

Recurrent subdural hematoma secondary to headbanging: A case report

Naoki Nitta, Junya Jito, Kazuhiko Nozaki

Department of Neurosurgery, Shiga University of Medical Science, Setatsukinowacho, Otsu, 520-2192 Shiga, Japan

E-mail: *Naoki Nitta - nnitta@belle.shiga-med.ac.jp; Junya Jito - xjun5@belle.shiga-med.ac.jp; Kazuhiko Nozaki - noz@belle.shiga-med.ac.jp

*Corresponding author

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Abstract

Background: “Headbanging” is the slang term used to denote violent shaking of one’s head in time with the music. This abrupt flexion-extension movement of the head to rock music extremely rarely causes a subdural hematoma.

Case Description: A 24-year-old female was admitted to our department because of right sided partial seizure and acute or subacute subdural hematoma over the left cerebral convexity. She had no history of recent head trauma but performed headbanging at a punk rock concert at 3 days before admission. Since, she had a previous acute subdural hematoma on the same side after an accidental fall from a baby buggy when she was 11 months old, the present was recurrent subdural hematoma probably due to headbanging.

Conclusions: Headbanging has the hazardous potential to cause a subdural hematoma.

Key Words: Headbanging, punk rock, recurrence, subdural hematoma

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INTRODUCTION

“Headbanging” is the slang term used to denote violent shaking of one’s head in time with the music. This abrupt flexion-extension movement of the head to rock music has been recently reported to cause subdural hematoma in “The Lancet,” however, the number of such reports is very limited as compared with the number of “headbangers” in the world.^[1,6,9,11,13,15] Here, we report a case of a 24-year-old woman with subdural hematoma after headbanging at punk rock concerts with no recent history of head trauma. Since, she had an acute subdural hematoma on the same side after an accidental fall from a baby buggy when she was about 1-year old, present is recurrent subdural hematoma due to headbanging.

CASE REPORT

A 24-year-old female was seen in our Neurosurgical Department because of partial seizures of right upper and lower limbs. On the morning of admission, episodes

of partial seizures, motor weakness, and numbness of right upper and lower limbs occurred. She did not bruise her head during partial seizures.

On examination, she was awake, alert, and oriented. No head injury such as skin bruises was observed. Cranial nerves were intact. Motor examination showed mild right hemiparesis. Sensory examination showed right upper and lower limbs numbness. After simple partial seizures on the right upper and lower limbs were controlled with diazepam and phenytoin, the numbness

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disappeared. Cranial computed tomography (CT) scans showed left-sided acute or early subacute subdural hematoma with neither subcutaneous hematoma nor skull fracture [Figure 1a]. Magnetic resonance imaging (MRI) [Figure 1b and c] at a day after admission and CT angiography at 6 days after admission showed no underlying brain lesion, arachnoid cyst, or vascular malformation.

She had no history of recent head trauma but reported headbanging at punk rock concerts at 17 and 3 days before admission. Her mother reported that she had been admitted to our department when she was 11 months old because of acute subdural hematoma on the same side after an accidental fall from a baby buggy. Although, she had an episode of generalized seizure when she was 20 years old, results of MRI and electroencephalography were normal at that time. Because she had no recent history of head trauma, we concluded that headbanging at 3 days before admission had caused a present subdural hematoma.

Carbamazepine was administered, and there were no episodes of seizure after the admission. On the second hospital day, her motor weakness improved, probably because of free of seizures. She was discharged home after 13 days. At 8-month follow-up, the patient remains free of seizures with the administration of carbamazepine. CT showed resolution of the subdural hematoma [Figure 1d].

DISCUSSION

The headbanging story may begin when the front rows of the audience were banging their heads on the stage in time to the music at the Boston Tea Party during Led Zeppelin's first US tour in 1969.^[12] Headbanging's violent neck movements may cause rock musicians'

