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Case Report

Three Cases of Shaken Baby Syndrome without a History of Shaking

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SUMMARY

Three cases of Shaken Baby Syndrome (SBS) without a history of abusive shaking have been reported. The reason why SBS without intentional shaking as follows ; case 1was throwing, case 2 was dropping, case 3 was unknown. For all 3 reported cases, attending physicians suspected the SBS from the presence of subdural hematoma and fundus hemorrhage. All 3 cases occurred at home, and the parents had no knowledge of SBS. After a detailed interview, the diagnosis of SBS without a history of intentional shaking was made. Although the mechanism in detail was unclear in 3 cases, these SBS may happen by the difference between acceleration and the deceleration during the throwing and dropping movement ; similar to intentional shaking that causes of common SBS.

For subdural hematoma and fundus hemorrhage of unknown cause, it is important to conduct an interview with the possibility of unintentional SBS in mind, without the occurrence of abusive shaking. In addition, attention should be paid to both pediatrician and parents about the risk of SBS in the care of infant in the everyday life.

Key Words : shaken baby syndrome, magnetic resonance imaging, abuse

INTRODUCTION

Shaken baby syndrome was first reported by Caffey[1,2] in 1974 regarding intracranial hemorrhage and fundal hemorrhage that developed after shaking the head of an infant. Since its symptoms comprise the characteristics of a head injury due to abuse, it is classified as a battered child syndrome[3,4]. SBS is diagnosed when the head is strongly shaken in early infancy, concurrently causing a subdural hematoma and fundal hemorrhage. Uncommonly, however, SBS happens without intentional shaking. Therefore, the diagnosis of SBS should be made carefully[5], whether intentional abuse is present or not. We herein report 3 cases of SBS without a history of intentional shaking.

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CASE REPORT

Case 1 :

The patient was 5-month-old boy. The chief complaints included spasm and respiratory problems. According to an interview, his father repeated the action of throwing the child up to approximately 50 cm overhead several times, intending to soothe him to sleep. There was no fact of a head shaking. Fifteen minutes later, the boy was transported to the hospital due to a spasm status and was put under artificial respiration management. Both eyegrounds showed preretinal fundal hemorrhage (Fig. 1A). A head CT (Figs, 1B, 1C) showed a subdural hematoma along the cerebral falx.

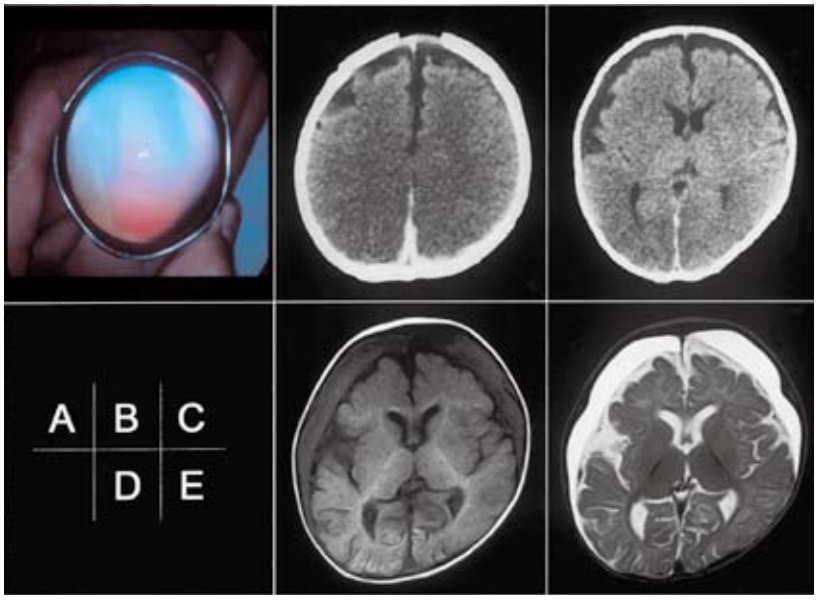

Fig. 1 **A** : A fundal hemorrhage was observed on admission using a magnifier lens. **B, C** : In the brain CT performed on admission, a region of high absorbance was observed along the cerebral falx, resulting in the diagnosis of subdural bleeding. **D, E** : In both the T1-weighted image (D) and T2-weighted image (E) of the brain MRI performed on Day 17 of hospitalization, crescentic regions exhibiting high signals were observed beneath the dura mater on both sides.

The diagnosis of SBS was made based on the presence of fundal hemorrhage and subdural hematoma. On the forth day, the examination of the spinal fluid showed xanthochromia. An MRI on the seventeenth day showed subacute subdural hematoma (Figs. 1D, 1E). Artificial respiration was required for 12 days. Six years after the onset, the patient's IQ was 75 and he is in a handicapped school for the intellectual disability. Intense amblyopia was detected, and epilepsy was controlled by anticonvulsants.

