Case Report

Wooden foreign body in orbit: Endoscopic removal

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Orbital injuries with a foreign body may result in severe structural and functional damage to the eye or orbital contents. The clinical presentation of an orbital foreign body is variable. Management and prognosis depend on the composition, location of the object and presence or absence of secondary infection. Metallic objects and glass particle foreign bodies are the most frequently encountered and well-tolerated, whereas organic foreign bodies elicit an inflammatory reaction and lead to serious complications. Despite modern imaging methods, it is often difficult to identify and locate organic intraorbital foreign bodies. Surgical removal is mandatory to save vision and prevent sequelae. It is imperative to maintain a high index of suspicion in such cases to avoid misdiagnosis.

Key words: Wooden foreign body, orbit, endoscopy.

INTRODUCTION

Penetrating intraorbital foreign bodies are usually fragments of metal or glass and commonly detected with contemporary imaging modalities. Intraorbital wooden foreign bodies usually from a low-velocity puncture are more elusive and demand a low threshold for further imaging. The radiological appearance of dry wood on computed tomographic (CT) scanning is similar to that of air, and the appearance of hydrated wood is similar to that of soft tissue, rendering detection more difficult (Cartwright et al., 1995). Penetrating orbital foreign bodies must be removed in a safe and controlled manner. Adequate access is necessary to ensure no further damage to the orbital structures, and allowing complete haemostasis. Orbit is a difficult area to access and traditionally these cases have been managed using external approaches, either trans-eyelid or by lateral or inferior orbitotomy (Wolfley, 1985). Minimally invasive surgery with a transnasal endoscopic approach has the advantage of going through the virgin field rather than through the infected route in addition to avoidance of facial scar. The transnasal orbital approach can also be combined with image-guided navigation for better identification of structures and the foreign bodies like wood that has a void signal on CT scan.

CASE REPORT

A 30 year old male patient presented history of with right orbital injury while cutting wood with axe about a month back which led to a progressively increasing swelling over his right eye and a penetrating wound on the medial canthus. Patient was taken to a local hospital where he received broad spectrum antibiotics, tetanus toxoid, and local wound care. However, the patient was not carrying any medical records with him. There was no other injury over the face. Subsequently patient developed decreased vision in right eye and purulent discharge from the wound and hence was referred to our institution. Examination at presentation revealed entry wound about 1.5 cm on superomedial aspect of right eye along with purulent discharge (Figure 1). There was reduced visual acuity (6/36) in right eye and no relative afferent papillary defect. His right eye was

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displaced downwards and laterally because of the swelling. Extra ocular movements were restricted in medial gaze. Examination of left eye was normal. CT scan revealed soft tissue density in right anterior and posterior ethmoid air cells and an air containing soft tissue density medial to medial rectus, with destruction of lamina papyracea at places (Figure 2).

The presence of an intraorbital mass with a discharging sinus was suspicious of a retained organic foreign body. Transnasal endoscopic orbital decompression was done with a view to decompress the orbit, drain the abscess and explore the orbit for a suspected foreign body. On exploring the anterior ethmoids, pus was found and there were broken pieces of wood. The cavity was inspected
with angled 30° and 70° endoscope to look for any left out foreign body piece. All the pieces of wood were removed (Figures 3A and 4) and the cavity was irrigated with povidone iodine solution. A probe was also inserted from external wound to rule out any left out foreign body along the wound of entry. Postoperatively the patient was treated with intravenous antibiotics in the form of amoxicillin clavunate one gram twice daily for a week and later switched to oral for another week. Patient also received oral steroids in tapering doses starting with prednisolone 60 mg after breakfast once daily for two weeks. The antibiotics and steroid were started to control the infection and oedema causing decreased vision in the right eye. The entry wound healed well (Figure 3B). Six months later patient’s visual acuity improved to 6/6 and extraocular movements were normal after a period of six month.

