CASE REPORT

Transorbital impalement by a wooden stick in a 3-year-old child

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SUMMARY

We present a case of a 3-year-old girl with a transorbital impalement injury due to a wooden stick penetrating the lower inferior palpebra and progressing through the orbita, after the child jumped from a table and hit a wooden basket containing pieces of exposed stick. CT revealed the stick progressing transorbitally through the medial wall and terminating just below the sella turcica. The stick was successfully removed by neurosurgical and ophthalmological specialists. The eye was subsequently inspected, and showed no pathological findings. The girl was treated with topical chloramphenicol and discharged 2 days later. Follow-up examination 2 months after the trauma demonstrated normal visual acuity and ocular motility, with no diplopia, tearing or pain.

BACKGROUND

Transorbital impalement injuries by a foreign body is a rare clinical situation.¹ Injuries with wooden foreign bodies are particularly rare and knowledge on intraorbitally lodged wood is very sparse.

The diagnosis and treatment of a transorbital wooden foreign body can be very difficult and is essential to reduce complications. In paediatric cases, the diagnosis is often complicated by an incomplete history. Further, the external signs of an

entry point of a foreign body can be very poor, and wooden objects, especially, can be missed on diagnostic imaging.^{2 3} The relevance of the present case lies in the unexpected trajectory of the foreign body, emphasising the importance of thorough diagnostic imaging and of proceeding with caution to avoid pitfalls.^{2 3} Also, avoid relying on only one type of imaging diagnostics if doubt exists, since cases have shown positive findings when performing other further imaging techniques.² In cases where these pitfalls have been missed, damage has included abscesses, bleeding, presence of foreign bodies and fractures.^{4 5}

CASE PRESENTATION

A formerly healthy 3-year-old Caucasian girl jumped from a table and landed in such manner that her head hit a wooden basket containing exposed sticks, leading to one of the sticks penetrating the medial part of her right orbita. The patient had followed the Danish Children Vaccination Programme, which includes tetanus vaccine. On admission, the patient was calm, lying in her mother's arms.

INVESTIGATIONS

Initial physical examination showed a stick penetrating through the inferior palpebra. Oedema was

Figure 1 Foreign body as seen at preliminary examination.

Figure 2 Foreign body as seen at preliminary examination.

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Figure 3 CT scan performed before removal.

present around the eye and blood was visible around the puncture site, but active bleeding was not present (figures 1 and 2). There were no other objective findings at the initial examination—especially no neurological deficits. Further examination of the eye was not performed at this point.

A CT scan was performed with the patient under general anaesthesia, showing a hypodense area in the medial part of the right orbital wall, breaking through the medial orbital wall, and proceeding along the right medial orbital wall, and stopping just 2 mm beneath the sella turcica. The hypodense area was identified as the stick. No intracranial penetration was found and the globe appeared intact (figures 3 and 4).

Postoperatively, the extracted foreign body was intact, and did not appear to have left remaining material in the patient's eye (figures 5 and 6).

DIFFERENTIAL DIAGNOSIS

The foreign body was visible, but the trajectory and potential damage to the eye, or other injury, were unclear at admission. Cases have been described where the trauma is initially recognised as a trivial, superficial laceration, and left without further medical investigation. An unrecognised foreign body from an orbital penetrating wound can be associated with severe

complications such as infection, brain abscesses and intracranial haematomas.

TREATMENT

After the initial assessment and the results of the CT scan, the two involved specialties decided that surgery was needed, and jointly performed it. Minimal invasive surgery was performed by the neurosurgeon, evacuating the foreign body with surgical pliers and suturing. Since the foreign body appeared intact, indications for additional surgery were not found. Following removal of the stick, the ophthalmologist examined the globe and ocular adnexa, and found no lacerations apart from the entry wound.

Preoperatively, the patient received prophylactic intravenous antibiotics. Post-surgical treatment included topical chloramphenicol four times per day for 7 days. The child was discharged after 2 days without any complications and was scheduled for follow-up after 2 months.

