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Anaesthetic Management of Traumatic Brain Injury, A Foreign Body: A Case Report

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Abstract

Orbitocranial penetrating injury caused by bamboo stick foreign body are very rare and life threatning. Their diagnosis and treatment could be challenging for an ophthalmologist requiring neurosurgical intervention for possible intracranial extension. We present a case of 52 year, male, with residual bamboo stick foreign body in left eye with intracranial. He had a notable history of trauma with a bamboo stick on his left eye at his own residence for which he took the initial treatment in local hospital. He was reffered to GMCH due to recurrent swelling over medial epicanthus with a pus discharge of left eye. The foreign body was successfully removed with a carefully planned craniotomy without complication. This case described the clinical manifestation, radiographic features and perioperative management of this rare trauma with an emphasis on imaging, diagnosis and multidisciplinary management.

Keywords: Orbitocranial penetrating injury, Intracranial foreign body, Bamboo stick injury, Neuroanesthesia, Oculocardiac reflex

Introduction

Orbitocranial penetrating injuries are relatively uncommon in clinical practice, accounting for 24% of penetrating head traumas in adults and 45% in children. The cause of injury could be metal glass, wood, plastic objects. Nevertherless, traumatic penetrating intracranial injuries by bamboo sticks are extremely rare. Only handful cases have been reported worldwide. The penetration is typically through the superior orbital fissure into the cavity because of the conical shape of orbit. Neurological surgery may not manifest immediately at time of injury, which results in delayed diagnosis and severe complication. If not completely removed, the residual foreign body in the orbit or cranial cavity could cause a serious infection. In this case report, we present the first case of foreign body with residual intracranial extension. The potential for massive

intraoperative bleeding, septic shock, systemic inflammatory reactions, hyperlactemia and emergency rescue increases the difficulty of surgery and anasthetic management. The literature describing the clinical coarse, imaging features and perioperative anaesthesia administration in patients undergoing such surgery is limited.

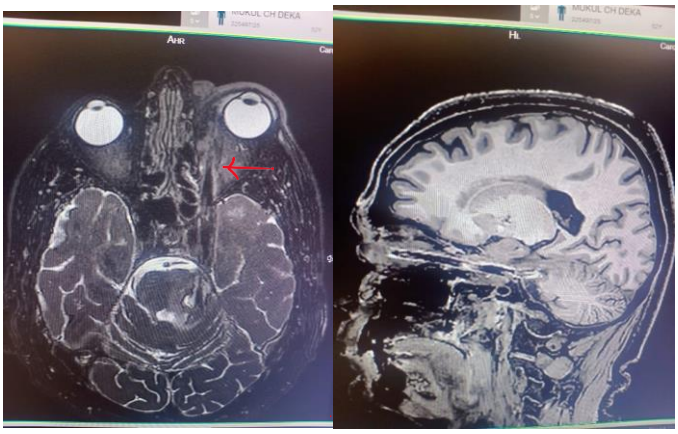

Figure 1: Head computed tomography (CT) scan showed a short, strip-like, slightly high-density shadow (red arrow) in the left frontal lobe, and a fracture of the left superior orbital wall (white arrow). Axial (A), coronal (B), and sagittal views.

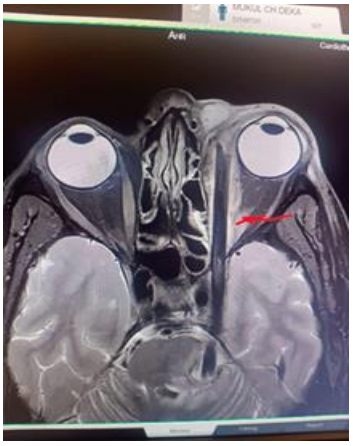

Figure 2: Head magnetic resonance imaging (MRI) showed a strip-shaped lesion that stretched from the left orbital roof to the left frontal lobe, was isointense on the T1-weighted image, slightly hyperintense on the T2-weighted image, and isointense/hypointense on FLARE with obvious irregular enhancement surrounding.