**DISCUSSION**

A variety of orbital foreign bodies have been reported in the literature. These include glass, stone, metal, wood, graphite, button, faucet handle, fish jaw, iron hat peg, chopstick, pencil, large wooden plank, pocket knife, meat hook, and pitchfork (Bullock et al., 1999). In general, a penetrating orbital foreign body injury may be categorized either as a low-velocity or high-velocity injury, with majority of them falling in the first category. Young people appear to have a propensity to these injuries, and children tend to get injured by falling on to a sharp object like pencil (Miller et al., 1977). Most eye injuries involving the penetration of a foreign body exhibit minimal surface damage, which may often be undervalued by the physician during the initial evaluation. Orbital fat tends to conceal the trajectory, making it difficult to identify a point
of entry. Thus, suspicion is crucial for defining the diagnosis (Bullock et al., 1999).

The possibility of a foreign body should be considered following a history of trauma with persistent signs of inflammation, limited eye movement, delayed healing or deterioration of the vision as was seen in our case. The cause of limited eye movement should be assessed with care, as it may have been caused by the presence of a foreign body, trauma to the oculomotor, trochlear and abducens nerves or muscle impingement in fractured bones in the orbital walls (Macrae, 1979).

Wooden foreign bodies are particularly liable to fragment, both on impalement and withdrawal, which makes their removal a particular challenge. They are soft, and may have many soil-borne bacteria hence infection is a risk even if a small fragment is left inside the wound (Specht et al., 1992). Those that penetrate the orbit must be removed completely in a controlled manner with meticulous haemostasis. Their vigorous removal may further damage the globe and cause loss of the tamponade effect stressing the need for good access for haemostasis.

Computed tomographic imaging relies on the differing radio densities of tissues for their differentiation. The radio density of wood is variable and may be similar to that of the orbital tissues, which may account for the difficulty in recognizing as well as localizing the foreign body. The CT appearance of wooden foreign bodies is related to the interval between injury and examination. The wooden foreign body may appear differently on CT scan depending upon the presentation. In early cases the wooden foreign body can mimic air bubble and later on may resemble the orbital fat and orbital muscle. Spiral CT scanners have improved resolution and faster speed of acquisition of images. The fast image capture allows the scanning to occur with minimal motion artifact. In spite of these advantages, wooden intraocular foreign bodies are difficult to diagnose with certainty due to varying water content (Dass et al., 2001). Magnetic resonance imaging which depends on the density of protons in the tissue and their different relaxation times is better for localizing the wooden foreign bodies. These properties of wood are dissimilar enough from those of the soft tissue to allow differentiation (Dass et al., 2001). Therefore, in cases where there is strong suspicion of wooden foreign body and the CT scan is not conclusive, MRI should be done. However as a primary investigation the role of MRI is debatable.

Since these foreign bodies may cause a severe orbital infection or lead poisoning (in the case of bullets) and threaten the patient’s vision, surgical removal is recommended (Kwiatkowski et al., 1998). Posterior medial orbital lesions and foreign bodies can be accessed via a transconjunctival as well as trans-eyelid approaches (Wollfey, 1985). The postero-medial position of this foreign body lent itself ideally to a transnasal approach which hardly disrupts the orbital tissue since the access is directly adjacent to the posterior ethmoid.

While open approaches are traditionally used, minimally invasive techniques are becoming increasingly popular. Endoscopy provides illuminated, high-resolution, magnified images allowing clear identification of structures and less trauma to nearby tissues. The endoscopic retrieval of orbital foreign bodies through the original facial wound has also been described (Feichtinger et al., 2007), although it may be necessary to extend the entry wound. An endoscopic transnasal approach, as in this case, has also been described (Khan-Lim et al., 1999) and has the advantage of avoiding any further facial scarring as well as its direct access. Combining an endoscopic approach with image guided navigation increases safety as it is possible to directly correlate pre-operative 3D imaging data with anatomy encountered intra-operatively and allows safer manipulation of instruments and easier location of the foreign body.

Conclusion

The case demonstrates that transnasal endoscopic approach can be used as an effective and efficient approach for removal of orbital foreign bodies lodged on the medial side of the orbit. These types of injuries are preventable if the people use protective gear while working. The industrial safety act provides these guidelines to the employers but in this patient the injury occurred while he was at home and was cutting wood for his household use. Immediate attention should be given to the patient who come with such a history and all attempts should be done to exclude the foreign body / bodies lodged deep in the orbit. Radiological investigation in the form of CT scan or USG of the orbit must be done. This should be followed by the exploration of the wound under antibiotic cover to prevent inherent complications associated with foreign bodies.

REFERENCES


