Transorbital Penetrating Injury by a Chopstick
—Case Report—

Takeshi MATSUYAMA, Kazuo OKUCHI, Keiji NOGAMI, Mitiaki HATA, and Yoshinori MURAO

Department of Emergency and Critical Care Medicine, Nara Medical University, Kashihara, Nara

Abstract

A one-year-old boy presented with orbitocranial penetrating injury by a chopstick. Neurological examination did not reveal abnormal findings. Skull radiography did not reveal any sign of fracture and there were no abnormal findings. Initially, computed tomography (CT) of the head did not reveal any intracranial lesions. However, bone window CT showed a well-defined low-density abnormality measuring 2.5 cm in length in the right orbit and parasellar region. Magnetic resonance imaging clearly revealed a low-intensity structure extending from the orbit to the prepontine area. Surgical exploration was emergently performed and the wooden fragment was removed. The postoperative course was uneventful. Transorbital penetrating injury by a wooden foreign body is relatively rare. The wound may be superficial and trivial. Major neurological deficit does not usually manifest immediately, so the penetrating injury may be overlooked. If the foreign body is retained in the orbit and cranium, severe infectious complications may occur later.

Key words: penetrating injury, chopstick

Introduction

Transorbital penetrating injury is relatively rare and usually occurs in young children.1,11 The diagnosis is straightforward when the absence or presence of the foreign body fragment in the wound is confirmed. However, diagnosis based on an incomplete history and trivial trauma is difficult and the penetrating injury may be overlooked. Furthermore, the patient may not exhibit immediate neurological deficits. Serious events may occur several days, months, or years after the injury.2,9,11,16 The detection of an orbitocranial wooden foreign body is difficult because orbit and head radiography cannot show wooden bodies.11 We treated a boy with orbitocranial penetrating injury caused by a chopstick in whom these diagnostic problems occurred.

Case Report

A one-year-old boy fell down on the floor with a chopstick in his hand. The right eyelid was punctured by the chopstick. His mother pulled it out immediately. His eyelid was swollen and bruised, so he was brought to our department. His mother reported that the tip remained attached to the broken chopstick and was not retained in the orbit.

On admission, his consciousness was clear. The right eyelid was remarkably swollen and a small laceration was recognized just at the medial canthus of the right eye (Fig. 1). His pupils were isocoric and reacted normally to the light. Ophthalmological examination showed the eyeball was intact, and visual acuity and ocular movements were normal. Neurological examination did not reveal abnormal find-
ings. Skull radiography did not reveal any sign of fracture and there were no abnormal findings. Initially, computed tomography (CT) of the head revealed no intracranial lesions (Fig. 2A). However, bone window CT at a different angle showed a well-defined low-density abnormality of 2.5 cm in length in the right orbit and parasellar region (Fig. 2B). This structure was located along the medial aspect of the right orbit and penetrated the superior orbital fissure and prepontine cistern. The density could be distinguished from air. To confirm that whether the tip of the chopstick retained in the orbit and cranium, we requested his mother to bring the chopsticks to us. Examination revealed that a section of the tip was missing from one of the chopsticks and corresponded to the low-density abnormality on CT. Magnetic resonance (MR) imaging clearly revealed this CT abnormality as a low-intensity structure extending from the orbit to the prepontine area (Fig. 3). This structure was slightly distant from the right carotid artery and there was no indication of major artery injuries. Therefore, cerebral angiography was not carried out.

Based on the diagnosis of a chopstick fragment in the orbit and cranium, surgical exploration was emergently performed 12 hours after injury. The transcranial approach was chosen. Right frontotemporal craniotomy was performed. The orbital roof was removed using the epidural approach, then the anterior clinoid process and the roof and optic strut were drilled away with a diamond burr. The upper posterior part of the orbital roof and the upper part of the optic canal were drilled out so that the entire segment of the optic nerve could be seen under the sheath. The periorbita was discolored and black. Incision revealed a purulent discharge which was evacuated. The incision was extended along the optic nerve and the fat tissue was dissected. The wooden fragment was found around the optic nerve and carefully removed to avoid injury to the optic nerve (Fig. 4).

The postoperative course was uneventful. Three days postoperatively, spinal tap was performed. Bacterial cultural examination revealed the growth of streptococcus. Antibiotics were administered for 3
weeks. The patient was discharged without neurological deficits.

**Discussion**

Transorbital penetrating injury by a wooden foreign body is relatively rare.¹¹ The orbit is shaped like a horizontal pyramid, so penetrating objects are directed toward the apex, and pass through the superior orbital fissure and the optic canal.¹² The wound may be superficial and trivial. Major neurological deficits do not usually manifest immediately after injury.⁹ Sometimes exact information on whether a fragment remains in the wound or not cannot be obtained from the patient or the parents.

Immediate complications include intracerebral hematoma, cerebral contusion, intraventricular hemorrhage, pneumocephalus, brain stem injury, and cerebrovascular injuries.¹¹⁻¹² If the foreign body is retained in the orbit and cranium, severe infectious complications may occur later.⁹ A wooden foreign body is very infectious because the porous organic material provides good culture conditions for bacterial agents.¹¹ Infectious symptoms such as meningitis and brain abscess occurred in 64% of patients, and brain abscess in 48%.¹¹ The mortality has been reported as 25%¹³ and 12.5%.¹⁵

Wooden objects are not always recognizable on roentgenograms. Diagnosis was difficult in 92% of cases.¹¹ CT shows wood as a low-density structure which cannot easily be distinguished from orbital fatty tissue or intracranial air.⁷ An experimental study showed that serial CT findings were variable because wood absorbs water.⁶ Serial CT shows that the well-defined low-density structure does not change in size, but immediate detection of the foreign body is mandatory to prevent dangerous infectious complications. Variation of the window range, angle, and level of CT can distinguish the wood fragment from air because the CT number of wood ranges from −500 to −200 and that of air is −1000.³ MR imaging is superior to CT for detection of small pieces of wooden foreign bodies.⁴⁻⁵⁻¹²⁻¹⁴ MR imaging shows woods as a low-intensity demarcated structure. CT requires careful attention to the window range to image wood in a fat background. In contrast, T₁-weighted MR imaging can provide a distinct contrast between fat and wood.¹³

Early radical debridement and removal of the retained fragment are mandatory to prevent potentially fatal infectious complications.⁶ Currently, neuroimaging examinations including CT and MR imaging are widely available and early diagnosis is possible. Early surgical exploration is likely to be successful. A transorbital or transcranial approach can be chosen depending on the location of the fragment. Postoperative intensive antibiotic treatment should be administered to prevent late infectious events. Correct history taking, neuroimaging investigation, and early surgical exploration are very important to obtain a good outcome.

**References**

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Address reprint requests to: T. Matsuyama, M.D., Department of Emergency and Critical Care Medicine, Nara Medical University, 840 Shijo-cho, Kashihara, Nara 634–8522, Japan.