

Case Report

Bilateral Subdural Hematoma due to an Unnoticed Dural Tear during Spine Surgery

Youn Young Jung, M.D.,¹ Chng Il Ju, M.D.,² Seok Won Kim, M.D.²

Departments of Anatomy,¹ Neurosurgery,² College of Medicine, Chosun University, Gwangju, Korea

We report a rare case of intracranial hypotension that was complicated by a subdural hematoma following spine surgery. Intraoperatively, we did not notice any breach of the dura. However, the patient continued to have fluid leakage from the inferior edge of the lumbar incision. During revision surgery, a small dural tear was identified and repaired. It is likely that a small dural tear was overlooked or the dura was weakened during the initial operation and caused a subdural hematoma associated with intracranial hypotension.

KEY WORDS : Subdural hematoma · Intracranial hypotension · Spine surgery · Cerebrospinal fluid.

INTRODUCTION

Intracranial hypotension is a rare condition resulting from cerebrospinal fluid (CSF) hypovolemia that may result in postural headache, neck stiffness, nausea, vomiting, visual and auditory disturbances, mental deterioration, and seizures¹⁾. Most of the cases, symptoms can be treated conservatively and usually take a benign course. Intracranial hypotension has long been known to occur after various interventions where there is a breach of the CSF barrier, frequently iatrogenically induced; such as with diagnostic lumbar puncture, spinal anesthesia, or myelography²⁾. Moreover, intracranial hypotension has also been considered as a potential source of an acute subdural hemorrhage (SDH) in the intracranial compartment, as a result of traction on cerebral veins after intraoperative loss of CSF³⁾. However, there have been only four case reports of intracranial hypotension-related subdural hematomas following spine surgery^{1,2,4,5)}. We report a unique case of a patient developing severe postural headache, typical of intracranial hypotension, which was complicated by bilateral subdural hematoma, immediately following spine surgery.

CASE REPORT

A 58-year-old man was admitted with severe low back pain and radiating pain to the right leg. Lumbar spine magnetic resonance imaging (MRI) revealed a huge disc herniation with upward migration at the L1-L2 level (Fig. 1A). The vital signs were stable and all laboratory data including coagulation tests were within normal limits. The patient had no past history of hypertension or diabetes mellitus. The surgical procedure, which typically consisted of a posterior lumbar interbody fusion, was uneventful (Fig. 1B, C). In particular, dural tear was not noted microscopically during the operation, and an immediate postoperative relief of symptoms was obtained with bed rest. However, there was continuous fluid drainage from the inferior edge of lumbar incision after removal of the hemovac drainage system. At the same time, the patient complained of a severe headache with nausea and vomiting and associated with standing position. Because the symptoms were considerably aggravated when he stood up, he remained confined to the bed for most of the time. With the diagnosis of CSF leakage and a postural headache, intravenous fluids and non-steroidal anti-inflammatory drugs were given; however, there was little improvement. Additional analgesics were also ineffective. Three days after the surgery a brain computed tomography (CT) was performed and revealed acute subdural hematomas at the frontoparietal area, bilaterally (Fig. 2A). The patient continued to be alert, and conservative

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• Address for reprints : Seok Won Kim, M.D.
Department of Neurosurgery, College of Medicine, Chosun University,
588 Seoseok-dong, Dong-gu, Gwangju 501-717, Korea
Tel : +82-62-220-3120, 3126, Fax : +82-62-227-4575
E-mail : chosunns@chosun.ac.kr

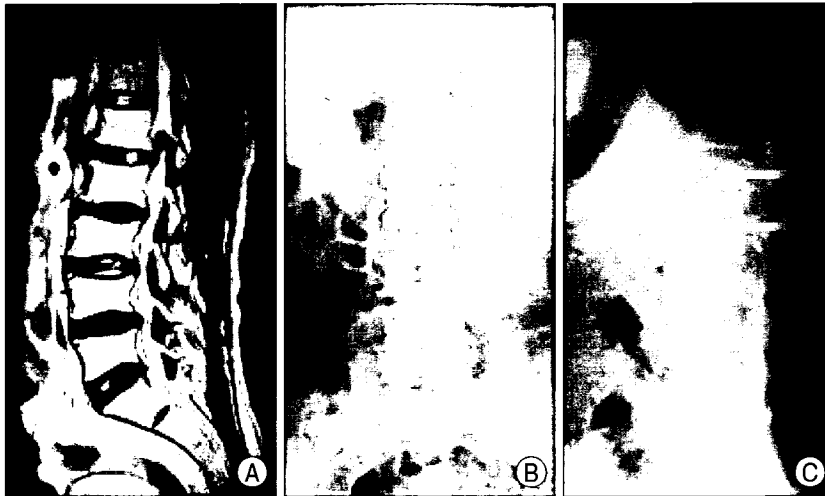


Fig. 1. A-58-year male patient with right leg pain. A : Preoperative T2-weighted sagittal image reveals upper migration of lumbar disc at L1-L2 level. B and C : Postoperative simple radiographs showing the bone cement augmented screw fixation with interbody fusion.

