

## Bilateral posterior fossa chronic subdural hematoma treated with craniectomy: Case report and review of the literature

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### Abstract

**Background:** Posterior chronic subdural hematomas (pCSHs) are rare. Their diagnosis and treatment are difficult.

**Description:** A 69-year-old woman was admitted to our hospital with nausea, headache, and mild consciousness disturbance. Computed tomography and magnetic resonance imaging showed bilateral pCSH. To prevent further neurological deterioration, we performed surgery under general anesthesia by midline suboccipital craniectomy. Unexpected bleeding from a developed circuitous occipital sinus was stopped with hemoclips. After hematoma removal, she recovered and was transferred to a rehabilitation hospital. By the 19<sup>th</sup> postoperative day, she had developed no neurologic deficits.

**Conclusion:** This experience demonstrates the risk of blind surgical therapy in patients with pCSH. In such patients, posterior fossa craniectomy may be preferable in terms of diagnosis and safe treatment.

**Key Words:** Chronic subdural hematoma, craniectomy, posterior fossa

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## INTRODUCTION

Most chronic subdural hematomas (CSHs) are supratentorial. Posterior fossa CSHs (pCSHs) are rare, their diagnosis is difficult, and their pathogenesis is not well understood.<sup>[1,5,7,12,13]</sup> No standard treatments have been established.<sup>[10,14]</sup> We encountered unexpected, but easily stopped intraoperative bleeding in a patient with pCSH who underwent craniectomy. We discussed the treatment of pCSH based on our experience and review the literature.

## CASE REPORT

### Presentation and clinical evaluation

This 69-year-old woman suddenly developed nausea and headache followed on the next day by bouts of vomiting

and gradual mild consciousness disturbance. At the time of admission to our hospital, she had mild consciousness disturbance (Glasgow Coma Scale [GCS] = 14) and her drowsiness increased (GCS = 13). She also had right dominant limb ataxia. She had undergone mitral valve replacement with a mechanical valve earlier and was on

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anticoagulation therapy. She also suffered from diabetes mellitus, rheumatoid arthritis, had an old vertebral compression fracture, old pulmonary tuberculosis, and an old brain infarct from cardiogenic embolism. There was no history of trauma. As laboratory data showed hypercoagulation (prothrombin time-international normalized ratio: 6.0), we reversed her status by administering Vitamin K. Computed tomography (CT) revealed a low- to high-density area in the subdural space of the posterior fossa and narrowing of the fourth ventricle [Figure 1a]. Magnetic resonance imaging (MRI) demonstrated a mass in the subdural space of the bilateral cerebellar hemispheres. On T1-weighted images, it ranged from hypo- to hyper-intense; on T2-weighted images, it was hyperintense. These findings were suggestive of CSH [Figure 1b and c]. Under a diagnosis of bilateral spontaneous CSH, she underwent surgery to prevent further neurological deterioration.

### Surgery and pathology

With the patient under general anesthesia and in the prone position, we used the midline suboccipital approach and performed bilateral suboccipital craniectomy [Figure 2a]. Intraoperatively, we encountered unexpected bleeding from a single occipital sinus that wound to the right and was well developed [Figure 2b]. Noncontrast CT and magnetic resonance angiography did not show its course. Bleeding was stopped with hemoclips. The outer membrane of the CSH was observed after dural incision [Figure 2c]. Dark brown fluid was evacuated,

