Abstract Preview - Step 3/4
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Topic: 20. Imaging

Title: Longitudinal MRI study to measure cervical cord atrophy in multiple sclerosis patients

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Text: Background and objective: Spinal cord atrophy occurs in multiple sclerosis (MS) and has been proposed as a measure of neurodegeneration. The aim of this longitudinal study is to quantify spinal cord atrophy to evaluate its association with clinical disability and other MRI measures.

Materials and methods: 31 patients (12 women; median age, 51 years; age range, [33, 61], baseline EDSS median, 5.5; baseline EDSS range, [3, 6.5]) diagnosed of primary progressive MS, underwent three serial 1.5 T brain and spinal cord MRI examinations (baseline, year 2, and year 7), including the following sequences: PD/T2, 2D T1-weighted, and a spinal cord 3D magnetization prepared rapid acquisition gradient echo (MPRAGE) T1-weighted. Spinal cord from C1 to C5 was segmented in MRI scan using the spinal cord tool included in Jim 6.0. Using this method we evaluated global cross-sectional spinal cord area (CSA), and CSA at C2-C3 (C23), C3-C4 (C34), and C4-C5 (C45) levels. CSA measurements were then normalized (CSAn, C23n, C34n, C45n) to the intra-cranial cross-sectional area measured at the inferior margins of the corpus callosum on an axial slice of the proton density-weighted image of each subject. Percentage of change in spinal cord measurements between baseline and 7th year exam were averaged per year of evolution. T2 lesion load (T2LL), T1 lesion load (T1LL), and brain parenchymal fraction (BPF) were measured at each time point. EDSS was also evaluated as the area under the curve of EDSS values in each time point normalized by the maximum area (AUCNEDSS). Partial correlations controlled for age and sex were performed to evaluate the relationship between spinal cord measurements and radiological or clinical measurements.

Results: All normalized CSA measurements showed moderate correlations with AUCNEDSS ranging between -0.4872 and -0.3717 (p< 0.05). In addition, the mean annual percentage of change in normalized CSA (pyCSAn: -0.7715%; pyC23n: -0.6155%; pyC34n: -0.7376%; pyC45n: -0.7720%) showed significant correlations with baseline BPF (pyC23n vs. BPF: r=-0.4514, p=0.014; pyC34n vs. BPF: r=-0.4556, p=0.013). Mean annual percentage of change in C34n also correlated with BPF at year 2 (r=-0.3688, p=0.049).

Conclusions: Results suggest that development of spinal cord atrophy is associated with increasing disability. Moreover, patients presenting larger baseline BPF seem to show a greater tendency for future spinal cord atrophy development at some cervical levels.

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Figure: Picture: 1426-PIC-1432028120.jpg

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