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Editorial

Cervical spinal cord atrophy impact on quality of life in MS: A neuroimaging study

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Multiple sclerosis (MS) is a progressive neurologic disease, which usually affects younger individuals and causes significant permanent disability. It is believed that pathophysiology of MS possesses two arms: inflammatory demyelination and neurodegeneration with resultant brain and spinal cord tissue atrophy due to significant tissue loss. In the past two decades, the role of central nervous system (CNS) tissue atrophy has been emerging as a significant marker of disability in MS patients and substantial research efforts have been focused on the gray matter as well as white matter volume loss in the context of the neurodegenerative arm of this progressive neurologic disease. More neurologists and neuroimagers recognize the concept of the brain and spinal cord atrophy and realize their compromising impact, as an independent variable, on the quality of life and long term disability of MS patients [1]. In particular, spinal cord atrophy has captured significant research attention. In a longitudinal study, Stevenson et al. [2] evaluated progressive cervical cord atrophy in a cohort of MS patients with progressive MS and found that during one year of follow up, the mean upper cervical cord area showed a decrease of $-3.53\ mm^3$ in those with primary progressive MS ($n = 12$) as compared to $-0.26\ mm^3$ in those with secondary progressive MS ($n = 6$). Despite the small number of patients, their findings evidently illuminated the rising concept of "cord atrophy" in MS. Another study by Agosta et al. [3] also measured the cervical cord injury in MS patients. The investigators measured the cervical cord atrophy in participants with primary progressive ($n = 15$), secondary progressive (14), and relapsing-remitting ($n = 13$) MS. They stated that the decline in cervical cord area during a mean of 2.4 years by 3.1 mL in patients with primary progressive MS, as compared with 2.2 mL in secondary progressive and 5.4 mL in patients with relapsing-remitting MS. Such exploratory and objective observations extensively highlighted the presence and progressive nature of spinal cord atrophy during MS pathogenesis. Previously, it has also been demonstrated that spinal cord atrophy may occur independently from brain atrophy in MS patients [4–6]. Spinal cord damage and atrophy, and more specifically, the cervical cord atrophy is frequently observed in MS patients and is associated with progressive illness course as well as significant disability. Such advancing disability potentially comprises the quality of life of MS patients and limits their physical capabilities.

Despite increasing awareness of the spinal cord atrophy in MS patients, its effects on the quality of life have not been fully explored. The present novel imaging study mainly focuses on such matter. During this interesting and comprehensive study and utilizing 3 T MRI, Zurawski et al. [7]assessed the brain and cervical spinal cord lesions in a cohort of 62 MS patients (53 relapsing MS, 7 with secondary progressive MS, and 2 with clinically isolated syndrome). All study participants underwent neurologic examination and quality of life assessment. The upper cervical cord area (utilizing 3D-high resolution MPRAGE sequences as well as the number of cervical cord lesions, and cervical cord and brain T2-weighted lesion volumes were determined. The investigators found that cervical cord area revealed a better correlation with disability and quality of life than cervical lesions. Upper cervical cord area also demonstrated an inverse relationship with age, disease duration, and nine-hole peg test. The Upper Extremity Function quality of life domain revealed the most robust relationship to upper cervical cord area. The authors concluded that cervical cord volume revealed an independent association with impaired extremity-related quality of life in MS population. While the findings of this scientific imaging observation are novel, they also are thought provoking and encourage more research in this area.

In conclusion, while the present study further explores the pathophysiology of MS through neuroimaging of brain and cervical spinal cord, it also reminds the readers about the significance of ordering and reviewing the cervical cord MR images in MS patients. The educational and scholastic findings of this neuroimaging study, also encourages other neurologists and neuroscientists to further concentrate their research on the underlying mechanisms of demyelinating and neurodegenerative processes affecting spinal cord in MS.

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Alireza Minagar[a,*], J. Steven Alexander[a,b]

[a] *Departments of Neurology, LSU Health Sciences Center, Shreveport, LA 71130, USA*

[b] *Molecular and Cellular Physiology, LSU Health Sciences Center, Shreveport, LA 71130, USA*

E-mail address: aminag@lsuhsc.edu (A. Minagar).

[*] Corresponding author at: Dept. Neurology, LSU Health Sciences Center, 1501 Kings Highway, Shreveport, LA 71130, USA.