Case Report

A Case Of Cervical Disc Herniation Presented With Brown-Sequard Syndrome

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Abstract

The Brown-Sequard syndrome is most commonly seen with spinal trauma. A herniated cervical disc has rarely been considered to be a cause of Brown-Sequard syndrome. We presented a 46-year-old man with 2 weeks history of pain in the neck and right arm. On neurologic examination revealed Brown-Sequard syndrome. Magnetic resonance imaging of the cervical spine showed a large right extradural lateral C4-5 disc herniation. The simple discectomy was performed to C4-5 by standart microsurgical anterior approach. On the second postoperative day, right hemiparesis completely recovered. A follow-up examination at 1 month revealed a slight residual diminishing of pain and temperature sensitivity in the left leg. Brown-Sequard syndrome caused by ekstradural cervical disk herniation is an extremely rare condition. Early surgical treatment is recomended in cervical disk herniation causing Brown-Sequard syndrome. Cervical disc herniation is one of the disorders which must be remembered in the differential diagnosis of patients presented with Brown-Sequard syndrome. By rewiev of the literature, prognostic factors in cervical disk herniation causing Brown-Sequard syndrome was evaluated.

Keywords: Brown-Sequard syndrome, cervical disc herniation, prognostic factors

Brown-Sequard Sendromu Bulguları İle Gelen Bir Servikal Disk Olgusu

Özet

Introduction
The Brown-Sequard syndrome was first described by Charles Edouard Brown-Sequard in a patient with hemisection of the spinal cord in 1849. It involves ipsilateral loss of motor function, proprioception and vibratory sense resulting from corticospinal tract and dorsal columns dysfunction, combined with contralateral loss of pain and temperature sensation as a result of spinothalamic tract dysfunction. The most frequent causes of this syndrome are traumatic injuries to the spinal cord. Other reports have described the syndrome in association with spinal cord tumors, multiple sclerosis, spinal epidural hematoma, vascular malformation of the spinal cord, spontaneous cervical subarachnoid hematoma, cervical spondylosis, ossification of the posterior longitudinal ligament, radiation injury and as a complication of spinal instrumentation.

Cervical disc herniation causing Brown-Sequard syndrome is rare condition. We report a case of C4-5 ekstradural cervical disc herniation causing a right hemicompression of the spinal cord, resulting in Brown-Sequard syndrome. The main purpose of this article is to review the cases of Brown-Sequard syndrome and evaluation of prognostic factors.

Case Presentation
A 46-year-old man presented with 2 weeks history of pain in the neck and right arm. He developed numbness and weakness in the right leg and right arm. There were bowel and bladder disturbances before 7 days and not now. He had no history of headache, sencop and seizure. On neurologic examination revealed mild hemiparesis on the right and bilaterally hypoestesis below C6 level that was more pronounced on the right. The examination of cranial nerves were normal. The man presented diminished sensation of pain and temperature on the left leg, with a sensory level beginning at T8. There was no decreased vibratory sensation and proprioception. The deep tendon reflexes of the right arm and right leg were increased. Babinski’s sign was present on the right leg. Clonus was presented on the right leg. Plain x-rays of the cervical spine showed no abnormalities. Magnetic resonance imaging (MRI) of cervical spine and brain was performed. There was no pathologic finding in MRI of brain. MRI of the cervical spine showed a large right extradural lateral C4-5 disc herniation, with ipsilateral severe spinal cord compression (Figure 1,2).

Figure 1 Sagittal T2 weighted MR scan of the cervical spine demonstrates C4-5 cervical disc herniation.
A standard microsurgical anterior approach to the C4-5 was used and simple discectomy was performed. A large amount of herniated disc material was found to be compressing the right side of the cord. Posterior longitudinal ligament was intact. The patient recovered from surgery with no complications. The pain disappeared almost completely within 24 hours after surgery. On the second postoperative day, right hemiparesis completely recovered. A follow-up examination at 1 month revealed a slight residual diminishing of pain and temperature sensitivity in the left leg.

