Background

- Seropositivity for anti-myelin oligodendrocyte glycoprotein (MOG) antibodies has been increasingly recognized in pediatric patients with acute disseminated encephalomyelitis, optic neuritis, transverse myelitis and neuromyelitis optica spectrum disorder.
- This syndrome is thought to be a distinct entity from other pediatric demyelinating syndromes including multiple sclerosis, and aquaporin-4 associated neuromyelitis optica spectrum disorder.
- Whether anti-MOG syndromes are associated with favorable neurological outcomes and whether they are relapsing diseases have been debated.
- Few studies have characterized this populations' neuroimaging and optical coherence tomography (OCT) features.

Objectives

- We describe the demographic, clinical, neuroimaging, and optical coherence tomography characteristics of our anti-MOG antibody positive cohort at UT Southwestern Medical Center.

Methods

- In this retrospective chart review study, 15 pediatric patients with diagnoses including acute disseminated encephalomyelitis, optic neuritis, and NMOSD were identified as anti-MOG antibody positive through a cell-based assay of their serum samples.
- This cohorts' demographic, clinical, neuroimaging, optical coherence tomography characteristics were analyzed.
- OCT data from pediatric patients with anti-AQP4 positive optic neuritis and multiple sclerosis related optic neuritis are provided for comparison to MOG positive patients.

Results

- The average age of first acute demyelinating episode was 9.5 years (range 3-17 years, SD 4.3 years).
- 12 of 15 patients were female (80%).
- 13 of 15 patients had bilateral optic neuritis/neuropathy based on clinical history and/or OCT results. 2 remaining patients had monophasic ADEM.
- Mean follow-up time was 3.93 years (SD 3.47, less than 1 year-14 years).

<table>
<thead>
<tr>
<th>OCT data</th>
<th>MOG positive</th>
<th>AQP4 positive</th>
<th>Multiple sclerosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RNFL</td>
<td>59.9 μm</td>
<td>60.2 μm</td>
<td>80.7 μm</td>
</tr>
<tr>
<td>P300 RNFL</td>
<td>35.4 μm</td>
<td>34.4 μm</td>
<td>42.7 μm</td>
</tr>
<tr>
<td>Macular volume</td>
<td>7.96 mm²</td>
<td>7.87 mm²</td>
<td>8.08 mm²</td>
</tr>
<tr>
<td>Ganglion cell layer volume</td>
<td>0.85 mm²</td>
<td>0.79 mm²</td>
<td>0.86 mm²</td>
</tr>
<tr>
<td>ETDRS Letters (high contrast)</td>
<td>51.6</td>
<td>35.1</td>
<td>56.75</td>
</tr>
<tr>
<td>2.5% SLOAN Low Contrast</td>
<td>22.25</td>
<td>13.9</td>
<td>27</td>
</tr>
</tbody>
</table>

- Interestingly, OCT revealed bilateral RNFL thinning in 2 patients with clinical history of unilateral optic neuritis, and in one patient with ADEM without a clinical history of optic neuritis.
- For those who had brain involvement, areas affected included thalamus, basal ganglia, cerebellum, and supratentorial white matter.
- 4 of 15 (26.7%) of these patients had evidence of a clinical and radiological relapse during follow-up period.

Discussion / Future Directions

- In our selected cohort of anti-MOG antibody positive patients, neuroimaging features overlapped with typical MS lesions but also diverged given deep gray matter involvement.
- OCT identified clinically silent RNFL thinning.
- Anti-MOG antibody positive patients have OCT characteristics that resemble patients with anti-AQP4 related optic neuritis, but they have better visual acuity.

Conclusions

- This study highlights the utility of testing for MOG antibodies in all cases of pediatric demyelination given overlapping clinical and radiographic features with NMOSD and multiple sclerosis.
- OCT may aid in identifying subclinical optic neuropathy.
- The study is limited by small sample size, retrospective methodology, selection bias, and limited duration of follow-up.
- More research is needed to identify and characterize biomarkers in pediatric MOG related syndromes.

Disclosures

- Dr. Greenberg has received grant support from the NIH, PCORI, NMSS, Guthy Jackson Charitable Foundation for NMO, Genentech, Chepl, Medimmune and Medisty. He has received consulting fees from Alexion and Novartis. He serves on the advisory board for the Transverse Myelitis Association.
- Dr. Wang’s fellowship was supported by the Transverse Myelitis Association.

* Based on 13 patients with bilateral optic neuritis (26 eyes total)
** Based on 9 patients, 3 with bilateral ON, 5 with unilateral ON (15 eyes total)
*** Based on 3 MOG negative MS patients, 1 with bilateral ON, 2 with unilateral ON (4 eyes total)