

Remote Cerebellar Hemorrhage Following Thoracic Spinal Surgery

—Case Report—

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Abstract

A 51-year-old man underwent surgery for ossification of the ligamentum flavum at the T9-T10 levels. Intraoperatively, the dura was opened unintentionally and a subcutaneous suction drain was placed. The patient complained of severe headache and nausea postoperatively. Brain computed tomography obtained 3 days after the surgery demonstrated remote cerebellar hemorrhage and hydrocephalus. Suboccipital decompression, C1 laminectomy, and ventriculostomy were performed and his symptoms subsided 2 months later. Remote cerebellar hemorrhage following spinal surgery is extremely rare, but may occur after any type of spinal surgery resulting in dural tear or intradural manipulation. Early diagnosis is particularly important for the treatment of remote cerebellar hemorrhage following spinal surgery.

Key words: complication, dural tear, remote cerebellar hemorrhage, spinal surgery

Introduction

Remote cerebellar hemorrhage occasionally occurs distant from the surgical site after cranial surgery and may be a life-threatening complication.^{2,13,16)} The incidence of remote cerebellar hemorrhage associated with craniotomy is 0.2–4.9%.^{2,13,16)} Recently, spinal surgery has also been reported to cause remote cerebellar hemorrhage.^{2,4)} Although the pathophysiological mechanism of remote cerebellar hemorrhage is unknown, intraoperative or postoperative loss of cerebrospinal fluid (CSF) seems to be involved. We report another case of remote cerebellar hemorrhage following spinal surgery.

Case Report

A 51-year-old man developed paraparesis with paresthesia in both legs, and visited a local hospital. Spinal computed tomography (CT) revealed ossification of the ligamentum flavum (OLF) at the T9-T10 levels (Fig. 1A). He underwent T9-T10 laminectomy and resection of the OLF (Fig. 1B) in the prone position via a posterior approach. Intraoperatively, the

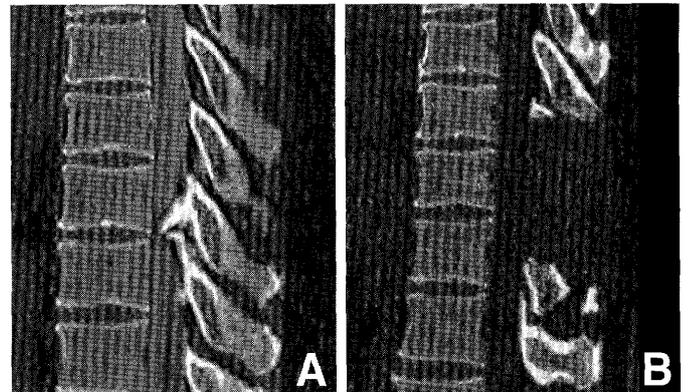


Fig. 1 A: Sagittal computed tomography scan of the spine showing ossification of the ligamentum flavum (OLF) at the T9-T10 levels. B: Postoperative computed tomography scan demonstrating the T9-T10 laminectomy and resection of the OLF.

dura was opened unintentionally, and was water-tightly repaired. A closed subcutaneous suction drain was placed. The patient was neurologically intact, but complained of severe headache and nausea postoperatively. His symptoms did not improve after up to 460 ml of serous fluid was removed through the suction drain over 18 hours. He was suspected to have low intracranial pressure syndrome, and sec-

ond surgery was performed to repair the CSF leakage. The dura mater was re-exposed, but no apparent CSF leak point was detected. Following the second surgery, he remained drowsy. Brain CT obtained 2 days after the second surgery revealed bilateral cerebellar hemorrhages facing the tentorium and obstructive hydrocephalus (Fig. 2). The

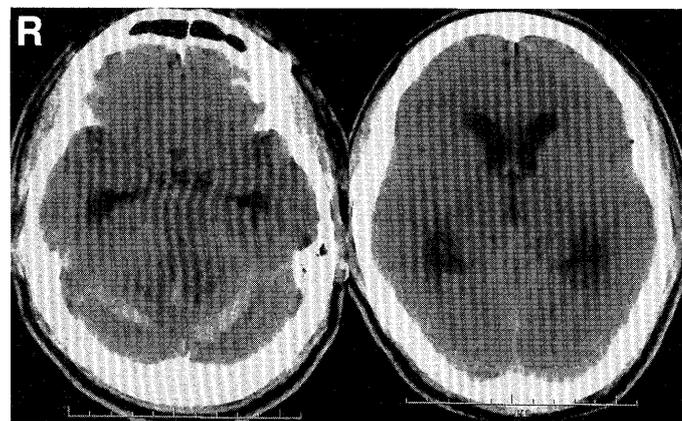


Fig. 2 Computed tomography scans of the brain 3 days after the spinal surgery revealing bilateral cerebellar hemorrhages facing the tentorium.

patient was then transferred to our institution. He had only bilateral cerebellar ataxia, but his level of consciousness gradually deteriorated. Laboratory studies including platelet count, prothrombin time, and partial thromboplastin time found no abnormalities. Digital subtraction angiography did not show any vascular lesions in the cerebellum. The patient underwent suboccipital decompression, C1 laminectomy, and ventriculostomy. The postoperative course was uneventful and cerebellar ataxia completely subsided 2 months later.

