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Case Report

Spontaneous Development of Encapsulated Subdural Hematoma in the Posterior Cranial Fossa after Cardiac Surgery: A Case Report

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We report a case of an encapsulated subdural hematoma in the posterior cranial fossa, showing spontaneous development and rapid increase in size after cardiac surgery. An 86-year-old woman underwent aortic valve replacement for aortic valve stenosis, followed by anticoagulant therapy with heparin. Three days after the cardiac surgery, she complained of headache. Computed tomography revealed development of a subdural hematoma in the posterior cranial fossa. The hematoma rapidly increased in size within 7 days. Eleven days after cardiac surgery, she underwent removal of the subdural hematoma by craniotomy. Intraoperatively, the subdural hematoma was covered by a thick granulomatous capsule, with histopathological findings similar to those of a chronic subdural hematoma. She was discharged 2 weeks after the craniotomy without any neurological deficits. Encapsulated subdural hematoma in the posterior cranial fossa is rare and its etiology is unknown. In this case, postoperative anticoagulant therapy can promote the rapid growth of thick hematoma capsule. It is possible that previously reported cases of "posterior fossa chronic subdural hematoma" contain similar lesions to that in our patient.

Keywords: encapsulated subdural hematoma, posterior cranial fossa, surgery

Introduction

Formation of a thick fibrous capsule around the intracranial hematoma is often seen in chronic subdural hematoma (CSH) or chronic encapsulated intracerebral hematoma (CEIH); however, the etiology of the capsule formation is not clear. We report a case of encapsulated subdural hematoma in the posterior cranial fossa, which developed spontaneously after cardiac surgery and showed a rapid increase in size in a short period.

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Case Report

An 86-year-old woman underwent aortic valve replacement for aortic valve stenosis. Preoperative CT revealed no obvious intracranial lesions (Fig. 1A). Beginning the next day after cardiac surgery, she received anticoagulant therapy with continuous administration of heparin (1000 U/day). Three days after surgery, she complained of headache. CT revealed development of a subdural hematoma on the surface of the bilateral cerebellar hemisphere (Fig. 1B). She had no history of head trauma before or after the surgery. Because the hematoma was thin and no neurological symptoms were observed at the time, she was treated conservatively with blood pressure control and continued heparin administration. Her headache gradually aggravated and CT performed 10 days after cardiac surgery revealed a marked increase in size of the subdural hematoma on the lateral side of the left posterior cranial fossa with compression of the left cerebellar hemisphere (Fig. 1C). Neurological examination revealed mild ataxia in the left upper and lower limbs.

She underwent removal of the posterior fossa subdural hematoma 11 days after cardiac surgery. A small craniotomy of the left suboccipital region in the right supine-lateral position allowed observation of the subdural hematoma. On the side of convexity, the surface of the hematoma was covered with a very thin membranous layer (Fig. 2A); however, after the evacuation of the blood clot, the hematoma was found to be covered by a thick granulomatous capsule (Fig. 2B). The capsule existed on the lateral surface of the left cerebellar hemisphere, extending to the pyramidal portion of the dura mater. Since the granulomatous tissue tightly adhered to the arachnoid membrane, we only removed the subdural clots and did not completely remove the hematoma capsule.

Postoperative CT revealed sufficient decompression of the cerebellar hemisphere (Fig. 3A). Histopathological findings of the hematoma capsule indicated granulomatous tissue containing newborn capillary vessels, similar to the outer membrane of CSH (Fig. 4). The patient's neurological symptoms were improved immediately after the craniotomy and she was discharged 2 weeks later without any neurological deficits. Recurrence of the hematoma was not observed within the follow-up period of 6 months (Fig. 3B).