**Discussion**

Herniation of a cervical disc has rarely been considered to be a cause of Brown-Sequard syndrome. The frequency of this syndrome produced by herniated cervical discs has been reported as 2.6% by Jomin et al. In the English language literature, the first to identify a herniated disc as the etiology of Brown-Sequard syndrome was Stookey, in 1928. Jomin et al have reported that Brown-Sequard Syndrome developed in six cases with cervical disc herniae in their series. However, details were not mentioned in this report. Jabbari et al. alluded to one case caused by herniated cervical disc. No details for this case were given. To our knowledge, until now only 27 cases have been published in the international literature except Jomin’s and Jabbari’s cases.

Complete hemisecion, causing classic clinical features of pure Brown-Sequard syndrome is rare. Typical complete or pure Brown-Sequard syndrome constitutes 35% of more than 600 reviewed cases. More often, the clinical syndrome is incomplete, with ipsilateral weakness and contralateral loss of pinprick and temperature sensation, but intact proprioceptive and vibratory sensation. Our case is also an incomplete Brown-Sequard syndrome. This results from compression of the spinal cord sparing the dorsal columns.

Our patient had diminished sensation of pain and temperature below T8 level on the right side. The spinothalamic tract crosses the midline of the spinal cord one or two segments rostral of entry level. Thus, contralateral deficit in sensation of pain and temperature is likely to be demonstrable starting at a dermatome a few levels below the cord injury on the contralateral side. Kobayashi et al. introduced two cases with loss of pain and heat sensation developed at several levels lower than disc herniation similar to our case. They reported that this situation developed in cervical spinal stenosis and parasentral protruded disc herniations. Servical spinal stenosis was not found in our case. This could be explained by release of compression over anterior and medial fibers arising from spinothalamic tractus towards periphery.

Brown-Sequard syndrome is seen more frequently in servical intradural disc herniations. Iwamura et al reported Brown sequard syndrome developed in eigth out of seventeen (47%) cases with servical disc herniation written in literature before 2001. Brown-Sequard syndrome caused by extradural cervical disc herniation is an extremely rare condition. Whereas most of the servical disc herniations are extradural, Brown-sequard syndrome reported only in
seventeen cases 1,11,15,17,19,20,27,30,31. In accordance with Rumana et al., this condition is underdiagnosed 27.

The twenty-eight cases (including our case) of Brown-Sequard syndrome produced by cervical disc herniation were described in detail at Table 1. The 18 male and 10 female patient were described. The age ranged from 25 to 73 years (mean 45.2 years). The disc herniation involved one interspace in 26 cases and two contiguous interspaces in 2 cases. The disc herniation was at C2-3 in 2 cases (6.7%), at C3-4 in 2 cases (6.7%), at C4-5 in 6 cases (20%), at C5-6 in 14 cases (46.6%), at C6-7 in 6 cases (20%). The extradural disc herniation was seen in 18 cases (64.3%), the intradural disc herniation was in 10 cases (35.7%). The interval between the onset of symptoms and the diagnosis ranged from 1 day to 18 months (mean 4.4 months). The trauma was in 4 cases. In three cases of four, the cervical disc herniation was intradurally located 4,8,10.

The 27 patients were surgically treated; with laminectomy in 6 cases, with anterior discectomy without interbody fusion in 4 cases, and with anterior discectomy or corpectomy followed by interbody fusion in 17 cases. The one case was no performed surgery. The patient was treated by steroid 19.

The postoperative recovery of motor deficits was complete or near complete in 15 cases (60%) and minimal or incomplete in 10 (40%) cases. The postoperative recovery of sensory deficits was complete or near complete in 11 (44%) cases, minimal or incomplete in 13 (52%) cases and no recovery in 1 (4%) case.

