

Measuring cervical cord atrophy in multiple sclerosis patients. A longitudinal MRI study

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Purpose

To quantify the cervical atrophy and longitudinal changes in patients with multiple sclerosis (MS), and evaluating its association with clinical disability and other MRI measures.

Material and methods

Thirty-one patients with primary progressive MS underwent three brain and cervical cord 1.5T MRI (baseline, 2 and 7 years), including proton density-, T2-, and T1-weighted sequences for brain study, and 3D T1 MPRAGE for cervical cord. The cervical cord was segmented between C1 and C5 using the spinal cord tool included in Jim 6.0 to evaluate the global cross-sectional area (CSA) and their normalized values at C2-C3, C3-C4 and C4-C5 levels. Annualized rates of normalized CSA loss, lesion load in T2, lesion load in T1, the brain parenchymal fraction (BPF) in each time point were also evaluated. EDSS was evaluated as the area under the curve of the values in each time point normalized by the maxima area (AUCNEDSS). Partial correlations controlled for age and sex were performed to evaluate the relationship between cervical cord measurements and radiological or clinical measurements.

Results

Normalized measures of CSA showed moderate significant correlations with AUCNEDSS between $-0,4872$ and $-0,3717$ ($p < 0,05$). Annualized rates of normalized CSA loss showed significant correlations with baseline BPF (pyC23n vs. BPF: $r = -0,4514$, $p = 0,014$; pyC34n vs. BPF: $r = -0,4556$; $p = 0,013$), and with second year BPF ($r = -0,3688$, $p = 0,049$) at C3-C4 level.

Conclusions

Results suggest that development of cervical 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.