CERVICAL CORD ATROPHY AND DIFFUSION TENSOR IMAGING IN MOGAD, AQP4-AB NMOSD AND MS

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BACKGROUND & AIM

- Spinal cord involvement is an important feature of antibody-mediated demyelination, as occurs in myelin-oligodendrocyte glycoprotein antibody disease (MOGAD) and aquaporin-4 (AQP4-Ab)-positive neuromyelitis optica spectrum disorder (NMOSD), as well as in multiple sclerosis (MS).
- Cervical cord MRI metrics are emerging as an important outcome measure in MS but their application in AQP4-Ab-positive NMOSD and MOGAD are not well studied.
- We aim to compare cervical cord atrophy and diffusion measurements between these conditions and also to healthy volunteers (HV) and to explore their clinical relevance.

METHODS

- Adult patients with spinal cord involvement and either relapsing remitting MS (n = 20), AQP4-Ab NMOSD (n = 20) or MOGAD (n = 20) were recruited at least six months outside of a relapse.
- Clinical details were collected and an Expanded Disability Status Scale (EDSS), Brief Pain Inventory and cervical cord 3T MRI (3DT1, 3DT2, axial T2*, diffusion) were done under the appropriate ethics. Matched HV (n = 20) underwent the same MRI scan.
- T2w scans were used for lesion location segmentation using FSL. T1w scans were used to calculate the mean cervical cord cross-sectional area (CSA) across C1-C7 using SCT (v.4.0). Diffusion imaging was pre-processed using FSL *topup* and *eddy*, followed by registration and metric extraction using SCT.

RESULTS

DEMOGRAPHICS & IMAGING ANALYSIS

Table 1. Demographics

	MOG	AQP4	MS	HV
Number	20	20	20	20
Mean age +/- SD	43.1 +/- 10.9	54.5 +/- 12.5	44.9 +/- 6.9	44.1 +/- 14.3
Sex F:M	10:10	13:8	11:9	12:8
Ethnicity (%) Caucasian Afro-Caribbean Asian	 20 (100) 0 (0) 0 (0)	 11 (55) 5 (25) 4 (20)	 20 (100) 0 (0) 0 (0)	 18 (90) 1 (5) 1 (5)
Phenotype (%) Isolated TM TM + ON TM + BS/BR TM + BS/BR + ON	 4 (20) 10 (50) 5 (25) 1 (5)	 10 (50) 4 (20) 4 (20) 2 (10)	NA	NA
Median disease duration in months (range)	40.1 (8.5 – 239.9)	141.5 (8.5 – 297.7)	147.1 (10.4 – 252.1)	NA
No. relapse/pt	2	3	3	NA
No. myelitis/pt	1.1	2.3	NA	NA

Figure 1. Cervical cord segmentation

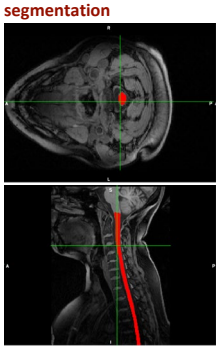


Figure 2. Grey matter and lesion segmentation

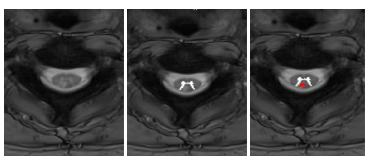
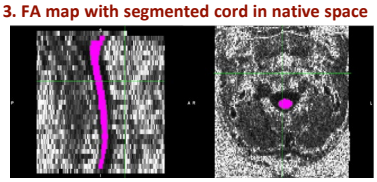


Figure 3. FA map with segmented cord in native space



GROUP COMPARISON & CLINICAL RELEVANCE

Figure 4. Within-group differences based on lesion status

Grey line dotted line in each modality represents the healthy volunteer mean

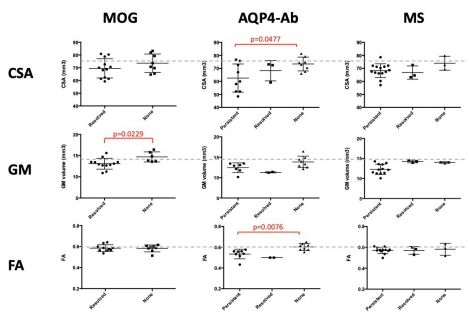
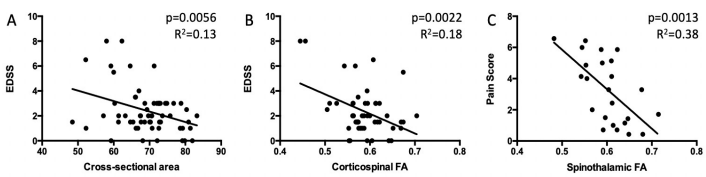


Figure 5. (A) Relationship between mean cross-sectional area and disability in all disease groups, (B) Mean corticospinal tract FA and disability in all disease groups, and (C) Mean spinothalamic tract FA and pain score in those with neuropathic pain



CONCLUSION

MOGAD may predominantly affect the grey matter. AQP4-Ab disease shows the most severely affected cord, localised to lesional areas. The MRI metrics used in this study do not differentiate these conditions but have clinical relevance in their association with disability and pain scores, independent of disease type.

REFERENCES & DISCLOSURES

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