



## NeuroSpine's Greatest Strength is our Integrated Approach

The NeuroSpine Center of Wisconsin is recognized as among the best in spine and brain care in the Midwest and is acknowledged as the leader in neurospine care in the region.

With our unique integrated approach, surgeons and physiatrists work as a unified team, providing same-day coordinated consults. From diagnostic testing including X-ray, to physical therapy, to on-site MRI, to therapeutic injections, care remains patient-focused in a single convenient location.

NeuroSpine Center of Wisconsin, S.C.  
5320 West Michaels Drive  
Appleton, WI 54913-8446  
920-882-8200 or 888-231-5236  
www.neurospinewi.com



### Chiropractic

Connon L. Pienczkowski, DC  
Chris D. Resch, DC  
John D. Schutte, DC  
Peter J. Schutte, DC

### Physical Therapy

Robert J. Daul, MPT  
Brennan R. Hussey, PT  
Ron S. Miller, PT  
Jason G. Schomburg, MPT  
Cindy J. Hillesheim, PT

### Physical Medicine and Rehabilitation

John R. Revord, MD  
J. Talbot Sellers, DO  
Randall J. Schultz, MD  
Richard A. Staehler, MD  
Douglas J. Hendricks, MD

### Orthopedic Spine Surgery

Peter F. Ullrich, Jr., MD  
David C. DeWitt, MD  
Pamela E. Verkuilen, APNP  
Jill J. Buchinger, RN, BSN, CCRN

### Neurosurgery

Karl A. Greene, MD, PhD, FACS  
Thomas M. Wascher, MD, FACS  
David R. Bond, APNP, CNRN  
Jill E. Coenen, RN, BSN, CST-FA

November 2007

# Back TO Life

*Back to Life* was developed specifically for chiropractors, worker's compensation case managers, physical therapists, occupational therapists, athletic trainers and personal trainers to provide a better understanding of **NeuroSpine's integrated approach** to back pain.

### We want to hear from you!

Is there a topic you want to see in "Back to Life"? Do you have questions about our services? Would you like to refer a patient to one of our physicians? Call us at 920-882-8200 or 888-231-5236, or visit [www.neurospinewi.com](http://www.neurospinewi.com).

**Be assured your patient will be referred back to you after we treat his/her condition.**

## Understanding Cervical Spondylotic Myelopathy



By Thomas M. Wascher, MD, FACS  
Co-authored by [spine-health.com](http://spine-health.com)

Cervical spondylotic myelopathy (CSM) refers to impaired function of the spinal cord caused by degenerative changes of the discs and facet joints acquired in adult life. This is the most common disorder causing dysfunction of the spinal cord in the United States. Most patients with this condition are over 50 years of age, but the age of onset is variable depending on the degree of congenital spinal canal narrowing.

The process that leads to spinal cord compression is a result of cervical "arthritis" (also called cervical spondylosis), which is incompletely understood and likely has a number of causes. Factors that are thought to contribute to cervical spondylotic myelopathy include:

- Normal age-dependent changes of the intervertebral discs, most commonly manifest as osteophytes (bone spurs) at the margins of the vertebrae
- Arthritis in the neck leading to facet hypertrophy (enlargement of the facet joints)
- Thickening of the ligaments surrounding the spinal canal, especially the ligamentum flavum, which parallels loss of disc height
- Translational mechanical instability resulting in subluxation (or partial dislocation) of the vertebral bodies
- Congenitally small spinal canal, which renders the patient's spinal cord more susceptible to compression secondary to a given amount of acquired canal encroachment
- Repetitive wear and/or "trauma" leading to degenerative changes affecting the disc spaces and vertebral endplates

These changes in the cervical spine produce narrowing of the spinal canal itself, leading to thickening of the posterior longitudinal ligament and bone spur (osteophyte) formation compressing the spinal cord, most commonly at the C4-C7 levels. The end result is chronic compression of the spinal cord and nerve roots leading to impaired blood flow and neurological deficit resulting in frank damage within the spinal cord itself. A related condition that is more commonly being appreciated in non-Asians is Ossification of the Posterior Longitudinal Ligament (OPLL).



## Symptoms of cervical spondylotic myelopathy

Patients with cervical spondylotic myelopathy often have the following symptoms:

- **Weakness, numbness or clumsiness of the upper extremities (arms, hands, fingers)**
- **Altered walking ability perceived as either poor balance, weakness, heaviness or numbness in the legs**
- **Painful, stiff neck**
- **Variable degrees of radicular arm pain**

Though cervical spondylotic myelopathy is painless in more than 50% of patients, pain may be described as a stabbing, burning sensation or a persistent dull ache radiating throughout the arms to the forearms, at times to the fingers, associated with "pins and needles" paresthesias extending into the fingers. Patients often comment about dropping objects accidentally or having trouble fastening their clothes. If prolonged, there may be associated muscle wasting and overt loss of sensation to vibration, pinprick sensation, pain and thermal sensation.

