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Case report

Craniofacial penetration by a wooden stick

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ABSTRACT

Introduction: Penetrating craniofacial injuries caused by stick-like foreign bodies occur as a result of accidents particularly in children, and often lead to significant morbidity.

Case summary: We describe a 5-year-old boy who sustained facial trauma after falling on a wooden stick which penetrated his left cheek. At the initial visit, his vital and neurological signs were normal. However, the stick had penetrated the frontal lobe to a depth of 3 cm via the orbital cavity and the anterior skull base. The stick was successfully removed while visualizing the anterior skull base in an endoscopic transthemoidal approach. A follow-up examination one year after the accident demonstrated normal visual acuity and ocular motility, with no diplopia, tearing or pain.

Discussion: Penetrating facial injuries caused by stick-like objects carry a significantly higher risk of serious neurological involvement. Even if penetrating facial injuries sometimes appear trivial, the external injury site is often insufficient to determine the position of the object within the head. Although the cheek is a rare entry site for intracranial injuries, the extent of damage should be assessed fully before attempting removal.

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1. Introduction

Penetrating craniofacial injuries, although relatively rare, do occur as a result of accidents particularly in children. Stick-like foreign bodies such as pencils, chopsticks, and umbrellas usually penetrate intracranially via the orbital or oral cavity [1–4] and may cause significant morbidity including intracranial hemorrhage, brain abscess, meningitis, cerebrospinal fluid (CSF) leakage, epilepsy, and brain stem damage. Even if the damage appears to be trivial at the initial examination and the wound site is distant from the skull base, the possibility of serious intracranial injury remains. Therefore, appropriate diagnosis by imaging examinations and clinical management are important for preventing a catastrophic outcome.

Herein we present a 5-year-old boy with a penetrating craniofacial injury caused by a wooden stick. The current case demonstrates how a foreign body may penetrate the brain even when the entry site is the cheek.

2. Case report

A 5-year-old boy presented to the emergency department for facial trauma which occurred when a wooden stick he was holding penetrated his left cheek when he fell on it while running (Fig. 1). He complained of pain but his vital signs, neurological examinations, and ocular movement were normal. Computed tomography (CT) of the head showed a 5 mm diameter linear hypodense structure penetrating the frontal lobe to a depth of 3 cm via the left anterior skull base, ethmoid sinus, medial wall of the orbit, and the orbital cavity. There was no eye injury (Fig. 2). Contrast-enhanced CT revealed no major intracranial hemorrhage. Intravenous cefotaxime and an intramuscular tetanus toxoid vaccination were administered prophylactically.

After discussion with neurosurgeons and the patient's family, we decided to remove the stick while visualizing the anterior skull base in an endoscopic transthemoidal approach with the patient under general anesthesia. The neurosurgeons were prepared to perform an open craniotomy in case of massive bleeding. The anterior skull base through which the stick passed was clearly visible after the left anterior ethmoidectomy (Fig. 3A). The stick was removed from the outside. No remarkable bleeding occurred, but some CSF leakage was recognized. The stick was 20 cm in length and had penetrated to a depth of 8 cm including 3 cm into the intracranial area

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Fig. 1. The wooden stick penetrating upwards through the left cheek.

(Fig. 3B). The tip of the stick had not fragmented. Gelatin sponges were placed in the skull base defect for hemostasis. In order to prevent intracranial infection due to organic foreign body penetration, we avoided dura reconstruction using any rigid materials, e.g., a titanium mesh or cartilage of the nasal septum. We have planned staged dura reconstruction in case CSF leakage occurred. A postoperative brain CT showed no cerebral hemorrhage or edema. The postoperative course was good, with only an edematous left eyelid and epiphora lasting three days. After eight days of postoperative bed rest, the site of the injury in the anterior skull base was fully covered by scar tissue. The patient received ten days of intravenous cefotaxime treatment. At the one-year follow-up, he was stable without neurological sequelae or any central nervous system infection.

3. Discussion

Facial traumas resulting from accidents are not uncommon. However, penetrating injuries caused by stick-like objects carry a significantly higher risk of serious neurological involvement. Observation of the external injury site is often insufficient to determine the position of the object within the head.

The orbital cavity is the most common penetration site in craniofacial injuries because of its wide bottom and pyramidal shape formed by a thin, bony wall terminating at the superior and inferior orbital fissures with the optic canal at the apex [1–3]. The eyelid, canthus, conjunctiva, and cornea are reportedly major surface entry sites in transorbital intracranial penetration [2,3]; however, the present case demonstrated that the cheek can also be an entry site via the paranasal cavity.