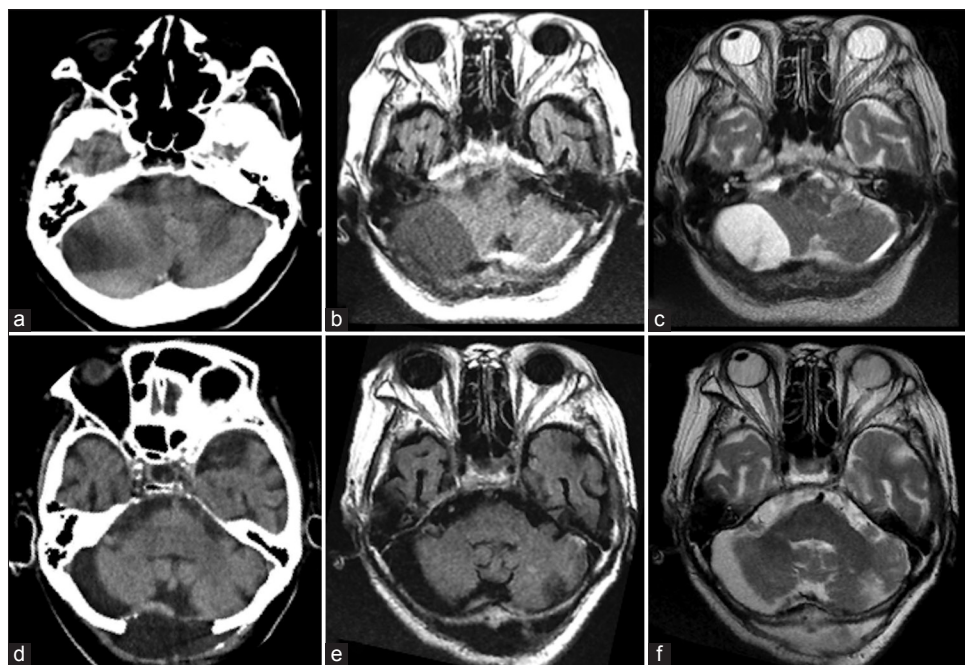
and the cavity was irrigated with saline. We resected the outer membrane in our field of vision and coagulated the residual outer membrane. As there was insufficient cerebellar re-expansion, we placed a drain in the subdural space and closed the wound. The outer membrane specimen was examined histopathologically.

### Postoperative course

Immediately after surgery, her dizziness and consciousness disturbance disappeared. The drain was removed on the postoperative day (POD) 1. CT and MRI studies showed no residual mass effect in the fourth ventricle [Figure 1d-f]. Her earlier vertebral compression fracture and rheumatoid arthritis worsened, and she underwent delayed rehabilitation. On POD 19, she was transferred to a rehabilitation hospital without neurological disturbance.

### DISCUSSION

As pCSH is uncommon, especially in adults, its natural history, pathogenesis, and effective treatment remain to be fully elucidated. The anatomic characteristics of posterior fossa- and supratentorial CSH (sCSH) are different; vascular injuries are rare.<sup>[13]</sup> The posterior fossa is small and patients with pCSH may die of brainstem compression before a diagnosis is made.<sup>[5,7,13]</sup> The pathogenesis of pCSH and sCSH is thought to be the same.<sup>[4,7,13]</sup> The origin of CSH tends to be direct or indirect cranial trauma.<sup>[5,13]</sup> Blood accumulation in the subdural space may be the result of tearing of the bridging



**Figure 1:** Pre- and post-operative computed tomography and magnetic resonance imaging scans. (a) Preoperative computed tomography showed a low-density area in the right cerebellar hemisphere and a partly isodense area that was difficult to diagnose. (b and c) Preoperative magnetic resonance imaging (b, T1-weighted image; c, T2-weighted image) showing a subdural hematoma. The intensity is different on these images. (d) Postoperative computed tomography showing removal of the hematoma. (e and f) Postoperative magnetic resonance imaging showing removal of the hematoma (e, T1-weighted; f, T2-weighted)

veins, venous sinuses, and arachnoid cysts.<sup>[5,13]</sup> Like sCSH, pCSH may have a nontraumatic origin and be due to convex arteriovenous malformations, aneurysms, other cerebrovascular lesions, disordered coagulation in patients receiving anticoagulation and/or antiplatelet treatment, brain tumors, and intracranial hypotension.<sup>[5,12,13]</sup> In fact, many of the previously reported patients with pCSH manifested disordered coagulation due to anticoagulant and/or antiplatelet therapy and had no past history of trauma.<sup>[9]</sup>