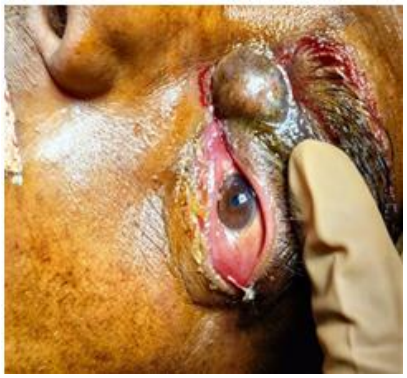

Figure 3: Pre-operative, traumatic eye.

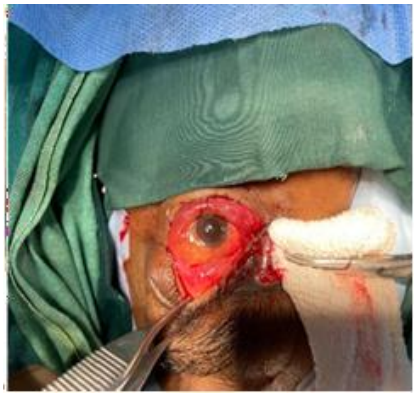

Figure 4: Intraoperative image

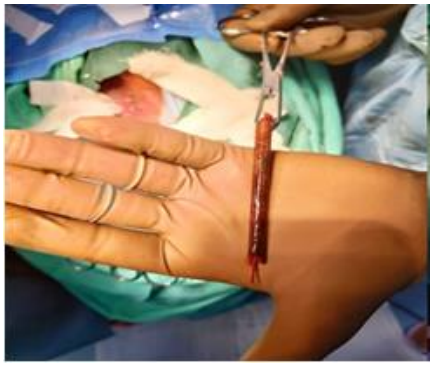

Figure 5: The foreign body after removal

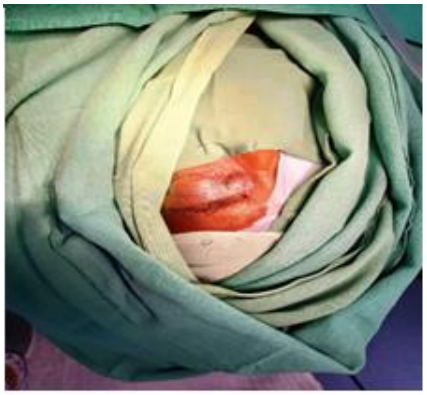

Figure 6: Postoperative image

Case Report

A 52 year old male got hit with a bamboo stick on his left eye 2 weeks back. A bamboo stick foreign body penetrated the left upper eyelid and extended to left orbit and intracranially. The patient was conscious after the incident and was taken to local hospital where emergency CT scan of the orbit done which did not revealed a foreign body, antibiotic eye drops were given. The patient began to have a swelling over the medial epicanthus and pus discharging from it with visual impairment but no neurological deficiet and fever. Subsequent CT scan done

He was referred to Department of Neurosurgery, GMCH with the CT findings for the further management. His best visiual acuity was 6/20 on left eye, 20/20 over right eye. Ecchymosis of the left eye with pus filled swelling over the upper medial epicanthus was present. His body temperature was normal. He was neurologically intact with a normal muscle strength and tension. The patient was hypertensive on irregular medication.

Pre operative routine blood investigations showed no significant abnormality. The ecg showed sinus tachycardia with left ventricular hypertropy and a long QT1 was found. The chest xray with the prominent bronchovascular markings and consolidation. The faciomaxillary CT scan showed a hypodense linear tract measuring approx. 10cm in length and approx. 6mm in width noted along the medial wall of left orbit abutting the medial rectus reaching upto CP angle via orbital apex from cutenous surface, bilateral globes normal. MRI brain reveals a well – defined round linear T1 and T2 hypodense linear component with T1 hyperintense wall noted extending from orbit, traversing through inferior aspect of superior orbital fissure abutting the left medial rectus muscle, along left paracavernous location reaching into posterior fossa, impenging left hemipons lateral aspect and left middle cerebellar peduncle.

On airway assessment of the patient -MPS was IV, Mouth opening 3 fingers, Neck extension and flexion was adequate, No loose teeth and dentures.

The foreign body was removed from the compound Neurosurgery operating room on 9th July, 2025. Before surgery, multidisciplinary consultations were held in the departments of ophthalmology, anaesthesiology, neurosurgery, cardiology, CT and MRI imaging etc to enhance preoperative evaluation.

