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Case Report

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Asymptomatic Infantile Acute Subdural Hematoma with Benign Enlargement of the Subarachnoid Space and Large Sylvian Fissure

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Abstract

Background: An acute subdural hematoma (ASDH) in an infant without external signs of head trauma is sometimes thought to be symptomatic of shaken baby syndrome (SBS) / abusive head trauma (AHT) (in the United States) or of an infantile acute subdural hematoma (IASDH) due to minor head trauma (in Japan). The present case report aimed to demonstrated that IASDH may occur spontaneously without symptoms or signs in patients with cranio-cerebral dysproportion (CCD), including benign enlargement of the subarachnoid space (BESS) and /or large sylvian fissure (LSF).

Case description: A 2-month-old, female patient had subcutaneous bleeding in the left thigh. Her mother brought her to a nearby emergency hospital for an examination. On arrival, the infant was apparently in good spirits and had no neurological abnormalities or external signs of head trauma. However, head computed tomography (CT) requested by the mother revealed small, film-like ASDH on the left cerebral hemisphere. In addition, bilateral BESS and LSF were observed. An ophthalmological examination found no retinal hemorrhage or other abnormalities. On the next day, magnetic resonance imaging (MRI) found a decrease in the ASDH volume together with a prominent BESS and LSF. The patient was followed on an outpatient basis for more than two years but did not present any neurological abnormalities.

Conclusion: IASDH may develop spontaneously without neurological signs or symptoms in an early infant who has CCD, including a BESS and LSF. Patients with intracranial structural vulnerabilities inducing IASDH must be ruled out when assessing for SBS/AHT.

Keywords: Infantile acute subdural hematoma; Shaken baby syndrome; Abusive head trauma; Benign enlargement of subarachnoid space; Large sylvian fissure

Introduction

Infantile Acute Subdural Hematoma (IASDH) is defined as an Acute Subdural Hematoma (ASDH) in infants caused by minor head trauma without the loss of consciousness or cerebral contusion [1]. In addition, most patients with IASDH have Retinal Hemorrhage (RH). On the other hand, based on the assumption that short falls are unable to cause ASDH, an American neurosurgeon insisted on an automatic diagnosis, i.e., Subdural

Hematoma (SDH) + Retinal Hemorrhage (RH) = shaken baby Syndrome (SBS) [2]. Since then, this "automatic diagnosis" has gained traction in the English-speaking world, where the presence of a subdural fluid collection on CT or MRI leads straightway to the diagnosis of SBS/AHD unless pathological findings demonstrate a different cause [3]. The present case is a valuable illustration of the fact that IASDH can occur even without an external impact to the head or neurological signs and symptoms.

Case Presentation

The patient, a female infant, was born after 37 weeks' gestation with a birth weight of 3090 g after a painless childbirth. Her delivery was complicated by severe asphyxia. The patient was managed in a neonatal intensive care unit and recovered well without any sequelae. When aged 5 days, she underwent Magnetic Resonance Imaging (MRI) as part of a routine follow-up examination for patients with a history of severe asphyxia. As a result, SDH was diagnosed **(Figure 1)**. After eight days' hospitalization for close observation, she was discharged and led an uneventful life at home.

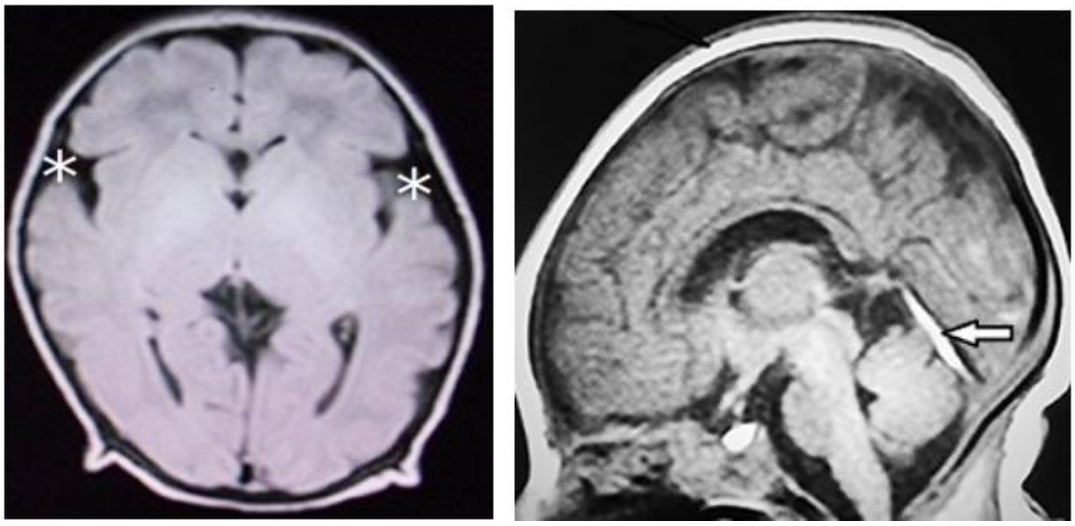

Figure 1: MRI (FLAIR sequence) at the age of 5 days taken as routine follow-up examination for patients with a history of severe asphyxia.

