Overview

• What is optic neuropathy?
• How should studies be performed?
• What are the common causes of optic neuropathy and what are the findings on imaging?
• Strategy for image review
• Research progress, directions for the future.
Why MRI?

CT vs. MRI

Meningioma

Bilateral spheno-optic meningioma

Pneumosinus Dilatans
Aneurysm

Sinus disease

Optic nerve glioma

Not all optic nerve enlargement is glioma
Not all optic nerve enlargement is glioma

Compressive Optic Neuropathy

• MRI often specific for the diagnosis.

Infectious and inflammatory causes of optic neuropathy

– Demyelinative optic neuritis
– Sarcoidosis
– Idiopathic Orbital Inflammatory Syndrome (IOIS) with perineuritis
– Neuroretinitis in cases where optic nerve dysfunction precedes retinal changes
  • Toxoplasmosis, cat scratch, syphilis, Lyme
– Radiation optic neuritis

Optic Neuritis

Demyelinative Optic Neuritis
Sarcoidosis

Toxoplasmosis

Radiation Optic Neuropathy

Inflammatory Optic Neuropathies

- Diagnosis can be suggested taking into account the clinical findings and additional findings in the brain.

Non-specific findings on MRI – now what?

- Ischemia
- Glaucoma
- Nutritional/toxic
- Hereditary – Lebers
- Post-traumatic – does not require direct involvement of optic nerve.

Non-specific findings – how common?

- Glaucoma is the most common chronic optic neuropathy.
- NAAION is the most common acute optic neuropathy in patients over 50 y.o.
Ischemic Optic Neuropathies

- Anterior vs. Posterior
  - Optic nerve head or behind the optic nerve head
- Arteritic or Non-arteritic
  - Giant Cell Arteritis

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<th>Ischemic Optic Neuropathy</th>
<th>Anterior</th>
<th>Posterior</th>
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<tr>
<td>Arteritic</td>
<td>AAION</td>
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<td>Non-arteritic</td>
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Challenges of DWI in optic nerves

- Small structure
- Susceptibility artifact
- No large experience to indicate sensitivity and specificity

Mucormycosis

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Mucormycosis 1.5 vs 3.0 T

Optic neuropathy, vitritis, vascular sheathing on fundus exam.

Checklist for findings

- Is there a compressive mass lesion?
  - Look carefully at optic canal – this is where small lesions do the most damage.
- Is the nerve isointense to subcortical white matter on T2 weighted images?
- Is the nerve enhancing?
- Are there any associated findings in the brain?
- Use this to decide compressive, inflammatory, or other cause of optic neuropathy.