The diagnosis of pCSH is difficult; this may account for the low number of reported cases. Before the introduction of CT, most subdural hematomas in the posterior fossa were diagnosed intraoperatively or upon autopsy.<sup>[3,4]</sup> The diagnosis of pCSH is particularly difficult in adults; pCSH due to acute subdural hematoma and

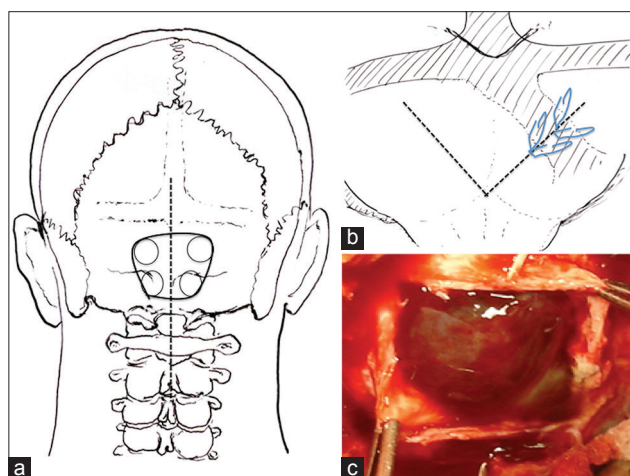
birth trauma has been reported.<sup>[4]</sup> As shown in Table 1, the number of patients with a preoperative diagnosis of pCSH has increased in the CT era ( $n = 13$ , including our patients).<sup>[2,5,7,8,10-14]</sup>

Izumihara *et al.*<sup>[7]</sup> documented the first pCSH patient diagnosed by MRI. This imaging modality is preferable to CT studies because on CT scans, the posterior fossa appears as a strong bone artifact that renders the exclusion of brain tumors and the evaluation of hematomas difficult.<sup>[2,5,7,12,13]</sup> Reported treatments are conservative, craniectomy, and burr hole craniostomy.<sup>[1,2,5,7,8,10-14]</sup> Short-term closed drainage with the drainage tube placed in the hematoma has been used in surgically treated patients. As shown in Table 1, the clinical treatment outcome was satisfactory in the previously-reported and our patient ( $n = 13$ ); based on the GOS, 11 patients enjoyed a good outcome and 2 experienced mild disturbances.<sup>[10,12]</sup>

Among 4 conservatively treated patients with good outcomes, 3 manifested no posterior fossa symptoms.<sup>[7,11,14]</sup> However, patients with symptoms may deteriorate acutely and intervention may be too late. Therefore, early surgical intervention has been recommended as the safer choice.<sup>[1,2,5,10,13]</sup> The use of burr hole craniostomy has increased and yielded good results,<sup>[10,12,13]</sup> and some have suggested that the appropriate treatment is the same in patients with pCSH and sCSH.<sup>[2,5,10,13]</sup>

The mortality rate of CSH patients treated by craniectomy and burr hole craniostomy is not significantly different although craniectomy tends to elicit more perioperative complications than burr hole craniostomy. Therefore, burr hole (or twist-drill) craniostomy and placement of a closed drainage system are now the first choice surgical treatment due to its low morbidity and mortality rate.<sup>[15]</sup>

Nonetheless, the surgical treatment of patients with pCSH must be considered carefully. Dural sinuses such



**Figure 2: Operative procedure. (a)** A straight skin incision (dotted line) was made for midline bilateral suboccipital craniectomy (black solid line). **(b)** AV-shaped dural incision was made (dotted line) and the winding occipital sinus was clipped with hemoclips (slanted line). **(c)** After dural incision, the outer membrane of the chronic subdural hematoma was observed