In predicting prognosis of cases with Brown-Sequard syndrome caused by cervical disc herniations the parameters such as location of disc either intradural or extradural, duration of symptoms, effectiveness of surgical technique and presence or absence of trauma were studied excluding Stookey’s cases (Table 2). Stookey et al. did not report details for recovery of motor and sensory deficits 30. The recovery of motor and sensory deficits in extradural cervical disc herniation causing Brown-Sequard syndrome has been found better than intradurally located disc herniations (Table 2). It was found that duration of symptomatic period did not effect the prognosis (Table 2). When the effect of surgical technique on recovery of motor and sensory deficits was evaluated the best results were observed with anterior discectomy or corpectomy with fusion and simple anterior discectomy. It was noted that recovery of motor and sensory deficits was not good in performed laminectomy cases (Table 2). Incomplet recovery in motor deficit without improvement in sensory deficit was developed only in one case to whom medical treatment was introduced 19. The presence of trauma is a bad prognostic factor (Table 2).

**Conclusion**

Brown-Sequard syndrome causing by extradural cervical disc herniation is an extremely rare condition. Cervical disc herniation is one of the disorders which must be remembered in the differential diagnosis of patients presented with Brown-Sequard syndrome. Early surgical treatment is recommended in cervical disc herniation causing Brown-Sequard syndrome.
Table 1. The cases of Brown-Sequard syndrome produced by cervical disc herniation

<table>
<thead>
<tr>
<th>Author (year) &amp; number of references</th>
<th>Age (sex)</th>
<th>Level</th>
<th>SD</th>
<th>Initial symptoms</th>
<th>EDU ID</th>
<th>Trauma</th>
<th>Surgical Approach</th>
<th>Recovery of motor deficits</th>
<th>Recovery of sensitive deficits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockley (1978) (30)</td>
<td>44, M</td>
<td>C3-4</td>
<td>?</td>
<td>Left leg weakness, neck pain</td>
<td>ED</td>
<td>No</td>
<td>Lam</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Durg and Zhovelyewski (1977) (27)</td>
<td>68, M</td>
<td>C6-7</td>
<td>?</td>
<td>Neck pain</td>
<td>ED</td>
<td>No</td>
<td>Lam</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Rod et al. (1982)</td>
<td>52, F</td>
<td>C5-6</td>
<td>2 m</td>
<td>?</td>
<td>ID</td>
<td>Yes</td>
<td>Lam</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Eisenberg et al. (1986) (10)</td>
<td>43, M</td>
<td>C6-7</td>
<td>1 d</td>
<td>Thoracic pain</td>
<td>ID</td>
<td>No</td>
<td>Lam</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Schuiber et al. (1975) (26)</td>
<td>50, F</td>
<td>C5-6</td>
<td>1 d</td>
<td>Numimbres of left leg, neck pain</td>
<td>ID</td>
<td>No</td>
<td>AD</td>
<td>InCR</td>
<td>CR</td>
</tr>
<tr>
<td>Sprizk and Fegoes (1971) (29)</td>
<td>46, F</td>
<td>C6-7</td>
<td>10 d</td>
<td>?</td>
<td>ID</td>
<td>?</td>
<td>ADF</td>
<td>InCR</td>
<td>CR</td>
</tr>
<tr>
<td>Finelli et al. (1992) (11)</td>
<td>28, F</td>
<td>C5-6</td>
<td>19 m</td>
<td>Bilateral hand and right leg numbness</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>MinP</td>
<td>MinR</td>
</tr>
<tr>
<td>(1992) (11)</td>
<td>61, M</td>
<td>C6-7</td>
<td>8 m</td>
<td>Left hand numbness</td>
<td>ED</td>
<td>No</td>
<td>Lam</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>(1996) (27)</td>
<td>46, F</td>
<td>C4-5</td>
<td>6 m</td>
<td>Left leg numbness</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Antill et al. (1999) (1)</td>
<td>56, F</td>
<td>C4-5</td>
<td>5 m</td>
<td>Left leg numbness</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Kohn et al. (1999) (17)</td>
<td>73, F</td>
<td>C3-4</td>
<td>6 m</td>
<td>Sharp neck pain</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Bora and Bohstedt (2000) (4)</td>
<td>31, M</td>
<td>C4-5</td>
<td>1 m</td>
<td>?</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Chatterjee et al. (2000) (7)</td>
<td>40, M</td>
<td>C4-5</td>
<td>5 w</td>
<td>Neck and right arm pain</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>(2000) (7)</td>
<td>52, F</td>
<td>C3-4</td>
<td>3 m</td>
<td>Right leg weakness</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>(2001) (12)</td>
<td>30, M</td>
<td>C5-6</td>
<td>9 m</td>
<td>Right arm and leg weakness</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Iwanuma et al. (2001) (31)</td>
<td>42, M</td>
<td>C6-7</td>
<td>10 m</td>
<td>Stillness and dull pain in the posterior neck</td>
<td>ED</td>
<td>?</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Ugawa et al. (2003) (23)</td>
<td>41, F</td>
<td>C5-6</td>
<td>3 d</td>
<td>Right arm and neck pain, right arm weakness</td>
<td>ED</td>
<td>No</td>
<td>ADF+Lam b</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Kobayashi et al. (2003) (15)</td>
<td>64, M</td>
<td>C5-6</td>
<td>6 m</td>
<td>Parasthesia in the left leg</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>(2003) (15)</td>
<td>35, M</td>
<td>C3-4</td>
<td>1 m</td>
<td>Neck and right shoulder pain</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
<tr>
<td>Lin et al. (2003)</td>
<td>37, M</td>
<td>C6-7</td>
<td>4 d</td>
<td>Limh numbness and weakness</td>
<td>ED</td>
<td>Yes</td>
<td>No surgery</td>
<td>InCR</td>
<td>NoR</td>
</tr>
<tr>
<td>(2003) (19)</td>
<td>38, M</td>
<td>C5-6</td>
<td>9 m</td>
<td>Left arm and neck pain</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>NeurCR</td>
</tr>
<tr>
<td>Mastromarco and Ruggeri (2004) (20)</td>
<td>46, M</td>
<td>C4-5</td>
<td>2 w</td>
<td>Right arm and neck pain</td>
<td>ED</td>
<td>No</td>
<td>ADF</td>
<td>CR</td>
<td>CR</td>
</tr>
</tbody>
</table>

