Optic Neuritis imaging
Changes in size and signal of the optic nerve over time in Multiple Sclerosis patients

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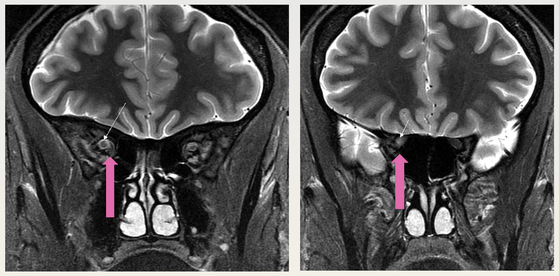
Objectives

- Typical optic neuritis (ON) is common in the setting of Multiple Sclerosis (MS) and a frequent first clinical occurrence in young patients[1]. Magnetic Resonance Imaging (MRI) of the brain provides diagnosis of the demyelinating disease, as well as precise measurement of optic nerves while allowing the observance of changes over time, in size, signal and gadolinium enhancement.
- Assessment of MRI changes of the optic nerve, observed over a period of time ranging from 4 months-8 years in MS patients, presenting with ON as an inaugural clinical manifestation.

Methods

- Retrospective analysis of repeated MRIs in 35 patients presenting with acute or subacute uni- or bi-lateral optic neuritis with decreased visual acuity. All MRIs were performed using a 3 TESLA machine.
- The Optic nerves were studied in the Axial T2, Fluid attenuation inversion recovery (FLAIR), Coronal Short Tau Inversion Recovery (STIR, Figure 1), and diffusion imaging sequences
- Three measures of the optic nerve were performed: Retro-bulbar, Intra-orbital and Pre-chiasmatic, applying largest transversal diameter as basis for measure. Both optic nerves were analyzed with the asymptomatic eye acting as a control.
- All patients presented Optic Neuritis as first symptom of disease, either unilaterally or bilaterally.
- The initial MRI of the acute episode was used as the baseline. These were compared with control MRIs ranging from 6 months to 8 years, after the first episode.
- Of the 35 Patients assessed 15 subjects (≈40%) were examined within 2 years, while 20 subjects (≈ 60%) were those, followed and assessed for up to 8 years
- The majority of the patients were aged between 20-40, and 2/3 of the examined subjects were female patients.

Figure 1

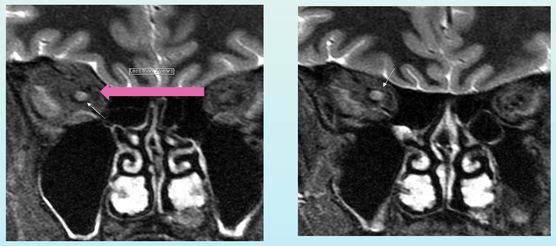


Results

- Over 70% of the patients controlled within 2 years of onset of acute ON (Group 1), did not present with meaningful changes as compared to the opposite control (Figure 2).
- The first group showed recuperation in optic nerve size once the acute episode subsided.
- The majority of patients assessed beyond 2 years (Group 2) had significant decrease in optic nerve size either uni or bilaterally (Figure 3),
- A smaller sample size of patients revealed no change in size after multiple controls, even after 8 years of disease onset.
- Most of the patients had brain lesions, compatible with the diagnosis of Multiple Sclerosis, while no brain lesions, was observed in a smaller percentage of patients (≈10%).
- Persistence of the STIR signal years after ON episode (Figure 1)

Figure 2

At onset



16 months post-onset

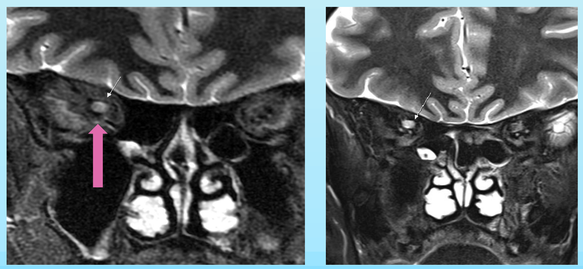
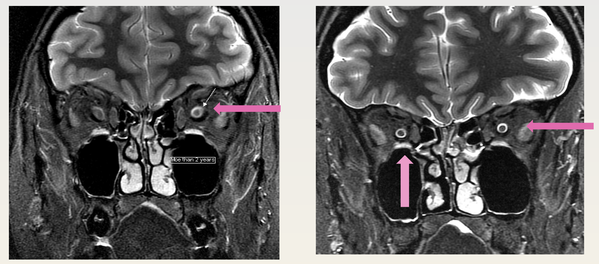


Figure 3



At onset — 6 years post-onset

Conclusion

- No significant change in optic nerve size was observed in patients with optic neuritis controlled up to 24 months
- Meaningful changes in the optic nerve, in favor of atrophy, were observed as the disease progressed beyond 2 years. The degree of atrophy was dependent on the delay from the disease onset, This correlates wit another published study showing that serial follow-up in a subgroup of patients demonstrated ongoing atrophy years after the acute event in many of the subjects (2).
- Of note, that atrophy was observed at a certain degree in the initially asymptomatic eye.
- The majority of patients with isolated optic neuritis had “silent” brain lesions compatible with MS. This is not unusual and ahs been observed in the clinical setting and available literature (3).

References

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2. *A serial MRI study following optic nerve mean area in acute optic neuritis. Hickman et al. DOI: http://dx.doi.org/10.1093/brain/awh284 2498-2505 First published online: 1 September 2004*
3. *Predicting the outcome of optic neuritis: evaluation of risk factors after 30 years of follow-up. Nilsson et al. Jneur, 2005 Apr;252(4):396-402. Epub 2005 Mar 22*

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