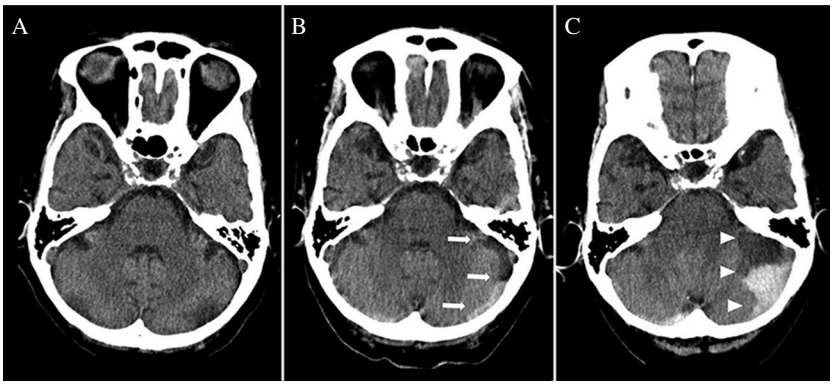

Fig. 1 (A) Preoperative head CT scan showing no obvious intracranial lesions. (B) CT scan obtained 3 days after the cardiac surgery revealing subdural hematomas in the bilateral posterior fossae (I). (C) CT scan obtained 10 days after cardiac surgery revealing marked increase of the subdural hematoma on the lateral side of the left posterior fossa with compression of the left cerebellar hemisphere (arrow head).

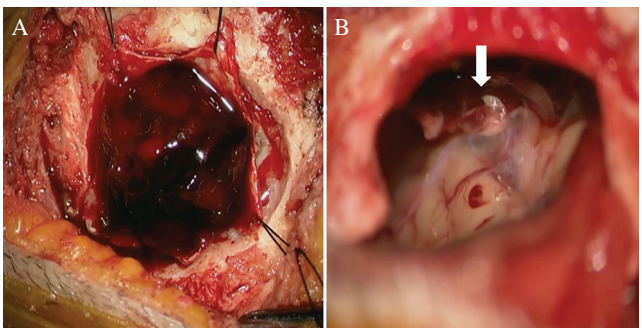

Fig. 2 Intraoperative views. (A) On the side of convexity, the surface of the hematoma was covered with a very thin membranous layer. (B) On the lateral surface of the left cerebellar hemisphere, the hematoma was covered with a thick granulomatous capsule (arrow).

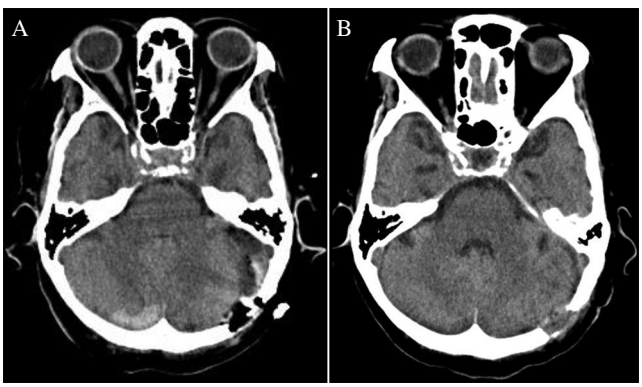

Fig. 3 (A) Postoperative head CT scan revealed sufficient decompression of the cerebellar hemisphere. (B) CT scan obtained 1 month after craniotomy showing no recurrence of the subdural hematoma.

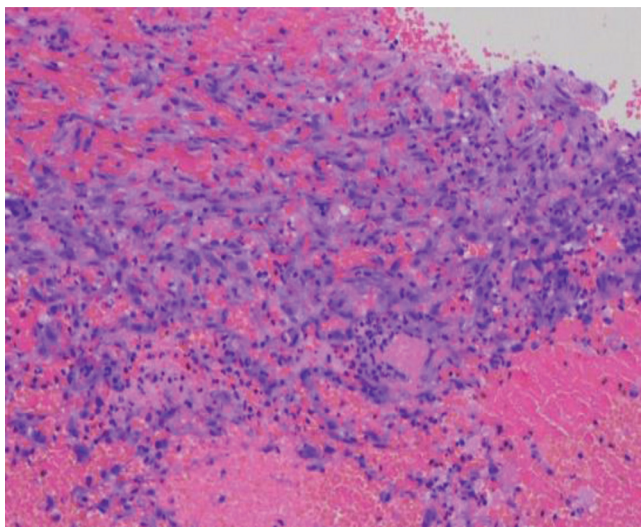

Fig. 4 Result of the hematoxylin-eosin staining of the hematoma capsule (×200). The capsule was composed of granulomatous tissue containing newborn capillary vessels, similar to the outer membrane of a chronic subdural hematoma.

Discussion

This is a rare case of encapsulated subdural hematoma in the posterior cranial fossa, showing rapid development and enlargement in a short period. CSH sometimes form thick granulomatous capsules; however, the aggressive course of the hematoma in the present case is obviously different from that of general CSH. There are some reported cases of CEIH, whose capsules consist of fibrous tissues containing capillary vessels, similar to that in the present case.[1] Since the majority of CEIH are reported to develop beneath the cerebral cortex and in contact with the cerebrospinal fluid,[2] it is possible that the present case involved a similar lesion. The etiology of the formation of CEIH is unclear. The existence of occult vascular malformations is supposed to participate in the development of CEIH[3–5]; however, in the present case, the hematoma developed in the subdural space, where vascular malformations are not common. Furthermore, there is currently no evidence of vascular malformation.