Case 2 :

Case 2 is that of a 2-month-old boy. His father dropped the child from a height of approximately 1 m onto a mattress and there was no evidence of head shaking. After ten minutes, respiration became irregular, and the boy was taken to the hospital via emergency transport. On admission, an examination of the fundus revealed extensive preretinal hemorrhage accompanying soft exudates. A skull X-ray showed no fracture and brain CT (Figs. 2B. 2C) demonstrated subdural hemorrhage along the cerebral falx and cerebral edema. On the second day after admission, midazolam was administered via continuous intravenous infusion in order to control prolonged partial convulsions of the upper limbs. Three months after the onset, the subdural hematoma remained on MRI (Figs. 2D, 2E). Four months after the onset, the patient was on a rehabilitation program for spasticity of the limbs.

Case 3 :

The patient was a 2-month-old boy. The chief complaints included respiratory problems, ocular deviation, and partial spasm of the limbs. No evidence of shaking was obtained in the interview of the parent. Fundal hemorrhage was detected in both eyes. Brain CT revealed a subdural hematoma along the cerebral falx and extensive cerebral edema in the area of left occipital region (Figs. 3B, 3C). As partial spasm progressed, the child was admitted to the ICU, where head cooling and steroid pulse therapy was implemented. Two months after the onset, a brain MRI showed subdural hematoma and cerebral atrophy in the right frontotemporal area. The opposite side showed severe cystic encephalomalacia (Figs. 3D, 3E). At 3 months after the onset, oral feeding became possible, however, the disturbance of the visual field and visual impairment remained unchanged. The patient was put on a rehabilitation program for spastic quadriplegia.

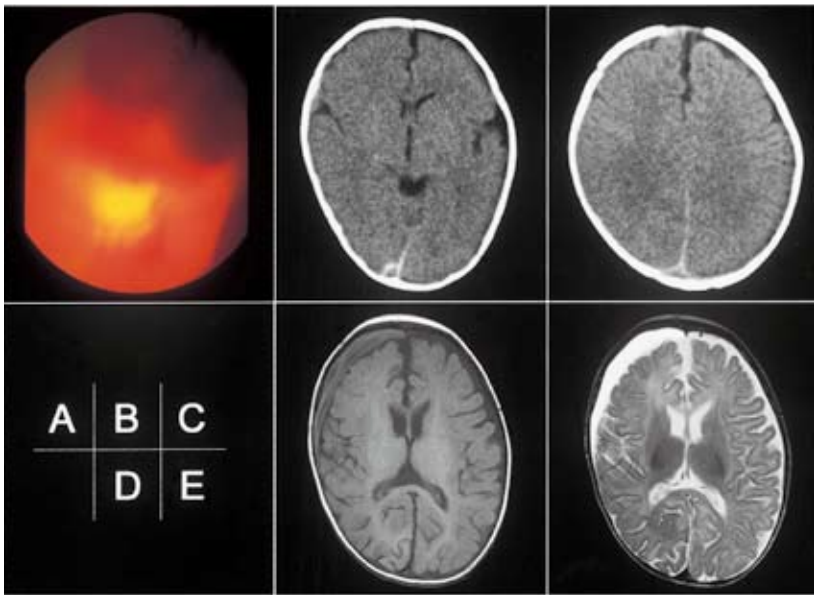

Fig. 2 **A**：In the fundus examination performed on fourth day from admission, diffuse preretinal bleeding with soft exudates was observed. **B, C**：Brain CT showed images of subdural hemorrhage along the cerebral falx and cerebral edema. **D, E**：In the T1-weighted image (D) and T2-weighted image (E) of the brain MRI performed at 3 months after onset, the subdural hematoma remained in the right anterior temporal area.

