

Title: Magnetic Resonance Diffusion Tensor Imaging and functional neurophysiological study in patients with cervical spinal stenosis.

Background : Degenerative cervical spinal cord compression (DCC) is a common incidental radiographic finding, not always associated with neurological symptoms . This anatomical-functional discrepancy makes it necessary to introduce new clinical biomarkers. Diffusion tensor imaging (DTI) is an MRI technique that allows three-dimensional evaluation of the movement of water molecules across injured white matter axonal membranes in response to compression.

Research question: Does MRI- DTI show a better diagnostic yield and a better correlation with neurophysiological studies than morphological MRI in patients with degenerative cervical canal stenosis?

Material and Methods : A Prospective study evaluating a cohort of 25 patients , 16 men and 9 women, referred at the Spine Unit of a tertiary university hospital for assessment of DCC. 6 patients were excluded due to incomplete study. Clinical, radiographic (morphological MRI) and functional variables (somatosensory and motor evoked potentials (EP)) and EMG were analyzed. All of them underwent a new MRI-DTI (3 tesla) . Radial and axial diffusion data , fractional anisotropy and apparent diffusion coefficient values were calculated to assess their diagnostic yield and were compared with the results of the functional study by EP. Student's t-test, Pearson correlation coefficient and analysis of variance (ANOVA) were applied in this study. All data was presented as mean $\pm$ SD and a p-value <0.05 was considered significant. R software (R 4.1.2 version) was used for statistical analysis.

Results: Compression levels in morphological MRI were multilevel in 12 patients . Hypersintensity on T2 weighted scans , considered as a radiological correlate of myelopathy , was present only in 3 patients . With DTI, 18 patients with multilevel axonal involvement were detected. In 3 patients, the lesion level was not consistent with the M-MRI. Functional test were normal in 3 patients, of which 2 presented an altered MRI-DTI. The rest of the patients with altered MRI-DTI showed altered electrophysiological findings, 9 with sensory and motor involvement, 3 with sensory involvement and 4 with only motor pathway involvement.

Discussion: The diagnostic yield of MRI-DTI in the study of DCC has been shown to be greater than morphological MRI, with better localization of lesion level.

A higher concordance was observed between the functional study (PESS and PEM) and the DTI sequence.