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Case Report

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Penetrating Sugarcane Injury to Brain via Orbit: A Case Report

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Conflict of Interest
The authors have no financial conflicts of interest.

ABSTRACT

Penetrating brain trauma is rare. We present a unique case involving a sugarcane injury that penetrated the brain via the orbit following a road traffic accident. A 32-year-old male arrived at our emergency department with a penetrating injury to his left eye. A non-contrast computerized tomography (NCCT) scan of the head showed a foreign body in the left orbit, extending to the frontal lobe. Left frontotemporal craniotomy, anterior cranial fossa exploration, retrieval of the foreign body (a sugarcane piece), and dural repair of the anterior cranial fossa were performed. The patient was discharged and showed positive progress on follow-up. Penetrating trauma to the eyes and brain can be fatal, leading to vision loss. Therefore, early surgical intervention and close coordination between ophthalmologists and neurosurgeons are imperative.

Keywords: Brain injuries, traumatic; Ocular trauma; Head injuries, penetrating; Saccharum; Agriculture

INTRODUCTION

Penetrating brain trauma is rare, accounting for 0.4% of all brain injuries.[4,5] The thick skull bone prevents effective penetration by projectiles. However, thin bone fragments in the temporal and orbital regions can break and cause injuries. Orbito-cranial trauma is a rare occurrence. A few case reports have described industrial and road traffic injuries in which a speeding non-projectile passes through the orbital wall into the brain.[3] We describe a unique case of sugarcane injury that penetrated the brain via the orbit following a road traffic accident.

CASE REPORT

A 32-year-old male arrived at our emergency department with a penetrating injury to his left eye. The patient was sitting in the front seat of a car when it collided with a truck carrying sugarcane from behind. The sugarcane penetrated the left eye. He was initially admitted to a local hospital, where first aid was provided, and then brought to us. He arrived with an impaled object. In the primary survey, he had a pulse rate of 78 bpm and a blood pressure of 116/76 bpm. He had a Glasgow Coma Scale of E4V5M6, the left side had a globe rupture

FIGURE 1. Pre-operative image showing foreign body in left eye.

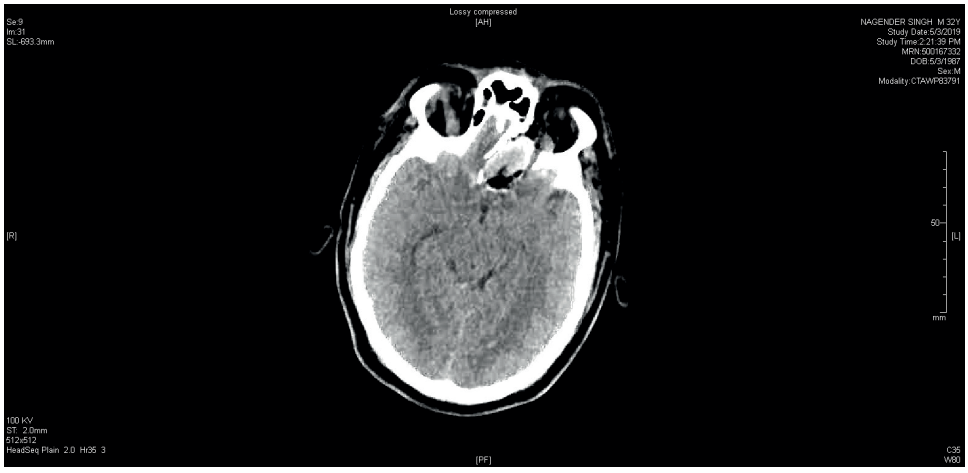

FIGURE 2. Showing foreign body in left orbital cavity reaching up to left frontal lobe.

with a foreign body in situ (**FIGURE 1**), and the right pupil was normal in size and reacted to light. The patient had complete vision loss in the left eye and no eye movement. The patient was able to move all 4 limbs equally. The results of the remaining neurological examinations were normal. He had a laceration just below the right eye measuring approximately 3×1×1 cm, a laceration over the mentum measuring 2×1×1 cm, and a laceration on the left side of the neck measuring 4×1×1 cm. A non-contrast computerized tomography (NCCT) scan of the head (**FIGURE 2**) and orbit in both the coronal and axial planes using multiplanar reformation showed the presence of a foreign body in the left orbital cavity. The penetrating object passed through the ethmoid sinus and entered the left frontal lobe, leaving multiple small contusions around the foreign body with a mass effect. No cerebrovascular injury was observed.

After an ophthalmological examination, the patient was immediately transferred to the operating room. A left-sided frontotemporal craniotomy was performed, and the dura was opened (**FIGURE 3**). The left anterior cranial fossa was also examined. The left frontal lobe

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was retracted posteriorly using a brain spatula, and the impaled object was removed under vision. Hemostasis was achieved using bipolar cautery and topical application of surgicel and abgel. A 20× microscope was used to remove tiny sugarcane fragments that were intermingled with brain tissue (**FIGURES 4** & **5**). Dural repair of the anterior cranial fossa was

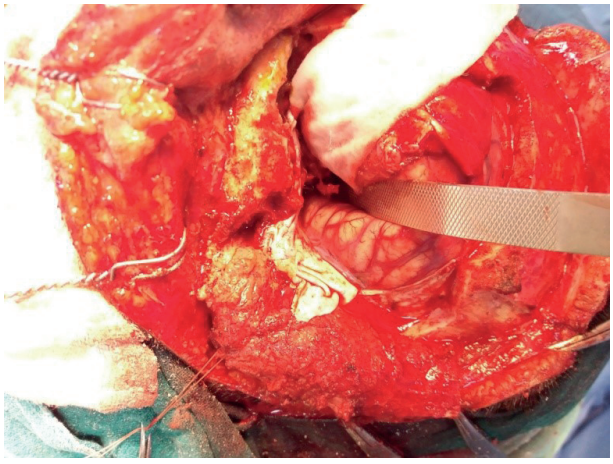

FIGURE 3. Showing left frontotemporal craniotomy.

