Journal of Clinical Neuroscience 21 (2014) 2189–2193

Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: www.elsevier.com/locate/jocn

Clinical Study

# Is cervical decompression beneficial in patients with coexistent cervical stenosis and multiple sclerosis?

Lee A. Tan [a], Manish K. Kasliwal [a,*], Christopher C. Muth [b], Dusan Stefoski [b], Vincent C. Traynelis [a]

[a] Department of Neurosurgery, Rush University Medical Center, 1725 W Harrison Street, Suite 855, Chicago, IL 60612, USA
[b] Department of Neurology, Rush University Medical Center, Chicago, IL, USA

ARTICLE INFO

*Article history:*
Received 27 February 2014
Accepted 4 May 2014

*Keywords:*
Cervical spondylosis
Multiple sclerosis
Myelopathy
Neck pain
Radiculopathy
Urinary dysfunction

ABSTRACT

Cervical stenosis (CS) and multiple sclerosis (MS) are two common conditions with distinctive pathophysiology but overlapping clinical manifestations. The uncertainty involved in attributing worsening symptoms to CS in patients with MS due to extremely high prevalence of asymptomatic radiological CS makes treatment decisions challenging. A retrospective review was performed analyzing the medical records of all patients with confirmed diagnosis of MS who had coexistent CS and underwent surgery for cervical radiculopathy/myeloradiculopathy. Eighteen patients with coexistent CS and MS who had undergone cervical spine decompression and fusion were identified. There were six men and 12 women with an average age of 52.7 years (range 40–72 years). Pre-operative symptoms included progressive myelopathy (14 patients), neck pain (seven patients), radiculopathy (five patients), and bladder dysfunction (seven patients). Thirteen of the 14 patients (92.9%) with myelopathy showed either improvement (4/14, 28.6%) or stabilization (9/14, 64.3%) in their symptoms with neck pain and radiculopathy improving in 100% and 80% of patients, respectively. None of the seven patients with urinary dysfunction had improvement in urinary symptoms after surgery. To conclude, cervical spine decompression and fusion can improve or stabilize myelopathy, and significantly relieve neck pain and radiculopathy in the majority of patients with coexistent CS and MS. Urinary dysfunctions appear unlikely to improve after surgery. The low rate of surgical complications in our cohort demonstrates that cervical spine surgery can be safely performed in carefully selected patients with concomitant CS and MS with a good clinical outcome and also eliminate CS as a confounding factor in the long-term management of MS patients.



## 1. Introduction

Cervical stenosis (CS) and multiple sclerosis (MS) are two common conditions with distinctive pathophysiology but overlapping clinical manifestations which may include myelopathy, motor/sensory disturbances, and bowel/bladder dysfunctions [1,2]. CS is most commonly secondary to degenerative spine changes that occur with aging and can result in chronic compression of the cervical spinal cord and spinal cord dysfunction [3]. MS, on the other hand, is a progressive autoimmune disease characterized by demyelination in the brain, spinal cord and optic nerve with a female predilection and an earlier age of onset between 15 to 50 years [4].

Although these two clinical entities usually affect two different age groups, aging MS patients are susceptible to develop CS. Furthermore, it is estimated that over 90% of patients with relapsing-remitting multiple sclerosis (RRMS) will transform into secondary progressive multiple sclerosis (SPMS) about 25 years after the initial diagnosis [4]. As patients with MS age, a subgroup of those patients would have spinal cord compression from CS secondary to degenerative spondylotic changes which can lead to gradually progressive myelopathy which may be indistinguishable from SPMS in patients diagnosed with MS. In the absence of florid spinal compression on imaging, it is often difficult to decipher if the exacerbation/progression of the existing MS or the coexisting CS is the culprit for neurological deterioration in these patients [5–8]. There is often a reluctance in subjecting these patients to surgical decompression which is understandable due to absence of strong evidence demonstrating benefit of such intervention. Literature regarding the surgical outcome of cervical decompression and fusion for patients with concomitant CS and MS is sparse [5–10]. A recent study has demonstrated that even though surgery is beneficial, the improvement is less in comparison to patients with isolated CS/spondylosis [10]. This retrospective review was performed to analyze the clinical outcome following cervical spine

* Corresponding author. Tel.: +1 312 942 6644; fax: +1 312 563 3358.
*E-mail address:* manish_kasliwal@rush.edu (M.K. Kasliwal).

http://dx.doi.org/10.1016/j.jocn.2014.05.023
0967-5868/

decompression and fusion in patients with coexisting CS and MS with a review of pertinent literature.

## 2. Methods

A retrospective review was performed analyzing the medical records of all patients with confirmed diagnosis of MS who had coexistent CS and underwent surgery for cervical radiculopathy/myeloradiculopathy from October 2009 to June 2013 after Institutional Review Board approval. The indications for surgery were intractable/progressive radiculopathy or radiculomyelopathy with presence of stenosis on MRI. Figure 1 demonstrates a representative image of one the patients from the study population. Information regarding patient demographics, medical history, length of MS diagnosis, presenting symptoms, imaging findings, type of surgical intervention and post-operative course were recorded and analyzed independently both by a board-certified neurosurgeon and neurologist subspecialized in MS. Nurick myelopathy grade was assessed before surgery and at last follow-up for clinical outcome measurement in patients with myelopathy and neck pain was assessed using before surgery and at last follow-up using a visual analogue scale (VAS). Post-operative data were then categorized as to whether there was improvement (either complete resolution or improvement with persistent but less severe symptoms), or stable (no change) from the pre-operative symptoms. Expanded Disability Status Scale (EDSS) was used to grade the severity of MS just before surgery and at last follow-up. Fusion assessment was performed by spine fellowship trained neurosurgeon based on conventional flexion-extension radiographs and was defined as presence of bridging bone across the disc space and no differences in angulation (<2 degrees) or the alteration of interspinous process distance (<2 mm) between flexion and extension films. A review of the literature was conducted using PubMed with the search terms "cervical spondylosis, cervical decompression, cervical myelopathy AND multiple sclerosis".

