Razavi Int J Med. 2025 April; 13(2): e1381 doi: 10.30483/rijm.2025.254592.1381

Published online 2025 April. **Case Report**

Severe Simultaneous Bilateral Optic Neuritis as a Rare Clinical Manifestation in a Case of Multiple Sclerosis Presented with Acute Bilateral Vision Loss in the Emergency Department

Rana Kolahi Ahari[1*], Shaghayegh Rahmani[2], Hamed Rouhani[3]

1. Faculty of Medicine, Mashhad Medical Sciences, Islamic Azad University, Mashhad, Iran
2. Innovated Medical Research Center, Faculty of Medicine, Mashhad Islamic Azad University of Medical Sciences, Mashhad, Iran
3. Department of Neurosurgery, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

***** ***Corresponding author:*** Rana Kolahi Ahari, Faculty of Medicine, Mashhad Medical Sciences, Islamic Azad University, Mashhad, Iran. Email: kolahi.rana@gmail.com.

Received 2025 January 28**; Accepted** 2025 April 25.

Abstract

Background: Ophthalmological emergencies typically present with visual loss, diplopia, ocular motility impairment, or anisocoria. Acute vision loss is a frightening manifestation for both patients and physicians, and it can occur as one or both eyes are involved. It is a common manifestation in patients with multiple sclerosis (MS), and the most common cause is optic neuritis (ON). ON is almost always unilateral in subjects with MS, and simultaneous bilateral ON has rarely been reported.

Case Presentation: Here, we report a case of a female patient with a history of MS who presented with simultaneous bilateral and progressive vision loss. ON in this patient did not respond dramatically to high doses of intravenous methylprednisolone. So, she received intravenous humanized monoclonal anti-CD20 antibody therapy (Ocrelizumab).

Conclusion: This report aims to introduce a scarce case regarding the key points for evaluating patients with acute visual loss in the emergency department.

Keywords: Multiple Sclerosis, Bilateral Optic Neuritis, Emergency Department, Acute Vision Loss

1. Background

Emergency-related situations are those that, if not identified and managed properly, may lead to long-term consequences or death. Ophthalmological emergencies typically present with symptoms such as visual loss, diplopia, ocular motility impairment, or anisocoria. Acute vision loss is a common, alarming symptom in the emergency setting that can be presented as a transient problem (lasting less than 24 hours) or persistent (lasting more than 24 hours) (1).

Multiple sclerosis (MS) is a chronic inflammatory immune-mediated neurological disease, which is associated with demyelinating and axonal damaging of the central nervous system (CNS) (2, 3). MS is considered one of the most common neurological diseases affecting young adults (2). The clinical presentation is varied and depends on the brain and spinal cord region involved (4). However, common manifestations are sensory-motor deficits, visual symptoms, fatigue, and weakness.

Early ophthalmologic signs of MS can be optic neuritis (ON), diplopia, or blurred vision (5). ON is the initial manifestation in 15-20% of MS cases, almost always presenting unilaterally, and simultaneous bilateral ON is rare (6). Here, we reported a case of MS with bilateral ON who was referred to the emergency department with acute blindness.

2. Case Presentation

A 38-year-old woman with a prior medical history of MS since 2015 was referred to the emergency department with sudden bilateral blurred vision. She did not report other signs or symptoms. MS was first diagnosed in 2015 within the juxta cortical area, the corpus callosum, and pericallosal white matter demyelinating plaques on magnetic resonance imaging (MRI). Her first manifestation was Optic Neuritis.

Ophthalmology examination showed significantly poor visual acuity (slight perception of bright light). The patient's ocular movements were painful. Both eyes were involved, so the relative afferent pupillary defect (RAPD) could not be assessed. Fundoscopic examination revealed severe bilateral papilledema. Autokeratometery was also done, but it was not significant. Based on these findings and her past medical history, she was referred for a neurological consult for further investigations and the possibility of bilateral optic neuritis. Her laboratory examination was also unremarkable.

Other neurologic examinations were normal, and the patient had a clinically isolated syndrome (CIS). The patient was diagnosed with acute simultaneous bilateral optic neuritis caused by multiple sclerosis exacerbation by an experienced neurologist.

