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About an Observation of a Child Penetrating Brain Injury by Knife

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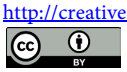

Abstract

Background: Reported cases of knife injuries to the head in children are rare. Here we describe a case of pediatric penetrating brain injury by knife (PPBIK) and review literature. The patient's parents were informed that non-identifying information from the case would be submitted for publication, and they provided consent. **Case Presentation:** A 3-year-old boy presented to our emergency department with a knife penetrating the front of his head during play. Neurologic examination was normal. Radiograph in lateral view demonstrated a metallic knife entering frontal bone. Computed tomography (CT) scan showed small hemorrhage around the foreign body recognized, accompanied by small pneumocephalus. The knife was surgically removed and the dura was closed. He was discharged home after the surgery with normal neurological status. **Conclusion:** Only four cases of PPBIK have been reported in the literature. The adequate management of these types of injuries requires a correct neuroradiological evaluation.

Keywords

Craniocerebral Trauma, Penetrating Head Injury, Traumatic Brain Injury, Wound Stab

1. Introduction

Pediatric penetrating brain injury caused by knife (PPBIK) is unusual and described in only four cases in the literature [1] [2] [3] [4]. The injuries can be accidental during play or the result of violence. Several penetrating "low-velocity" objects have been reported in total of 57 cases of pediatric penetrating head injury

[5]. However the knife is rarely mentioned. We describe our case that was successfully treated surgically correlated with a literature review.

2. Case Presentation

A 3-year-old boy presented to our emergency department with a knife penetrating the front of his head, as a result of an incident that occurred while playing with his 6-year-old brother. On presentation, the patient was hemodynamically stable with a Glasgow Coma Scale (GCS) score of 15. Physical examination showed a knife lodged in the right frontal region (**Figure 1(a)**). Radiograph in lateral view (**Figure 1(b)**) demonstrated a metallic knife entering frontal bone and inserting the right frontal lobe. Computed tomography (CT) scan showed small hemorrhage around the foreign body recognized, accompanied by small pneumocephalus (**Figure 1(c)**).

The patient was transferred to the operating room, with the patient under general anesthesia, intubated and ventilated, installed in the supine position, the forehead turned 30˚ to the left side and then proper cleaning and draping of the surrounding area was applied. An arcuate skin incision was performed and the arcuate flap was divided medially by an incision on either side of the knife. The craniotomy with Kerrison rongeurs 2 cm around the knife was performed on the right side, the bone flap was removed. The knife had pierced the dura over a 10 mm length (**Figure 2(a)**) and we found bleeding from the brain wound. The craniotomy was completed on the left side, after the knife was carefully extracted. The wound was irrigated profusely, the dura was sutured, and the skin was closed. A CT scan of the brain performed on postoperative day 3 showed a small brain hemorrhage (**Figure 2(b)**). He was discharged home 4 days after the surgery with normal neurological status (**Figure 2(c)**).

3. Discussion

Intracranial injuries (II) caused by foreign bodies are relatively rare, with a reported incidence of 0.4% of all brain injuries [6]. They can be divided into categories of missile or nonmissile injuries; the main difference between is the

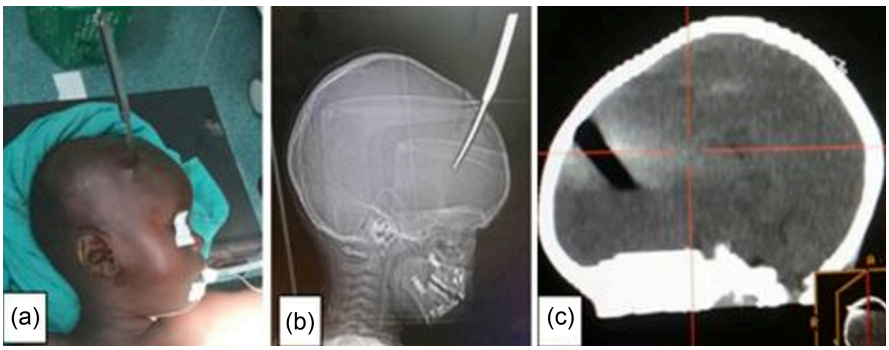

Figure 1. (a) Patient with knife lodged in the right frontal region; (b) Lateral radiograph view; (c) CT scan in sagittal section showed small hemorrhage around the foreign body recognized, accompanied by small pneumocephalus.

