

Endoscopic Treatment of a Nasocranial Penetrating Head Injury by Knife Blade

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ABSTRACT

Background: Non-ballistic penetrating head injuries are exceptional at the skull base. A foreign object entering the brain via one nostril is a rare situation. It is serious because of skull base vital anatomical elements threatened. We report a case of nasocranial penetrating head injury by knife blade in a child whom we treated with an endoscope.

Case Description: This was a 07-year-old patient admitted urgently for an accidental implantation of a metallic foreign object (knife) in the right nostril. The examination noted a knife blade implanted firmly in the right nostril and inactive right rhinorrhagia. Computed tomography made it possible to objectify the knife blade going from the right nostril, crossing the ethmoidal cells to lodge in the cerebral parenchyma. It was performed approximately 14 hours after admission, removal of knife blade using endoscope. After 3 months, postoperative follow-up was simple.

Conclusion: Penetrating skull base injuries are exceptional. Their management poses particular difficulties in relation to this location. Endoscope was certainly helpful in the management of our case.

Keywords

Penetrating head injury, Skull base, Knife, Endoscopy.

Introduction

Non-ballistic skull base penetrating head injuries are exceptional [1,2]. They affect children more and usually occur accidentally [1-4]. A foreign object entering the brain via one nostril is a rare situation. It is serious because of the vital anatomical elements threatened at the skull base.

Whatever circumstance or type of penetrating object the challenge is to its removal most often after a good study of its trajectory

to most suitable medical imaging. Thus, the timing and surgery method as well as anticonvulsants and antibiotic therapy remain questionable [1].

In general, management requires a careful search for damage to these vital elements (skull base arteries, brain stem ...). Then removal of skull base penetrating foreign object must be done with great care that most often requires a multidisciplinary team. We report a case of nasocranial penetrating head injury by knife blade in a child whom we managed with an endoscope in double team (neurosurgeons and ORL).

Case Description

Seven-year-old schoolgirl resident in Ouagadougou admitted for an accidental implantation of a metallic foreign object (knife) in the right nostril. Patient reportedly sat near to her mother and held a knife with which she was playing. Afterwards she started running with the knife. In this race, she fell on the knife, which lodged, firmly in her right nostril resulting in medium abundance rhinorrhagia. She consulted in the otorhinolaryngology (ORL) department at the second hour after this trauma where after performing a CT scan she was referred to neurosurgery. It does not report any particular pathological history

Physical examination noted normal consciousness; good hemodynamic status; a knife blade firmly implanted in the right nostril; inactive right rhinorrhagia; absence of rhinorrhea and neurological deficits. Skull X-ray had made it possible to objectify a metallic foreign object (knife blade) going from right nostril, crossing ethmoidal cells, to lodge in the skull base.

Figure 1: Preoperative medical imaging. skull X-ray from front (a) and profile (b); Brain CT scan in axial section parenchymal window (c, d); bone window sagittal (e) and coronal (f) reconstruction showing metallic foreign object (knife blade) going from right nostril, crossing ethmoidal cells, ethmoid screened blade to lodge in the left part of frontal lobe parenchyma skull base.

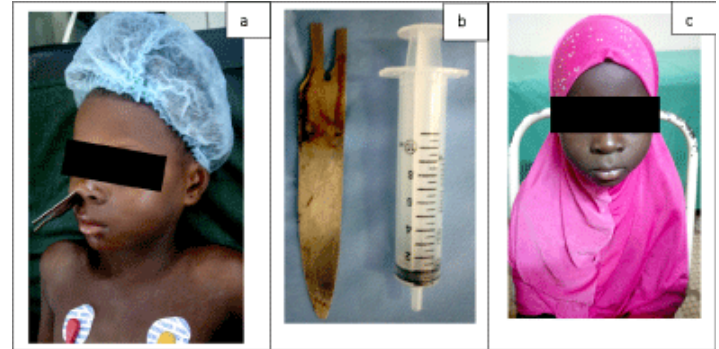
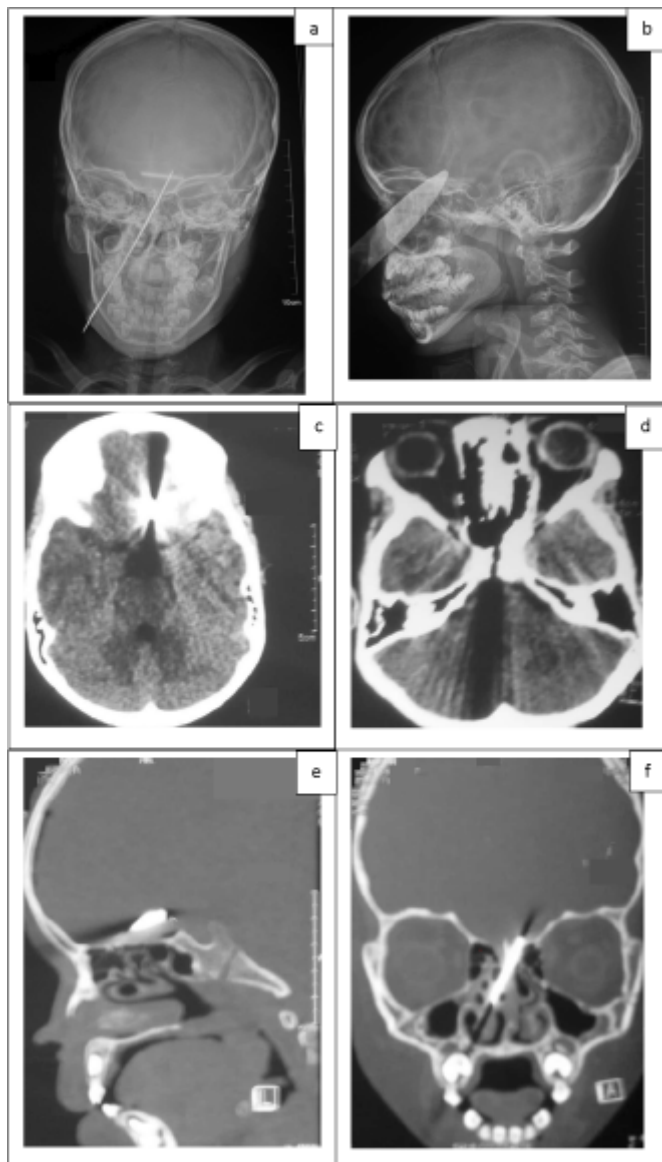


