Spontaneous Slow Drainage of Epidural Hematoma Into the Subgaleal Space Through a Skull Fracture in an Infant
—Case Report—

Kohei CHIDA,1 Hirotsugu YUKAWA,1 Tomohiko MASE,1 Hideo ENDO,1 and Kuniaki OGASAWARA2

1Department of Neurosurgery, Iwate Prefectural Chubu Hospital, Kitakami, Iwate; 2Department of Neurosurgery, Iwate Medical University, Morioka, Iwate

Abstract

A 4-month-old girl fell off a table onto the floor. Computed tomography performed 4 hours after the trauma showed a left parietal epidural hematoma (EDH) with an omega-shaped fracture line in the left parietal region. The EDH was enlarged after another 4 hours. However, the EDH showed drainage into the subgaleal space through the skull fracture 2 days after the trauma and was almost completely discharged into the subgaleal space by 5 days after trauma. Both the EDH and the subgaleal hematoma had resolved completely by 12 days after the trauma. No symptoms or signs were observed during the course. This case suggests that EDH can drain slowly and spontaneously into the subgaleal space through a skull fracture in an infant.

Key words: epidural hematoma, infant, skull fracture, slow drainage, subgaleal space

Introduction

Epidural hematoma (EDH) is rare in infants, as the dura is strongly attached to the skull in that age group.5) Spontaneous rapid (within 24 hours) resolution of EDH via a skull fracture has also been reported in several age groups other than infants.1,2,4,6–8,10,11) We report the case of an infant showing spontaneous slow drainage of EDH into the subgaleal space through a skull fracture.

Case Report

A 4-month-old girl fell approximately 1 m from a table to the floor, hitting her occipital region. She was brought to our hospital. Neurological examination revealed no abnormalities. The anterior fontanelle was not bulging. Computed tomography (CT) performed 4 hours after the trauma showed a 12-mm thick left parietal EDH with left parietal bone fracture (Fig. 1A). CT performed 8 hours after the trauma showed enlargement of the EDH to a thickness of

Received March 8, 2011; Accepted May 24, 2011
Author’s present address: Kohei Chida, MD, Department of Neurosurgery, Iwate Medical University, Morioka, Iwate, Japan.

Neurol Med Chir (Tokyo) 51, December, 2011
Fig. 1 A: Computed tomography (CT) scan performed 4 hours after trauma showing left parietal epidural hematoma (EDH) with left parietal bone fracture. B: CT scan performed 8 hours after trauma showing enlargement of the EDH. C: CT scan performed 2 days after trauma showing regression of EDH with enlargement of subgaleal hematoma and dilation of fracture line. D: CT scan performed 5 days after trauma showing almost complete discharge of the EDH. E: CT scan performed 12 days after trauma showing complete resolution of both EDH and subgaleal hematoma.

Fig. 2 Photographs obtained 5 days after trauma showing a protrusion in the left parietal region.

Fig. 3 Three-dimensional computed tomography scans of the skull performed 12 days after trauma showing an omega-shaped fracture line (arrows).

Fig. 4 T2-weighted magnetic resonance image performed half a year after trauma demonstrating no remnant of the epidural hematoma, subgaleal hematoma, or any other lesions in the brain.

15 mm (Fig. 1B), but symptoms and signs were still absent, including bulging of the anterior fontanelle. CT performed 2 days after the trauma revealed dilation of the fracture line and drainage of the EDH into the subgaleal space through the skull fracture (Fig. 1C). CT performed 5 days after trauma showed almost complete discharge of the EDH into the subgaleal space and narrowing of the fracture line (Fig. 1D). At this time, the left parietal region had a protruding appearance (Fig. 2). CT performed 12 days after trauma showed complete resolution of both the EDH and subgaleal hematoma (Fig. 1E). Three-dimensional CT of the skull showed an omega-shaped fracture line (Fig. 3). The patient was discharged from our hospital without neurological deficits 12 days after the trauma, during which time the anterior fontanelle had never shown any bulging. Half a year later, magnetic resonance imaging of the head demonstrated no abnormal lesion (Fig. 4).

Discussion

Symptomatic EDH must be treated by urgent craniotomy and evacuation, but small asymptomatic EDH can be treated conservatively with good outcomes in children. In our patient, CT performed 8 hours after the trauma showed enlargement of the EDH, but no symptoms or signs were observed. Therefore, we did not perform craniotomy and evacuation.

Spontaneous drainage of EDH through a skull fracture has been reported in only 9 cases. The hematoma may be forced out of the intracranial region by the high intracranial pressure associated with severe cerebral edema. In such patients, outcomes would be poor. The

Neurol Med Chir (Tokyo) 51, December, 2011
hematoma may also be forced out by a pressure gradient between the venous EDH located at the transverse sinus and the intradural space. In contrast, the hematoma may first develop in the epicranial/subcutaneous region, and then serosanguineous fluid from the hematoma leaks into the epidural space through an underlying fracture due to an increase in epicranial/subcutaneous pressure, then as the epicranial tissue pressure subsides, the fluid leaks back out through the fracture into the epicranial space. Therefore, the pressure gradient between the subgaleal and epidural spaces may be important for the drainage of hematoma through a skull fracture.

In our case, bulging of the anterior fontanelle was never seen at any time during the clinical course, indicating that intracranial pressure was not particularly high. However, dilation of the fracture line during drainage of the EDH implies the presence of a pressure gradient between the subgaleal and epidural spaces. In infants, the dura is firmly attached to the skull, but the connection between extracranial tissues is loose and easily detachable. Such loose connection may allow spontaneous drainage of EDH into the subgaleal space through a skull fracture despite the absence of a substantial pressure gradient. Whereas spontaneous drainage of EDH through the skull fracture was completed within 24 hours after head trauma in all the previously reported cases, the hematoma in our case continued to drain for more than 48 hours. These findings support our conjecture that the pressure gradient between the subgaleal and epidural spaces was not particularly high. In addition, skull fractures in infants tend to form a jagged line rather than a straight line, because of the pliability and unevenness of the cranial flat bones. Our patient showed an omega-shaped fracture that might have acted as a "hinge" to facilitate discharge into the subgaleal space without a high pressure gradient.

References

1) Aoki N: Rapid resolution of acute epidural hematoma.

Address reprint requests to: Kohei Chida, MD, Department of Neurosurgery, Iwate Medical University, 19–1 Uchimaru, Morioka 020–8505, Japan.
e-mail: k_c1228@sunny.ocn.ne.jp

Neurol Med Chir (Tokyo) 51, December, 2011