

What's Your Diagnosis?

Gait Problems and Neuromuscular Abnormalities in an Elderly Patient

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This patient found it difficult to maintain his balance when walking, and physical examination showed a variety of neurologic and muscle abnormalities. Can you guess his underlying problem?

A 75-year-old man presented to his primary care provider with reports of walking difficulties. Over the past two years, he had experienced worsening unsteadiness and stumbling when he walked. He had begun using a cane because of his bad balance. The patient reported no numbness or tingling in his feet, but he described weakness in his legs. He also noticed occasional tingling and clumsiness in his hands, which he attributed to arthritic fingers and wrists. The patient reported experiencing no positional dizziness or lightheadedness, having no recent illnesses, and taking no prescription medications. His medical history was significant for osteoarthritis and gastroesophageal reflux disease.

On physical examination, the patient appeared well nourished, alert, and oriented. He walked with a wide-based gait and staggered from side to side, requiring support. Cardiac exami-

nation showed normal jugular venous distention and normal rhythm with no murmurs. Pulmonary examination revealed normal breath sounds bilaterally. Vascular examination showed normal pulses.

Neurologic examination revealed normal cranial nerves and normal strength in the legs and arms, although his hands showed a significant amount of intrinsic muscle atrophy and weakness to grip. Light touch, pinprick, and monofilament sensation tests indicated that he had normal sensation in his hands and feet. The patient's deep tendon reflexes, however, showed hyperreflexia of the biceps, brachioradialis, triceps, quadriceps, and achilles reflexes. Additionally, eight to 10 beats of sustained clonus were evident in both of his feet. He had a positive Hoffman sign and inverted radial reflex in his upper extremities, as well as a negative Babinski reflex in the feet. The patient had a positive Romberg test. He had normal rectal tone and perineal sensation. He showed significant difficulty with rapid alternating movements in his hands, as well as poor finger-to-nose testing. The patient demonstrated normal positional and vibratory sensation.

An electromyogram and nerve conduction studies showed no myopathy or peripheral neuropathy, but they demonstrated abnormal muscle fibrillations



Figure 1. Magnetic resonance imaging scan of the lumbar spine, showing stenosis of the spinal canal across multiple segments.

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in the arms and legs. Laboratory tests revealed normal white blood cell and red blood cell counts, creatine kinase and vitamin B12 levels, and renal and thyroid function. A magnetic resonance imaging (MRI) scan of the lumbar spine was conducted and demonstrated stenosis of the spinal canal (Figure 1).

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Based on the findings of the lumbar MRI, the patient was referred to the spine surgery service with an initial diagnosis of lumbar stenosis. Lumbar stenosis can account for the symptom of leg weakness, and it also can cause claudication pain that affects walking. The patient's chief concern, however, was a sensation of unsteadiness or disequilibrium when walking. Physical examination (most notably the gait disturbance), hyperreflexia, and pathologic reflexes also raised concerns that the patient's symptoms had another source.

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With the aforementioned concerns in mind, the spine service had the patient undergo a cervical spine MRI. This test revealed evidence of spondylotic changes with nerve root and spinal cord compression across multiple levels, along with spinal cord signal changes consistent with myelomalacia (Figure 2). The patient was diagnosed with cervical myelopathy.

The spine service treated the patient with an anterior and posterior cervical decompression and fusion (Figure 3). The patient reported immediate improvement in hand tingling and, at 12-month follow-up, his hand function had subjectively improved. He still experienced balance problems at follow-up, however, and he continued to use a cane.

ABOUT THE CONDITION

Gait disturbances are quite common in elderly patients and can be classified broadly by three etiologies: neurologic, musculoskeletal, or combined neurologic and musculoskeletal.⁵ Neurologic causes of gait disturbances include Parkinson disease, cerebrovascular accident, cerebellar ataxia, hydrocephalus, peripheral neuropathies, and changes in the central ner-



Figure 2. Magnetic resonance imaging scan of the cervical spine, showing nerve root and spinal cord compression across multiple levels and spinal cord signal changes consistent with myelomalacia.



Figure 3. X-ray image showing a lateral view of the cervical spine after anterior and posterior cervical decompression and fusion.

vous system related to drug or alcohol abuse. Such musculoskeletal diseases as osteoarthritis, joint laxity, or joint contractures may produce antalgic or Trendelenburg gait patterns.

Combined neurologic and musculoskeletal diseases typically originate in the spinal column. Degenerative changes in the spine (including arthritis, disk herniation, and spondylosis) can result in secondary neurologic compression. At the root level, this compression can cause radiculopathy, typically presenting with radiating pain, numbness, or tingling in the upper extremities. If spinal cord compression occurs, it may result in myelopathy.

The incidence and prevalence of cervical myelopathy remain unknown. It is seen typically in patients older than 50 years and is more com-

mon with advancing age. The natural history is one of a gradual, stepwise decline in function, with long periods of stability in 75% of patients; a slow, steady progression of symptoms in 20% of patients; and rapid deterioration in 5% of patients.¹ Symptoms can include neck pain and such radicular symptoms as pain, numbness, or weakness in the hands or arms. Subtle changes in gait, balance, and manual dexterity may be the earliest symptoms of myelopathy.³ As the disease progresses, walking and balance problems can become severe enough to require assistance and, in some cases, to necessitate a wheelchair. Comorbid stenosis of the lumbar spine (“tandem stenosis”) often is present.

Physical examination often will reveal weakness and atrophy of the hand's intrinsic muscles. Additionally, neck stiffness and tenderness may be evident. A thorough and detailed neu-

rologic examination is critical. Weakness and numbness often are not present until the late stages of the disease. Such subtle findings as hyperreflexia, clonus, and pathologic reflexes (including Hoffman reflex, inverted radial reflex, and Babinski reflex) are present earlier. Gait examination, as in this patient, reveals a broad-based, ataxic pattern. Such specific gait tests as heel-to-toe tightrope-style walking are sensitive. Lastly, Romberg sign and difficulty with finger-to-nose and rapid alternating hand movements are signs of spinocerebellar dysfunction seen with cervical myelopathy.

Diagnosis is best confirmed with the use of cervical MRI. Findings typically will include disk space collapse, disk degeneration, or ligamentous hypertrophy, any of which can result in spinal cord compression, deformation, or spinal cord signal change. Deformities in spinal alignment that further compress the cord also may be seen.

Patients with minimal symptoms can be observed with serial physical examination. Given the natural history of the disease, patients with significant symptoms are best treated surgically. Surgical aims include thorough decompression of the spinal canal and reconstruction of the spine to restore and maintain spinal alignment. Often this may be achieved through anterior or posterior decompressive procedures performed in conjunction with cervical fusion. In cases of cervical deformity (such as with kyphosis), combined anterior and posterior procedures may be necessary.

Complications from surgical treatment can include dysphagia, odynophagia, and dysphonia (notably for anterior approaches), as well as the potential for infection and fusion pseudarthrosis or nonunion.^{2,4,6} Given that the elderly population is often affected by this condition, cardiovascu-

lar and pulmonary complications also can occur postoperatively.

Neurologic recovery can be variable. Often, as in this case, the patient's myelopathic symptoms of gait or hand disturbances may not improve due to irreversible spinal cord dysfunction despite surgical treatment. Therefore, the primary goal of surgery is prevention of further neurologic injury, and early treatment often is recommended to prevent functional loss. ●

Author disclosures

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