Title: Diagnostic ability of spinal diffusion tensor imaging in cervical degenerative pathologies: A systematic review of the literature

Rima Sestokas Rindler, MD; Falgun Chokshi, M.D.; James Malcolm Ph.D.; Mahmud Mossa-Basha, M.D.; Sheila Eshraghi, M.D.; Jason Chu, M.D.; Gustavo Pradilla, M.D.; Faiz Ahmad, M.D.

**Objective**

Diagnosis of cervical spondylotic myelopathy (CSM) and correlation to neuroimaging findings is challenging. This study reports a systematic literature review literature evaluating the diagnostic ability of diffusion tensor imaging (DTI) in CSM.

**Methods**

A systematic literature search adherent to PRISMA guidelines was performed using PubMed. Articles reporting measures of clinical severity and DTI in adults with CSM and were included. Demographics, clinical severity, and DTI parameters were abstracted and pooled.

**Results**

Sixteenof 562 studies met inclusion criteria (total 776 patients; 574 CSM, 202 controls). Fractional anisotropy (FA) (mean difference, MD= -1.11, Confidence Interval, CI= -0.12,-0.10, p<0.01) and track density were significantly lower (p<0.01), and apparent diffusion coefficient (ADC) was significantly higher (MD=-0.08, CI=-0.09,-0.07, p<0.01) in patients vs. controls at the level of maximal compression (LMC). Both FA (n=⅘; correlation coefficient [CC]=0.327-0.883, p<.05) and track density (n=½; CC= -0.632, p<.01) had moderate to strong correlation with modified Japanese Outcome Assessment. Area under the receiver operating curve (AUC) for both FA and ADC in detecting mild to moderate impairment was strong (AUC= 0.68-0.77, p<0.05 and 0.73, 95% CI 0.58-0.87, respectively) with adequate sensitivity (FA 65-81%, ADC 70%) and specificity (FA 74.2-92%; ADC 75%).

**Conclusion:**

DTI, particularly FA, may be a valuable tool for diagnosing CSM and identifying ideal surgical candidates. Prospective studies are required to determine optimal DTI measures, anatomic levels and acquisition techniques.