Case report

A case of transorbital intracranial injury presenting with subtle neurological deficit

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Abstract

Background: Ocular trauma is a major cause of visual morbidity. **Objective**: To present a rare case of transorbital intracranial injury extending up to the left internal carotid artery (ICA) with no other systemic neural deficit except for the ocular manifestations. **Case**: A 14-year-old female presented to our out-patient department (OPD) with the history of trauma to her left eye with stumps of bamboo shoots secondary to a fall injury. Examination and investigations revealed a foreign body extending from left inferior conjunctival fornix into the intracranial cavity, occluding the various segments of left ICA. The patient subsquently underwent craniotomy and foreign body removal by a combined team of neurosurgeons and ophthalmologists. On discharge, the patient had slight improvement in extraocular motility of her left eye. However the trauma rendered the affected eye, non-seeing. **Conclusion**: The intracranial extent of a foreign body entering the cranium via the transorbital route cannot be judged merely by the clinical findings of the nervous system and ocular examination. These patients need timely management by the combined effort of ophthalmologists, neurosurgeons and radiologists.

Keyword: Ocular trauma, transorbital injury

Introduction

The world-wide prevalence of people blinded by ocular injuries is approximately 1.6 million. About 2.3 million people are visually impaired bilaterally and 19 million have unilateral visual loss secondary to ocular trauma (Negrel & Thylefors, 1998). A study conducted in Nepal showed that there is a marked increase in prevalence of ocular injuries with increasing age where prevalence rose from 340/100,000 for persons under age 10 to 1780/100,000 for persons aged 55 to 59 (Brilliant et al, 1985).

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Case report

A 14-year-old female child presented to our OPD from Baitadi (which is one of the most unreached far western districts of Nepal), with complaint of sudden painful diminution of vision in her left eye for the last two days following an alleged accidental fall injury. The child fell down from a tree while collecting fodder, and landed with her face down on stumps of bamboo shoots (*nigalo*). She also c/o swelling of her left periocular area with associated pain. She had history of bleeding from her left ear and both nostrils. However there was no history of nausea or vomiting, loss of consciousness, abnormal body movement or any major injury to other parts of her body. With this history, the patient had visited an eye hospital in the rural setting, from where she was referred to our centre. The patient had to travel for two days to reach us.

Figure 1: Showing the site of entry of the foreign body (note that the distal end of the foreign body is visible in the inferior conjunctival fornix)

The clinical examination of the patient in the OPD revealed her to be hemodynamically stable with no neurological deficit. Ocular examination showed visual acuity to be 6/6 OD and No Perception of Light (NPL) OS with a frozen left globe. The left lids were swollen, erythematous and tender. The left globe was proptosed and displaced superiorly by a foreign body that could be seen penetrating into the left orbit from the inferior fornix. The left pupil was mid-dilated and fixed. The fundoscopic examination of left eye revealed a hyperemic disc with blurred margins. The retina was grossly pale with gross inward buldging in the inferonasal quadrant along with retinal detachment due to the foreign body. There were flame shaped hemorrhages and tortuous vessels in all the retinal quadrants. With these findings the patient was admitted in the eye ward for further management.

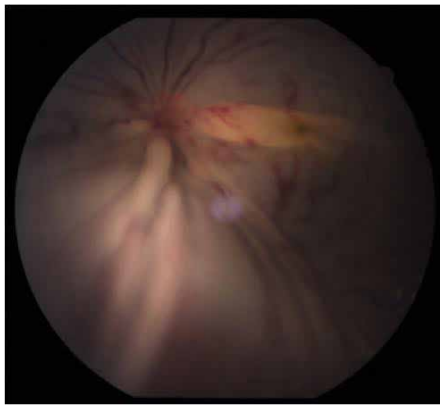
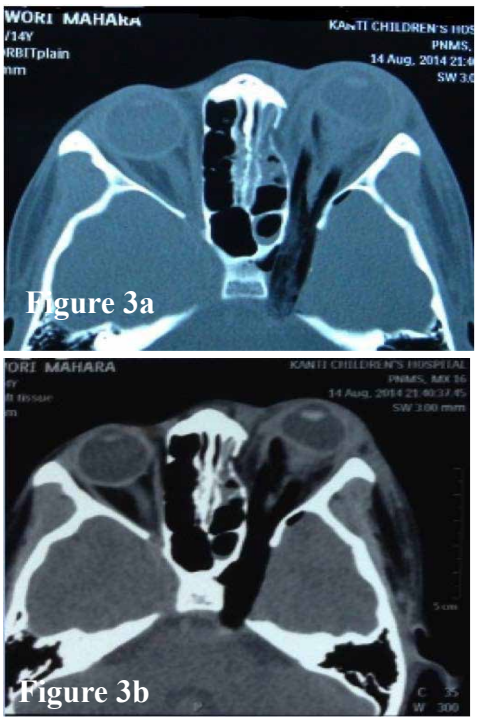


Figure 2: Showing fundus findings of the affected eye

Her computed tomography (CT) scan of head and orbit revealed linear hypodense area in the left orbit extending from the orbit up to the basisphenoid region, traversing the intraconal space. Neurosurgical advice was sought. They advised for continuation of intravenous antibiotics and CT-Angiogram head, which showed obstruction of the cervical, petrous and cavernous segment of the left ICA. However the terminal part of the left ICA was normally supplied from the anterior cerebral artery. Bilateral anterior cerebral artery, posterior cerebral artery, anterior and posterior communicating arteries were normal. Linear hypodense area was seen in left orbit with extension up to cavernous sinus. With these findings, she was planned for surgical intervention by the combined team of neurosurgery and ophthalmology.



