Multimodal Imaging of Fellow Eye Involvement in Leber Hereditary Optic Neuropathy

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Overview

LHON is the most commonly inherited mitochondrial disorder. It arises from several mutations in the NADH-ubiquinone red-ox chains. G11778A is the most common and severe, T14484C has the overall best prognosis for final visual outcome, and G3460A has an intermediate outcome.

Age of onset is usually between 10-30 years old, with males much more commonly affected than females. Symptoms typically progress from mild early blurring in one eye to bilateral reduction of vision, which stabilizes in the range of 20/150-20/400. Involvement of the fellow eye usually occurs between several weeks to 2 years.

In working up such a presentation, other causes of optic neuropathy must be evaluated and excluded with infectious/inflammatory labs and MRI brain and orbit + fat suppression.

Unfortunately, permanent vision loss is expected for all patients with LHON. However, final outcomes may vary between the causative mutations.

Here we present a case of a young patient who presented with vision loss OD and then experienced new onset of progressive vision loss OS.

Patient Presentation

16-year-old Caucasian male developed onset of blurry vision of the right eye mid-Sept 2022

On presentation in Nov 2022, he was found to have optic nerve edema OD (normal OS)

Extensive lab workup was unremarkable

FHx was positive for 2 maternal males with vision loss

Genetic testing revealed T14484C mutation

He initiated Idebenone by mouth 300mg TID at the end of Jan 2023

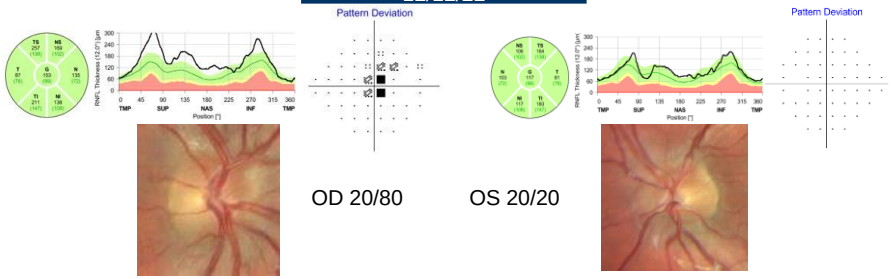
At this point VA had been stable at ~20/125 OD and was 20/20 OS

In Feb 2023, the VA OS declined to 20/50

In March 2023, the VA OS reduced to 20/250

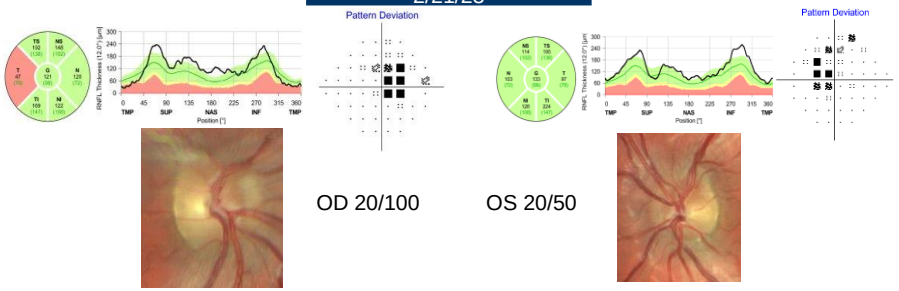
Progression of findings

12/12/22



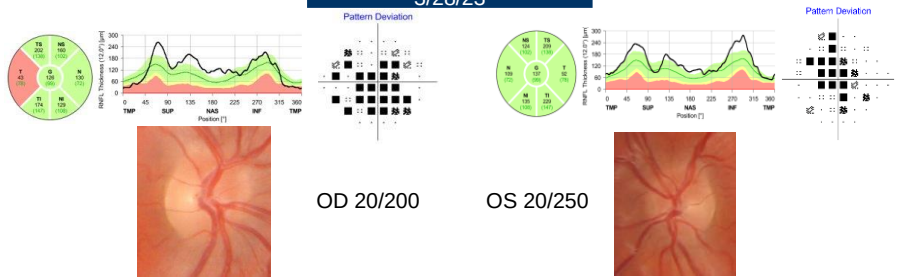
OD 20/80 OS 20/20

2/21/23



OD 20/100 OS 20/50

3/28/23



OD 20/200 OS 20/250

References

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Discussion

This patient's progressive loss of vision in the fellow eye within a few months of onset of symptoms in the original eye is typical for LHON.

Currently, treatment options are relatively limited. Patients should be counseled to avoid sources of oxidative stress, such as smoking and alcohol. Although there is limited evidence of benefit, B-complex vitamins, brimonidine, and Co-Q10 may be offered as potential neuro-protective agents. Mitochondrial gene therapy may hold promise for future treatment. Importantly, these patients should be referred to low vision and sometimes occupational therapy to ensure they have the resources to adapt to their vision loss. Genetic counseling should be offered to them and their relatives.

As with this patient, Idebenone 300mg TID has been used more recently as a potential therapy. It is a benzoquinone compound that was originally developed for cognitive decline. The Rescue of Hereditary Optic Disease Outpatient Study was a double-blind randomized placebo control study that suggested therapeutic benefit with the use of idebenone. Benefit was mainly noted in those with G11778A and G3460A mutations. Unfortunately, idebenone is not routinely covered by insurance and may at times be cost-prohibitive to patients.

Disease burden may be mitigated in the future through other societal mechanisms such as the advent of AI, self driving vehicles, and significant accessibility advancements being incorporated into cell phones and other devices.

Overall, people afflicted by LHON will benefit from a strong support network and supportive care providers who are able to direct them and their families to the many low vision resources available.

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