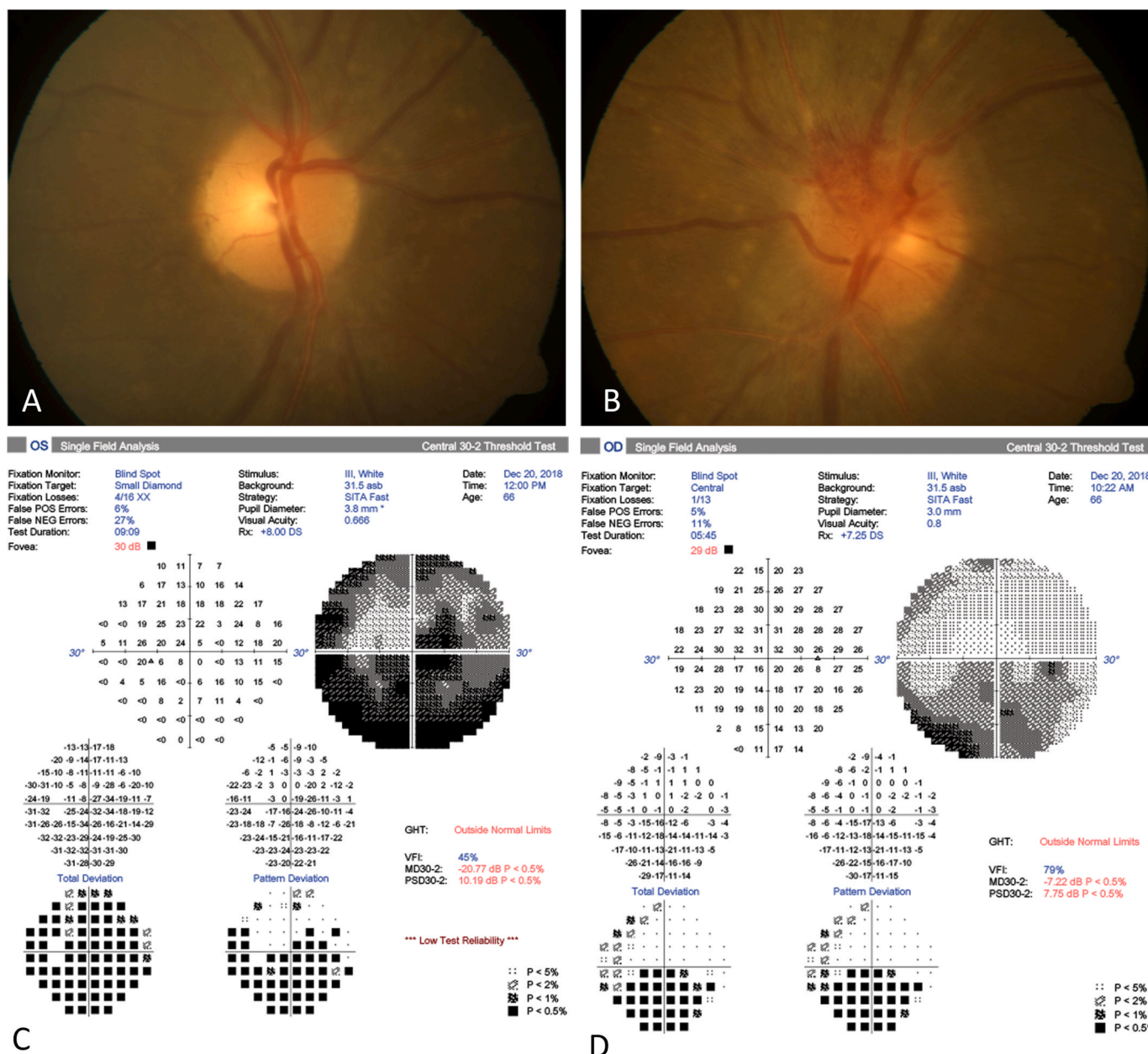


Fig. 3. Right and left eye disc photo (A, B) showing normal right optic disc and left eye resolving disc edema. Humphrey visual fields show constriction in the left eye and inferior defects in the right eye (C, D).

person via coughing or sneezing or by contact with surfaces contaminated with the virus then touching the mouth or nose.³

A population-based study⁵ on the estimation of community-level influenza-associated illness in a low resource rural setting in India conducted during 2011 by means of household-based healthcare utilization surveys for acute medical illness in preceding 14 days along with clinic-based surveillance using nasal and throat swabs real-time polymerase chain reaction testing for influenza demonstrated that influenza-like illness was highest among young children and older adults in the rural community of Ballabgarh, in northern India.

