

## Spinal Epidural Hematoma Related to Intracranial Hypotension

Kyung Han Cha, Tack Geun Cho, Chang Hyun Kim, Ho Kook Lee, Jae Gon Moon

*Department of Neurosurgery, Hallym University Kangnam Sacred Heart Hospital, Seoul, Korea*

A 45-year-old female patient visited the hospital complaining of severe sudden headache and posterior neck pain. The patient did not have any traumatic history or abnormal neurologic finding. The patient had sudden quadriplegia and sensory loss. Cervical spine MRI scan was taken, and the compatible findings to acute epidural hematoma were shown. The emergency operation was performed. After the operation, the patient recovered all motor and senses. As there was CSF leakage in the postoperative wound, this was confirmed by cervical spinal computed tomography (CT). Then lumbar drainage was thus performed. The opening pressure upon lumbar puncture was not measured as it was very low. As a result of continuous CSF leakage, dural repair was performed. After the operation, the patient had been discharged without neurologic deficits. In this case, it is sensible to suspect intracranial hypotension as a possible cause of spinal EDH.

**Key Words:** Spinal epidural hematoma • Headache • Neck pain • Cerebrospinal fluid leakage

### INTRODUCTION

Spontaneous spinal epidural hematoma is a rare type of spinal epidural hematoma (SEDH) that occurs without specific cause. It typically manifests with sudden pain on the back or neck accompanied by sensory and motor paralysis symptoms, which progress fast according to the degree of the pressure on the spinal nerve<sup>1,2,18</sup>. A person who shows these symptoms must be diagnosed immediately through spinal magnetic resonance imaging (MRI) and should undergo emergency surgery to obtain a good outcome<sup>5,9,11</sup>.

SEDH is known to be related to coagulopathy, increased venous pressure, hypertension, vascular malformation, trauma, tumor, and an idiopathic origin<sup>2,12</sup>. No case showing a correlation between spinal epidural hematoma and a decrease in intracranial pressure, however, has yet been presented. Such a case will be presented in this report.

### CASE REPORT

A 45-year-old female was admitted to the hospital after

complaining of an orthostatic headache and cervical pain the day before. The headache occurred whenever the patient was in a sitting or standing position, but not in a supine position. She did not have a history of trauma. She was alert and did not have other neurological symptoms. There were no abnormal findings in the brain MRI.

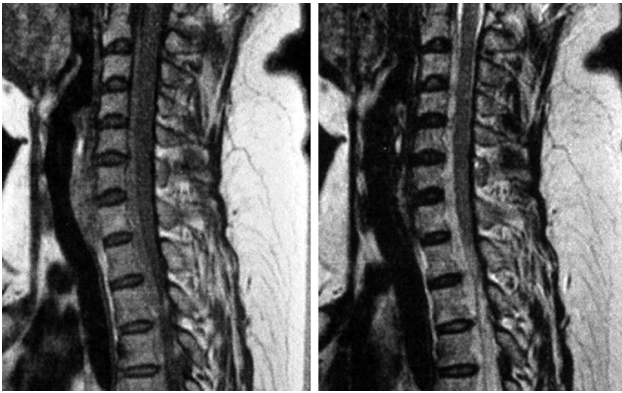
The day after the patient's hospital admission, she had sudden quadriplegia and paraesthesia. The motor grade of her lower extremities was 0, and that of her upper extremities was I. The pain and high temperature on both sides were reduced, and the patient recovered with a motor grade of 3 in her upper and lower extremities. C-spine MRI was taken, and SEDH was suspected because isointensity was observed in the T1-weighted image of the epidural space from C2 to T2 while hyperintensity was observed in the T2-weighted image of the same (Fig. 1).

Angiography was performed to rule out any vascular abnormality, such as arteriovenous malformation. Its result was normal. An emergency left hemilaminectomy from C4 to T1 was performed to remove the hematoma, and controlled the bleeding. During the operation, engorged epidural veins were observed, and the dura was not damaged during the operation. After the operation, the patient recovered completely from motor and sensory deficits. 6 day after surgery, myelography and computed tomography (CT) were performed due to the CSF leakage in the wound. As a high density was observed from C3 to T3 (Fig. 2), lumbar drainage was performed. During the lumbar puncture, the opening pressure was too low to be measured, and the lumbar drainage was minimal. The patient was treated for two weeks, for stabilization. There

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Corresponding Author: **Tack Geun Cho**, MD  
Department of neurosurgery, Hallym University Kangnam Sacred Heart Hospital, Daerim-dong, Yeongdeungpo-gu, Seoul 150-950, Korea  
Tel: +82-2-829-5175, Fax: +82-2-833-0219  
E-mail: jotak01@naver.com



**Fig. 1.** Cervical-spine MRI images: There is isointensity in the T1-weighted image, and hyperintensity in the T2-weighted image, from the C2 to the T2 epidural space of the ventral side of the spinal cord.