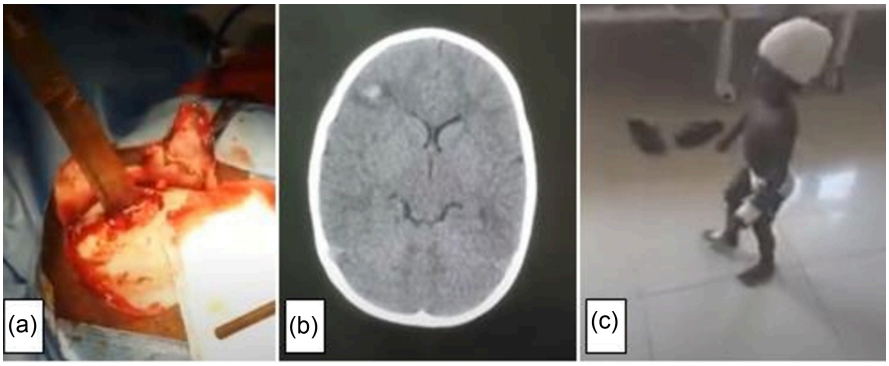

Figure 2. (a) The knife pierced the dura over a 10 mm length; (b) CT scan in axial view performed on postoperative day 3 showed a small brain hemorrhage; (c) Patient walking independently 2 days after surgery.

velocity of impact [7]. Nonmissile penetrating (NMP) lesions are defined as having an impact velocity of <100 meters per second causing injury by laceration and maceration, whereas missile projectiles cause lesions by kinetic and thermal energy [8].

Although injuries caused by knife which is an NMP object in pediatric erea are particularly uncommon [5]. Most II in children result from accidental stabbing while playing, eating, falling, or pushing and the sharp object is not a knife but a pencil, stick, or other sharp objects [9]. Injuries may include dural, parenchymal brain contusion, hemorrhage, pneumocephalus, infection of the central nervous system.

For injuries with intracranial knife, the patient must be referred for neuroradiologic evaluation. Initial examination includes plain radiograph of the skull, which demonstrates the intracranial penetration; it is also useful when CT scans. In our case, given the contraindication of MRI in front of a metal object, we only have CT scans to analyze the state of the cerebral parenchyma and have a better visualization of the bone structures in the bone window. An angiotomography may be considered for selected patients with suspicion of vascular lesion [10], we did not do so due to its unavailability. Vascular complications are rare but some late complications may present, such traumatic aneurysms or pseudoaneurysms in a delayed fashion, with 2 - 3 weeks or months after injury [11]. Surgical management requires craniotomy both to remove the object under direct vision, to treat secondary lesion, to repair the dura mater and prevent CSF leakage [1]. Coverage antibiotic prophylaxis gram-positive, gram-negative and anaerobic bacteria are indicated [1] [8]. The presence of brain parenchymal damage is an indication of antiepileptic drugs therapy, which will be discontinued if there is no evidence of seizure after 6 months. The GCS scores at admission are the main prognostic factor [1] [12]. De Holanda LF reported 0% death in patients with a GCS score of 15 versus 66% of death when the GCS is less than 15.

4. Conclusion

Pediatric penetrating brain injury is uncommon; those involving knife injuries

are especially rare. The injuries can be accidental during play or the result of violence. The adequate management of these types of injuries requires a good neuroradiological study for the correct neurosurgical approach.

Authors' Consent

All authors read and approved the manuscript for publication. Ethıcs approval and consent to participate Authors' institution do not require ethical approval for publication of a single case report. Written informed consent was obtained from the patient.

Consent for Publication

Written informed consent for publication of clinical details and images was obtained from the patient's parents.

Competing Interests

The authors declare that they have no competing interests.

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