Discussion

Fifteen cases of remote cerebellar hemorrhage following spinal surgery have been reported, including the present case (Table 1).^{1,3-12,14,15} The exact pathophysiological mechanism of remote cerebellar hemorrhage is unknown, but a venous origin and intra- or postoperative CSF loss may be involved.² During spinal surgery, the dura mater was opened in all cases (Table 1). This may suggest that CSF loss is one of the most important factors regarding remote cerebellar hemorrhage. Two cases of remote cerebellar hemorrhage with spinal surgery suggested that

Table 1 Summary of cases of remote cerebellar hemorrhage following spinal surgery

Case No.	Author (Year)	Age (yrs)/ Sex	Diagnosis	Type of spinal surgery	Intradural manipulation/ dural tear
1	Chaddock (1981) ⁴	59/M	cervical spinal stenosis	laminectomy	transdural exploration
2	Mikawa et al. (1994) ¹⁰	75/M	atlantoaxial subluxation	revision fusion	durotomy
3	Andrews and Koci (1995) ¹¹	36/M	lumbar scoliosis	Harrington rod placement	occult dural injury
4	Satake et al. (2000) ¹⁴	62/M	cervical intramedullary tumor	removal of the tumor	intradural manipulation
5	Morandi et al. (2001) ¹¹	34/M	cervical schwannoma	removal of the tumor	intradural manipulation
6	Friedman et al. (2002) ⁷	43/M	thoracic herniated disk	transpedicular removal of the disk	opening of the dura
7		56/F	lumbar spinal stenosis	laminectomy and fusion	dural tear
8	Thomas et al. (2002) ¹⁵	38/F	thoracolumbar schwannoma	removal of the tumor	intradural manipulation
9	Karaeminogullari et al. (2005) ⁹	73/F	lumbar spinal stenosis	laminectomy, facetectomy, and fusion	dural tear
10	Farag et al. (2005) ⁶	43/F	lumbar spinal stenosis	laminectomy and fusion	probably dural tear
11	Brockmann et al. (2005) ³	52/M	lumbar spondylolisthesis	fusion	probably dural tear
12	Nakazawa et al. (2005) ¹²	74/F	cervical intradural extramedullary tumor	removal of the tumor	intradural manipulation
13	Konya et al. (2006) ⁹	48/F	lumbar spinal stenosis	laminectomy and fusion	dural tear
14	Chalela et al. (2006) ⁵	62/F	lumbar spinal stenosis	laminectomy and fusion	dural tear
15	Present case	51/M	thoracic OLF	removal of the OLF	dural tear

OLF: ossification of the ligamentum flavum.

caudal cerebellar displacement or sag due to intraoperative loss of CSF may cause transient stretching and occlusion of the superior cerebellar veins, which drain in the cephalad direction into the deep venous system.⁷⁾ In the present case, brain CT demonstrated a streaky bleeding pattern in the superior aspect of the cerebellum, which is termed the 'zebra sign' indicating a characteristic pattern of remote cerebellar hemorrhage which is discrete from an arterial bleeding.³⁾ This bleeding pattern is considered to be the same, as that following craniotomy.^{2,3)} The incidence of remote cerebellar hemorrhage after spinal surgery might be higher than expected because postoperative brain CT is not routinely performed after spinal surgery, and cranial lesions are unlikely to be considered.

In the present case, brain CT was performed 3 days after the first surgery. Retrospectively, it should have been obtained earlier. However, symptoms such as headache and nausea in the postoperative period may be associated with low intracranial pressure syndrome.²⁾ In addition, these symptoms are not so specific to indicate brain CT and to suggest cerebellar hemorrhage. In our case, intracranial lesion seemed unlikely because the patient had not received anticoagulant or antiplatelet therapy, and his blood pressure remained normal throughout perioperative period.

Remote cerebellar hemorrhage may occur after any type of spinal surgery resulting in dural tear or intradural manipulation. Intra- or postoperative CSF leakage may be among the causative factors of remote cerebellar hemorrhage. Therefore, use of suction drains should be considered if the dura mater is injured. Moreover, the occurrence of remote cerebellar hemorrhage is important to consider if the patient complains of severe headache, vomiting, or unexplained neurological deterioration following spinal surgery. Most reported cases were managed conservatively, but large hematoma and acute hydrocephalus require surgical treatment. Early diagnosis is particularly important for the treatment of remote cerebellar hemorrhage following spinal surgery.

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