

# Could MR Diffusion Tensor Imaging Help to Solve Clinical-Radiological Mismatch in Cervical Spondylotic Myelopathy?

## Abstract

**Background:** Cervical spondylotic myelopathy (CSM) is a major cause of motor dysfunction. The radiological diagnosis of CSM has to be made as early as possible, since surgical interference in earlier stages during the disease course was reported to be more successful and associated with favorable post-operative clinical outcome when compared with later stages. Diffusion tensor imaging (DTI) is a promising technique that could help to detect early structural cord changes in patients presenting with cervical compressive myelopathy.

**Aim of the study:** To investigate the utility of MR diffusion tensor imaging using its quantitative fractional anisotropy (FA) and apparent diffusion coefficient (ADC) parameters as an early detector biomarker of microstructural cord affection in cervical spondylotic myelopathy (CSM) patients with no detectable intramedullary hyperintensity in the conventional T2 WIs.

**Methods:** This study is a prospective study. 60 patients presented with neurological symptoms and signs of cervical compressive myelopathy with cervical spondylotic changes and normal cord signal on conventional T2 WIs were included in this study. The clinical severity of compressive myelopathy was assessed based on the mJOA score. MR diffusion tensor imaging was done for all patients. FA and ADC values of the cervical cord at level of most severe disc lesions and at non-stenotic level (C2-3, considered as internal reference) were measured and compared. The DTI parameters at level of most severe disc lesions were also correlated with disc severity score and mJOA score.

**Results:** At the level of most severe disc lesions; we found statistically significant reduction of FA values (mean  $0.57 \pm 0.10$  vs.  $0.67 \pm 0.06$  with P value  $<0.001$ ) and increase of ADC values (mean  $1.02 \pm 0.34$  vs.  $0.88 \pm 0.31$  with P value 0.015) compared to non-stenotic reference level. FA & ADC parameters had high sensitivity for detection of early myelopathy in CSM patients with normal cord signal in conventional T2WIs (sensitivity 86.66% and 80% respectively). FA and ADC values show significant correlation with both disc severity (P value  $<0.001$  & 0.008) and clinical function mJOA score (P value 0.015 & 0.031 respectively).

**Conclusion:** MR diffusion tensor imaging using its quantitative FA and ADC parameters is more sensitivity than conventional T2 WIs in detection of early microstructural cord affection in CSM patients and could help as an early detector biomarker of cervical myelopathy before the appearance of any detectable signal abnormalities on T2 WIs. Our study enhanced the utility of DTI in cases with CSM to solve the clinical/radiological mismatch; enabling the decision of appropriate timing of cervical decompression surgery before the chronic irreversible myelopathy changes become settled.

**Keywords:** Cord compression, DTI, FA, ADC, myelopathy.