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Case Report

An Unusual Case of Cerebral Penetrating Injury by a Driven Bone Fragment Secondary to Blunt Head Trauma

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Temple trauma that appears initially localized to the skin might possess intracranial complications. Early diagnosis and management of such complications are important, to avoid neurologic sequelae. Non-penetrating head injuries with intracranial hemorrhage caused by a driven bone fragment are extremely rare. A 53-year-old male was referred to our hospital because of intracerebral hemorrhage. He was a mechanic and one day before admission to a local clinic, tip of metallic rod hit his right temple while cutting the rod. Initial brain computed tomography (CT) and magnetic resonance imaging demonstrated scanty subdural hematoma at right temporal lobe and left falx and intracerebral hematoma at both frontal lobes. Facial CT with 3-D reconstruction images showed a small bony defect at the right sphenoid bone's greater wing and a small bone fragment at the left frontal lobe, crossing the falx. We present the unusual case of a temple trauma patient in whom a sphenoid bone fragment migrated from its origin upward, to the contralateral frontal lobe, producing hematoma along its trajectory.

Key Words : Head injury · Penetrating · Bone fragment.

INTRODUCTION

Penetrating cerebral injuries caused by foreign bodies other than bullets are relatively rare[8,9,15,22]. In clinical practice, most such injuries are mostly due to industrial accidents or criminal activities[5,7,8,11,14,22]. Some reports have documented penetrating injuries resulting from suicide attempts[4,9,15,19,22]. However, most of these reports have described penetrating intracranial injuries caused by foreign bodies. We report the unique case of a non-penetrating head injury, with intracranial hemorrhage, caused by a driven bone fragment, secondary to a metallic rod tip hitting the patient's temple.

CASE REPORT

A local clinic referred a 53-year-old male to our hospital because of an intracerebral hemorrhage. He was a mechanic and a day before admission, he had been cutting a metallic rod, when the rod's tip hit his right temple (Fig. 1A). On his arrival at our hospital, a physical examination revealed a laceration wound (Fig. 1B) on his right temporal skin, and, a baseline neurologic examination showed mild confusion and slurring of speech. The initial brain computed tomography (CT) reveals a scanty subdural hematoma at the right frontal skull base and left falx, with intracerebral hematomas at both frontal lobes (Fig. 2). Facial CT with 3D reconstruction images showed a small, bony defect at the greater wing of the right sphenoid bone and a small bone fragment at the left frontal lobe, crossing the falx (Fig. 3). To evaluate the vascular injury along the bone fragment's trajectory, we performed a CT angiography and found no vascular injuries (Fig. 3). Patient was managed conservatively with anticonvulsant prophylaxis. A follow-up brain CT showed the resolution of the intracerebral hemorrhages and perihemorrhagic edema. The patient was discharged without any neurologic deficit on day 15 of admission.

DISCUSSION

Penetrating cranial injuries are common in warfare; however, they are rare in civilian head injuries. In clinical practice, most such injuries are due to industrial accidents, criminal activities[5,7,8,11,14,18,22], and suicide attempts or other self-inflicted injuries[4,9,15,19,22]. Several reports in the literature have addressed intracranial penetrating injuries, caused by foreign bodies such as sewing needles, knives, metal bars, valve flange, nails, power drills, chopsticks, or pencils[4,5,7,15,18-20,22]. However, only one previ-

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ous report in the literature presented an intracranial penetrating injury caused by a skull bone fragment[21]. In this report, the patient was a 14-month-old child, who fell from a chair and hit her head against a heater. The penetrating bone fragment was from an orbital rim, which likely occurred due to the relatively thin and unmineralized orbital rim found in the pediatric age group.

In our case, the foreign body was a small bone fragment which was detached from the greater wing of the right sphenoid bone. The 3D CT reconstruction images showed a bony defect at the transitional zone between the sphenoid bone and the squamous part of the temporal bone, which was the portion most vulnerable to injury. This is consistent with the fact that most foreign bodies' entrance sites into the cranium are through the relatively-vulnerable portions of the cranial bones, such as the orbital roof, the squamous part of the temporal bone, and the cribriform plate[5,10].

High-velocity objects cause most penetrating cranial injuries. However in our case, the trauma mechanism was unique. A low-velocity metallic rod hit the temporal area of the patient's head. Instead of continuing its course, into the brain, the fractured greater wing of the sphenoid bone penetrated to the contralateral frontal lobe, apparently following Newton's law of "action and reaction".

In the literatures, researchers have reported that the incidence of traumatic intracranial aneurysm formation following a penetrating head injury ranges from 5% to 42%[1-3,6,12,13,16,17]. Bell et al.[6] suggested digital subtraction angiography screening for every military trauma patient with a penetrating head injury but did not suggest the routine use of CT angiography, due to the likely presence of a metallic artifact. However, in our case, the penetrating foreign body was a skull bone fragment, with no definite subarachnoid hemorrhage visible on brain CT. Therefore, CT angiography was the only examination performed.

