Optic neuritis

- Neuroprotective role of high dose Vitamin D supplementation in multiple sclerosis: Sub-analysis of the EVIDIMS trial
- Biomarkers for diagnosis and prognosis of myelin oligodendrocyte glycoprotein antibody-associated disease - review article
- Myelin oligodendrocyte glycoprotein-antibody disease (MOGAD) with leukodystrophy-like presentation
- Optical coherence tomography angiography biomarkers in multiple sclerosis and neuromyelitis optica spectrum disorders: a systematic review
- Reconsideration of conversion to multiple sclerosis: one-year cerebral lesion appearance rate of Japanese aquaporin-4 antibody-negative optic neuritis patients
- Role of CSF flow and meningeal barriers in the development of inflammatory lesions at the CNS-PNS transition zone of cranial nerves in autoimmune demyelinating diseases
- The potential of visual evoked potentials latency and amplitude to be a subclinical predictor of clinical prognosis in multiple sclerosis
- Neutropenia Associated With B Cell-Depleting Therapies in Multiple Sclerosis and Neuromyelitis Optica Spectrum Disorder

Optic neuritis is an inflammation of the optic nerve.

Clinical features

It can cause severe pressure, pain and headaches and may result in the destruction of the protective myelin sheath that covers the optic nerve. These conditions are usually the result of an autoimmune reaction or disorder in which the body mistakes its own oligodendrocytes for a pathogen and essentially attacks them.

Any time the myelin sheath has been destroyed or severely compromised, the nerve is susceptible to direct damage. Optic neuropathy is a general term used to describe any conditions that result in damage to the optic nerve. Symptoms would include blurred vision in only one eye, double vision, difficulty in coordination and fatigue. Benign tumors can also form in the optic nerve sheath and cause these side effects. Tumor growth may compress the optic nerve and cause loss of vision in the affected eye.

Research has been conducted for many years to develop techniques for detecting these issues early on and repairing the myelin sheaths. One option to patients might be the surgical implanting of oligodendrocyte precursor cells. Other times, the condition is so progressed or acute that there may not be a cure, only medications and treatments to deal with pain or slow the condition's progress.

Classic clinical findings of multiple sclerosis are optic neuritis, paresthesias, INO and bladder symptoms.

The percentage of patients with an attack of optic neuritis and no prior attack that will go on to develop MS ranges from 17–87%, depending on the series [1)].

see neuromyelitis optica

Nitrofurantoin (Macrodantin®): may cause optic neuritis.

Papilledema may appear similar to optic neuritis on funduscopy, but the latter is usually associated with more severe visual loss and tenderness to eye pressure over the eye.

Early bevacizumab therapy in steroid refractory radiation induced optic neuritis (RION) shows gratifying results [2)].

Diagnosis

see Optic Neuritis Diagnosis

Associated Conditions: - **Multiple Sclerosis (MS)**: Optic neuritis is often the first symptom of MS, and up to 50% of people with optic neuritis will develop MS. - **Neuromyelitis Optica**: A condition that also causes inflammation in the optic nerves and spinal cord.

Differential diagnosis

Optic neuritis can present similarly to other conditions affecting vision or the optic nerve. To ensure an accurate diagnosis, physicians consider several conditions in the **differential diagnosis** of optic neuritis. These conditions may have overlapping symptoms, such as visual loss, optic nerve inflammation, or pain. Below are key conditions that are typically included in the differential diagnosis:

1. Neuromyelitis Optica Spectrum Disorder (NMOSD)

1. **Description**: An autoimmune disorder that primarily affects the optic nerves and spinal cord, similar to multiple sclerosis.
2. **Differentiation**: Often presents with severe optic neuritis, bilateral involvement, and more pronounced visual loss than typical optic neuritis. Presence of aquaporin-4 (AQP4) antibodies helps differentiate NMOSD from MS-related optic neuritis.

2. Multiple Sclerosis (MS)

1. **Description**: An autoimmune disease affecting the central nervous system, often manifesting with optic neuritis as an early symptom.
2. **Differentiation**: MS-related optic neuritis usually presents with unilateral involvement, pain

with eye movement, and often recovers spontaneously. MRI showing brain lesions (demyelinating plaques) consistent with MS can confirm this.

3. Ischemic Optic Neuropathy (ION)

1. **Description**: Reduced blood flow to the optic nerve, leading to sudden vision loss, commonly in older individuals.
2. **Differentiation**: Ischemic optic neuropathy usually occurs without pain and is more common in older adults (over 50). It typically involves sudden, painless vision loss. Fundoscopy shows optic disc swelling and may reveal vascular risk factors.

4. Compressive Optic Neuropathy

1. **Description**: Compression of the optic nerve due to tumors (e.g., pituitary adenoma, meningioma), aneurysms, or other mass lesions.
2. **Differentiation**: Gradual, painless vision loss and visual field defects, often bitemporal hemianopia in cases of pituitary adenoma. MRI or CT scan can reveal compressive masses.