Although influenza is usually a self-limited disease, some patients develop pulmonary complications that may be life-threatening. Rarely, non-pulmonary complications like myocarditis, pericarditis, toxic shock syndrome, and neurological complications can occur particularly in the elderly and those with pre-existing medical disease and are associated with increased mortality. Neurological manifestations including encephalitis, encephalomyelitis, Guillain-Barré syndrome, transverse

myelitis, Reye syndrome, and cranial neuropathies have been described.⁴

Yang et al.² reported a case of ADEM in a 56-year-old patient following H1N1 pneumonia and suggested that H1N1 can affect the CNS and in these patients, there should be increased awareness for neurological complications. Similarly, Wang et al.⁶ reported a case of ADEM associated with H influenza A H1N1 infection. Vienello et al.⁷ described a child with optic neuritis following influenza B virus meningoencephalitis and emphasized that clinicians should be vigilant about the possibility of optic neuritis among complications of influenza virus infections.

Lai et al.⁸ reported the first case of acute anterior uveitis and optic neuritis after influenza A infection in a 11-year-old boy. This patient was also prescribed high-dose intravenous pulse steroid therapy and achieved a good response with symptom relief and visual acuity improvement. A case of bilateral acute anterior uveitis and unilateral optic neuritis concomitant with influenza A infection was reported by