Left: Coronal image, showing bilateral LSF (asterisks).

Right: Sagittal image, showing ASDH on the cerebellar tentorium (arrow).

Normal development was confirmed at a regular follow-up examination one month later. At the age of 2 months, however, her mother noticed subcutaneous bleeding in the left thigh, prompting her to take her child to an emergency department of a nearby hospital. On arrival, the patient was

apparently in good spirits, and no abnormalities, such as vomiting or seizures, were observed. Moreover, no external signs of head trauma were noted. However, because the etiology of the subcutaneous bleeding remained unknown, she underwent brain CT, which revealed ASDH with mixed density **(Figure 2)**. On the following day, MRI revealed Benign Enlargement of the Subarachnoid Space (BESS) and Enlargement of the Sylvian Fissure (LSF) **(Figure 3)**.

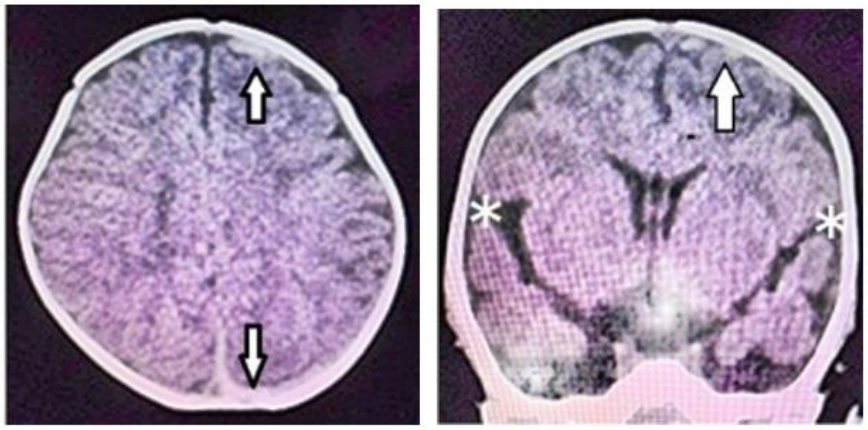

Figure 2: CT at the age of 2 months.
Left: Axial image, showing thin, film-like ASDH on the frontal and occipital regions (arrows)
Right: Coronal image, showing mixed-density ASDH on the frontal region (arrow), and bilateral LSF (asterisks).

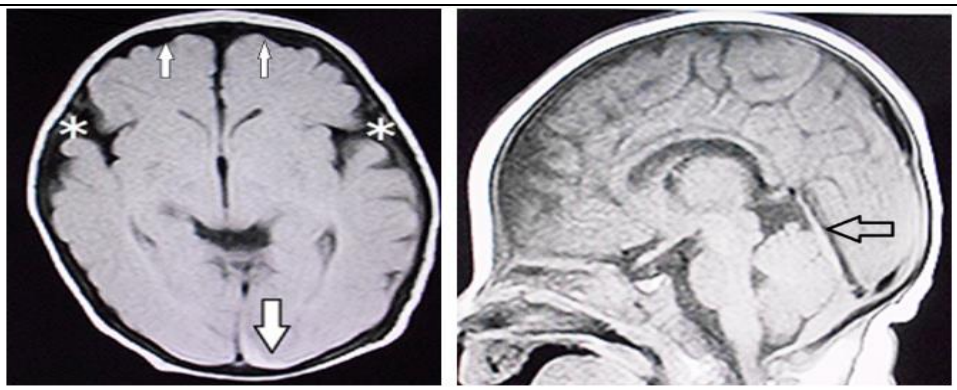

Figure 3: MRI (FLAIR sequence) took next day after the CT **(Figure 2)**.
Left: Axial image, showing thin- film like ASDH (arrow), bilateral LSF (asterisks), and BESS (small arrows).
Right: Sagittal image, showing reduced volume and intensity of ASDH on the cerebellar tentorium, compared to that taken at the age of day 5 **(Figure 1)** (arrow).

Fundoscopic examination found no bilateral retinal hemorrhage. She was hospitalized for close observation and was reported to a child-care center, which ruled out AHT as the cause of her condition. At the age of 2 years, she was confirmed to have achieved the normal, developmental milestones.