After entering the operating room patient was cross checked, nil per oral history taken, BP, HR, SPO2, ECG were routinely monitored, and intravenous line was secured in the left and right upper limb, and an invasive arterial line was secured in the right radial artery. For monitoring the depth of anaesthesia BIS and Neuromuscular monitoring was attached. Following the verification of unimpeded mask ventilation, pre oxygenation with 100% oxygen was done for 3 min with the anticipation of difficult intubation, followed by premedication with 200mcg of glycopyrolate , 80mcg of inj fentanyl , induction with inj propofol 100mg iv , inj rocuronium 60mg iv in intubation dose muscle relaxant prior to tracheal intubation. Maintained with air:o2 at 3:3 , inhalational sevoflurane at <1 MAC , infusion rocuronium. Ventilatory approach to maintain end-tidal carbondioxide at 35-45 mmhg, tidal volume of 6-8ml/kg, PAW<20 H2O, PEEP -3,Fio2 .6, to ensure SPO2 >96%. A blood transfusion set was connected to resicitate unexpected bleeding.

A transcaranclar medial canthus approach was made to extraconal space and the foreign body and the pus was

removed by the neurosurgeon and carancular, conjunctival repair done by the opthalmologist.

Post operatively the vision of left eye was 1/5 and right eye 20/20.

Discussion

In this case we can clearly understand the importance of preoperative assesment and meticulous anaesthetic planning before the intracranial foreign body removal

1. Extending upto posterior fossa – where during operation there may be direct surgical injury or ischemia from retraction or interruptions of blood supply as the vital circulatory and respiratory brainstem centres are nearby thereby causing abrupt changes in blood pressure, heart rate, cardiac rythm for which we needed to be more vigilant. We prepared radial artery cannulation for invasive blood pressure monitoring.
2. The foreign body traversing the left para cavernous structures with the risk of injurying the neurovascular structures leading to massive haemorrhage by ensuring adequate hydration and administration of intravenous vasoconstrictors on need. Hypotension intraop can compromise cerebral hemodynamics and cause cerebral ischemia. Therefore, blood pressure management, including choice of fluids and vasopressors, is of paramount importance
3. To prevent the ocular mobility and increasing IOP during the surgery we needed to maintain the adequate depth of anaesthesia and muscle relaxation for which BIS monitoring was also placed for measurement of sensitivity to neuromuscular blocking agents with train of four assessment and depth of anesthesia and preventing overdosing of muscle relaxants.
4. The possibility of arrythmias caused by occulocardiac reflex increases the importance of close ECG monitoring.
5. Another concerns in our patient were care for the normal eye, raised intracranial pressure, raised blood pressure indirectly increasing intraocular pressure which could have increased due to multiple reasons including laryngoscopy response, positioning, inadequate analgesia, drugs used during anaesthesia, hence proper consideration was done to overcome the risk factors. Drugs such as ketamine, were avoided for the same reason, also emphasis was given to neuroprotective agents such as propofol for induction and inhalational agent sevoflurane were preffered. Also, normocapnia was maintained throughout the surgery to avoid any rise in intracranial pressure, and peak airway pressure was maintained at 25mmHg. The reversal of neuromuscular blockade and activation was done cautiously and smoothly after assuring the return of spontenous respiratory function and the presence airway reflexes also preventing postoperative wound dehiscence. Coughing and gagging was minimized by extubating the patient at moderately deep anaesthesia and intravenous Lidocaine 1.5mg/kg was given to blunt the cough reflex . Sometimes brain stem injury may present as an abnormal respiratory pattern or an inability to maintain a patent airway following extubation, hence our patient was kept in neurological intensive care unit for strict monitoring for atleast 48 hrs postoperatively.

Conclusion

The anaesthetic management of patients with foreign body with intracranial extension undergoing surgical management is complex and requires preparedness and

care full attention to avoid complications leading to morbidity and mortality. The key message of the study is that the foreign body eye with its intracranial extension to brainstem and its complications associated with vicinity with the vitals centres of brain stem, cavernous sinus , intracranial and intraorbital structures make it very challenging and requires well structured and disciplined management by combined anesthesiology, ophthalmology, neurosurgery approach with emphasize on preoperative, intraoperative and postoperative complications and its timely management.

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