Figure 2: Patient clinical preoperative (a) and 3 months postoperative (c) images. Knife blade image (after removal) compared to a 20 cubic millimeter syringe (b).

On CT scan there was a metallic foreign object (knife blade) going from right nostril, crossing ethmoid cells, ethmoid riddled blade to lodge in the left part of the frontal parenchyma lobe in the skull base. There was also subdural pneumocephaly mainly left frontal and a large metal artifact with no visible hematoma. Figure 1 shows the patient's preoperative medical imaging.

Diagnosis skull base penetrating injury was retained. Therapeutically, antibiotic prophylaxis (ceftriaxone, metronidazole) and tetanus serovaccination were administered. At the 14th hour after trauma, the patient was admitted in operating room and under general, we proceeded to knife blade removal by a traction in the axis without enlargement of this blade entrance port. Then we set up an endoscope which made it possible to objectify a rather venous minimal bleeding associated with a discrete flow of cerebrospinal fluid (CSF) through a small linear opening (about 1.5 centimeters long) of the nasal mucosa caused by a knife blade, a little above right sphenoidal ostium. After washing with saline bleeding stopped. We stopped CSF leakage by placing grease tips and sticky hemostatic gauge.

Postoperative follow-up was simple. The patient was discharged from hospital and returned home on the third postoperative day. Antibiotic was continued for 7 days. At discharge from hospital, clinical examination was normal (without rhinorrhagia or rhinorrhea). During his outpatient follow-up, clinical examination remained normal at the second week, the first month and the third month postoperatively. Figure 2 illustrates patient clinical aspects in pre-operative and at 3 months postoperative, as well as the knife blade after its removal.



Discussion

Penetrating head injuries are most often located in cranial convexity [5-7]. Various types of penetrating objects have been described (arrow, Carpenter's Nail, iron bars, angle grinder, traditional agriculture tool, wood, missiles ...) [2,4-9]. Non-ballistic skull base penetrating injuries are exceptional [1,2]. They affect children more and usually occur accidentally [1-4]. Cases of assault have also been described [2,10]. Whatever circumstance or penetrating object type challenge is in its ablation most often after its trajectory a good study one CT scan and standard radiography [2,8,10]. An MRI may be performed when the penetrating object is not metallic [4]. A CT angiography was performed for vascular lesions [3,11,12].

In our case, because of patient modest financial means, we did not perform CT angiography and we simply studied knife blade trajectory on the CT scan and standard X-ray that had been made before referring the patient to us. However, we were forced to remove this penetrating object. Our choice of endoscopic endonasal approach is justified by the fact that our technical platform offers us no possibility of repairing a vascular wound even less that of an artery of Willis's polygon. Indeed, knife blade trajectory threatened anterior cerebral arteries and anterior communicating artery more. If we had the possibility of repairing a wound of such an artery, a greater approach by transcranial upper approach would be more appropriate.

We therefore explained to the family the vital risk incurred by their daughter during the removal of this object while specifying that the fate would be the same in the short term if nothing was done. These explanations were well understood by those who authorized intervention.

Timing and surgery method as well as anticonvulsants and antibiotic therapy remain questionable [1]. Some authors recommend an enlargement craniectomy around penetrating object before proceeding to its removal [10]. Others [5-8] prefer traction ablation in the axis of the penetrating object without enlargement craniectomy. We think that enlargement craniectomy is to be avoided because not only does it prolong intervention with all its corollaries of infection risk increased and blood spoliation; but also it increases the risk of penetrating object accidental mobilization, which could aggravate brain and / or vascular lesions.

In case of existence of vascular lesions caused by the object during its penetration, vascular imaging and balloon occlusion are imperative in circumstances where vessels sacrifice is necessary [12]. Additionally, balloons placement inside large vessels that are in proximity to penetrating object is necessary to control bleeding that may occur upon object removal [12]. It is essential to have a multidisciplinary team [4,8].

Pre- and postoperative antibiotic prophylaxis was routine [8]. Tetanus vaccine has also been administered [10]. When risk of

developing epilepsy is high, it is tempting to consider medications to prevent seizures [10,13]. Most often, patients with penetrating head injuries had a normal neurological examination without hemodynamic disorders [8,10,11] upon admission. Postoperative follow-up was simple in 3 days on average in these patients [8,10,11]. On the other hand, patients admitted in a comatose state associated with hemodynamic disorders died even with appropriate management [2,10].

Conclusion

Penetrating skull base injuries are exceptional. Their immediate vital prognosis depends on different anatomical structures crossed by penetrating object in this case large vessels. In the short and medium term, infection is the main complication to be feared. Management of these penetrating skull base injuries poses particular difficulties in relation to this localization at the base of the skull. Endoscope was certainly helpful in our case management.

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