Spontaneous Concomitant Intracranial and Spinal Subdural Hematomas in Association with Anticoagulation Therapy

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Simultaneous intracranial and spinal subdural hematomas are extremely rare. In most cases, they are attributed to major or minor trauma and iatrogenic causes, such as those resulting from spinal puncture. To the best of the authors’ knowledge, there has been only two reports of spontaneous concomitant intracranial and spinal subdural hematomas in a patient receiving anticoagulant therapy who had an absence of evident trauma history. We report on a case of spontaneous concomitant intracranial and spinal subdural hematomas that occurred in association with anticoagulant therapy and present a review of the relevant literature.

Key Words: Cranial · Spinal · Subdural hematoma · Anticoagulant therapy.
low signal intensities on T2 weighted images. No contrast enhancement was seen on fat-suppressed T1-weighted images (Fig. 1, 2). These findings confirmed that the hematoma was localized in the subdural space. Based on these magnetic resonance (MR) findings, the patient was diagnosed with concomitant cranial and spinal SDHs. The level of headache fluctuated and was resistant to medical treatment. The hematoma was evacuated under local anesthesia through one burr hole using a 5-L catheter 7 days after admission. The headache improved immediately after the hematoma evacuation. The spinal SDH was treated conservatively. To distinguish this case from other conditions for differential diagnosis, a lumbar spinal puncture was performed at L5-S1 level. The cerebrospinal fluid (CSF) analysis revealed 190000 red blood cells/mm³ and 267 white blood cells/mm³. A brain computed tomographic scan and lumbar spine MR images taken 14 days after admission revealed that the spinal SDH had completely resolved (Fig. 3). The patient was in good health and free of neurological deficits during the 12-month follow-up period.

**DISCUSSION**

Unlike the cranial counterpart, the spinal subdural space lacks the bridging veins that act as an origin for a SDH. The lower incidence of SDH in the spine has been attributed to the protection of the spinal subdural space by the vertebrae and broad paravertebral muscles and to the rare passage of blood vessels, such as bridging veins, through the subdural space. Moreover, a concomitant intracranial and spinal SDH is extremely rare, and to the best of the authors' knowledge, a total of 13 cases of the concomitant occurrence of intracranial and spinal SDHs have been reported so far in the English literature (Table 1). Among them, most cases were attributed to head injury or changes of CSF hydrodynamics, and there has been only two reports, including our report, associated with anticoagulation in the absence of trauma. When using antiplatelet agents, the ADP receptor antagonists prevent ADP-induced fibrinogen binding to platelets, a necessary step in the platelet aggregation process. They would not influence the coagulation profiles of our patient, so the patient's coagulation status remained normal. The exact etiology of the simultaneous occurrence of intracranial and spinal SDHs has not been clearly elucidated. The spinal subdural hematoma may be caused by a rupture in the spinal vessels. Initial hemorrhage in the subarachnoid space is thought to be the primary lesion that eventually dissects into the subdural space, and the subarachnoid hemorrhage is washed out by cerebrospinal flow. However, the causal relationship between cranial and spinal bleeding is not clearly documented by this theory. Hung et al. hypothesized that a rise of intracranial pressure may also increase shearing force between spinal subdural and subarachnoid spaces so that the inner dura may tear and bleed. It may then migrate from the cranial lesion. Either high or low intracranial pressure has been proposed as a predisposing factor for this migration. Raised intracranial pressure due to brain swelling might displace the hematoma to the skull base or spinal canal. The anatomic continuity between the intracranial and spinal subdural spaces can be observed using an electron microscope. A spinal SDH and an intracranial acute SDH could result from this phenomenon. In the present case, rebleeding might have occurred in the cranial lesion before the onset because MR imaging of the brain suggested that the hematoma was in the subacute phase on admission. A growing hematoma might have torn the membrane.

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**Fig. 1.** Radiological findings of brain (pretreatment). T2 and fluid-attenuated inversion recovery magnetic resonance images show mixed signal intensity spinal subdural hematoma in left fronto-temporo-parietal area.

**Fig. 2.** Radiological findings of spine (pretreatment). T2 and T1 weighted sagittal images reveal intradural lesion compressing the cauda equina at L4-S1 level (arrows).

**Fig. 3.** Radiological findings after treatment. A: Brain computed tomographic scan taken 14 days after hematoma drainage shows complete removal of hematoma. B and C: Magnetic resonance images taken 14 days after admission reveals complete resolution of hematoma.
Oral antiplatelet therapy and brain atrophy with aging may have facilitated the rebleeding and migration of the hematoma. The limitation of this study is that even though we discarded the possibility of a minor trauma and thoroughly educate the patient, there is not enough to rule out the possibility of chronic subdural hematoma due to an accidental minor injury to the head.

CONCLUSION

Although rare, concomitant intracranial subacute SDH and spinal SDH should be included in the differential diagnosis of nerve root compression in a patient receiving anticoagulant therapy.

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Table 1. Summary of the previous and present cases of spinal subdural hematoma (SDH) concomitant with intracranial SDH

| Author (year)               | Age/Sex | Cranial SDH | Level        | MR imaging (T1WI/T2WI) signal intensity | Treatment of spinal SDH | Outcome | Predisposing factor | Trauma history |
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