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Case Report

Spontaneous healing of Brown-Sequard syndrome caused by cervical disc herniation: a case report and literature review

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Abstract: Brown-Sequard syndrome is most commonly seen in patients with spinal trauma and extramedullary spinal neoplasms. Pure Brown-Sequard syndrome caused by cervical disc herniation is extremely rare. In order to obtain an improvement in neurological function, early surgical decompression of the spinal cord is generally recommended for patients with BSS caused by cervical disc herniation. However, decompression on the injured spinal cord during surgery may increase spinal cord damage. Here, a case of spontaneous healing of BSS caused by C5-6 herniated cervical disc leading to a severe spinal cord compression is reported. Surgical treatment was suggested, but the patient refused. After about 10 months of conservative treatment, her previous symptoms completely disappeared. Two years follow-up showed complete disappearance of the symptoms without recurrence. To the best of our knowledge, this is the first case to report such condition. It is of great importance that clinicians should be aware that conservative treatment can be considered for appropriate patients for a few months before deciding on surgical treatment.

Keywords: Brown-Sequard syndrome, cervical disc herniation, spontaneous, healing

Background

BSS is usually characterized by ipsilateral motor weakness, loss of proprioceptive and vibratory sensation, as well as loss of contralateral pain and temperature sensation [1]. BSS is most commonly seen in patients with spinal trauma and extramedullary spinal neoplasms [2-4]. However, cervical disc herniation is an uncommon cause of BSS and only a few cases have been reported [5-7]. Early surgical decompression of the spinal cord is generally recommended to obtain improvement in neurological function [8]. Here is reported a case of spontaneous healing of BSS caused by C5-6 herniated cervical disc leading to a severe spinal cord compression. This is believed to be the first case reporting such condition. In addition, the potential mechanisms are discussed.

Case presentation

A 45-year-old woman who was unable to conduct her routine activities presented with a 5-month history of gradual-onset neck pain and numbness and weakness of the right upper extremity accompanied with a 3-month history of weakness and paresthesia of left lower extremity. She denied any history of trauma to the head or neck. Her neurologic examinations revealed motor weakness of the right upper extremity and left lower extremity (Manual Muscle Test 3/5), in association with pain and temperature sensation loss on the left side below the T10 dermatome. Fortunately, there was no bladder or bowel dysfunction. On deep tendon reflex examination, the Hoffman sign was positive on the right side and the ankle clonus test was positive on the left side. All these findings were in accordance with a diagnosis of BSS caused by cervical disc herniation. The basic x-rays of the cervical spine revealed no abnormality. However, MRI showed extruded herniated nucleus pulposus at the C5-6 level, almost occupying half of the vertebral canal volume (**Figure 1**).

Surgical treatment was suggested, but the patient refused. Then the patient received conservative management in the form of intrave-

