Nontraumatic Acute Complete Paraplegia Resulting From Cervical Disc Herniation
A Case Report

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Study Design. A case report of nontraumatic acute complete paraplegia resulting from cervical disc herniation.

Objectives. To describe a rare case of nontraumatic paraplegia resulting from an enlarged herniated disc in the cervical spine and to outline appropriate management of a patient with severe spinal cord compression secondary to disc herniation with developmental spinal canal stenosis.

Summary of Background Data. Acute progression of myelopathy into complete paraplegia resulting from disc herniation is rare. There are only four reported cases of nontraumatic acute myelopathy secondary to cervical disc herniation. No other report has described magnetic resonance imaging findings noted before and after the onset of acute myelopathy.

Methods. A cervical disc herniation at C6–C7 is reported in a 29-year-old man who had nontraumatic acute complete paraplegia. Neurologic and magnetic resonance imaging findings are evaluated and discussed.

Results. Disc herniation at C6–C7 enlarged nontraumatically, resulting in complete paraplegia. Emergent anterior decompression followed by secondary posterior multilevel decompression was performed. Magnetic resonance imaging studies revealed localized high signal intensity change in the spinal cord. No neurologic recovery was achieved 3 years post-surgery.

Conclusion. We emphasize that there is a possibility of acute, irreversible progression of paralysis secondary to nontraumatic enlargement of cervical disc herniation with canal stenosis. In these cases, immediate early decompressive surgery is crucial to the prevention of severe myelopathy. [Key words: nontraumatic, cervical disc herniation, acute paraplegia, MRI] Spine 2003;28:E125–E128

Case Report

A 29-year-old man presented to our service with a 5-month history of slowly progressive numbness in both arms and legs. Physical examination revealed hyperreflexia in the lower extremities, hypesthesia on the ulnar side of the left upper extremity, and no motor weakness of either upper or lower extremities. Radiographs of the cervical spine showed a relatively narrow spinal canal with 12-mm anteroposterior diameter at the level of the C5 vertebral body. Magnetic resonance imaging (MRI) revealed multilevel disc herniation at C3–C4 to C7–T1 with severe spinal cord compression at C6–C7 (Figure 1). He was registered on a waiting list for semiemergent surgery. Numbness in his arms and legs improved while wearing a cervical collar for 4 days.

At midnight a week after his first visit to our service, he gently rolled in bed to the left side, immediately noting rapid progression of hypesthesia and motor weakness. The patient was transferred to the emergency room in the early morning.

On admission to our service, neurologic examination revealed a flaccid complete paraplegia; anal wink and anesthesia below T1 dermatome were both noticed. An emergency MRI showed enlargement of disc herniation at C6–C7 with a high signal intensity change in the spinal cord on T2-weighted image (Figure 2).

Seven hours after this acute onset of paraplegia, the patient underwent emergency surgery consisting of removal of the C6–C7 herniated disc and anterior fusion with iliac bone grafting. Intraoperatively, the herniated soft disc was found to have compressed the dural sac posteriorly through a small tear in the posterior longitudinal ligament.

No improvement of the patient’s paraplegia was found during the first 12 days postsurgery. Postoperative MRI revealed sufficient decompression of the spinal canal at C6–C7; however, a high signal intensity change in the spinal cord spread from the level of C2 to T1 (Figure 3). Thirteen days after surgery, the patient underwent additional posterior decompression surgery consisting of laminoplasty of C3–C7. Three years postsurgery, no neurologic recovery has been demonstrated and the localized high signal intensity in the spinal cord on T2-weighted MRI remains at C6–C7 (Figure 4).

Discussion

Nontraumatic acute myelopathy associated with disc herniation has been reported to occur most frequently in the thoracic spine. Cervical disc herniation rarely causes nontraumatic acute myelopathy. There are only four reported cases of nontraumatic acute paraplegia resulting from cervical disc herniation (Table 1). Warabi et al7 reported a case of nontraumatic progressive myelopathy involving multilevel cervical disc herniations. In their case, the level of the lesion responsible for acute palsy was C4–C5 intervertebral disc. In the other three cases, the disc herniation at C6–C7 caused acute progressive palsy.3,5,7 Usually, ruptured cervical discs that induce myelopathy tend to occur at the level of C5–C6 followed by C4–C5; herniation of C6–C7 discs has rarely caused myelopathy.4 This is one of the reasons why nontraumatic acute progressive myelopathy is rare.
The case presented here is the first report that detected the pre- and postonset condition of the herniated discs and spinal cord using MRI. The preonset MRI showed multilevel disc herniations with a relatively narrow spinal canal and severe compression of spinal cord at C6–C7. The patient exhibited mild myelopathic symptoms before the acute onset of paraplegia. Under these circumstances, the spinal cord seems to suffer not only a mechanical compression but also an insufficiency of blood supply to the anterior spinal artery and its branches. At first presentation to our service, the spinal cord may have been at a critical point leading to infarction of the spinal cord or spinal shock. However, we could not predict that this case would progress to complete paraplegia nontraumatically. This case suggests the importance of considering that patients with multilevel cervical disc herniations with developmental canal stenosis seen on MRI, especially those with severe compression at the lower cervical level, may represent a critical condition that can progress to nontraumatic acute paraplegia. Furthermore, the possibility of rapid progression of myelopathy secondary to nontraumatic cervical motion associated with physical examination or changing position during surgery should be kept in mind.

