Cerebellar atrophy in Neuromyelitis Optica Spectrum Disease (NMOSD) Patients

Souza, R. F. S.[1]; Von Glehn, F[2], Santos, LMB [2], Cendes, F1, Yasuda, C L[1]
[1]Neuroimaging Laboratory –[2] Biology Institute
UNICAMP

Introduction: Neuromyelitis Optica Spectrum Disease (NMOSD) is an autoimmune neurodegenerative process which affects the optic nerve and spinal cord in inflammatory outbreaks, leading to its symptons[1]. Newly, recent studies have showed that other structures in central nervous system (CNS), like the brain cortex, thalamus and medulla oblongata are affected too[2,3]. The increased use of different techniques of magnetic resonance imaging (MRI) analysis, such the voxel-based morphometry (VBM), has improved our knowledge about the real CNS damage in NMOSD patients[4,5].

Materials and Methods: Thirty-nine NMOSD AQP4-IgG positive patients from UNICAMP's Neurology Service were selected to participate in this study; fifteen of these patients presented neuromyelitis optica (NMO), nine presented longitudinally extensive transverse myelitis (LETM) and eight are diagnosed with optic neuritis only. For group comparisons, forty-two healthy controls were selected from an MRI bank of healthy volunteers. Images were acquired at Hospital de Clínicas (UNICAMP) using a 3 Tesla Achieva-Intera Philips MRI scanner including 3D-T1 weighted images (isotropic voxels of 1 mm^3, acquired in the sagittal plane; 1 mm thick, flip angle=8º, TR= 7ms, TE 3,2ms, FOV= 240 x 240 x 180 mm^3). All images were segmented according to standard SPM12/CAT12 and SUIT[6] protocols (http://www.neuro.uni-jena.de/cat/) (www.fil.ion.ucl.ac.uk) (http://www.diedrichsenlab.org/imaging/suit.htm), which included: spatial normalization, cerebellum segmentation and smoothing, Quality control of image segmentation was performed. Statistical analysis of images was performed with SPM12, while clinical information was compared with GraphPad Prism 7.

Results: NMOSD and control were paired by gender and age. The figure below shows significant cerebellar cortical atrophy in NMOSD patients compared to healthy controls ($p<0.05$)

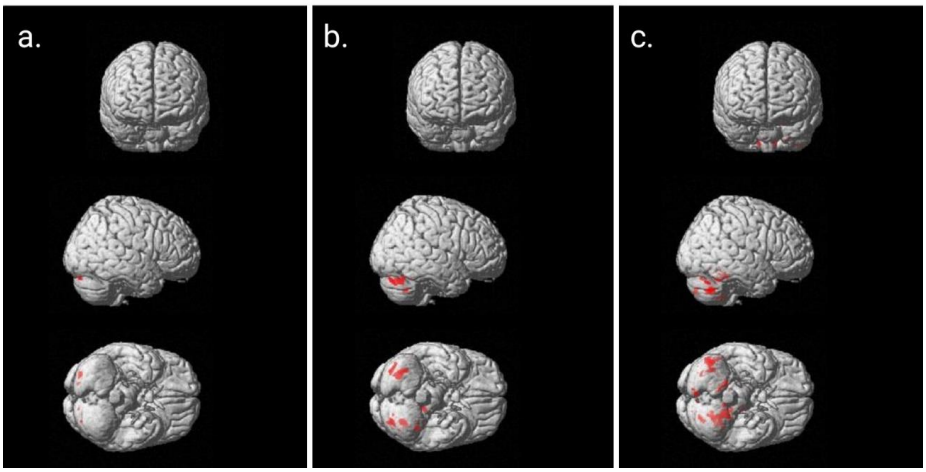

Figure 1. Distribution of cerebellar cortical atrophy in NO (a), LETM (b) and NMO (c) patients. Both cerebellar hemispheres and vermis are affected.

Discussion: Cerebellar cortical atrophy observed in patients group confirms the recent studies results', in which other areas of CNS than the classic ones are affected by NMOSD. It is possible that these findings occurs due to direct immunomediated lesions or by a secondary degeneration mechanism in areas interconnected in the CNS [1-3].

Conclusion: Cerebellar atrophy can be seen in NMOSD patients, especially in the ones who present LETM or NMO spectrum of the disease. Further studies of clinical symptoms in these patients or using other MRI techniques may reveal the complete clinical meaning of these findings.

References: [1] Wingerchuk, D. M. et al. Neurology 85, 177–189 (2015); [2] Glehn, F. Von et al. Mult. Scler. J. (2014).; [3] Whittam, D. et al. J. Neurol. (2017). [4] Duan, Y., Liu, Y., Liang, P. & Jia, X. Acta radiol. 55, 589–593 (2014); [5] Chen, C. et al. Acta Acad. Med. Sin. 36, 432–438 (2014). [6] Diedrichsen, J. Neuroimage 33, 127–138 (2006).