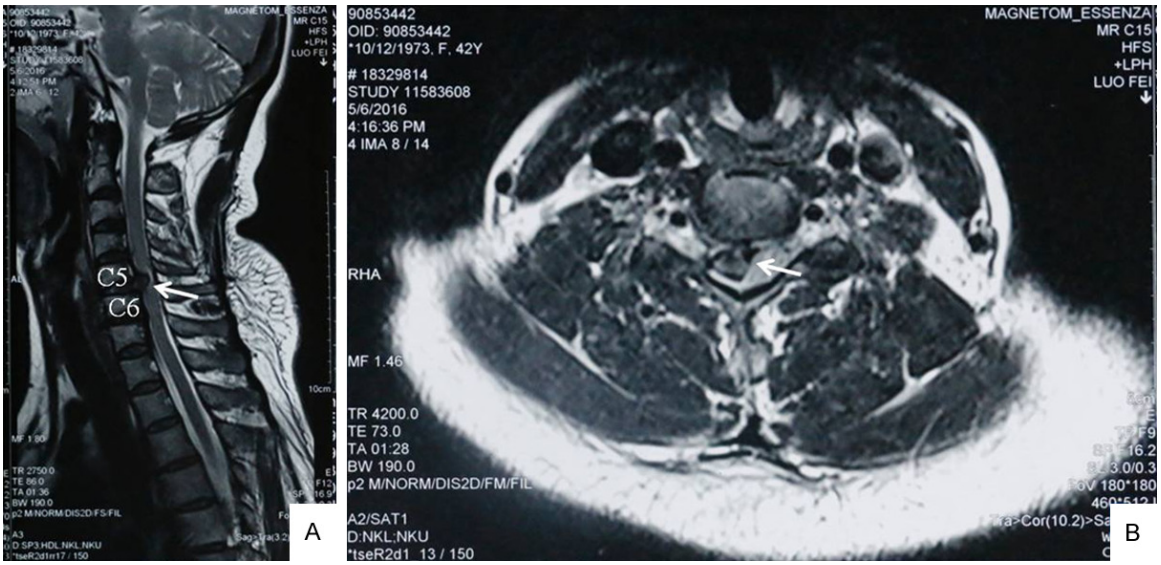

Figure 1. Initial MRI (May 6, 2016) of the cervical spine (A, mid-sagittal; B, axial) reveals a large herniated disc (arrow) at the C5-6 level compressing the right C6 root.

nous 250 ml 20% mannitol plus 10 mg dexamethasone once a week for four weeks. In addition, non-steroidal anti-inflammatory drugs (celebrex 200 mg orally once a day) and physiotherapy (a warm water bath once a day for at least 30 minutes at a time) were also recommended.

Incredibly, the patient's symptoms gradually were relieved and the patient was followed up as an outpatient. About 2 months later, she showed a significant improvement in right-sided motor weakness and the left-sided pain and temperature sensation gradually recovered 4 months later. At the 10-month follow-up examination revealed a complete recovery from motor deficits and full recovery of the left-sided pain and temperature sensation. No pathological reflection was induced. About 1 year later, she has since started to return to her normal life and the follow-up cervical MRI revealed almost complete regression of the extruded disc at the C5-6 level without any neural compression. Moreover, during 2 years of follow-up, the patient remained asymptomatic and had no recurrence and the MRI still confirmed almost complete regression of the extruded disc (**Figures 2** and **3**).

Discussion

Cervical disc herniation, which induces upper extremity pain and neurological deficits, appears to be a highly prevalent disease that neurosurgeons and orthopedic surgeons face every day. Cervical disc herniation is an uncommon cause of BSS, of which C5-C6 is the most frequently involved [5, 9]. In the present case, MRI showed a large central right-sided C5-C6 disc herniation, almost occupying half of the vertebral canal volume, severely compressing the spinal cord. As a consequence, the neural compression seen in our patient was primarily on the spinal cord itself rather than the nerve root. Many studies have shown that the sensory level of the spinal cord was usually three segments lower than the lesion of BSS caused by cervical disc herniation [10]. In our case, the sensory level is at the level T10 dermatome on the left side while the compressive lesion is at C5-6 on the right side.

In order to obtain an improvement in neurological function, early surgical decompression of the spinal cord is generally recommended for patients with BSS caused by cervical disc herniation. However, decompression on the injured spinal cord during surgery may increase spinal cord damage [11]. Previous studies have shown that treatment should be conservative in the initial course of the sequestrated type of disc herniation for at least 2 months before recommending surgical intervention unless severe neurologic deterioration occurs [12]. In this patient, with conservative treatment, the symptoms begin to ease about 2 months later, and