CT is the chief diagnostic modality for determining the extent of transorbital trauma, but radiolucent materials including dry wood have an exceedingly low density indistinguishable from that of air [2,5,6]. Magnetic resonance imaging is therefore a more reliable means of detecting the shape and identity of wooden or plastic foreign bodies especially where retained objects are concerned [6], while an angiography is useful for evaluating vascular injury in conjunction with contrast-enhanced CT [7].

Retained intracranial foreign bodies, especially organic materials, may cause a brain abscess. An open craniotomy is one of the standard methods of removing intracranial foreign bodies and facilitates debridement, repair of dural defects, and management of abscesses or bleeding. Recently, the endoscopic transnasal approach was reported to be a less invasive method of removing intracranial foreign bodies penetrating the skull base via the nasal or paranasal cavity [7]. In this report, we chose the endoscopic transthemoidal approach because there were no major intracranial signs of hemorrhage and the assistance of neurosurgeons was available if needed.

In addition to adequate removal of the foreign body, broad-spectrum antibiotic treatment is recommended as soon as possible. A tetanus toxoid vaccination and/or antitetanus immunoglobulin administration is also recommended depending on the patient's vaccination status in accordance with the current guidelines [1].

In this report, we presented an unusual intracranial injury caused by a foreign object penetrating through the cheek. Although the cheek is a rare entry site, there are some previous reports of the control lever in a vehicle [8] or a rivet propelled by an explosion [9] passing through the cheek into the skull base. Therefore, otolaryngologists who encounter stick-like foreign bodies penetrating the face should be aware that the object may have invaded the brain.

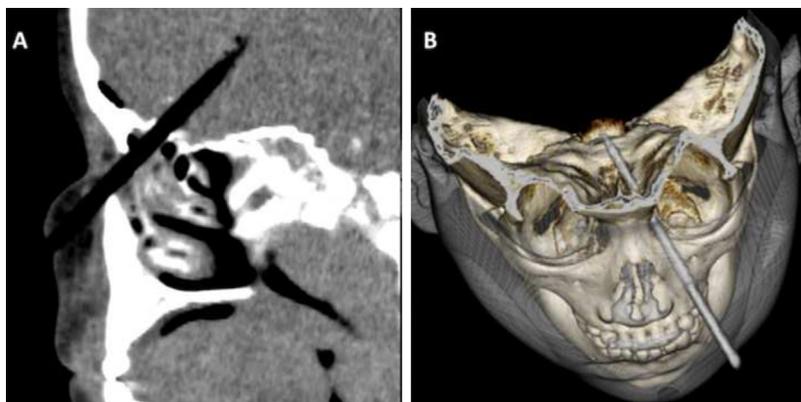


Fig. 2. A hypodense structure penetrating the frontal lobe via the left anterior skull base, ethmoid sinus, medial wall of the orbit, and orbital foramen. A. Sagittal computed tomography CT. B. Three-dimensional reconstruction CT image.

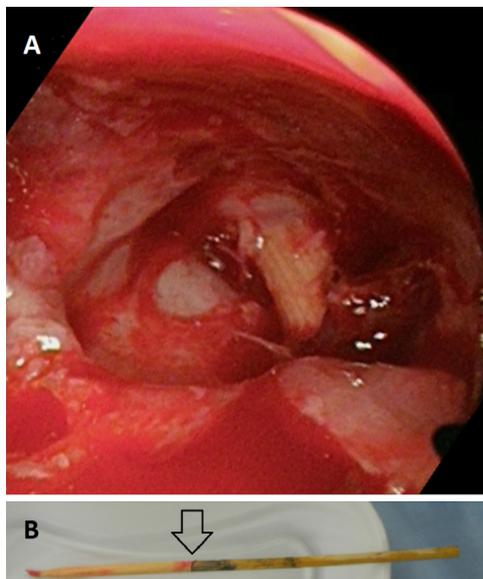


Fig. 3. A. Intraoperative photograph of the wooden stick penetrating the anterior skull base after a left anterior ethmoidectomy. B. The wooden stick was 20 cm long and had penetrated the cranium to a depth of 8 cm. The depth of penetration can be seen clearly on the stick (arrow).

4. Conclusion

Even if penetrating facial injuries caused by stick-like foreign bodies sometimes appear trivial, the extent of damage should be assessed fully before attempting removal. This report

underscores the significant risk of penetrating intracranial injury in facial trauma caused by a stick-like foreign body even when the entry site is the cheek.

Disclosure of interest

The authors declare that they have no competing interest.

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