5. Leber's Hereditary Optic Neuropathy (LHON)

1. **Description**: A mitochondrial genetic disorder that leads to sudden vision loss, typically in young adult males.
2. **Differentiation**: Painless, subacute bilateral vision loss, with no inflammation. Family history of similar cases and genetic testing for mitochondrial mutations confirm LHON.

6. Sarcoidosis-Associated Optic Neuropathy

1. **Description**: Sarcoidosis is a systemic inflammatory disease that can involve the optic nerve, causing optic neuropathy.
2. **Differentiation**: May present with optic nerve swelling, vision loss, and other systemic symptoms (e.g., lung involvement, skin lesions). Chest imaging and biopsy can confirm sarcoidosis.

7. Infectious Optic Neuritis

1. **Description**: Infections such as syphilis, tuberculosis, or Lyme disease can involve the optic nerve, causing optic neuritis-like symptoms.
2. **Differentiation**: Symptoms may include systemic signs of infection, such as fever, rash, or joint pain. Serological tests (e.g., VDRL for syphilis, Lyme titers) help identify the infectious cause.

8. Toxic or Nutritional Optic Neuropathy

1. **Description**: Caused by exposure to toxins (e.g., methanol, ethambutol) or vitamin deficiencies (e.g., B12, thiamine deficiency).
2. **Differentiation**: Often bilateral, painless vision loss, sometimes with a history of toxic exposure (e.g., alcohol, medications) or poor nutrition. Blood tests for vitamin levels or toxic substances help confirm the diagnosis.

9. Autoimmune-Related Optic Neuropathy

1. **Conditions**: Such as lupus, Behçet’s disease, or giant cell arteritis (temporal arteritis).
2. **Differentiation**: Giant cell arteritis typically presents in elderly patients with scalp tenderness,

jaw claudication, and systemic symptoms (e.g., weight loss, fever). Elevated ESR and CRP levels, as well as a temporal artery biopsy, help confirm the diagnosis.

10. Central Retinal Artery Occlusion (CRAO)

1. **Description**: Sudden blockage of the central retinal artery leading to acute vision loss.
2. **Differentiation**: Presents with sudden, painless, unilateral vision loss. Fundoscopy reveals a pale retina with a cherry-red spot.

11. Acute Disseminated Encephalomyelitis (ADEM)

1. **Description**: A rare autoimmune disease that causes inflammation in the brain and spinal cord, often following an infection or vaccination.
2. **Differentiation**: Optic neuritis in ADEM is often bilateral and associated with other neurological deficits. MRI may show multiple inflammatory lesions in the brain.

12. Paraneoplastic Optic Neuropathy

1. **Description**: A rare condition in which optic neuropathy is associated with an underlying cancer (e.g., small cell lung cancer).
2. **Differentiation**: Symptoms may be accompanied by systemic signs of malignancy (weight loss, night sweats). Autoantibody testing (e.g., anti-Hu, anti-Yo) and cancer screening may be warranted.

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Diagnostic Tools to Differentiate Causes: 1. **MRI**: To assess optic nerve and brain lesions. 2. **Blood Tests**: For autoimmune markers, infections, and toxins. 3. **CSF Analysis**: In cases of suspected autoimmune or infectious causes. 4. **Visual Field Testing**: To map visual deficits. 5. **Genetic Testing**: For hereditary optic neuropathies like LHON. 6. **Biopsy**: Temporal artery biopsy in suspected giant cell arteritis.

Correct diagnosis involves ruling out these differentials through clinical assessment, imaging, and lab tests.

Treatment

- **Corticosteroids**: High-dose intravenous steroids may be used to reduce inflammation and speed up recovery. - **Plasma Exchange**: In severe cases, plasma exchange may be used if steroids are ineffective.

Early diagnosis and treatment are important to prevent long-term vision problems.

Narrative reviews

In a patient-physician perspective article, Braithwaite et al. shared the story of a patient affected by an autoimmune disease that attacks the nerves connecting the eyes and the brain and reflects back physicians’ perspectives on the disease and the patient’s experience of it. In a compelling account, we gain some understanding of what it might be like to live with the fear of unpredictable episodes of

sudden, recurrent sight loss and the important impacts that this has on a patient's life and mental wellbeing. We recognize that the outcome metrics that physicians usually focus on, such as measurement of vision and imaging of the optic nerve, do not fully capture the outcomes that most matter to the patient. We explore patient-reported outcome measures that go some way towards bridging this gap. Finally, we consider the technological advances that will make more comprehensive capture of the patient experience reality in future clinical practice and research, supporting both patients and physicians to optimize shared care [3].

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Rowland LP. Merritt's Textbook of Neurology. Philadelphia 1989
2)
Dutta P, Dhandapani S, Kumar N, Gupta P, Ahuja C, Mukherjee KK. Bevacizumab for radiation associated visual decline among aggressive residual/recurrent suprasellar tumors: More than a mere anti-neoplastic effect. World Neurosurg. 2017 Jul 25. pii: S1878-8750(17)31211-1. doi: 10.1016/j.wneu.2017.07.111. [Epub ahead of print] PubMed PMID: 28754639.
3)
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