According to current guidelines for Optic Neuritis Treatment (ONT), the patient was a candidate for high doses of intravenous methylprednisolone and hospitalization. She received intravenous methylprednisolone with an initial dose of 1000 mg/day for 5 days. After 5 days, while she did not experience a dramatic response with no improvement in visual symptoms, methylprednisolone infusion was extended for two more days, followed by oral prednisolone. After 2 weeks, with no change in clinical condition and referral to an expert panel committee, Ocrelizumab (intravenous anti-CD20 monoclonal antibody) was administered to her. After the first dose, she experienced significant improvement.

3. Discussion

Diagnostic approach to vision loss

As in other neurologic emergencies, localizing the lesion is important in diagnosing the condition. It is important to consider ophthalmic and neurologic systems in patients with visual complaints. Physical examination and history-taking must focus on the severity and duration of vision loss, binocularity of involvement, and pupil condition. Determining the detailed ophthalmic examination in patients with bilateral homonymous visual field deficits might be misinterpreted. Table 1 summarizes the key points for evaluating patients with visual loss in the emergency department (7).

Table 1. Key points in patients with acute blindness

History	Physical Examination
Duration of visual loss	Visual acuity
Severity of visual loss	Visual color
Drug use or drug abuse	Visual field
Binocularity of vision loss	Pupillary exam
Existence of Pain	Fundoscopic exam
Other neurologic signs or symptoms	Ocular movement

A detailed neurologic examination should be considered in patients with acute vision loss. Acute bilateral blindness might be a manifestation of cerebral ischemic or hemorrhagic stroke. Methanol toxicity, paracetamol overdose, or other drug interactions also can lead to vision loss. Orbital or ocular movement pain and extra-ocular movement limitations should be assessed in all patients. Giant Cell Arteritis (GCA) is another life-threatening condition presented with acute blindness (8).

MS pathophysiology and presentations

MS is a chronic inflammatory immune-mediated neurological disease associated with demyelinating and axonal damage of the central nervous system (CNS) (3, 9). MS is also considered an autoimmune disease with periods of exacerbation and remission, involving both humoral and cellular arms of the immune system, and accepted pathogenesis indicates auto reactivation of T helper1 and T helper17 cells (10). Environmental factors, including infections, vitamin D deficiency, smoking, and obesity, are crucial in MS pathogenesis (11).

The clinical manifestation of MS is unpredictable since it can affect any area of the central nervous system. The most common symptoms include sensory disturbances, motor dysfunctions, vision problems, cognitive and emotional impairment, and urinary system dysfunction. Visual problems include optic neuritis, diplopia, or blurred vision(4, 11, 12).

Globally, MS affects individuals between the ages of 20-40 and is more common in women than men (sex ratio 2.5:1). The prevalence is approximately 120 per 100,000 individuals (12). Our patient was first diagnosed at a young age, and it was her third exacerbation. She was in her fourth decade of life, and her first presentation was unilateral ON.

Rare presentations of ON

To the best of our knowledge, there are less than 10 cases reported with simultaneous bilateral ON related to MS worldwide.

ON refers to inflammation of the optic nerve, which is the most common optic neuropathy in people under the age of 50 coming to general ophthalmic practice and also the earliest clinical manifestation in about 20% of cases of MS(13). The classic triad for diagnosis of ON is periocular pain, visual loss, and dyschromatopsia(13). Although ON is usually an inflammatory condition, it can also occur following an infection caused by bacteria (Tuberculosis, Bartonella henselae, syphilis, and borrelia burgdorferi), viruses (influenza, measles, and mumps), fungi (candida, cryptococci, Histoplasma, mucormycosis and aspergillus) and parasites (toxocara canis, toxoplasma gondii, onchocerca volvulus, toxocara canis and malaria) (14).

ON in MS patients is characterized by almost always sub-acute painful unilateral visual loss, especially in young females (15). However, it can be presented bilaterally, occurring sequentially within a few weeks or simultaneously (15). The incidence of bilateral simultaneous ON in the white adult population is low, and it is usually considered as one inaugural form of Neuromyelitis Optica (NMO; Devic_s disease) (16). Furthermore, the frequency of bilateral ON as a symptom of MS is only 0.42%, making this a rare manifestation of MS (17).

Bilateral ON is presented in many diseases and conditions like COVID-19, after COVID-19 vaccination, Tuberculosis, mycoplasma infection, and others. However, it is rare to present in MS patients(18). Our patient had a positive history of COVID-19 vaccination. It is not clear if it is a consequence of vaccination or an exacerbation session of her underlying disease.