## 3. Results

Eighteen patients with the diagnoses of both CS and MS who had undergone cervical spine decompression and fusion were identified from the database. There were six men and 12 women with an average age of 52.7 years (range 40–72 years). The average length of MS diagnosis was 13.9 years (range 3–35 years). Pre-operative symptoms included progressive myelopathy (14 patients), neck pain (seven patients), radiculopathy (five patients), and bladder dysfunction (seven patients).

Thirteen of the 14 patients (92.9%) with myelopathy showed either improvement (4/14, 28.6%) or stabilization (9/14, 64.3%) of their symptoms. One patient (7.1%) had worsening of myelopathy during the follow-up period. All seven patients (100%) with severe neck pain had either resolution or significant relief. Similarly, four of the five patients (80%) with severe radiculopathy improved after surgery, while one patient (20%) continued to have arm pain. None of the seven patients with urinary dysfunction had improvement in their urinary symptoms after surgery. During the follow-up period, the EDSS improved or stabilized in 16/18 patients (94.4%), while two patients (5.6%) worsened slightly after surgery. One patient experienced wound drainage that required superficial wound debridement. No other surgical complications occurred in this cohort. The average follow-up was 18 months (range 3–45 months). Fusion occurred in all 12 patients who had at least 1 year of follow-up. Pre-operative clinical, surgical and outcome details are summarized in Table 1 and 2.

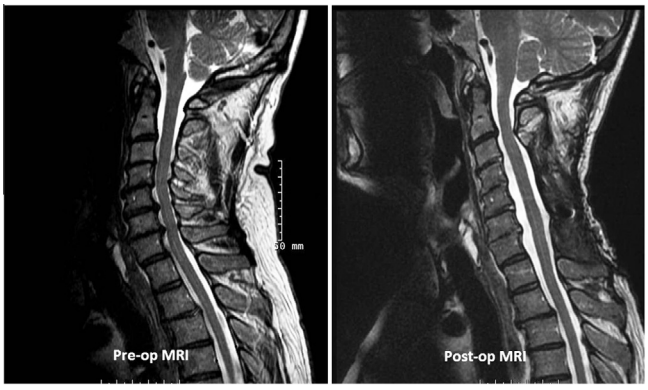


**Fig. 1.** Pre-operative sagittal T2-weighted MRI of a patient who presented with myelopathy demonstrating multilevel cervical stenosis in the cervical spine (left), and sagittal post-operative T2-weighted MRI demonstrating adequate decompression with cerebrospinal fluid signal surrounding the cervical spinal cord.

## 4. Discussion

Brain et al. [11] first reported a series of 17 patients with coexisting CS and MS in 1957, but there is an absence of high quality data and management guidelines regarding this subgroup of patients harboring both MS and CS. The existing literature on this consists of case reports and some case series with mixed results and conflicting recommendations [5–14] (Table 3). The conflicting data is not surprising as both MS and cervical spinal cord compression secondary to degenerative cervical spine pathology have overlapping clinical features and determination of the cause of myelopathy for patients with MS and compressive cervical spondylosis or disc disease can be arduous. Even though there has been concern of deterioration following administration of anesthesia to these patients with risk of neurological deterioration secondary to relapse in the past, [15,16] recent studies have shown that there is no correlation between MS disease activity and administration of anesthesia, with no negative effect of surgery on the natural course of MS [5–7,10,17]. Nevertheless, the distinction is clinically relevant as surgical decompression of the cervical spine certainly would not improve a patient's symptoms if the worsening symptoms are in fact solely due to exacerbation or progression of existing MS; on the other hand, patients are likely to have improvement or stabilization of symptoms with cervical spine decompression if severe CS is in fact the true culprit. Patient selection is extremely important in these cases. However, in reality it is often very complex for clinicians to diagnose whether a patient's worsening gait or increasing hand weakness is the result of either progression of MS and spinal cord compression, CS, or both, creating a dilemma.

Cervical spondylosis with myelopathy is the most common cause of spinal cord dysfunction in the world that results in a non-traumatic, progressive and chronic compression of the cervical spinal cord. Though spine degeneration is a part of the normal aging process with radiological studies showing evidence of cervical spondylosis in up to 95% of men and 70% of women older than 70 years of age [18], it is much more widely accepted that pathological degenerative disc disease is a distinct condition and not normal [3]. The sequence of degenerative changes starting from intervertebral disc progresses to involve uncovertebral joints, facet joint, ligamentous hypertrophy and osteophytes formation which culminates in narrowing of the spinal canal and neuroforamina which can manifest as myelopathy and radiculopathy. The natural history of CS tends to be progressive with an estimated 8% of asymptomatic patients becoming symptomatic at 1 year and 23% of patients becoming symptomatic at 4 years [19]. Furthermore,