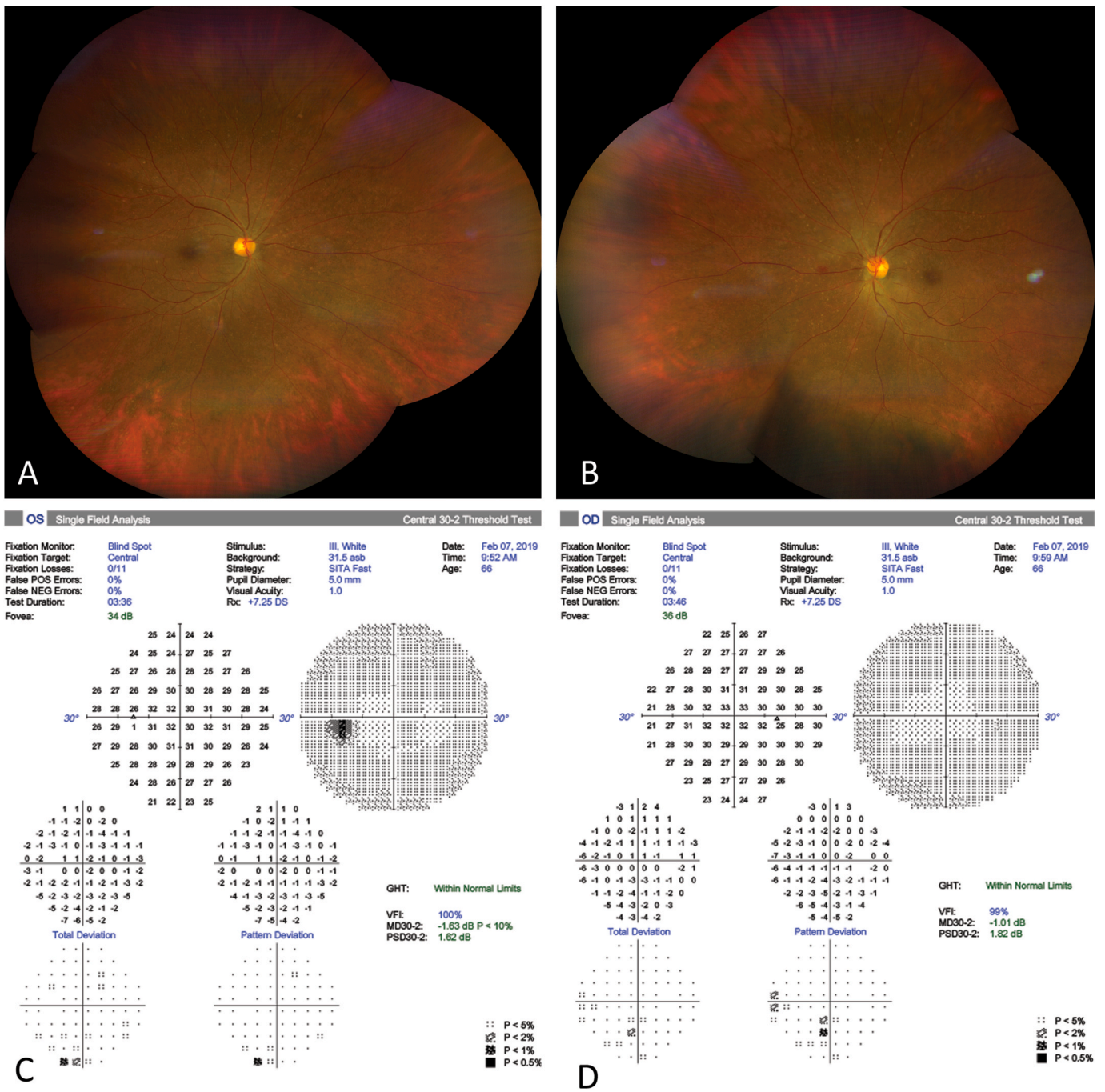


Fig. 4. Right and left eye fundus photo (A, B) shows normal optic discs and visual fields are normal in both eyes (C, D).

Nakagawa et al.⁹ which resolved effectively with topical and systemic corticosteroids. A few cases of optic neuritis in adults associated with influenza infection have been reported in the literature. Kidd D.P¹⁰ described a 26-year-old female with blurred vision in both eyes following flu-like illness and viral screening study was positive for H1N1. Another case of unilateral optic neuritis associated with influenza A infection in a 51-year-old woman who responded well to corticosteroid therapy was illustrated by Iorga et al.¹¹

In addition to neuro-ophthalmic manifestation, H1N1 influenza virus infection has been associated with various posterior segment changes including acute retinitis,^{12,13} cotton wool spots,¹⁴ acute macular neuroretinopathy,¹⁵ frosted branch angiitis-like fundus,¹⁶ acute multifocal placoid pigment epitheliopathy and serous macular detachment,¹⁷ bilateral vaso-occlusive retinal vasculitis¹⁸ and uveal effusion

syndrome.¹⁹

Neuroimaging is a valuable tool not only to confirm the diagnosis but also to evaluate the severity of clinical state and associated abnormalities guiding treatment decisions. In our patient, ring-enhancing lesion abutting right frontal cortex was probably a cysticercus lesion detected incidentally on MRI. The presence of optic disc edema and cerebral ring-enhancing lesion might raise the suspicion of toxoplasmosis. Optic nerve involvement in ocular toxoplasmosis is usually associated with 1) a distant active lesion, 2) activation near an old peripapillary scar 3) direct optic nerve involvement as either papillitis or neuroretinitis.²⁰ Eckert GU et al.²¹ described that in pure papillitis, the majority of cases have a peripheral scar lesion and vitritis is always present over the optic disc. Thus, the absence of associated juxtapapillary or distant retinochoroidal active or inactive lesion, vitritis, retinal vasculitis, or macular exudates

proves ocular toxoplasmosis a less likely etiology.

Our patient, an elderly female with several systemic ailments and wheelchair-bound due to recent tibial fracture on plaster cast presented with acute vision loss following a flu-like episode. She was diagnosed as bilateral optic neuritis with spine demyelination along with neurocysticercosis. She responded well to corticosteroid therapy and in combination with immunosuppressants and antihelminthic drugs had complete recovery of visual acuity and visual fields within a month. Although our patient had a selective involvement of optic nerves and spine post-viral infection, probably the likelihood of developing multiple sclerosis (MS) is less in our case in concurrence with the results of Optic neuritis treatment trial (ONTT). The ONTT showed the chance of conversion to multiple sclerosis at five years was lower when the optic disc was swollen (papillitis).²² Several case reports of optic neuritis associated with viral infections have been reported in the literature. Optic neuritis following herpes simplex virus,²³ measles,²⁴ chikungunya,^{25,26} dengue²⁷ treated with systemic steroids were reported to have good visual recovery similar to our case.

4. Conclusion

Optic neuritis has been reported earlier in association with various infectious diseases. We present a rare case of optic neuritis following H1N1 infection associated with demyelinating spinal cord lesions that responded to intravenous and oral steroids and had a good visual recovery.

Conflicts of interest

No conflicting relationship exists for any author.

Patient consent

Written consent to publish this case report was obtained from the patient.

Acknowledgment and Disclosures

None.

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