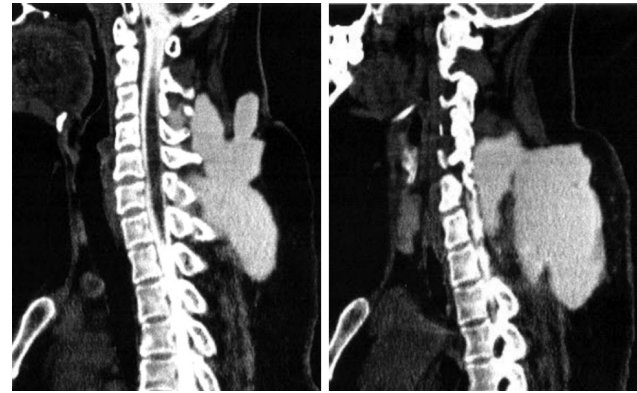


**Fig. 2.** Contrast-enhanced CT of cervical-spine: There is fluid collection in the dorsal area of the vertebral bodies from C3 to T3 at 6 day after 1<sup>st</sup> surgery.

was increased epidural fluid collection at C2 to T3 in the spinal CT (Fig. 3). Second operation was thus performed, and there was no leakage at the dorsal part of the dura but there was some leakage at the C5-6 ventral part that was not found at the 1<sup>st</sup> operation. The dura defect was covered with collagen sponge (Gelfoam) and fat tissue, and sealed with adhesive sealant (Tisseel). The symptoms disappeared, and no CSF leakage was found in the follow-up myelography and spinal CT. The patient was discharged without deficits.

## DISCUSSION

Spontaneous SEDH is a very rare disease that occurs at a ratio of 0.1/100,000<sup>5)</sup>. It usually occurs in people in their 50s to 80s, and more in males (male/female ratio, 1.4:1)<sup>4,10)</sup>. Although it can occur anywhere in the spinal cord, it mostly occurs in the dorsal spine, especially in the thoracolumbar and cervicothoracic region (the posterior and posterolateral



**Fig. 3.** Contrast-enhanced CT of cervical-spine: There is increased fluid collection in the dorsal area of the vertebral bodies from C2 to T3 at 24 day after 1<sup>st</sup> surgery.

region of the spinal cord)<sup>4,11,18)</sup>. It clinically manifests typically as sudden pain on the back or neck accompanied by sensory and motor paralysis symptoms, which progress fast according to the area and the degree of pressure on the spinal nerve<sup>2,8,9,11,18)</sup>. It can be diagnosed according to the patient's medical history and the results of the neurological examination, spinal cord angiography, CT, and MRI<sup>9,11)</sup>. MRI is the best choice, and the SEDH typically shows a heterogenous signal of a fusiform on the T2-weighted image, and isointensity on the T1-weighted image<sup>9,11)</sup>. Early operation is necessary as delayed operation can cause neurological defects and even death<sup>9,11)</sup>. There were the other cases that excellent functional recovery obtained after prompt surgical decompression<sup>7)</sup>. Although there have been recent attempts to conservatively treat patients with neurological symptom recovery or coagulopathy<sup>1,3)</sup>, the operation, when necessary, should not be delayed<sup>9,11)</sup>. The patient in this case had a sudden onset of orthostatic hypotension that progressed to sensory and motor paralysis. Although she recovered shortly, her recovery was incomplete. Also, she had an emergency operation as she had no abnormalities such as coagulopathy.

The clinical symptoms of intracranial hypotension include an orthostatic headache (its main symptom), pain or tetany on the column, nausea, vomiting, diplopia, tinnitus, and vertigo<sup>14,15)</sup>. The known intracranial complications of intracranial hypotension include subdural hematoma or edema, and cerebellar tonsil herniation<sup>6,17)</sup>. The intracranial hypotension also increases the risk of intracranial aneurysm<sup>16)</sup>. Its diagnosis includes postural headache, diffuse pachymeningeal gadolinium enhancement, and low CSF opening pressure<sup>13)</sup>. There are various types of intracranial hypotension, however: one with a normal CSF pressure range, one without diffuse pachymeningeal enhancement, and one without orthostatic hypotension<sup>13,19)</sup>. Epidural fluid collection, engorgement of the epidu-

ral vein, and abnormalities in the nerve root sleeve are observed in the spinal MRI<sup>13,14</sup>). Conservative treatments include stabilization on a bed, analgesics, hydration, caffeine, mineralocorticoid, and glucocorticoid. Invasive treatments include autologous epidural blood patch and operation<sup>13,14,19</sup>).

In this case of postural headache, it is not sure whether it is due to CSF leakage, but there is a possibility of unnoticed surgical accident in the first surgery, causing in CSF leakage. However, there was no trace of damage to the dura mater, and engorgement of the intervertebral artery was seen. Thus, the reason may be due to a CSF leakage that was present even before the first surgery.

In the case, the patient complained of severe orthostatic headache for no reason, and cervical pain, at the first visit. Decreased intracranial pressure was suspected. In the first operation, engorgement and hyperemia of the spinal veins were found, but there was no CSF leakage. In the second operation, CSF leakage was directly observed. As the patient already had an earlier operation, epidural blood patch was not applied; instead, surgery was performed to block the CSF leakage. SEDH occurred sometime after the headache emerged. Also, decreased intracranial pressure was confirmed because the patient had orthostatic hypotension and lower CSF opening pressure when lumbar drainage was performed. Because the symptoms of patient and engorgement of spinal cord vein were associated with intrahypotension and there were no CSF leakage during the 1<sup>st</sup> operation, the intracranial pressure decrease is thought to be the result of the slight CSF leakage, which may have led to the vascular congestion and hematoma in the spinal cord vein.

## CONCLUSION

CSF leakage is a cause of intracranial hypotension, which can result in postural headache. It is difficult to state that an intracranial hypotension due to CSF leakage leads to spinal EDH. However, in regards to this case, it is sensible to suspect intracranial hypotension as a possible cause of spinal EDH. When sensory and motor weaknesses are present along with postural headache, a brain lesion must be suspected. However, a lesion of the spinal cord must need attention.

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