Comparative Diagnostic Utility of the different MR Modalities in Mild Cognitive Impairment and its use as Predictor of Dementia.

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INTRODUCTION: Mild cognitive impairment has been regarded as a pre-Alzheimer condition, but some patients do not develop dementia. Cognitive impairment pathologies have been almost exclusively studied with MRS and hippocampal volumetry by comparison with healthy patients. The authors' objective was to determine whether findings from a combined use of magnetic resonance spectroscopy (MRS), perfusion (PWI) and diffusion (DWI) would predict conversion from amnesic mild cognitive impairment to dementia and to compare the diagnostic accuracy in discriminating patients with Probable Alzheimer Disease (AD), Lewy body dementia (LBD), mild cognitive impairment (MCI), vascular mild cognitive impairment (VaMCI), and anxious or depression patients with cognitive impairment (DeMCI).

METHODS: A longitudinal cohort of 119 consecutive and incident subjects (73 women, 46 men; main of age 70 $\pm$ 9.5 years old) fulfilling the criteria of amnesic mild cognitive impairment was followed for a mean period of 25 months (15-36 months). At baseline, a neuropsychological examination and standard blood test were performed, and different areas were examined by proton MRS, DWI and PWI-DSC. After the following we grouped the patients as AD, LBD, MCI, VaMCI and DeMCI. Inside the group of patients considered as AD, we included also patients with Mixed Dementia since these patients have a neurodegenerative component.

RESULTS: After the followed period, 54 patients (45.3 %) converted to dementia (49 with AD and 5 with LBD). From the rest of patients, 15 patients (12.7%) were considered as VaMCI, 22 patients (18.5%) as DeMCI and 28 (23.5%) as MCI. When we evaluated the conversion from MCI to probable AD, we found that NAA/Cr ratios in Posterior cingulated gyri (PCG) lower than 1.40 predict the conversion to probable AD with a sensitivity of 79% and Specify of 72% (area under ROC curve = 0.81, 95% CI=0.73-0.89, p<0.001); NAA/mI ratios in PCG lower than 2.04 predict this conversion with a sensitivity of 71% and specify of 74% (area under ROC curve = 0.75, 95% CI=0.65-0.84, p<0.001); and, NAA/Cr ratios in the Left Occipital Cortex (LOC) lower than 1.57 predict the conversion to AD with a sensibility of 77% and specify of 74% (area under ROC curve = 0.80 (95% CI=0.72-0.89, p<0.001). NAA/mI ratios in LOC lower than 2.45 predict this conversion with a sensitivity of 68% and specify of 64% (area under ROC curve = 0.69, 95% CI=0.59-0.78, p<0.001). When we try to differentiate MCI groups, we found significance statistical difference in NAA/Cr ratios in PCG between AD and DeMCI (p<0.001), AD and MCI (p<0.001), AD and VaMCI (p=0.003). NAA/mI ratios in PCG showed this difference between AD and DeMCI (p=0.001). NAA/Cr ratios in LOC showed a differences between AD and MCI (p<0.001), AD and DeMCI (p=0.001), AD and VaMCI (p=0.003). NAA/mI in LOC showed differences between AD and DeMCI (p=0.018). DWI showed in the right hippocampus significance statistical differences between LBD and DeMCI (p=0.003), LBD and MCI (p=0.048); and, LBD and VaMCI (p=0.009).

CONCLUSIONS: NAA/Cr ratios in posterior cingulated gyri and in the left occipital cortex can predict the conversion from MCI to dementia with high sensibility and specificity. MRS offers extra information in the posterior cingulated gyri compared to left occipital cortex and could allow to differentiate dementia from MCI. DWI in the right hippocampus presented higher values of ADC in LBD than patients with different types of MCI. MRS and DWI are more reliable than perfusion MR in the initial evaluation of MCI and AD. Perfusion MRI we cannot recommend to carry out it systematically.