In our case, periocular pain was not very significant. Her main complaint was visual loss. Eye movements are painful in ON because of muscle traction and optic nerve inflammation. In more than 80% of patients with ON, visual functions recover spontaneously and without treatment within 2-3 weeks. According to the

Optic Neuritis Treatment Trial (ONTT) and other studies, high-dose intravenous corticosteroids were effective in improving short-term visual recovery, especially for contrast sensitivity and visual fields, compared to oral prednisolone and placebo(19). Treatment with standard doses of oral prednisone alone is not recommended in acute typical ON since it increases the risk of relapse of ON(20). Based on recent developments in ON treatment, patients with poor response to steroids can be treated with intravenous immunoglobulins or plasma exchange (5).

Ocrelizumab rationale and response

Our reported case of visual loss did not respond to corticosteroid therapy, and she received Ocrelizumab. Ocrelizumab is an intravenously infused humanized monoclonal antibody that depletes CD20-expressing B cells selectively(21). Ocrelizumab is FDA (Food and Drug Administration) approved therapy for relapsing-remitting multiple sclerosis (RRMS) and primary progressive multiple sclerosis (PPMS). According to an extensive systematic review study, it has been indicated that the efficacy and safety of Ocrelizumab is comparable or even superior to all other disease-modifying therapies (DMTs) approved for RRMS as of yet (22)

4. Conclusion

We presented a known case of MS with acute and simultaneous bilateral ON. Although ON in MS is a common manifestation, simultaneous bilateral ON is rare. Therefore, ophthalmologists should be aware of ON atypical types and immediately refer patients with acute bilateral vision loss for further evaluations and decisions regarding the early institution of disease-modifying therapy for rapid return of visual acuity.

Intravenous methylprednisolone is still considered a standard acute ON treatment. Atypical forms of ON, such as simultaneous bilateral Optic Neuritis, seem to have less response to traditional therapeutic options like steroids with a more extended recovery period. Thus, further therapeutic options such as intravenous monoclonal antibodies and other novel options should be considered.

Acknowledgment: We would like to thank all personnel for their support and cooperation, especially those in the emergency room.

Availability of data and materials: The data supporting the findings of this case report are available from the corresponding author upon reasonable request.

Conflicts of Interests: The authors declare no conflict of interest regarding the present case report. The authors confirm that neither the manuscript nor its main contents have been published or submitted for consideration for publication in another journal.

Consent for publication: Written informed consent for publication of this case report has been obtained from the patient.

Ethics approval and consent to participate: This case report was conducted in accordance with the ethical standards of the ethics committee. Given the nature of a case report and the use of anonymized patient data, formal ethical approval was waived or deemed unnecessary by the relevant ethics committee. Informed consent for participation was obtained from the patient.

Financial disclosure: No financial support was received for this study

Author contributions: Each author has made substantial contributions to the final manuscript, approved the submitted version, and agreed to be personally accountable for the author's contributions and to ensure that questions related to the accuracy or integrity of any part of the work.

