Dynamic MRI Lesion Evolution in paediatric MOG-Ab associated disease (MOGAD)

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Introduction: Myelin oligodendrocyte glycoprotein (MOG) antibodies are associated clinically with either a monophasic or relapsing disease course in both children and adults. There are few studies studying lesion evolution in children with myelin oligodendrocyte glycoprotein antibody associated disorder (MOGAD).

Aim: The aim of this study was to examine MRI lesion evolution over time in a large single-centre paediatric MOGAD cohort.

Methods: We retrospectively identified patients with MOGAD from a tertiary paediatric neurosciences centre (Great Ormond Street Hospital) between 2001 to 2022.

Results: A total of 363 MRI scans from 59 included patients were available for analysis. Median age at presentation was 4 yrs (IQR 4-9), 32 (54.2%) were female and 34 (57.6%) were of non-white ethnicities. Twenty-seven children (45.8%) had a monophasic illness and 32 (54.2%) had a relapsing disease course. In the relapsing MOGAD group, median number of relapses was 4 (range 2-30). Initial presentation was ADEM in 27(46%), ON in 18 (31%) ADEM-ON in 4 (7%), ADEM-TM in 6 (10%) TM in 2 (3%) ADEM-TM-ON in 1 (2%) and ON-Brainstem syndrome in 1 (2%). There was no difference in demographics or clinical presentation between monophasic and relapsing groups.

Fifteen patients (25.4%) had gadolinium enhancement on initial attack MRI. Seven out of 32 (21.9%) relapsing patients had persistent enhancement on follow-up MRI scans. One patient with a clinical transverse myelitis at presentation was MRI negative. New asymptomatic lesions following first clinical event were seen in 5/27 (18.5%) monophasic patients and 8/32 (25%) relapsing patients.

During follow-up interval scanning,38 out of 59 have had follow up neuroimaging after their first attack whereas15/32 had relapsed before having a follow up MRI. Complete lesion resolution was reported in 9/38 (23.6%) (8 monophasic, 1 relapsing) following 1st acute attack, 3/32 (9.3%) after 2nd acute attack, and 1/32 (3.1%) following 3rd acute attack and 0/32 following 4th acute attack. Partial resolution of MRI lesions was seen in 7/20 (35%) monophasic patients and 7/32 (21.8%) relapsing patients at follow-up scans.

Conclusions: Demyelinating lesions in paediatric MOGAD are dynamic and timing of MRI scanning may influence CNS region involvement. Unlike in multiple sclerosis, a significant number of MOGAD patients will have complete lesion resolution at first follow-up, although the ability to repair is reduced following multiple relapses.