Figures 3a and 3b: Axial CT images of orbit (bone window and plain) demonstrate air attenuating (-280HU) foreign body in left orbit with intracranial extension through the superior orbital fissure up to cavernous sinus. Also note small left pneumocephalus and fracture of medial orbital wall of ipsilateral side.

Figure 4: CT angiogram with 3D volumetric reconstruction image demonstrates non-opacification of cervical, petrous and cavernous segment of left ICA

The details of the demanding surgery, which was a Herculean effort by both the ophthalmic and neurosurgery team are as follows.

The patient was kept in supine position with neck extended 20 degrees and tilted to right 30 degrees. Four cm vertical incision along anterior border of left sternocleidomastoid was made, platysma dissected; strap muscles were separated to expose carotid sheath and an umbilical tape was passed around left internal carotid artery. Incision starting from 1 cm above left tragus and extending vertically up to widow's point was made. Skin flap and temporalis was reflected anteriorly and then bone flap was raised. After adequate dissection up to cavernous sinus, the foreign body was seen compressing the paraclinoid intradural portion of the left internal carotid artery, which was shrunken and non-pulsatile. Intracranial portion of foreign body was removed in piecemeal fashion, followed by closure of dura. In the second stage of surgery, floor of left orbit was explored. About 5 cm long foreign body was removed which was broader at the anterior end and narrower posteriorly. Floor of orbit was irrigated thoroughly with antibiotic solution and repair of left lower lid was done. Bone flap was replaced and sutured to the skull with prolene suture via marginal holes. Temporalis was repaired and scalp was closed in layers. Neck incision was also closed in layers and dressing was applied.

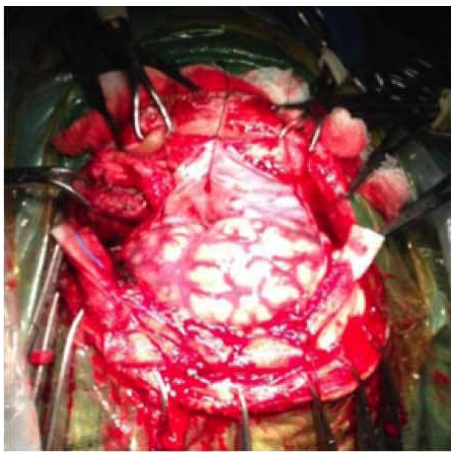


Figure 5: The standard frontotemporal approach to remove the intracranial portion of the foreign body.

Figure 6: The orbital portion of the foreign body being removed from the lower fornix after removal of the intracranial portion.

Figure 7: The foreign body inflicting the injury

The postoperative course of the patient remained uneventful. Proptosis, oedema, and ecchymosis of the left eye gradually alleviated. Her neurological status remained normal throughout her stay in the hospital. CT scan of head and orbit done after a week of surgery confirmed complete removal of foreign body.

Figure 8: Status of the intact left globe on the 10th postoperative day

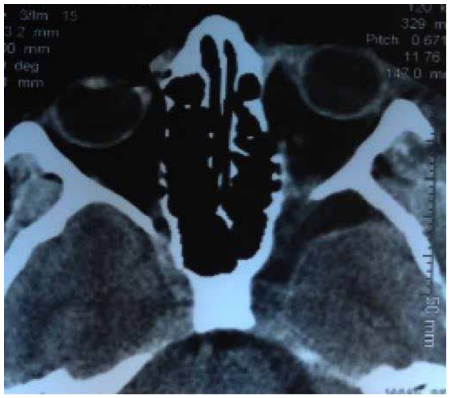


Figure 9: Post exploration axial CT image demonstrates minimal epidural collection in left temporal region

Discussion

Transorbital penetrating brain injury by a foreign body is relatively rare. As the orbit is a horizontal pyramid directed posteromedially, foreign bodies tend to get deflected towards the apex, where they traverse the natural orifices: the optic canal, the superior and the inferior orbital fissures, to reach into the intracranial cavity. Foreign bodies most frequently penetrate the orbital roof to reach intracranial space because of the fragility of the superior orbital plate of the frontal bone. The other most frequent site of penetration is the superior orbital fissure from which the foreign body can extend up to the brain stem via the cavernous sinus (Miller, Brodkey & Colombi,1977), (Wesley et al, 1988), (Feifan et al, 2013)

Feifan et al (2013), reported a similar case of orbital trauma in which a bakelite comb extended from the left orbit, through the cavernous sinus to reach up to the pons, with complete occlusion of the cavernous segment of the left ICA, but without any neurological deficit.

In any case of intraorbital foreign body with or without intracranial extension, CT is considered the primary diagnostic tool (Hansen et al, 1988), (Etherington & Hourihan, 1989). Angiography is required to identify the presence of injury to the intracranial vascular structures. Magnetic resonance imaging can be used at times to delineate the foreign bodies, however only after ruling out any possibility of magnetic metallic foreign body (Green et al, 1990), (Boutin, Briggs & Williamson, 1994).

Conclusion

Penetrating orbitocranial injuries are sight threatening and potentially life-threatening conditions. These cases demand initial resuscitation followed by complete neurological and ophthalmologic assessment. The patient should be kept under full antibiotic coverage although surgical intervention is the mainstay of management. A timely team approach by neurosurgeons, ophthalmologists and radiologists is needed for the better outcome of the patient. A close post-operative follow-up is imperative in the management.

Acknowledgement

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