Cervical Myelopathy

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What are the causes of cervical myelopathy?

Myelopathy is caused by any pathologic process that interferes with transmission of signals through the spinal cord. In regard to orthopedic surgery, the most common cause of this disease is due to cervical degenerative disc disease putting pressure on the spinal cord in a condition referred to a cervical spondylotic myelopathy. The remaining references to cervical myelopathy in this interview will refer to this condition. More specific pathologies include disk bulging, herniations, osteophytes, facet hypertrophy, or thickening of the ligamentum flavum. Congenital narrowing of the spinal canal, dynamic changes due to hypermobility, and spinal deformity may also contribute to the disease.

What are the symptoms of cervical myelopathy?

The symptoms of cervical myelopathy depend on which portion of the spinal cord is involved. As clinicians, we look for changes in fine motor control. These symptoms can present as difficulty using the hands and fingers, dropping objects, problems with manipulating small items, trouble using keys and buttons, or changes in handwriting. Patients may have decreased sensation in a non-dermatomal pattern below the level of the compression. Radicular symptoms also may be observed at the level of compression if nerve root involvement occurs. Unsteady gait and problems with balance are sometimes present, and impaired control of bowel and bladder function may occur as a late finding. Patients also may report the sensation of an electrical shock throughout their body with neck flexion, which is known as a Lhermitte’s sign. Physical examination often reveals upper motor neuron findings and pathologic reflexes.

Cervical myelopathy can be easily overlooked. Patients with neck pathology often have comorbidities, and the symptom presentation of myelopathy may be dismissed for other causes. For example, difficulty with handwriting and manipulating small objects may be attributed to severe arthritis in the hands or fingers, and gait disturbances can sometimes be mistaken for osteoarthritis in the hip and knee.

What role does imaging play in diagnosing or treating cervical myelopathy?

Imaging studies are critical in the evaluation and treatment of cervical myelopathy. Magnetic resonance imaging (MRI) is the...
most useful study. The images help identify any areas of stenosis and show changes in spinal cord signal or myelomalacia. In the absence of MRI, a computed tomography myelogram is helpful in identifying cord compression. A computed tomography scan can also identify the presence of an ossified posterior longitudinal ligament and can help clinicians determine additional details of the bone if a significant deformity is present. Plain radiography is used to evaluate the overall cervical spine for kyphosis, deformity, or anterolisthesis. In addition, the radiographs may indicate whether the patient’s overall sagittal alignment needs to be evaluated.

What are the operative and nonoperative treatment options for patients with cervical myelopathy?  

The only nonoperative treatment option is observation, with further intervention if symptoms worsen. Unfortunately, no nonoperative treatments take pressure off of the spinal cord. The natural history of the disease is that progression will occur. A majority of patients with cervical myelopathy are described to have stepwise progression, which is deterioration followed by a period of stability that lasts for a variable duration. However, other patients may have a rapid decline. Nonoperative treatment is generally reserved for mild cases or if other factors are present that are contraindications to surgery.

Operative treatment is necessary to take pressure off of the spinal cord. Treatments may involve anterior or posterior approaches. Anterior procedures include anterior cervical diskectomy and fusion or anterior cervical corpectomy and fusion. Posterior procedures include laminectomy, laminectomy and fusion, or laminoplasty. In some circumstances, a combined anterior and posterior approach may be necessary. The operative procedure is based on the pathology causing the central stenosis, the presence of kyphosis, the levels involved, patient factors, and surgeon preference.

When is surgery optimal for patients with cervical myelopathy?  

This is a controversial area in the management of cervical myelopathy. Despite the knowledge that the natural history of cervical myelopathy indicates that the disease will progressively worsen, there is no way to know when the symptoms will progress. One option is to operate early, as soon as the patient develops symptoms. The neurological deficits from spinal cord compression are potentially permanent. It would be advantageous to address the pathology before the patient developed any irreversible symptoms. A second option, if the patient is asymptomatic or only has mild symptoms, is a period of observation with surgery if symptoms become moderate to severe. The rationale behind this approach is that an extended period of time may pass before any progression occurs. Performing surgery in the early stages of the disease would subject patients to unnecessary risks and possible complications.

What are the rehabilitation protocols used for patients with cervical myelopathy?  

Rehabilitation occurs in 2 parts. The first part is recovering from surgery. Patients may be immobilized or restricted from strenuous activity for 3 months postoperatively. A cervical collar may be used, depending on the type of surgery performed and the quality of fixation achieved intraoperatively. The second part of rehabilitation begins with physical therapy 3 months postoperatively, along with a gradual return to normal activities. Physical therapy and occupational therapy can be tailored to meet the needs of individual patients. Patients may benefit from physical therapy to assist with gait training, whereas occupational therapy may help improve hand and finger function. More aggressive rehabilitation may be necessary for patients with more severe spinal cord injuries. Unfortunately, neurologic improvements from rehabilitation may be limited.

What is the prognosis for patients with cervical myelopathy?  

The prognosis is variable. Studies have shown that the duration of preoperative symptoms is associated with the degree of recovery. The presence of myelomalacia on MRIs is associated with less recovery of neurologic symptoms and a poorer outcome. Varying degrees of functional recovery may also occur, depending on the symptoms. For example, some studies have suggested that hand numbness and gait abnormalities are less likely to recover. I tell my patients that it is difficult to predict whether any recovery of symptoms will occur. The purpose of the surgery is to prevent any further progression or neurological deterioration.

What research is being done on cervical myelopathy?  

One major area of research involves determining the best way to treat cervical myelopathy. What are the best indications for an anterior or posterior approach? Which approach is more effective? How does the type and location of pathology affect our treatment decisions? What are the roles for newer technologies, such as total disk replacement, in the treatment of cervical myelopathy? Another area of research is trying to determine the best indicators for prognosis and operative outcomes. Which symptoms have the best chance of improving? Which radiographic findings are associated with the best and worst outcomes? A third area of research is directed toward spinal cord injury treatment. Are there ways to treat the cord injury to prevent further deterioration and promote recovery?

What does the future hold for cervical myelopathy?  

Having better ways to predict which patients have risk factors for progression will help improve the timing of surgery. Improvements in implants and bone grafts will help with operative management and successful healing. Studies are needed to evaluate new technology and improve treatment and rehabilitation protocols for spinal cord injuries.