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

Abstract 1481

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Disclosures

- None

Introduction

- Diagnosis of cervical spondylotic myelopathy (CSM) and correlation to neuroimaging findings is challenging.

- Diffusion tensor imaging (DTI) is a promising modality that may improve diagnostic accuracy of cervical myelopathy.

- Fractional anisotropy (FA), apparent diffusion coefficient (ADC), tractography and fiber tract ratio (FTR, i.e. relative density) are DTI measures that are abnormal in patients with CSM.

Does diffusion tensor imaging (DTI) predict pre-operative clinical severity in patients with cervical spondylotic myelopathy?

Methods

- Systematic literature search of PubMed
  - *Search 1: ("Diffusion Tensor Imaging"[Mesh]) AND ("Spinal Cord"[Mesh])*
  - *Search 2: "diffusion tensor imaging" [All Fields] and "spinal cord" [Title/Abstract]*
  - *Search 3: "DTI spine myelopathy"*
- PRISMA guidelines
- Inclusion: clinical articles, measures of clinical severity, DTI parameters, adult humans with CSM, 1990-2015
- Demographics, clinical severity, and DTI parameters abstracted
- Correlation coefficients pooled using the Hedges-Olkin method

Results

PRISMA Flow Diagram
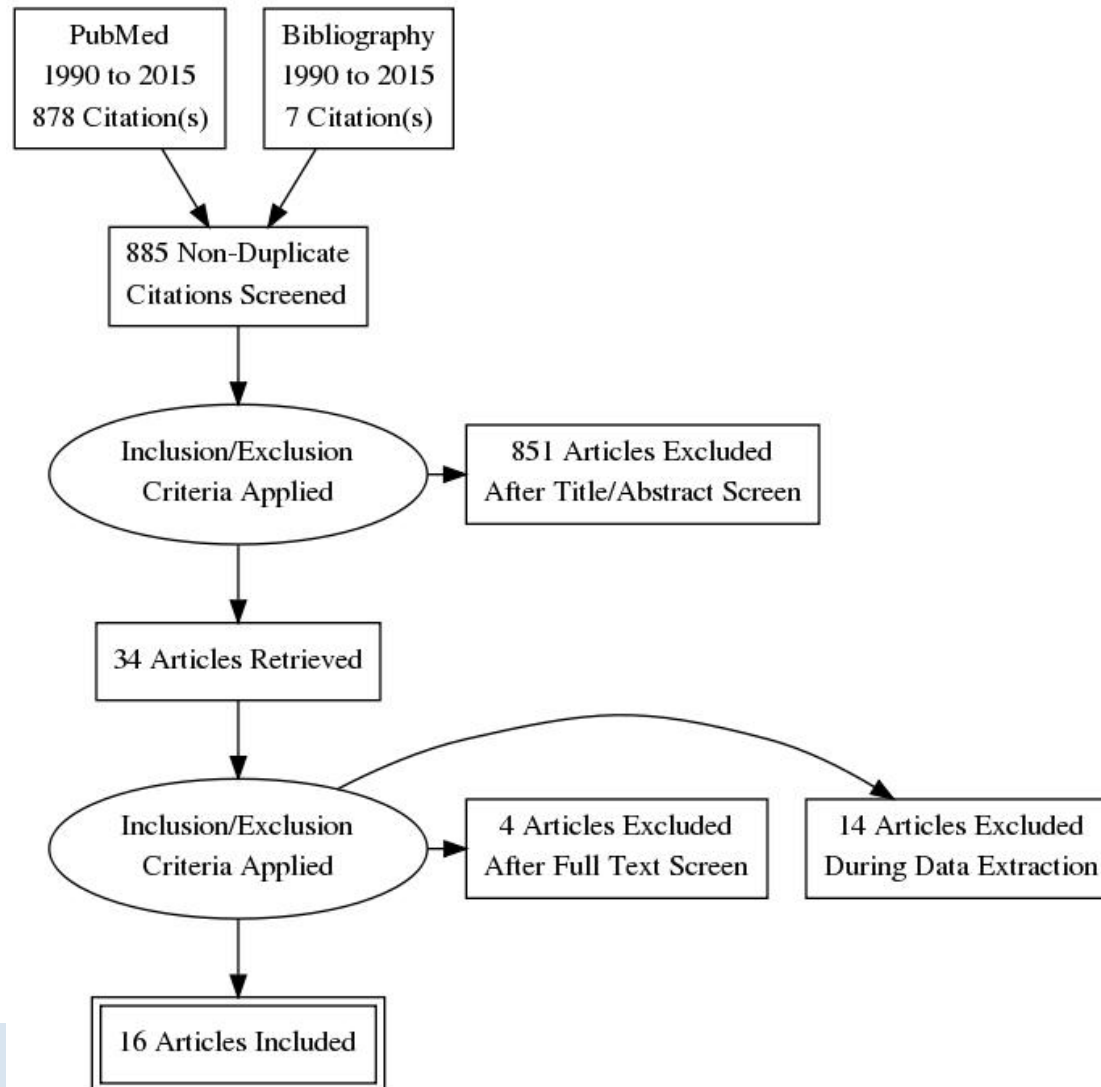
Results
Demographic Information

- n= 574 patients with myelopathy from cervical spondylosis or ossification of posterior longitudinal ligament
- Studies reported FA (n=14), ADC (n=5), and tractography (n=6) measures
- All were case series or retrospective cohort studies
- Clinical severity assessments:
  - Modified Japanese Orthopedic Assessment (mJOA)
  - Nurick Assessment
  - Neck Disability Index
  - Short Form-36

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Results
DTI correlates with clinical severity scores

- FA strongly correlates with mJOA (n=5; pooled rho= 0.6995, CI 0.624-0.762, $p<0.01$).

- ADC does not correlate with mJOA (n=1; rho=0.067, p=0.78).

- The relationship of track density with mJOA is inconclusive (n=2; R^2= -0.6324; r=0.949, $p<0.05$).

- No significant association between DTI and other clinical assessments.

Results

- FA accurately detects mild to moderate impairment (area under the receiver operating curve, AUC= 0.68-0.77, p<0.05) with high sensitivity (65-81%) and specificity (74-92%).

- ADC accurately detects mild to moderate impairment (AUC 0.73, 95% CI 0.58-0.87) with adequate sensitivity (70%) and specificity (75%) despite having no direct correlation with clinical measures.

Summary Points

- Cervical spondylotic myelopathy can be challenging to diagnose.
- Diffusion tensor imaging, particularly fractional anisotropy and tractography, may be valuable for accurately identifying symptomatic patients that might benefit from operative decompression.
- Future studies should determine optimal DTI measures, acquisition techniques, anatomic levels, and outcome measures for clinical use.