**Table 1: Review of chronic subdural hematomas of the posterior fossa**

Ref	Authors	Age/sex	Trauma	Coagulation disorder	Side	Diagnosis	Symptoms	Treatment	Outcome
1	Ashkenazi (1994)	65/F	UK	Yes	Lt.	CT	Vertigo, Nystagmus	Craniectomy	GR
2	Berhouma (2007)	38/F	No	Yes	Rt.	MRI	Vertigo, Ataxia	Craniectomy	GR
5	Costa (2004)	64/F	No	No	Rt.	MRI	Somnolence, Ataxia	Craniectomy	GR
7	Izumihara (1993)	72/F	Yes	Yes	Bil.	MRI	No	Conservative	GR
		70/M	No	No	Lt.	CT	No	Conservative	GR
8	Kachkov (1999)	41/F	UK	UK	Rt.	MRI	Ataxia	Surgical evacuation	GR
9	Kanter (1984)	59/F	No	Yes	Lt.	CT	Coma	Surgical evacuation	6 <sup>th</sup> nerve palsy
10	Kurusu (2012)	86/F	Yes	No	Bil.	MRI	Stupor, Tetraparesis	Trepanations	GR
11	Lagares (1998)	65/F	No	Yes	Bil.	MRI	No	Conservative	GR
12	Pollo (2003)	52/F	No	Yes	Bil.	MRI	Tetraparesis, Coma	Trepanations	GR
13	Stendel (2002)	70/F	No	Yes	Bil.	MRI	Vertigo, Ataxia	Trepanations	GR
14	Takami (2013)	83/F	No	Yes	Bil.	CT	Headache, Ataxia	Conservative	GR
	Our case	69/F	No	Yes	Bil.	MRI	Somnolence, Ataxia	Craniectomy	MD

UK: Unknown, GR: Good recovery, MD: Mild disease

as the occipital-, sigmoid-, and transverse sinus and some relatively large emissary veins run in different courses on the surface layer of the posterior fossa. Their evaluation is difficult and not many patients with CSH are subjected to preoperative cerebral angiography. Consequently, intraoperative bleeding may occur. In fact, we encountered unexpected intraoperative bleeding from a circuitous occipital sinus. This sinus flows into the left or right side of the confluence of a sinus or transverse sinus, while most of these sinuses are single, missing, or double sinuses can exist. The occipital sinus is well developed in the perinatal period, and in most cases, it undergoes gradual involution; however, a well-developed occipital sinus may persist into adulthood.<sup>[6]</sup> In such cases, the choice of craniectomy renders complete bleeding stoppage easy because the operative field is sufficiently large.

When intraoperative bleeding from the occipital sinus occurs, as it did in our patient, it may be difficult to control in patients subjected to burr hole surgery. To operate patients with pCSH, particularly those with bilateral lesions, we recommend general anesthesia and the prone position because the midline suboccipital approach is needed. However, prolonged general anesthesia increases the risk to the patient.<sup>[10]</sup>

As it is difficult to make a preoperative diagnosis of pCSH, the histologic study may help to reach a differential diagnosis although a relatively large operative field is required for the harvest of tissue specimens. To obtain satisfactory treatment outcomes, the location of the CSH, posterior fossa or supratentorial, must be known and the best treatment strategy, craniectomy or burr hole craniostomy, must be carefully chosen. Based on our experience, we recommend craniectomy with a sufficient operative field in patients with pCSH who must be placed under general anesthesia and operated in the prone position. More case reports must be collected to identify the best treatment in patients with pCSH.

## CONCLUSION

The diagnosis of pCSH is difficult as is choosing the appropriate therapeutic method. Our patient alerts to the danger of blind surgical therapy in patients with pCSH. To operate pCSH patients under general anesthesia and in the prone position, we suggest that craniectomy is a safe, effective surgical procedure in terms of diagnosis and safety of the treatment.

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## Conflicts of interest

There are no conflicts of interest.

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