This symptom is thought to disappear rapidly after surgical treatment. If the neurologic disturbance is mild, the symptom can disappear conservatively. Ueyama et al. reported one case that experienced poor and slow recovery after emergency surgery. They recommended decompressing the injured spinal cord via anterior pro-

Figure 1. Magnetic resonance images at first presentation to our service. A and B, Sagittal T1- and T2-weighted image of the cervical spine shows multilevel disc herniation with narrow spinal canal compressing the cord at C6–C7 most severely. C, Axial T2-weighted image of C6–C7 reveals central disc extrusion that transforms the cord to a boomerang shape.

Figure 2. Magnetic resonance images after acute progression of paraplegia. A and B, Sagittal T1- and T2-weighted image shows enlargement of the herniated mass at C6–C7. C, Axial T2-weighted image of C6–C7 illustrates a new fragment of the disc herniation that extruded to the left anterior side of the cord.
procedure with vertebrectomy. Most authors reporting on treatment of this symptom performed anterior decompression, too. We also performed single-level anterior decompression at first; however, the high signal intensity change of the spinal cord in MRI spread to the rostro-caudal sides of the decompression area once, and no neurologic recovery was detected.

Many authors have reported experimental ischemia-reperfusion injury of the spinal cord. They suggest that free radicals play an important role in palsy resolution in the reperfused spinal cord. Wisselink et al reported the histologic findings of ischemia-reperfusion-injured spinal cord, including destruction of anterior horn cells, nuclear disintegration, perikaryal swelling, and infarction of the spinal cords of all paraplegic animals. In our case, the intensity changes of spinal cord seen on MRI are thought to be similar to those experiments, implying demyelination at C6–C7, and spreading edema in the spinal cord. These findings strongly suggest the necessity of early preventive decompression to avoid progression into permanent neurologic deficit, especially in cases with a narrow spinal canal. Once acute neurologic deterioration developed, it seems better to perform urgent and multilevel decompression preparing for spinal cord swelling.

### Conclusion

A case of nontraumatic acute complete paraplegia resulting from cervical disc herniation is reported. Magnetic resonance imaging findings revealed nontraumatic en-

### Table 1. Reported Cases of Nontraumatic Acute Progressive Myelopathy Due to Cervical Disc Herniation

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Age (yrs)</th>
<th>Multilevel Disc Herniation</th>
<th>Developmental Canal Stenosis</th>
<th>Responsible Level</th>
<th>Operative Procedure</th>
<th>Recovery of Motor Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lourie et al</td>
<td>1973</td>
<td>37 M</td>
<td>–</td>
<td>–</td>
<td>C6–C7</td>
<td>ASF</td>
<td>+</td>
</tr>
<tr>
<td>Kawaguchi et al</td>
<td>1991</td>
<td>61 M</td>
<td>–</td>
<td>–</td>
<td>C6–C7</td>
<td>ASF</td>
<td>+</td>
</tr>
<tr>
<td>Warabi et al</td>
<td>1995</td>
<td>49 M</td>
<td>+</td>
<td>+</td>
<td>C4–C5</td>
<td>ASF</td>
<td>+</td>
</tr>
<tr>
<td>Ueyama et al</td>
<td>1999</td>
<td>61 F</td>
<td>+</td>
<td>+</td>
<td>C6–C7</td>
<td>ASF</td>
<td>+</td>
</tr>
<tr>
<td>Present case</td>
<td>29 M</td>
<td></td>
<td>+</td>
<td>+</td>
<td>C6–C7</td>
<td>ASF + LP</td>
<td>–</td>
</tr>
</tbody>
</table>

M = male; F = female; ASF = anterior spinal fusion; LP = laminoplasty.
largement of disc herniation in an already narrow canal, precipitating spinal cord ischemia. It appears that timely surgical decompression for the spinal cord at the early stage of myelopathy may be crucial to preventing severe injury of the spinal cord.

### Key Points
- A case of nontraumatic acute complete paraplegia resulting from cervical disc herniation is reported.
- Magnetic resonance imaging findings of before and after paraplegia onset and postoperative condition are described.
- We need to consider urgent preventive surgical decompression in a case of cervical disc herniation with spinal canal stenosis to avoid acute irreversible progression of paralysis.

### References