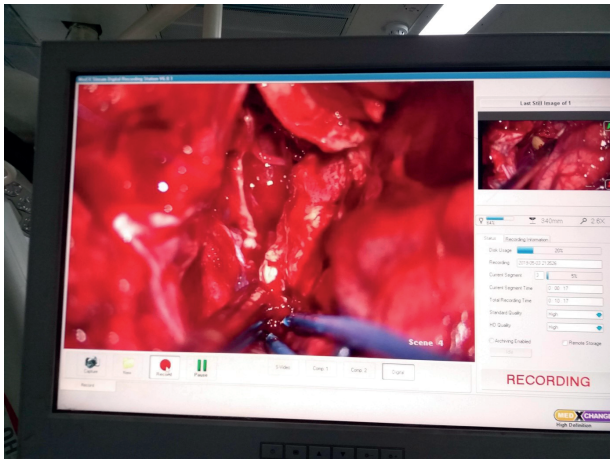

FIGURE 4. Retrieval of foreign body and haemostasis using operating microscope.

FIGURE 5. Retrieved foreign body.

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performed using a harvested pericranial flap. An ophthalmologist performed debridement and repair on the left upper eyelid and medial canthus. There was a scleral laceration with loss of the anterior and posterior chambers, as well as an optic nerve injury. The medial rectus muscle was also torn.

On the postoperative day, the patient was administered ceftriaxone (2 g) intravenously twice daily for 10 days, along with analgesics, antiepileptics, cerebral decongestants, and antifungal medication. The patient developed fever on day 5 and discharge from the eye wound, which was managed conservatively based on culture and sensitivity. A postoperative NCCT of the head showed resolution of the contusion and no brain abscesses. The patient was discharged with a full score of 15 and no residual deficits. He has been undergoing regular follow-ups in neurosurgery and ophthalmology for the past 6 months and is in good health.

DISCUSSION

Penetrating trauma to the eye and brain because of projectiles is uncommon. It threatens life and vision.[1] Areas adjacent to Delhi in northern India are sugarcane-producing regions. Most sugarcane in these regions is transported to sugar-producing mills using large open tractors (**FIGURE 6**). These tractors, often overloaded and operated at night with limited visibility, contribute to a significant number of collision-related head injuries.

Intracranial complications commonly occur in the form of parenchymal contusions, intracerebral hematomas, lacerations, edema, dural tears, intraventricular bleeding, and subarachnoid hemorrhages. Subsequent complications may involve intracerebral infections, intracerebral abscesses, cerebrospinal fluid leakage, and meningitis. The orbit, a bony pyramid-shaped structure, features a thin bone allowing tranorbital penetration into the intracranium. There are 2 natural penetration pathways: one through the superior orbital fissure and optic canal, and the other through the roof of the orbit.[3] The thin superior orbital plate of the frontal bone on the roof provides minimal protection, making it susceptible to injuries that may extend to the frontal bone upon impact.[2] However, in this case, the penetrating sugarcane entered the frontal lobe through the orbit's medial wall, causing injury to the ethmoidal wall.

The management of such patients necessitates a transfer to the nearest trauma center. In this case, the foreign body was left in place. Following the primary survey and assessment of other life-

FIGURE 6. For representation, tractor with sugarcane loaded.

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threatening injuries, an NCCT scan of the brain along the face and orbit in both axial and coronal sections was required. Close coordination between the ophthalmologist and neurosurgeon is essential in such cases, and an operative strategy should be discussed. To minimize complications, early surgical intervention is effective in cases where foreign bodies are retained.[2]

A frontotemporal craniotomy was performed, and the frontal lobe was lifted after dural separation and identification of the dural tear. The foreign body was removed piece by piece under direct vision to prevent further damage to brain tissues. A limited contusectomy of the involved portion of the brain was required. After careful hemostasis and lavage, the dura requires augmentation with pericranium and glue over it.[2,7] Meticulous dural repair is required to avoid potential complications of cerebrospinal fluid leakage.[6] The ophthalmologist was then instructed to perform the surgical procedure on the eye. Thus, a transcranial approach is optimal for such patients. Such vegetative matter carries a high risk of bacterial and fungal infections. It is imperative to start treatment with empirical broad-spectrum antibiotics and antifungal medications early.

The culture sensitivity and potassium hydroxide mount of the fluid are sent; accordingly, antifungals and antibiotics must be tapered. After discharge, the patient was followed up regularly to detect any early complications.

CONCLUSION

Orbital cranial injury caused by sugarcane is rare but potentially fatal and sight-threatening. Preoperative imaging serves as a guide for the approach and avoidance of neurovascular structures. Emergent surgical intervention in close coordination with an ophthalmologist is necessary, as is meticulous removal of the foreign body under optimal vision, resulting in an improved outcome.

ACKNOWLEDGMENTS

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