

TRANSORBITAL STAB WOUND: A CASE REPORT*

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Stab wounds of the skull are uncommon. They are usually accidental in children. An apparently trivial wound may cause death due to vascular damage or infection. A 5-year-old boy presented with a nail in the left intraorbital region. He fell with a nail in his hand five hours prior to hospital admission. Computed tomographic scans displayed the nail penetrating the cranium through the left orbital roof and extending towards the left anterior clinoid process. The nail was removed under general anesthesia in the operating room. Meningitis developed two days after the removal of the penetrating object and responded well to antibiotics. The pertinent literature was reviewed. *Key words:* stab wound, head injury, penetrating head injury.

Penetrating stab wounds of the brain are uncommon. There is a male predominance and the injury is caused by combat in the majority of cases¹⁻⁶. However, this type of injury is usually accidental in children. A 5-year-old boy with a transorbital stab wound is presented and the pertinent literature is reviewed.

Case Report

A 5-year-old boy presented with a nail in the left intra-orbital region (Fig. 1). He fell down with a nail in his hand while running, five hours before he was transferred to



Fig. 1: Photograph showing the penetrating object (nail) in situ.

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our division from an outlying hospital. He was alert and cooperative. His vision and pupillary reactivity were normal. The movements of the left eye to both sides were restricted. Plain x-ray films of the skull revealed a metallic object with intracranial penetration (Fig. 2). The nail, penetrating into the cranium through the left orbital roof and extending towards the left anterior clinoid process, was visible



Fig. 2: Plain x-ray films of the skull: (a) anteroposterior and (b) lateral views showing intracranial extension of the penetrating object.

on the computed tomographic (CT) scans (Fig. 3). Tetanus prophylaxis was administered and intravenous antibiotics (mezlocillin, gentamicin and metradina-zol) were started. The patient was taken to the operating room and prepared for an emergency craniotomy. The nail was removed under general anesthesia. Cerebrospinal fluid (CSF) came out of the opening for a few seconds after



Fig. 3: CT scan showing penetration of the nail into the cranium through the left orbital roof.

removing the object. He awoke from the anesthesia and was taken to the intensive care unit where his consciousness could be closely monitored. Gaze restrictions of the left eye improved remarkably following removal of the penetrating object. Left periorbital edema developed on the following day. On the second postoperative day, he had complained of neck stiffness and he vomited a few times. Lumbar puncture was done and turbid CSF was obtained. Microscopic examination of the CSF revealed 1480 white blood cells/mm³. He was transferred to the department of infectious disease. No organism grew in the CSF culture as he had been on antibiotics. His symptoms and signs improved, and CSF was normal when he was discharged from the hospital 10 days later. He is neurologically intact six months after injury.

Discussion

Penetrating stab wounds of the skull are uncommon^{1,2,5-7}. This is typically an affliction of the young adult male and usually related to interpersonal violence, assaults and gang warfare¹⁻⁷. Only a small number of reported cases, particularly in children, resulted from accidental stabbing⁵⁻⁸. Knives are the objects most commonly used¹⁻⁷; however, nails, spikes, iron rods, pencils, scissors, a fan blade

and screwdrivers have been reported as objects causing stab wounds^{4,5,9}. Most stab wounds to the head occur on the left side, reflecting the predominant right-handedness of the assailants^{1,2,4,6}. Stab wounds may be obvious and fatal, or a trivial wound may lead to death days or weeks later because of rupture of a traumatic intracranial aneurysm or infection⁵.

The mechanism of injury in transcranial stab wounds differs from that of missile or gunshot injuries. There is no concentric zone of coagulative necrosis¹⁰. Unlike in motor vehicle accidents, brain damage is restricted to the wound tract¹¹. In the absence of direct injury to the brain stem or laceration of a major intracranial vessel, the prognosis is good.

Although de Villiers and Sevel⁷ mentioned that transorbital stab wounds causing intracranial complications occur more frequently in children than adults, and are reported more often in boys than girls, all of their cases were older than 20 years. The skull and orbital roof of a child can be exceedingly thin^{12,13}. The orbit is a quadrangular pyramid on a posteromedial axis. Objects entering near the orbit tend to be funnelled toward the apex. The superior orbital fissure or thin superior orbital plate grants access to the intracranial contents. At the time of injury, the head is often thrown backwards by reflex, further exposing the superior orbital plate. The orbital depth is approximately 42 to 50 mm. Therefore, a pointed object can easily reach and penetrate the dura mater^{14,15}. It has been suggested that the globe often escapes injury if a slender-pointed instrument is used. In low-velocity stabs, the eyeball can move into the space afforded by the copious orbital fatty tissue which surrounds the eye. However, the eye is frequently damaged by a large knife⁷.

In our case, when the patient fell down, his head conceivably extended and the nail punctured the orbital roof. The globe was not damaged because it was a low-velocity injury. Infection is common in transorbital stab wounds^{7,8}, caused by either a contaminated penetrating object or communication with the paranasal sinuses. The contaminated and rusted nail caused meningitis in this patient, in our opinion. Birsch-Hirschfeld¹⁶ and Kjer¹⁷ have reported 30 cases of tetanus caused by transorbital injury. Ventricular damage, pneumocephalus, subdural, intracerebral and intraventricular hemorrhages, damage to the cavernous sinus, carotid-cavernous fistulae, traumatic cerebral aneurysms, occlusion of the internal carotid artery and cerebral abscesses have been reported as cerebral complications of transorbital stab wounds^{5,7,8}.

Special views should be taken to demonstrate orbital fractures on the plain x-ray films. The presence of pneumocephalus indicates intracranial penetration or communication between the brain and paranasal sinuses^{3,7}. CT scanning can detect intracranial damage or hematoma. But a considerable artifact may seriously impair the interpretation of the CT scan when the penetrating metal object is

embedded in the cranium³. Angiography should be performed whenever a vascular complication is suspected⁵⁻⁷. Kieck and de Villiers⁵ found five cerebral aneurysms at the base of the brain in 20 cases following transorbital stab wounds. They advise repeated cerebral angiographies to detect vascular damage.

The penetrating object should be removed in the operating room. The patient should be prepared for a craniotomy. Antibiotic therapy should be started, and tetanus prophylaxis is mandatory. The patient should be closely followed for infection and vascular complications.

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