

Transnasal, intracranial penetrating injury treated endoscopically

ERDEM ATALAY CETINKAYA, ENT SURGEON, CINEMRE OKAN*, KESAPLI PELIN†

Abstract

Intracranial penetrating injury through the nose is uncommon. We present the case of a four-year-old girl who sustained a transnasal, intracranial penetrating injury with a sharp wooden object. We performed endoscopic removal of the foreign body and repair of the associated cerebrospinal fluid fistula.

Key words: Craniocerebral Trauma; Cerebrospinal Fluid; Endoscopic Surgical Procedures; Foreign Bodies; Nasal Cavity

Introduction

Penetrating anterior fossa injuries through the nose are uncommon and are usually the result of freakish injury or attempts at self-mutilation. Non-organic foreign bodies may present imaging problems. With the increased use of endoscopic techniques, the management of these cases may now come into the domain of the otolaryngologist.

Case history

The patient was a four-year-old girl in previous good health. Whilst playing in the house, holding a pencil in her hand, she tripped and fell forwards on to the pencil, which went up her right nostril, lead-end first. The pencil measured about 25 cm in length and was sharpened at one end. Her father broke off most of the protruding part of the pencil so that only about half a centimetre projected. She had a brief epistaxis at this stage but no cerebrospinal fluid (CSF) rhinorrhoea.

The girl was taken by her parents to the accident and emergency department of the Antalya Ataturk Government Hospital, where she was seen within 30 minutes of the accident. On examination, she was drowsy and confused but rousable. The blunt end of the pencil was seen to be emerging from the right nostril (Figure 1).

An immediate computed tomography (CT) scan was inconclusive and failed to demonstrate clearly the pencil (Figure 2a). Magnetic resonance (MR) imaging showed that the pencil had penetrated the anterior skull base through the cribriform plate and passed between the frontal lobes, with the tip lying close to the third ventricle (Figure 2b).

The child was transferred to the operating theatre, a lumbar drain was inserted and under general anaesthesia the nose was examined endoscopically. A neurosurgical team was at hand, prepared to perform a craniotomy if necessary. At endoscopy, the pencil could be clearly seen passing through the cribriform plate. There was no other intranasal injury, no bleeding and no CSF rhinorrhoea. Gentle manipulation indicated that the pencil was firmly embedded, but there was no change in the vital signs. A decision was therefore made to attempt removal

endoscopically. A pair of heavy clamps was used to grasp the pencil at the level of the nostril and it was withdrawn with some difficulty, employing linear (i.e. non-rotatory) traction. Again, there was no change in the vital signs and no bleeding, but there was a profuse flow of CSF from the nose. Endoscopic examination now revealed a clean, punched-out hole through the cribriform plate to the anterior cranial fossa, measuring about 8 mm in diameter. A piece of fascia lata was inserted through the hole under endoscopic control so that it would be held in position by the intracranial pressure from above. Tissue glue (Tissell kit 2.0 ml – Baxter) and Surgicell (Johnson & Johnson) were applied to the underside of the repair for further security. The integrity of the repair was tested by asking the anaesthetist to raise the intracranial pressure (Valsalva's manoeuvre). The nose was then packed with Merocel (Medtronic – Merocel).

The child recovered rapidly from the anaesthetic and was monitored according to a standard neurosurgical protocol for 24 hours. She was treated with ceftriaxone 0.5 g once a day for one week. Recovery was uneventful. The nasal pack was removed under sedation at seven days and the lumbar drain on the eighth post-operative day. She was discharged from hospital on the ninth post-operative day.

The child's continued recovery was excellent, and when last seen for follow up, some five months after the accident, she was, to all intents and purposes, a normal child. A CT scan one month after discharge was normal.

Discussion

This case highlights a number of important issues. It emphasizes just how easy it is for a simple domestic accident to lead to potentially lethal intracranial injury, especially in children. The cribriform plate is a very thin barrier and it is only its relatively protected location that prevents more frequent injury. The injury in this child was in a way a 'freak' occurrence but, once the pencil had entered the nostril, the narrowness of the nasal fossa in a four year old almost guaranteed that the foreign body would be directed to the cribriform plate.

From the Departments of ENT, *Neurosurgery, and †Anesthesiology, Ataturk Government Hospital, Antalya, Turkey.
Accepted for publication: 17 August 2005.



