Case Report

Motor Neuron Diseases Accompanying Spinal Stenosis: A Case Study

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Manuscript received: 07-09-2015
Revised manuscript received: 09-25-2015
Accepted for publication: 10-20-2015

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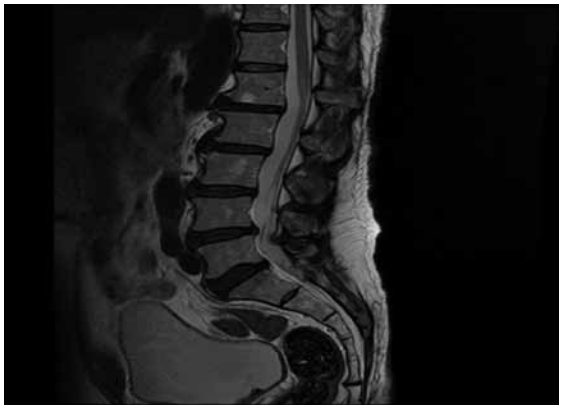
A 75-year-old man, who was healthy, visited the hospital because of shooting pain and numbness in both lower limbs (right > left). The patient had an L4/5 moderate right foraminal stenosis and right subarticular disc protrusion and received a lumbar epidural block. The patient experienced severe weakness in the right lower limb after 2 days. Lumbar and cervical magnetic resonance images were taken and electromyography and a nerve conduction study were performed to arrive at the diagnosis of a motor neuron disease. The patient expired 4 months later with respiratory failure due to motor neuron disease. This case suggests that any abnormal neurological symptoms that occur after an epidural block should be examined thoroughly via testing and consultations to identify the cause of the symptoms.

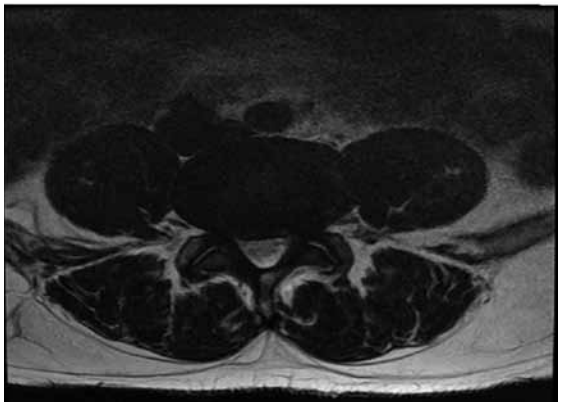
Key words: Leg pain, epidural steroid injections, motor neuron disease

Pain Physician 2016; 19:E455-E458

A 75-year-old man, who was otherwise healthy, presented at the hospital for shooting pain and numbness in both lower limbs. His pain began one year earlier and had intensified during the last 6 months. Pain in the right lower limb was more severe than that in the left lower limb (visual analog scale score, 7/10). A lumbar epidural block was requested. A lumbar magnetic resonance image (MRI) performed one year earlier at the onset of the pain and numbness showed a L4/5 moderate right foraminal stenosis and a right subarticular disc protrusion (Fig. 1); therefore, a caudal epidural block under the C-arm (0.125% ropivacaine 10 mL + triamcinolone 20 mg) was performed. When the patient visited the hospital 2 weeks later, the pain in the right lower limb was alleviated by about 30%, and the patient complained of mild weakness with no significant difference from before treatment. Hence, a lumbar epidural block (4/5) (0.125% ropivacaine 10 mL + triamcinolone 20 mg) was performed. On his next visit, the patient said that the weakness in the right lower limb had worsened to the point that it was nearly impossible to lift his leg 2 days after the lumbar epidural block. We examined motor power and found that the right limb had weakened, with an ankle dorsiflexion grade of 2. Moreover, the patient reported that he had been experiencing weakness in the upper right limb as well, and that it was difficult for him to use chopsticks. We performed contrast-enhanced MRI of the lumbar and cervical spines to detect any complications. We consulted the neurology department and performed an electromyography (EMG) and a nerve conduction study (NCS) for a more accurate diagnosis. The patient's lumbar MRI did not show any differences from the previous lumbar MRI; however, cervical spondylosis was suspected from the MRI findings (Fig. 2). However, the EMG performed on the right biceps brachii, deltoid, first dorsal interosseous, abductor pollicis brevis, extensor carpi ulnaris, extensor carpi radialis, brachioradialis, and infraspinatus muscle



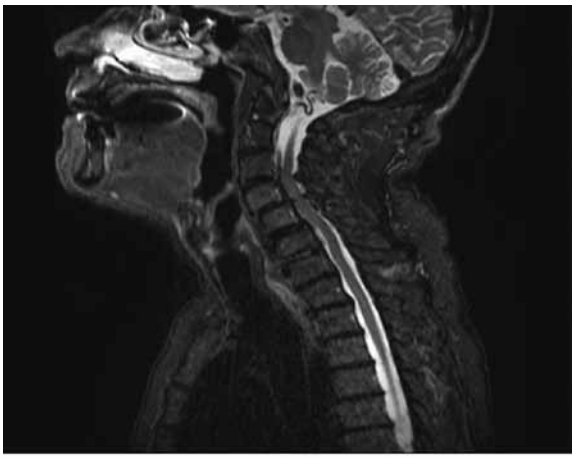
Sagittal T2-weighted MRI



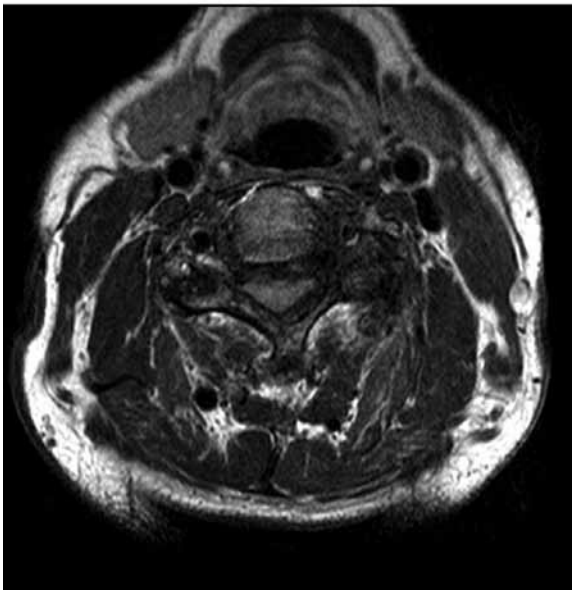
Axial T2-weighted MRI at the L4/5 vertebral level