OUTCOME AND FOLLOW-UP

Ophthalmological examination at 2 months follow-up was unremarkable, with normal visual acuity, Lang stereotest, ocular motility and fundus examination, with no diplopia, tearing or pain. The patient was scheduled for follow-up 1 year later.

DISCUSSION

Transorbital impalement by a wooden foreign object is an unpredictable and rare clinical situation.^{3 4} Patients can present in many ways, and often without or with only discrete symptoms. Patients are often divided into occult and non-occult groups. Either way, the patient can present with no symptoms at all, apart from the history of trauma to the eye, and minor wounds on the eyelid.^{1 3 5 6}

In the literature, the orbita is described as a pyramid with its apex at the entering point of the optic canal. In addition to the optic canal, two other direct entry points to the intracranial space exist. These are the superior and inferior orbital fissures.^{1 3} To characterise which path a foreign object takes through the orbita, Turbin *et al* reviewed 37 cases with transorbital foreign body trauma and objectified this. They divided the orbita into four zones and tried to predict the most likely path of a transorbital foreign body based on the zone of orbital entry³ (table 1).

In this case, the object's entry point was in zone 3C and, compared to the findings of Turbin *et al*, it took an unpredicted

Figure 4 CT scan performed before removal.

Figure 5 After removal of the foreign body.

path, which possibly prevented intracranial trauma. One factor explaining this could be the thinner orbital bones in children. However, the literature and this case show that predicting the trajectory is almost impossible and depends on multiple factors, such as the angle of the head during the trauma, velocity, etc.^{1 3} Furthermore, when dealing with an occult case the task

Figure 6 Foreign body as seen after removal.

Table 1 Likely orbit exit after penetration of the eye		
Zone	Area	Orbit exit
Zone 1	Non-medial upper lid	OR>Sph. w.
Zone 2	Non-medial lower lid	OR>SOF>IOF/floor
Zone 3	A: medial upper lid	SOF>OR>Sph. w.>OC
	B: medial canthus	SOF>Sph. w.
	C: medial lower lid	SOF>OC/Sph. w.
Zone 4	All non-medial lesions	OR>SOF>Sph. w.>/floor/IOF
IOF, inferior orbital fissure; OC, optic canal; OR, orbital roof; SOF, superior orbital fissure; Sph w, sphenoid wing.		

becomes even more complicated.⁷ Recommendations are sparse, and mostly based on case reports, recommending a high level of suspicion when dealing with such cases. If a crime is suspected, forensic steps should be established.

In terms of imaging to objectify the extent of transorbital trauma, CT is the primary diagnostic tool.^{2 3 5 6} However, there are pitfalls with this modality when transorbital trauma by a wooden foreign body is suspected. On CT, a wooden penetrating object may show varying degrees of attenuation.² Moreover, dry wood can have a surprisingly low Hounsfield value, which can make it difficult to distinguish from air.³ Owing to this, MRI has been used in cases when in doubt about the findings, or where relevant clinical suspicion of a wooden object presents without CT confirming this.⁸ MRI proves to be superior against CT in diagnosing wooden foreign bodies.^{1–3 5} Despite its superiority, CT is recommended as the primary diagnostic imaging, and the decision to perform an MRI should be made in consultation with a radiologist. Contraindications, such as iron content in the foreign body, have to be ruled out before performing an MRI. In this case, there was no need for further imaging, since the CT results matched the clinical findings. Had there been any neurological deterioration after the surgery, a MRI could have been performed to rule out any intracranial wooden foreign body.^{2 3 5}

In conclusion, multiple factors have to be taken into account when managing the rare entity of transorbital penetration. The history of the trauma must be explored, which is easier in non-occult cases, and diagnostic imaging should be performed. On the basis of the initial evaluation, the relevant clinical specialties have to be involved, and often these cases become multidisciplinary. This case emphasises the challenges of these rare traumas that require quick and wise decision-making.

Learning points

- ▶ Have a high level of suspicion—especially in occult cases.
- ▶ Use imaging to assess the trauma and extent of foreign body distribution.
- ▶ Do not remove the foreign body before imaging has been performed.
- ▶ Expect cases of transorbital penetration to often become multidisciplinary.

Competing interests None declared.

Patient consent Obtained.

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