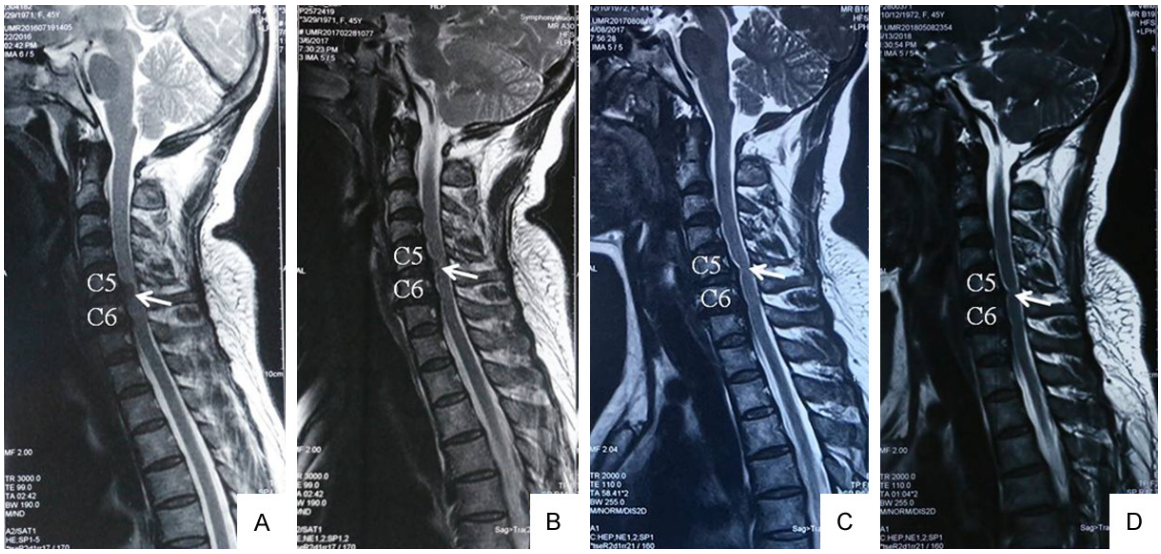

Figure 2. Follow-up sagittal MRI (A, July 22, 2016; B, March 6, 2017; C, August 14, 2017; D, May 13, 2018) of the cervical spine shows the gradual regression of the extrude disc (arrow) at the C5-6 level.

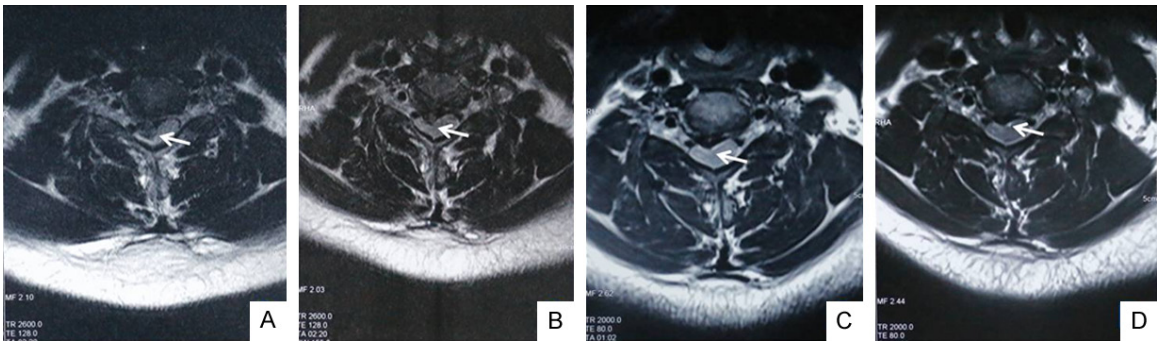

Figure 3. Follow-up axial MRI (A, July 22, 2016; B, March 6, 2017; C, August 14, 2017; D, May 13, 2018) of the cervical spine shows gradual regression of the extrude disc (arrow) at the C5-6 level.

complete relief was obtained after 10 months. However, certain amount of the risk of the occurrence of neurological deterioration has to be taken into account when selecting the conservative treatment. During the clinical course, what seems difficult is to predict which patient will profit from conservative treatment and which patient will require surgery. Therefore, a further study should be done to discover its real mechanism.

In conclusion, BSS caused by cervical disc herniation is extremely rare, therefore, detailed neurological examination and careful medical history collection are essential for early diagnosis. More and more studies have shown that cervical disc herniation have the potential to spontaneously regress through conservative treatment. It is thus of great importance that clinicians be aware that conservative treatment can be considered for appropriate patients for a few months before deciding on surgical treatment.

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Disclosure of conflict of interest

None.

Abbreviations

BSS, Brown-Sequard syndrome; MRI, magnetic resonance images.

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