Discussion

Due to the biophysiological characteristics of infants, IASDH was originally defined in 1984 as an acute subdural hematoma in infancy apparently caused by minor head trauma without the loss of consciousness and un associated with a primary brain injury [1]. Many cases of IASDH have been reported since the 1960s in Japan [4]. However, because most of these cases were published in Japanese-language journals, coupled with the frequent criticism that the diagnosis was being used to conceal cases of child abuse, the concept of IASDH is not widely accepted in the English-speaking world. A case series of 24 IASDH cases published in 1984 [1] was critically reviewed in a Letter to the Editor as follows: "While not totally pathognomonic of shaking, the constellation of subdural hematoma and retinal hemorrhage in the context of a historically trivial injury should be regarded as whiplash shaken baby syndrome unless another etiology can be determined [2]." However, recent Japanese studies have demonstrated that patients with IASDH can be distinguished from those with SBS/AHT through multidisciplinary assessment, including evaluation by a child abuse pediatrician and neurosurgeons [4-8]. Furthermore, neuroimaging studies are indispensable for ruling out cerebral parenchymal injuries, including cerebral contusions and diffuse axonal injuries, when assessing for IASDH. There are three distinct differences between IASDH and SBS/AHT [5].

First, IASDH generally has a favorable outcome with good recovery in approximately 80% of the patients. Second, IASDH is strictly age-specific, occurring mostly in infants from 5 ~12 months old, shows a statistical difference from AHT, and occurs predominantly in males, with the male: female ratio being 9:1. Third, the absence of a primary brain injury is evident on CT, MRI, and surgery and is compatible with the benign clinical course following conservative management or surgical removal of the hematoma. Although most neurosurgeons in the English-speaking world might assume that a minor fall cannot cause ASDH, the potentially tragic consequences of either a false-positive or false-negative diagnosis necessitate the establishment of a differential diagnosis for IASDH and SBS/AHT. The matter is of major legal importance as well, and the diagnosis should be based on strict medical evidence. **Table 1** shows the features differentiating IASDH from SBS/AHT [4].

Table 1: Comparison of Infantile Acute Subdural Hematoma (IASDH) with Shaken Baby Syndrome (SBS) /Abusive Head Trauma (AHT).

	IASDH	SBS/AHT
Applied force	Minor head trauma	Abuse (high energy impact)
Main etiology	Disruption of bridging vein	Cerebral contusional tears

Primary brain injury	None	Common
Age distribution	Peak at 6 ~ 10 months	Widely distributed (including age < 3 months)
Sex	Marked male preponderance	No preponderance
Recurrence	Rare	Not rare
Prognosis	Depends on volume of hematoma (mostly benign clinical course)	Poor
Retinal hemorrhage	Frequent	Common

(Cited from Ref. 4 with permission of the Society of Japanese Neurosurgery)

Conclusion

Although no neurological signs or symptoms were observed in the present case, incidentally performed CT led to the detection of ASDH. In the English-speaking world, the presence of a subdural fluid collection on CT or MRI leads to an automatic diagnosis of SBS/AHD unless pathological findings demonstrate another etiology.

The present case is invaluable because it demonstrates that IASDH can occur in the absence of an external impact to the head. The diagnostic criteria for SBS/AHT, particularly in terms of their application to very young infants, need to be reviewed, considering that the presence of CCD, including BESS and LSF, can cause IASDH even without trauma.

References

1. Aoki N, Masuzawa H. Infantile acute subdural hematoma. clinical analysis of 26 cases. J Neurosurg. 1984;61(2):273-80.

2. Rekate HL. Subdural hematomas in infants. (Letter). J Neurosurg. 1985;61:316-7.
3. Hahnemann ML, Kronsbein K, Karger B, et al. Characterization of subdural collections in initial neuroimaging of abusive head trauma: Implications for forensic age diagnostics and clinical decision-making. Eur J Radiol. 2023;159:110652.
4. Aoki N. Infantile acute subdural hematoma: caused by abuse or mild head trauma? Nervous System Children. 2011;36:326-30 (Japanese).
5. Aoki N. "Infantile" acute subdural hematoma: A clinical entity different from abusive head trauma. J Pediatr Neurol Neurosci. 2022;4(1):51-53.
6. Shimoji K, Suehiro E, Matsuno A, et al. Abusive head trauma in Japan. Childs Nerv Syst. 2022;38:2387-93.
7. Akutsu N, Nonaka M, Narisawa A, et al. Infantile subdural hematoma in Japan: a multicenter, retrospective study by the J-HITs (Japanese head injury of infants and toddlers study) group. PLoS One. 2022;17(2):e0264396.
8. Aoki N. Clinical and neuroimaging characteristics in mild-type infantile acute subdural hematoma. Report of four cases. Childs Nerv Syst. 2024;40(1):189-95.

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