Fig. 1. *MRI findings of the lumbar spine.*

showed a denervation potential, such as a fibrillation potential and positive sharp wave, and the NCS findings indicated sensorimotor polyneuropathy. Therefore, the patient was diagnosed with a motor neuron disease and he was transferred to the neurology department. He was eventually admitted to the intensive care unit 2 months later with dyspnea. The patient was intubated in the ICU but expired 4 months later with respiratory failure due to motor neuron disease.



Sagittal T2-weighted MRI



Axial T2-weighted MRI at the C4/5 vertebral level

Fig. 2. *MRI findings of the cervical spine. MRI at C3/4: bulging disc and ligamentum flavum thickening and central canal stenosis, C4/5: spondylolisthesis, bulging disc, and ligamentum flavum thickening, central canal stenosis, and left C5 foraminal stenosis.*

Discussion

Elderly patients with spinal stenosis accompanied by radiculopathy can experience back pain, neurological claudication, and lower limb weakness. The patient in the present case received a caudal epidural block for lumbar stenosis, and his pain was temporarily alleviated. However, the muscle weakness was aggravated after the lumbar epidural block, and we later found a pre-existing motor neuron disease. The patient died later from respiratory failure. A lumbar epidural block reduces pain, eliminates pain cycles, and improves blood circulation in patients with a herniated intervertebral disc, neuropathic pain syndrome, spinal stenosis, and spondylolisthesis. An epidural block rarely induces severe nerve damage, but can result in neurological com-

plications, including nerve damage or spinal cord damage, epidural hematoma or abscess, and neurotoxicity to drugs (2). Hence, lower limb weakness occurring after an epidural block should be assessed carefully. EMG and NCS can be useful to determine the causes of neurological symptoms after an epidural block, such as whether they are induced by the block or existed prior to the block, because EMG changes appear only after a minimum of 2 weeks (3). One case was reported in which a motor neuron disease (ALS) was discovered after severe lower limb weakness that occurred in a patient who received epidural steroid injections (ESI) to regulate lower back and lower limb pain (3). However, there have been no other cases of motor neuron diseases reported that progressed as rapidly as this case. Moreover, no study has examined the effects of ESI on the course of a motor neuron disease. The diagnosis in this case was relatively quick due to the work up that was performed to pinpoint the cause of the patient's aggravated muscle weakness.

Since Francois Aran (1) first described the symptoms of motor neuron diseases in the 1850s, several discussions about the causes of motor neuron diseases have been published. Despite that aging, hereditary factors, excitotoxicity, oxidative toxicity, protein aggregation, and environmental agents have been suggested as causes, the exact mechanism of motor neuron disease remains elusive. Motor neuron diseases are initially suspected from clinical findings of upper and lower motor neuron damage in one region of the body and spread throughout the entire body. Diagnosis is confirmed after eliminating other disorders via various tests (4). Disproportionate weakness or atrophy of the extremities is common, and bulbar or pseudobulbar paralysis may also occur. A motor neuron disease can be diagnosed through clinical findings of abnormal upper and lower limb motor neuron symptoms, but electrophysiological testing is also required to eliminate other disorders. Motor neuron diseases are characterized by active denervation and chronic reinnervation on EMG. Active denervation includes fibrillation potentials and positive sharp waves, whereas chronic reinnervation includes long duration, polyphasic large amplitude motor unit action potentials, and reduced interference patterns. In this case, the patient was diagnosed with a motor neuron disease based on EMG, NCS, and clinical findings. However, because he refused a work up and his respiratory symptoms progressed rapidly, we could not identify the exact type of motor neuron disease. There are no confirmed therapeutic remedies for motor neuron diseases. However, considering that motor neuron diseases result in limb weakness and dysarthria, ultimately leading to dyspnea and death, it is important to maintain the patient's bodily functions via palliative therapy. In this case, diagnosing the patient with a motor neuron disease was difficult because the cervical MRI taken after his weakness aggravated showed cervical spondylosis. Motor neuron diseases are difficult to distinguish from cervical spondylosis (5). Na et al (6) reported that ALS, one of the most common motor neuron diseases, is more frequently accompanied by cervical spondylosis than the control group. Thus, it is imperative that physicians distinguish cervical spondylotic myelopathy from ALS because these 2 diseases require different treatments and have different prognoses. For example, an appropriate surgical intervention in the initial stages can halt disease progress and patients usually recover successfully (7). However, unnecessary surgery rapidly damages neuromuscular function and can result in premature death of patients with ALS (8).

In conclusion, an epidural block to treat pain should be preceded by an aggressive work up, physical examination, MRI, and EMG to eliminate central nervous system or other neurological disorders. Once neurological symptoms occur after the block, the exact cause of the symptoms should be identified through exhaustive testing and consultation with other departments to prevent permanent nerve damage.

Disclaimer

There was no external funding in the preparation of this manuscript.

Conflict of interest

Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

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