SD= Symptom duration, m= month, d= day, w= week, ED= extradural, ID= intradural, Lam= laminectomy, AD= anterior discectomy, ADP= anterior discectomy and fusion, ACP= anterior corpectomy and fusion, Lam= laminectomy, Dsci= dexamethasene, Pred= prednisolone, InCR= incomplete recovery, CR= complete recovery, NeurCR= near complete recovery, MinP= minimal recovery, NoR= no recovery, ?= not reported

*Calcification of the ligamentum flavum was seen, b= C3-7 arthrodesis was performed after C3-6 laminectomy
Table 2. The postoperative recovery of motor and sensory deficits according to localization (intradural/extradural), symptom duration, surgical approaches and presence of trauma in cervical disc herniations causing Brown-Sequard syndrome

<table>
<thead>
<tr>
<th>Recovery of motor</th>
<th>Recovery of sensory deficits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Intradural</td>
<td>10</td>
</tr>
<tr>
<td>Extradural</td>
<td>15</td>
</tr>
<tr>
<td>30 days or &lt;</td>
<td>9</td>
</tr>
<tr>
<td>&gt; 30 days</td>
<td>16</td>
</tr>
<tr>
<td>Lam</td>
<td>3</td>
</tr>
<tr>
<td>AD</td>
<td>4</td>
</tr>
<tr>
<td>ADF/ACF</td>
<td>14</td>
</tr>
<tr>
<td>ADF+Lam/Lmp</td>
<td>3</td>
</tr>
<tr>
<td>No trauma</td>
<td>11</td>
</tr>
</tbody>
</table>

n= number of case, CR= complete recovery, nearCR= near complete recovery, inCR= incomplete recovery, minR= minimal recovery, noR= no recovery
30 days or <= symptom duration 30 days or less than 30 days
> 30 days = symptom duration more than 30 days
Lam= laminectomy, AD= anterior disectomy, ADF= anterior disectomy and fusion, ACF= anterior corpectomy and fusion. Lmp= laminoplasty

References


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