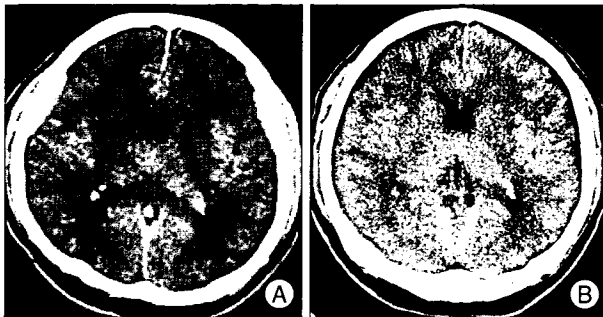


Fig. 2. Computed tomographic scans showing the development and resolution of subdural hemorrhage. A : Postoperative computed tomography scan at 3 days after operation shows bilateral subdural hemorrhage at both frontoparietal area. B : Follow-up computed tomography scan taken 20 days after revision surgery reveals complete resolution of subdural hematoma.

treatment consisting of bed rest and administration of mannitol along with close observation was initiated. Because of the continuous fluid drainage, the wound was explored again. Intraoperatively, a small dural breach, at the discectomy site, was identified and repaired. The patient's symptoms including headache resolved immediately after repair of the dura. The follow-up serial CT showed marked resolution of the SDH, and the latest CT scan, performed 20 days after revision surgery, showed complete resolution of the hematoma (Fig. 2B). The presence of malformations or a vascular lesion was ruled out by brain MRI and MR angiography. The patient recovered completely without any neurological deficits.

DISCUSSION

Intracranial hypotension associated with an acute subdural hematoma is very rare, but is a possible complication of procedures involving the dura. It is generally thought that

CSF leakage through the site of a puncture can result in decreased intracranial pressure and cause downward displacement of the brain with traction of the structures on the brain surface¹⁾. This may lead to a headache caused by traction on the intracranial structures that are sensitive to pain. The etiology of the headache is likely due to the downward displacement of the brain caused by the loss of CSF, with resultant tension on the pain-sensitive dural sinuses. Most of the cases usually have a benign course with bed rest and hydration. CT and MRI scans may show downward movement of the brain with tonsillar herniation

and a decrease in the size of the subarachnoid cisterns or cerebral ventricles. Moreover, meningeal enhancement, dilated epidural veins, and pituitary enlargement have been reported and highly correlated with CSF hypovolemia¹⁾. As mentioned above, intracranial hypotension is usually a benign condition; however, it can lead to SDH followed by laceration of the stretched superior cerebral vein or arachnoid granulations^{1,3,6)}. Although the exact mechanism is unknown, it is highly suggestive that CSF hypovolemia causes a decrease of intracranial pressure, leading to an enlargement of the dural venous sinuses that becomes an important factor in the pathogenesis of intracranial hemorrhage. Downward brain displacement resulting from pressure can cause transient stretching and occlusion of the previously enlarged venous sinuses and further predispose the patient to venous tears²⁾. There have been only four prior cases of acute SDH after spine surgery^{1,2,4,5)}. Surgical evacuation of a hematoma was performed in half of these cases. Three of them were associated with an intraoperative dural breach^{1,4,5)}. One case had an overlooked dural tear intraoperatively, and developed a large collection of CSF around the laminectomy site noted on the follow up MRI²⁾. Usually, such tears are readily identified visually by the spine surgeon and can be closed intraoperatively. However, in cases where the dural breach is very small, it may not be noticed during surgery, or the dura may have been intraoperatively weakened and prone to rupture later, which may result in an occult CSF leak and intracranial hypotension.

CONCLUSION

Intracranial hypotension associated with a subdural hematoma is a poorly recognized complication of spine surgery.

However, in any patient with an unusual headache, especially if it is postural, following this type of surgery, additional evaluations to rule out this complication are essential.

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