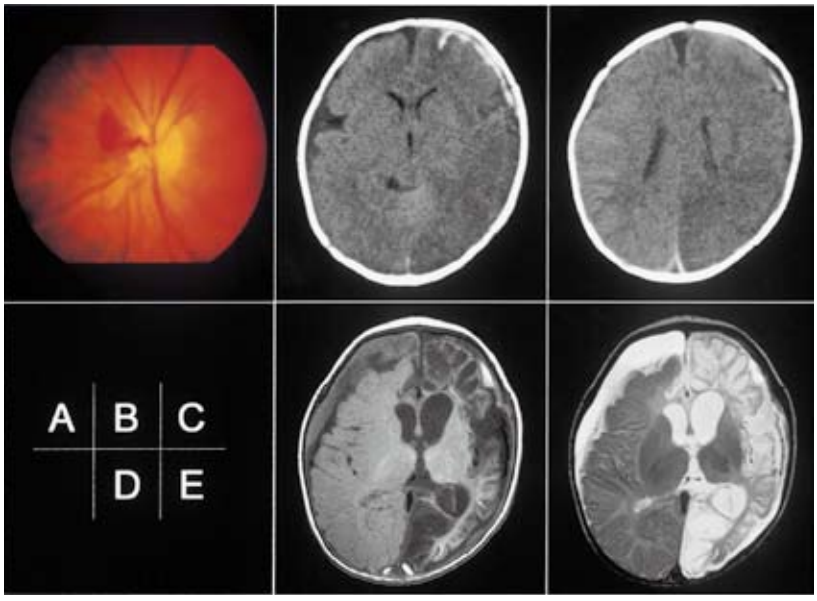

Fig. 3 **A**：In the fundus examination performed on seventh day from admission, diffuse preretinal bleeding was observed. **B, C**：Brain CT on admission, revealed a subdural hematoma along the cerebral falx and extensive cerebral edema on the area of left occipital region. **D, E**：At 2 months after the onset, a head MRI T1-weighted image (D) and T2-weighted image (E) showed images of subdural hematoma and cerebral atrophy in the right front temporal area. The left side showed a finding of severe multiple cystic encephalomalacia.

DISCUSSION

The diagnosis of SBS is not difficult when awareness of the shaking of an infant has occured, intractable hemorrhage on CT or MRI, and fundus hemorrhage. Physicians who are aware of SBS would not miss this

when hearing evidence of shaking from parents during an interview[4~10]. However, it has been reported that evidence of obvious shaking is not apparent in some cases of SBS[5]. In this report, there was no evidence of intentional shaking by the parents in any of the 3 cases. Pediatricians conducted detailed interviews from parents, which led to the diagnosis of SBS. We mentioned the importance of conducting an interview with SBS in mind, for an unexplained disturbance of consciousness and spasms. Subsequently, we obtained head CT or brain MRI and fundus examination, which confirm the early diagnosis of SBS without intentional shaking.

An accurate mechanism of SBS is uncertain. Oehmichen et al.[7] reported that SBS can be stated that falls from less than 1.5 m lead only in few cases to severe brain injuries. On the other hand, Guthkelch[10] pointed out that SBS happens by the difference between acceleration and the deceleration by the shaking. In case 1[5], the father threw the child high into the air. In the case 2, the child was dropped onto a mattress. In the case 3, the history of shaking was not obtained in the interview. But also case 3 was diagnosed with SBS based on clinical features of subdural hematoma and fundus hemorrhage. In case 3, it is assumed that a mechanism similar to intentional shaking was the cause of the injury.

All of the three cases in this report occurred at home. Furthermore, according to the interviews, all the 3 parents in this report had no knowledge of SBS. Recently, the education regarding SBS has spread socially in Japan. Although more and more parents in Japan are aware of SBS owing to the education campaign, the presence of our 3 cases itself indicates that further campaigning is necessary to establish the knowledge in the general population. If the parents in these case reports had known about SBS beforehand, these children might have escaped the SBS.

Our common nursing movement can deliver the mechanism similar to intentional shaking. Not only pediatricians but the general population should pay full attention to the variety of onset patterns of non-intentional SBS without obvious shaking.

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REFERENCES

1) Caffet J : On the theory and practice of shaking infants. Its potential residual effects of permanent brain damage and mental retardation. Am J Dis Child **124** : 161-169, 1972.
2) Caffey J : The whiplash shaken infant syndrome ; manual shaking by extremities with whiplash induced intracranial and intraocular bleedings, linked with residual permanent brain damage and mental retardation. Pediatrics **54** : 396-403, 1974.
3) Ludwig S : Shaken baby syndrome ; a review of 20 cases. Ann Emerg Med **13** : 104-107, 1984.
4) American Academy of Pediatrics Committee on Child Abuse and Neglect. Shaken baby syndrome ; inflicted cerebral trauma. Pediatrics **92** : 872-875, 1993.
5) Imataka G, Yamanouchi H, Hagiwara Y, Eguchi M : A baby with shaken baby syndrome in whom early diagnosis resulted in good prognosis. No To Hattatsu **32** : 534-537, 2000.
6) Duhaime AC, Gennarelli TA, Thibault LE, Bruce DA, Marqulies SS, Wiser R : The shaken baby syndrome. A clinical, pathological, and biomechanical study. J Neurosurg **66** : 409-415, 1987.
7) Oehmichen M, Meissner C, Saternus KS : Fall or shaken : traumatic brain injury in children caused by falls or abuse at home—a review on biomechanics and diagnosis. Neuropediatrics **36** : 240-245, 2005.
8) Asamura H, Yamazaki K, Mukai T, Ito M, Takayanagi K, Ota M, Fukushima H : Case of shaken baby syndrome in Japan caused by shaking alone. Pediatr Int **45** : 117-119, 2003.
9) Kujiraoka Y, Sato M, Tsuruta W, Yanaka K, Takeda T, Matsumura A : Shaken baby syndrome manifesting as chronic subdural hematoma : Importance of single photon emission computed tomography for treatment indications—Case report—. Neurol Med Chir (Tokyo) **44** : 359-362, 2004.
10) Guthkelch AN : Infantile subdural hematoma and its relationship to whiplash injuries. Br Med J **2** : 430-431, 1971.