FIG. 1
The pencil is seen protruding from the right nostril.

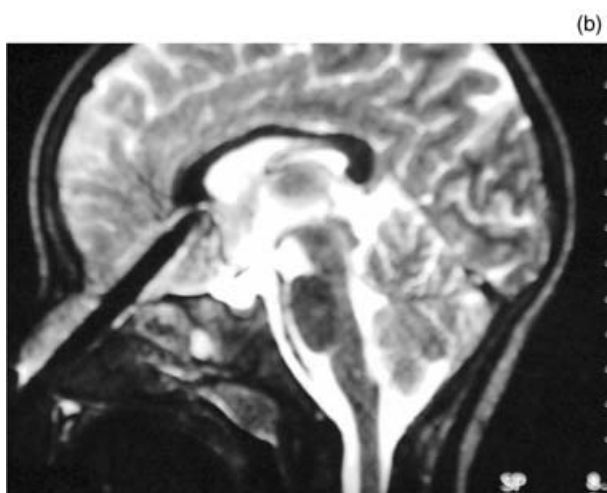


FIG. 2
(a) Axial computed tomograph showing interhemispheric location of the foreign body. (b) Sagittal magnetic resonance scan showing the position of the pencil. The tip is at the level of the anterior border of the 3rd ventricle.

It was very fortunate in this case that the pencil passed between the frontal lobes and did not cause any parenchymal damage to the brain. There have been a few reports in

the literature of penetrating injury, either through the nose or the orbit, in which the frontal lobes have been damaged by wooden (i.e. non-metallic) objects. Parenchymal damage may be expected to show up on CT imaging. Fallon *et al.* describe the case of a two-year-old child in whom a stick passed up the nose and penetrated into the parenchyma of the frontal lobe.¹ The track of the stick was associated with CT changes in the frontal lobe. In the case we describe, the CT was relatively inconclusive because there was no parenchymal damage. An MR scan, on the other hand, revealed the true nature of the intracranial injury. It is thus important to perform MR in such cases if the CT is negative.^{2,3}

Because of the interhemispheric location of the pencil, with no frontal lobe involvement, it was felt reasonable to attempt removal through the nose, although it was clearly important to have a neurosurgical team on hand to perform a craniotomy should it become necessary. As far as we can determine, this is the first case of this kind to be treated using endoscopic techniques. Endoscopic repair of nasal CSF fistulae is becoming the management of choice and has replaced formal anterior craniotomy in most cases.⁴ It is a technique that is well within the capability of competent rhinologic surgeons.⁵

- This report describes a case in which a foreign body was inserted into the nasal cavity, punctured the cribriform plate and resulted in significant intracranial penetration
- The case was managed by per nasal removal, with nasal endoscopic closure of the resultant anterior skull base defect
- This is another example of how endoscopic techniques can be used to manage cases which previously required open craniotomy

References

- 1 Fallon MJ, Plante DM, Brown LW. Wooden transnasal intracranial penetration: an unusual presentation. *Emerg Med* 1992;**10**:439–43
- 2 Jooma R, Bradshaw JR, Coakham HB. Computed tomography in penetrating cranial injury by a wooden foreign body. *Surg Neurol* 1984;**21**:236–8
- 3 Lydiatt DD, Hollins RR, Moyer DJ, Davis LF. Problems in evaluation of penetrating foreign bodies with computed tomography scans: report of cases. *J Oral Maxillofac Surg* 1987;**45**:965–8
- 4 Hughes RG, Jones NS, Robertson IJ. The endoscopic treatment of cerebrospinal fluid rhinorrhoea: Nottingham experience. *J Laryngol Otol* 1997;**111**:125–8
- 5 Wetmore RF, Duhaime AC, Klausner RD. Endoscopic repair of traumatic CSF rhinorrhea in a pediatric patient. *Int J Pediatr Otorhinolaryngol* 1996;**36**:109–15

Address for correspondence:

Dr Erdem Cetinkaya,
Gulluk Caddesi 103–2,
Antalya 07050, Turkey.

Fax: 0090 242 2489524

E-mail: erdemcetinkaya@ttnet.net.tr

Dr E A Cetinkaya takes responsibility for the integrity of the content of the paper.

Competing interests: None declared