

## Diffusion and Cerebrospinal Fluid Flow Magnetic Resonance Imaging in the Evaluation of Cervical Stenosis and Myelopathy: A Prospective Study

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### Introduction

Diffusion-weighted imaging (DWI) may be more sensitive in detecting early cervical cord injury than abnormal T2-signal. Cerebrospinal fluid (CSF) flow studies may demonstrate degree of stenosis based on cervical cord motion. This study evaluates tests correlation of DWI and cord motion to myelopathy severity and degree of stenosis.

### Methods

Prospectively, adult patients with concern for cervical stenosis underwent cervical magnetic resonance imaging (MRI) (T2, Cine CSF Flow, and DWI). Images were reviewed neuroradiologists blinded to the patient's clinical condition. Correlation of MRI findings to neurological status and outcomes following surgery were evaluated.

### Results

Twenty patients were enrolled. Mean age was 66 years, and 40% were male. Eleven presented with myelopathy and 9 had pain, weakness, and/or sensory changes. All patients had radiographic cervical stenosis (14 severe, 5 moderate, and 1 mild). In the presence of cervical stenosis, paradoxical cord motion (moving opposite to the rest of cord) was observed in 79% of severe and 50% of mild/moderate stenosis. The sensitivities of MRI findings to detect clinical myelopathy were 63% for T2 signal, 73% for abnormal DWI, 73% for abnormal cord motion, 91% for abnormal DWI/cord motion, and 100% for abnormal T2/DWI/cord motion. Fourteen patients underwent surgical decompression (4 anterior and 10 posterior). Ten of those 14 patients had improved Nurick myelopathy score. Of the 4 patients who did not improve, their MRI profile revealed that all preoperative MRI had abnormal cord motion (2 with normal T2-signal and DWI) ( $p=0.126$ ). Among the 6 patients (1 moderate and 5 severe stenosis) who did not undergo surgery, 1 worsened (abnormal T2-signal/DWI/cord motion) while 5 others had no change in neurological status.

### Conclusions

DWI and CSF flow studies are sensitive modalities in detecting myelopathy and evaluating cervical stenosis severity. Abnormal DWI and cord motion are present in myelopathic patients without T2-signal abnormality and maybe useful prognostic indicators.

### Learning Objectives

By the conclusion of this session, participants should be able to:

1. Understand that there is a need for additional modalities in evaluating cervical stenosis and identifying patients.
2. Discuss the value in utilizing DWI and CSF flow studies in evaluating cervical stenosis.
3. Describe the potential prognostic value of preoperative DWI and cord motion following surgery.

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