Physicians should consider the possibility of late complications, such as brain abscess, meningitis, CSF leakage, or seizure, during the follow-up period for such injuries.

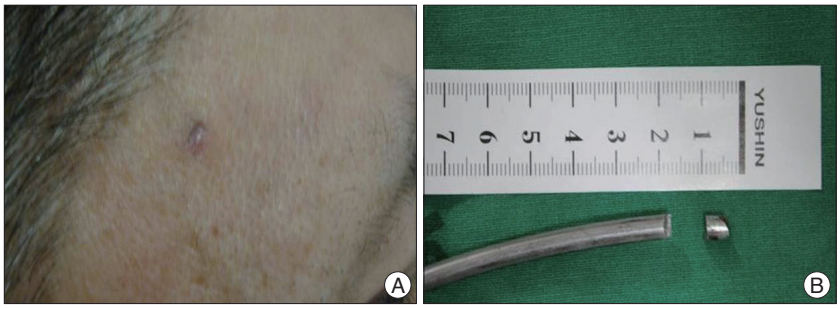

Fig. 1. Photographs of the patient and the metallic rod. A : Photograph showing a faint laceration on his right temporal skin. B : A metallic rod and tip.

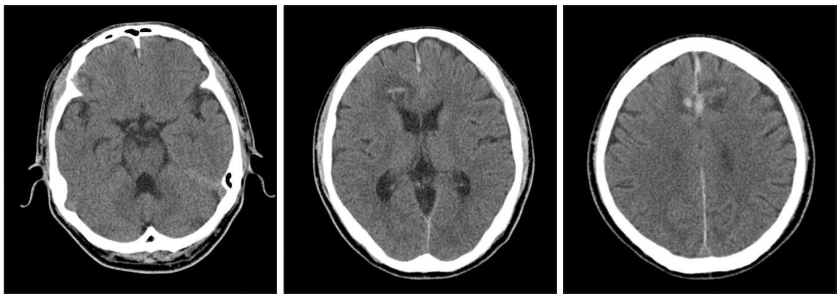

Fig. 2. Initial computed tomography images. Computed tomography demonstrating a scanty subdural hematoma at right frontal skull base and left falx and intracerebral hematoma at both frontal lobes.

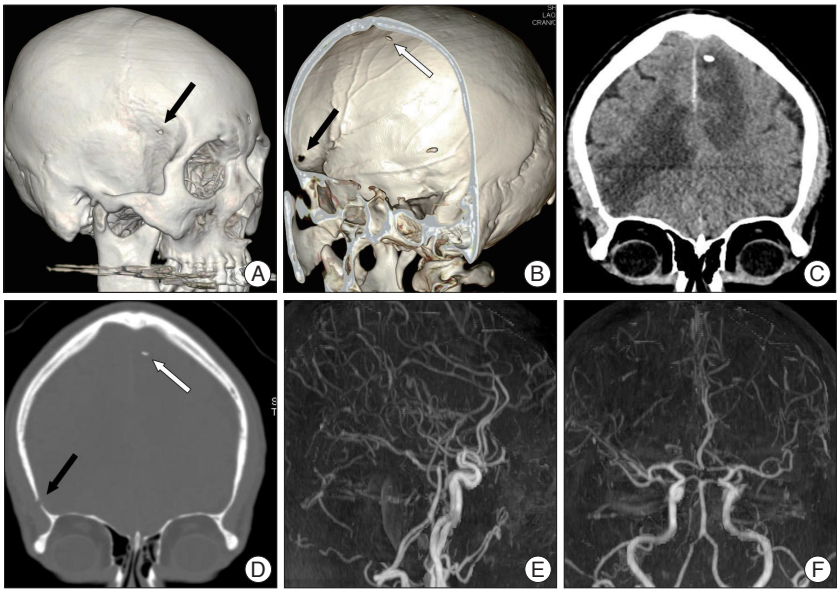

Fig. 3. Facial computed tomography (CT) with 3 D reconstruction images and CT angiography. A and B : Facial bone CT revealing small bony defect (black arrow) at greater wing of right sphenoid bone and small bone fragment (white arrow) at left frontal region. C and D : Coronal tilting reconstruction images shows resolution state of intracerebral hemorrhage, and both bony defect (black arrow) and small bone fragment (white arrow). E and F : Computed tomographic angiography showing no definite vascular abnormality.

CONCLUSION

We present an unusual case of a patient with temple trauma, where a sphenoid bone fragment migrated from its origin upward, to the contralateral frontal lobe, producing hematoma along its trajectory. Our case emphasizes the need for careful

clinical and radiographic examinations even when external wounds appear trivial.

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