References

1. Sen Tanrikulu C, Hocagil H, Kaya U, Hocagil AC. Acute bilateral vision loss in emergency department: A case report. Turkish Journal of Emergency Medicine. 2016;16(1):38-40. https://doi.org/10.1016/j.tjem.2014.12.001PMid:27239639 PMCid: PMC4882198
2. Haki M, Al-Biati HA, Al-Tameemi ZS, Ali IS, Al-Hussaniy HA. Review of multiple sclerosis: Epidemiology, etiology, pathophysiology, and treatment. Medicine. 2024;103(8):e37297. https://doi.org/10.1097/MD.0000000000037297PMid:38394496 PMCid: PMC10883637
3. Lorenzut S, Negro ID, Pauletto G, Verriello L, Spadea L, Salati C, et al. Exploring the pathophysiology, diagnosis, and treatment options of multiple sclerosis. Journal of Integrative Neuroscience. 2025;24(1):1-14. https://doi.org/10.31083/JIN25081PMid:39862004
4. Ford H. Clinical presentation and diagnosis of multiple sclerosis. Clinical Medicine. 2020;20(4):380. https://doi.org/10.7861/clinmed.2020-0292PMid:32675142 PMCid: PMC7385797
5. Khetpal A, Kumar R, Khetpal N. Severe Bilateral Optic Neuritis: A Rare Presentation of Clinically Isolated Syndrome. Cureus. 2020;12(10). https://doi.org/10.7759/cureus.11135
6. Ducloyer J-B, Marignier R, Wiertlewski S, Lebranchu P. Optic neuritis classification in 2021. European journal of ophthalmology. 2022;32(2):754-66. https://doi.org/10.1177/11206721211028050PMid:34218696
7. Da Cruz Escaleira ALR, Kalogeropoulos D, Kalogeropoulos C, Ch'Ng SW, Sung VC, Asproudis I, et al. Four common diseases causing sudden blindness or death in the eye emergency department. Postgraduate Medical Journal. 2021;97(1146):256-63. https://doi.org/10.1136/postgradmedj-2020-138163PMid:32788313
8. Spiegel SJ, Moss HE. Neuro-Ophthalmic Emergencies. Neurologic Clinics. 2021;39(2):631-47. https://doi.org/10.1016/j.ncl.2021.01.004PMid:33896536 PMCid: PMC8081067
9. Klineova S, Lublin FD. Clinical course of multiple sclerosis. Cold Spring Harbor perspectives in medicine. 2018;8(9):a028928. https://doi.org/10.1101/cshperspect.a028928PMid:29358317 PMCid: PMC6120692
10. Angelini G, Bani A, Constantin G, Rossi B. The interplay between T helper cells and brain barriers in the pathogenesis of multiple sclerosis. Frontiers in cellular neuroscience. 2023;17:1101379. https://doi.org/10.3389/fncel.2023.1101379PMid:36874213 PMCid: PMC9975172
11. Lazibat I, Rubinić-Majdak M, Županić S. Multiple sclerosis: new aspects of immunopathogenesis. Acta Clinica Croatica. 2018;57(2):352 https://doi.org/10.20471/acc.2018.57.02.17PMid:30431730 PMCid:PMC6532002
12. Ghasemi N, Razavi S, Nikzad E. Multiple sclerosis: pathogenesis, symptoms, diagnoses and cell-based therapy. Cell Journal (Yakhteh). 2017;19(1):1.
13. Guier C, Kaur K, Stokkermans T. Optic neuritis. StatPearls. 2025.
14. Eggenberger E. Optic neuritis. CONTINUUM: Lifelong Learning in Neurology. 2025;31(2):407-35. https://doi.org/10.1212/CON.0000000000001560PMid:40179402
15. Ciapă MA, Șalaru DL, Stătescu C, Sascău RA, Bogdănici CM. Optic neuritis in multiple sclerosis-a review of molecular mechanisms involved in the degenerative process. Current issues in molecular biology. 2022;44(9):3959-79. https://doi.org/10.3390/cimb44090272PMid:36135184 PMCid: PMC9497878
16. Kale N. Optic neuritis as an early sign of multiple sclerosis. Eye and brain. 2016:195-202. https://doi.org/10.2147/EB.S54131PMid:28539814 PMCid: PMC5398757
17. Kraker JA, Chen JJ. An update on optic neuritis. Journal of Neurology. 2023;270(10):5113-26. https://doi.org/10.1007/s00415-023-11920-xPMid:37542657
18. García-Estrada C, Gómez-Figueroa E, Alban L, Arias-Cárdenas A. Optic neuritis after COVID-19 vaccine application. Clinical and Experimental Neuroimmunology. 2022;13(2):72-4. https://doi.org/10.1111/cen3.12682PMid:34900001 PMCid: PMC8653244
19. Hickman SJ, Petzold A. Update on optic neuritis: an international view. Neuro-Ophthalmology. 2022;46(1):1-18.

https://doi.org/10.1080/01658107.2021.1964541PMid:35095131 PMCid: PMC8794242

20. Bennett JL, Costello F, Chen JJ, Petzold A, Biousse V, Newman NJ, et al. Optic neuritis and autoimmune optic neuropathies: advances in diagnosis and treatment. The Lancet Neurology. 2023;22(1):89-100. https://doi.org/10.1016/S1474-4422(22)00187-9 PMid:36155661
21. Montalban X, Hauser SL, Kappos L, Arnold DL, Bar-Or A, Comi G, et al. Ocrelizumab versus placebo in primary progressive multiple sclerosis. New England Journal of Medicine. 2017;376(3):209-20. https://doi.org/10.1056/NEJMoa1606468 PMid:28002688
22. McCool R, Wilson K, Arber M, Fleetwood K, Toupin S, Thom H, et al. Systematic review and network meta-analysis comparing Ocrelizumab with other treatments for relapsing multiple sclerosis. Multiple sclerosis and related disorders. 2019;29:55-61. https://doi.org/10.1016/j.msard.2018.12.040 PMid:30677733