Penetrating Head Injury Caused by Chopstick
—Case Report—

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Abstract
A 4-year-old boy suffered a transorbital penetrating head injury caused by falling on a wooden chopstick while walking. The chopstick was removed completely, but full diagnosis was delayed for 3 years because the entry wound had not appeared to be serious. The patient later experienced rhinorrhea of cerebrospinal fluid (CSF), and recurrent bacterial meningitis. Surgical repair of the CSF fistula at the anterior skull base was performed when the patient was 7 years old. Previous penetrating head injury should be considered in patients with recurrent CSF fistula and meningitis.

Key words: penetrating head injury, cerebrospinal fluid fistula, meningitis, infant

Introduction
Penetrating head injuries are rather uncommon in the civilian population, especially in countries with very strict gun-control laws. However, a wide variety of objects have been involved in stab wounds. Such stab wounds may induce serious brain injuries, even if only a minor surface wound results. Treatment for penetrating head injuries includes the prevention of infection, control of intracranial pressure, control of epilepsy, control of bleeding from major cerebral vessels, and surgical repair of the cerebrospinal fluid (CSF) fistula. We report an infant who suffered a transorbital penetrating head injury caused by a chopstick resulting in CSF rhinorrhea and recurrent meningitis, but the full diagnosis was delayed because the very small surface wound was difficult to identify.

Case Report
A 4-year-old boy fell forward on a chopstick holder while walking about the room in 1990. A wooden chopstick pierced the skin between the left inner canthus and the nasion. When his mother ran to him, the chopstick had been taken out. She noticed that the chopstick was not broken. They did not visit a hospital because there was no problem other than the minor surface wound, where bleeding stopped soon after compression. Subsequently, he sometimes experienced dripping of clear watery fluid from the nose on the left side, but this was overlooked as a nose allergy. However, he later had three separate episodes of purulent meningitis, in June 1991, April 1992, and February 1994. Bacterial examination of CSF revealed pneumococcus. Following the last episode of meningitis, information about the previous head injury was disclosed by his mother. Endoscopical examination revealed CSF leakage from around the opening orifice of the ethmoid sinus. He was admitted to our hospital for surgical treatment on March 14, 1994.

On admission, the patient, now 7 years old, had a small, healed skin wound (2 mm in diameter) between the left inner canthus and the nasion. The wound was not clearly visible, even upon careful inspection. He had no neurological deficits. CSF rhinorrhea was not apparent, and there was no general evidence of inflammation such as fever or leukocytosis. Skull radiography showed a decrease in radiolucency in the ethmoid sinus on the left side (not shown). Computed tomography (CT) and magnetic resonance (MR) imaging showed a fracture of the left orbital lamina of the ethmoid bone, and inflammatory thickening of the mucous membranes in the ethmoid, frontal, sphenoid, and maxillary sinuses mainly on the left side (Figs. 1 and 2). We be-
lieved that the tip of the chopstick had penetrated through the left orbital lamina and induced a dural laceration transorbitally, although direct evidence could not be obtained of either dural or brain injuries.

Surgery was performed according to a method described by Samii and Draf on March 24, 1994. Following a bifrontal craniotomy, a small fistula (dural laceration and bone fracture) was observed at the posteromedial region of the left orbital part of the frontal bone (Fig. 3). There was mild adhesion between the brain and the dura at the site of the fistula. The fistula was closed with a galeal pericranial flap obtained from the skin flap.

The postoperative course was uncomplicated with no deficits, including olfactory sensation, and neither CSF rhinorrhea nor cosmetic problems. MR imaging 2 weeks following the operation showed improvement of sinusitis (Fig. 4). The patient received no anti-convulsant treatment, and was discharged from our hospital on April 8, 1994. He has been fine for 2 years.

**Discussion**

Penetrating head injuries can be divided into high and low velocity injuries depending on the penetration speed of the foreign bodies. The major cause of high velocity injuries is gunshot, which involves the action of high temperatures (heat injury). There are many causes of low velocity injuries; for example, pencils, ballpoint pens, knives, etc.

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Penetrating head injuries can occur several ways: transcranial, transorbital, transnasal, and transoral. Except for war time, adults may suffer injury due to violence, labor accidents, car accidents, suicides, and psychiatric disorders. Infants may suffer injury by accidental falls while walking.

Penetrating head injuries can induce brain and nerve injuries, CSF fistula, meningitis, and abscess, even if the entry wound does not appear serious. Cerebrovascular lesions can be very serious, and may sometimes cause a fatal complication. Carotid-cavernous fistulas, traumatic cerebral aneurysms, and laceration or occlusion of the internal carotid arteries have been reported previously. Preoperative cerebral angiography is recommended, when the penetrating object is deep-seated or relatively large, the object has obviously penetrated or is adjacent to a major artery, or there has been penetration of a major dural sinus. We did not perform angiography on our patient because the foreign body had been removed 3 years before, and the preoperative MR imaging did not demonstrate any apparent brain injury.

There are several fundamental principles in the diagnosis and treatment of penetration injuries. The first point is that a foreign body can penetrate deeply even if the entry wound is small. The second point is that the foreign body should not be immediately pulled out. Careless removal of the object may induce fatal bleeding, if bleeding from a major artery has been prevented by the presence of foreign body. In addition, the removal procedure may not provide information about lesions caused by the tip of the foreign body. The third point is that if the foreign body has been taken out, information regarding whether or not the object has broken or is still intact should be obtained. Broken parts may remain in the brain, and induce delayed recurrent meningitis and brain abscess. Diagnosis using CT is difficult in cases involving a wooden foreign body, which appears similar to low-density free air.

The present infant received a transorbital penetrating head injury due to falling on a wooden chopstick. The chopstick was removed completely, and the full diagnosis was delayed for 3 years because the small entry wound did not appear to be serious. The possibility that a penetrating head injury has occurred should be taken into account in infant patients with recurrent CSF fistula and meningitis.

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References


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