In addition, on examination, increased resting tone of the arms and legs, focal weakness of muscles supplied by affected nerve roots, unsteadiness of gait and abnormally brisk deep tendon reflexes may be present. Coordination may be affected as well, including impaired fine finger movement, as well as difficulty with coordinated walking, such as seen with reverse tandem gait. Neck flexion may induce electrical-like sensations running down the spine (referred to as Lhermitte's phenomenon).

## Progression of cervical spondylotic myelopathy

As the impairment to spinal cord function (referred to as "myelopathy") progresses, both legs weaken and become progressively spastic. Bowel and bladder sphincter control may then be altered. In advanced cases, gait will become progressively more difficult without aid by a cane or a walker.

## Diagnosis of cervical spondylotic myelopathy

The diagnosis of cervical myelopathy depends on the patient's history and the physical findings described above. It may then be confirmed by radiologic imaging, such as an MRI scan of the cervical spine demonstrating overt spinal cord and nerve root compression.

## Diagnostic studies to diagnose cervical spondylotic myelopathy

Additional diagnostic studies often performed include:

- In certain instances (especially when the details of bone anatomy must be seen clearly), a cervical myelogram and post-myelogram CT scan may aid in determination of the anatomy associated with nerve root and spinal cord compression.
- Advanced cases may show abnormal signal within the spinal cord on MRI imaging and/or atrophy of the spinal cord due to nerve cell loss. In such cases, referred to as "myelomalacia," surgical outcomes may not be as promising.
- Flexion/extension cervical spine films to rule out translational instability of the cervical vertebral bodies, which can influence the choice of treatment.
- Somatosensory evoked potentials (SSEPs) or motor evoked potentials (MEPs) to provide a measure of the electrical conductivity of the spinal cord across the compressed segments. Such testing may also be performed as a baseline in anticipation of monitoring of the spinal cord during surgery itself.

## Differential diagnosis of cervical spondylotic myelopathy

To arrive at an accurate diagnosis, it is critical for the physician or chiropractor to consider other disorders that have similar symptoms as cervical spondylotic myelopathy (a "differential diagnosis"). Other conditions associated with neck pain and arm pain, motor-sensory-reflex changes and signs of spinal cord dysfunction include:

- **Progressive forms of multiple sclerosis**
- **Amyotrophic lateral sclerosis (Lou Gehrig's disease)**
- **Hereditary spastic paraplegia**
- **Subacute combined degeneration of the spinal cord associated with vitamin B12 deficiency**
- **Certain spinal cord tumors**
- **Combined system disease**

## Treatment options for cervical spondylotic myelopathy

Both conservative and surgical approaches are available to treat cervical spondylotic myelopathy.

## Non-surgical treatment for cervical spondylotic myelopathy

Conservative treatment is aimed at decreasing pain by reducing spinal cord and nerve root inflammation, as well as improving the patient's function and ability to perform daily activities.

Treatment generally consists of a combination of temporary immobilization of the neck, steroidal and/or non-steroidal anti-inflammatory medications (such as COX-2 inhibitors or ibuprofen), as well as physical therapy.

Depending on the specific MRI/CT myelogram findings, other potential treatment options include various forms of cervical traction and epidural steroid injections, as well as chiropractic options.

Patients with overt spinal cord compression resulting in spinal cord dysfunction (myelopathy) may be referred directly for consideration of spine surgery. Failure of the patient to improve after 4 to 6 weeks of conservative management or progression of their symptoms in spite of it, are indications for surgical evaluation.

## Spine surgery for cervical spondylotic myelopathy

In the past, cervical laminectomy (removing the posterior aspects of the spinal canal) to decompress the spinal cord has been the procedure of choice.

However, the majority of the abnormal anatomy producing spinal cord compression is located anteriorly to the spinal cord itself. This is only indirectly addressed by a cervical laminectomy, with a clear subset of patients either failing to benefit or even getting worse after a laminectomy. Therefore, depending on the patient's anatomy, many surgeons prefer anterior decompression of the spinal cord and nerve roots. These procedures are referred to as anterior cervical decompression and spine fusion operations. The surgeon may also use instrumentation (plates and screws) to provide immediate internal support for the cervical spine and to promote bone graft healing.

Published August 31, 2001. Information provided by [www.spine-health.com](http://www.spine-health.com)  
© 1999-2007 Spine-health.com. Any duplication or distribution of the information contained herein is strictly prohibited. This information is not intended as a substitute for medical professional help or advice but is to be used only as an aid in understanding back pain and neck pain. A physician should always be consulted for back pain or any health problem.