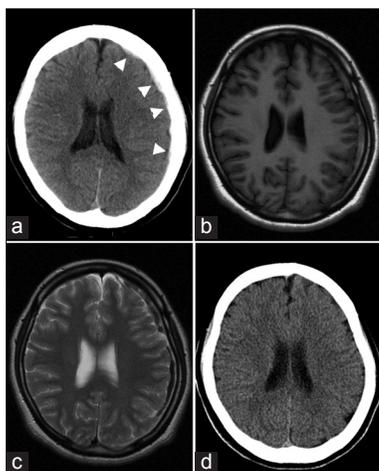


Figure 1: (a) Computed tomography showing a left-sided acute or early subacute subdural hematoma (arrow heads). (b) T1-weighted and (c) T2-weighted images at a day after admission. (d) Computed tomography at 1-month follow-up

stroke and cervical disc herniation. In medical journals, carotid dissection, subdural hemorrhage, basilar artery thrombosis, vertebral artery aneurysm, and mediastinal emphysema have been reported as severe health complications.^[1,3,4,6,8-15]

A previous study has reported that nothing need strike the head in order for the acute subdural hematoma to occur.^[5] Although the appropriate acceleration strain-rate conditions cause acute subdural hematoma, the least angular acceleration for acute subdural hematoma was about 1.0×10^5 rad/s² in rhesus monkeys, which acceleration must be difficult or impossible for human to reproduce only by headbanging without hitting his head against something.

Patton and McIntosh evaluated risks of brain and neck injury caused by headbanging using head injury criterion and neck injury criterion.^[12] Undertaking biomechanical analyses with a theoretical headbanging model, they predict that headbanging in the up-down style can cause headaches and dizziness if the range of movement of the head and neck is $>75^\circ$ at a moderate tempo of popular headbanging songs. Head banging at a moderate tempo with 105° range of motion can cause acute neck soft tissue injury. If someone were to headbang at 180 beats/min with 120° range of motion, he would suffer from the long-term neck injury and 1–6 h unconsciousness, but the physical limitations of the neck muscle makes it difficult for the head travel through a large range of movement while headbanging to high-speed songs. These results suggest that headbanging does not result in severe head and neck injuries theoretically.^[12]

Why did previous and our patients have the severe or fatal complication of headbanging? One reason is the cumulative effects of repetitive head movement, which no established injury criteria or risk assessment consider, in one session or multiple sessions of headbanging.^[12] This reason, however, cannot explain why only limited persons suffered from a subdural hematoma after headbanging, because other people without subdural hematoma can also experience such cumulative effects at same concerts.

Another reason is a predisposition. In six previous cases of subdural hematoma due to headbanging, two patients had an arachnoid cyst in the middle fossa, ipsilateral to the hematoma, suggesting that headbanging may cause subdural hematoma in patients with predisposing factors for subdural hematoma like an arachnoid cyst.^[1,6,9,11,13,15] Although other four patients were not reported to have such predisposing factors, we think that constitutional course and little play of bridging veins (BV) in subdural space might contribute to excessive strains and rupture of itself after shifting of the brain and cerebrospinal fluid during headbanging in other patients. When the human cadaver heads were subjected to impact, the

relative displacement between the brain and skull were reported to be on the order of ± 5 mm.^[7] The study of the superior sagittal sinus (SSS) and parasagittal BV complex (SSS-BV), the mean ultimate strain corresponded to a mean elongation of the SSS-BV units of 4.95 ± 1.8 mm.^[2] These results suggest the existence of a critical elongation/strain criterion for the occurrence of acute subdural hemorrhage due to BV rupture, with 5 mm elongation or 25% strain being the cut-off.^[2] If mean elongation of units of SSS-BV is much shorter than 5 mm, weak impact that displace the brain by <5mm may cause a subdural hematoma.

Because our patient had no arachnoid cyst on images, but had a history of traumatic subdural hematoma on the same side in her infancy, we infer that she might have constitutionally structural vulnerability of BV which caused previous and present subdural hematoma, or acquire vulnerability of BV by the first subdural hematoma, e.g., reduction of play of BV by adhesion after first injury. We assume that angular acceleration of the head or relative displacement between the brain and skull during headbanging exceeded our patient's strain tolerance threshold of subdural BV, which might be much lower than normal.

CONCLUSION

We report a case of a 24-year-old woman with subdural hematoma after headbanging at punk rock concerts. In six previous cases of subdural hematoma due to headbanging, two patients had an arachnoid cyst in the ipsilateral middle fossa as predisposing factors for subdural hematoma, and our patients had a past history of acute subdural hematoma ipsilateral to the present subdural hematoma, suggesting that our patient also has vulnerability of BV to rapid movement of the head and should not perform headbanging.

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Conflicts of interest

There are no conflicts of interest.

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