In fact, subdural hematoma in the posterior cranial fossa is rare.[6] About 13 cases of CSH in the posterior cranial fossa have been reported in the CT era[7–18] (Table 1). In these reported cases, 12 of the 13 patients (92.3%) were female, and 9 of the 13 (69.2%) had some kinds of coagulation disorders or administration of anticoagulants. Preceding traumas were evident only in 2 of the 13 patients (15.3%). Furthermore, 5 of the 13 patients (38.5%) had cardiac valvular diseases and 3 patients (23.1%) underwent valve replacement. All of these characteristics accord with the present case. In one case reported by Lagares et al.,[10] CSH in the posterior cranial fossa developed in perioperative term of cardiac valve replacement,

Table 1 Characteristics of previously reported cases of "psoterior fossa chronic subdural hematoma" and present case

No.	Author	Year	Age	Sex	Side	Symptoms	Preceding trauma	Anticoagulant	Associated disease	Cardiac valvular disease	Treatment	Outcome
1	Kanter[7]	1984	59	F	l	Coma	No	Yes	No	Mitral valve disease	Surgical evacuation	MD
2	Izumihara[8]	1993	70	M	l	Gait disturbance	No	No	No	No	Conservative	GR
3	Izumihara[8]	1993	72	F	bil	Headache	Yes	Yes	No	Valvulr disease	Conservative	GR
4	Ashkenazi[9]	1994	65	F	l	Nystagmus	UK	Yes	No	Aortic valve replacement	Craniotomy	GR
5	Lagares[10]	1998	65	F	bil	No	No	Yes	No	Mitral valve replacemnet	Conservative	GR
6	Kachkov[11]	1999	41	F	r	Ataxia	UK	No	No	No	Surgical evacuation	GR
7	Stendel[12]	2002	70	F	bil	Vertigo	No	Yes	No	No	Trepanations	GR
8	Pollo[13]	2003	52	F	bil	Coma	No	No	Thrombocytopenia	No	Trepanations	GR
9	Costa[14]	2004	64	F	r	Vertigo	No	No	No	No	Cranienctomy	GR
10	Berhouma[15]	2007	38	F	r	Vertigo	No	No	Cagulation abnormality	No	Craniectomy	GR
11	Kurisu[16]	2012	86	F	bil	Tetraparesis	Yes	No	No	No	Trepanations	GR
12	Takami[17]	2013	83	F	bil	Headache	No	Yes	Trombocytopenia	No	Conservative	GR
13	Takemoto[18]	2016	69	F	bil	Ataxia	No	Yes	No	Mitral valve replacement	Craniectomy	MD
	Present case	2017	86	F	bil	Headache	No	Yes	No	Aortic valve replacement	Cranientomy	GR

GR: good recovery, MD: moderate disability, UK: unknown.

as in the present case. It is possible that the previously reported cases of the "posterior cranial fossa CSH" contain similar lesions to those in the present case.

Formation of the fibrous capsule can be observed not only in CSHs but also sometimes in acute subdural hematomas.[19,20] Mechanisms underlying the formation of the subdural neomembranes have been investigated and reported. In an unresolved subdural hematoma or subdural hygroma, the dural border cells proliferate and form subdural neomembranes.[21] The subdural neomembrane is composed of inner and outer layers, and the outer neomembrane contributes to hematoma enlargement.[22] Although the time of the formation of hematoma capsule is unclear in most of the cases, the present case suggests that, under a particular condition, an interval of 10 days is sufficient for the development of a thick hematoma capsule. Some kind of inflammatory response after cardiac surgery can promote the rapid growth of the neomembrane, along with the hemorrhagic diathesis due to anticoagulant therapy.

Subdural hematoma in the posterior cranial fossa can be a life-threatening lesion. However, if the lesion is diagnosed early and treated adequately, the prognoses are not always poor.[13,15] Although the present case is considered to be a rare manifestation, careful observation is required for the patients under postoperative anticoagulation therapy.

Conflicts of Interest Disclosure

The authors report no conflicts of interest concerning the materials used in this case report.

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