Clinical profile & management of orbital foreign bodies : a prospective study

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Abstract :

106 Patients with penetrating missile injuries to orbit reported to the authors during last 17 years form the basis of this study. The injuries were caused by fragments of improvised explosive devices/ artillery shells (87%) or by bullets (13%). They were evaluated clinically & by CT (Computed Tomography) and managed conservatively or surgically by balancing the risk from additional trauma with surgery against the existing loss of function and potential for further damage from future reaction. We report our rare & large experience.

Key words : orbital foreign bodies, computed tomography, management.

Introduction : Eye injuries are a severe & common consequence of modern warfare. Because of exposure of face in combat & the susceptibility of orbit to small particles, intraorbital foreign bodies are common in war and counterinsurgency. Penetrating orbital trauma due to missile injuries is potentially dangerous as the fragments often lie close to important structures. They may cause perforating or contusive injury to the eyes or violate the anterior & middle cranial fossa. In addition optic nerve, extraocular muscles, lacrimal system may also be involved. Computed Tomography is the single most informative diagnostic modality for investigation as it accurately localizes these foreign bodies & demonstrate the extent of associated injuries. Removal of these foreign bodies from the orbit is difficult & existing loss of function & potential for further damage from future reaction. This report details our experience of managing a large number of cases of orbital foreign bodies.

Patients & methods: Penetrating missile injuries of orbit that were received in a forward hospital involved in management of war and counterinsurgency injury cases during 17 years from 1999 to 2015 form the basis of this paper. The patients often had multiple injuries & prioritization for treatment was done as per standard protocols[1,2]. Neurological assessment was done as per Glasgow coma scale. Evaluation of visual function, ocular injury, Extraocular muscles, lacrimal apparatus and optic nerve function was done. All patients were investigated by CT scan & treated as per the location & damage caused to eye & associated structures.

Results : A total of 106 patients reported with orbital foreign bodies during the 02 years period. Their mean age was 26 years (range 18-52 years). All patients were males. Gun Shot wounds were seen in 12 patients (11.3%) & splinter injuries in the remaining 94 (88.7%).Associated injuries to head, limbs, abdomen or chest were present in 72 cases (Table I). 32 patients had associated penetrating ocular injuries. Few cases had various types of orbital fractures. (Table II). One patient on X-ray revealed large intraorbital splinter causing irreparable damage to the globe. But an evisceration splinter could not be felt. CT revealed deep-seated splinter partly in the orbit & partly intra cranially (Figure 1).

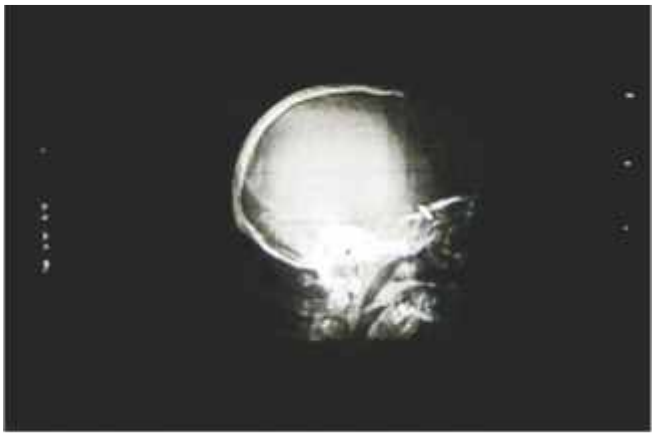

Figure.1 CT of deep-seated orbitocranial splinter

It was removed with the help of neurosurgeon. Two patients had complete loss of vision due to optic nerve transaction.. One case had optic chaismal damage by splinter. One case had splinter damaging the medial rectus muscle. Five patients had retrobulbar haemorrhage due to splinter injuries. CT revealed retroorbital location of foreign bodies causing damage to orbital blood vessels. They were managed by lateral canthotomy. Splinter penetrating the orbit damaged the orbital walls in 27 cases (Figure 2).

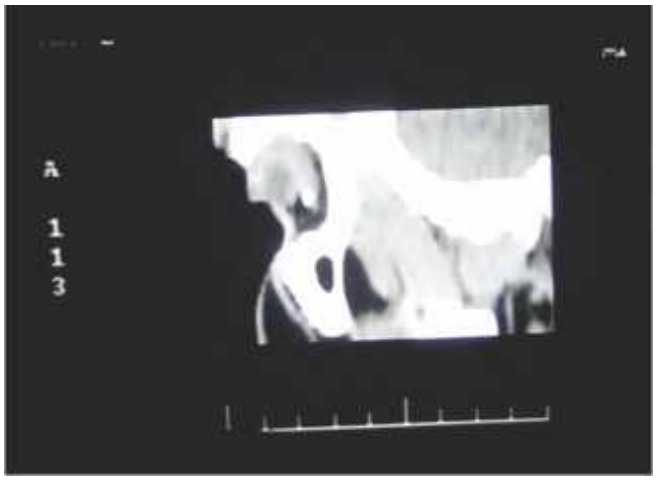

Figure 2: CT scan showing orbital fracture

Figure 4:
CT scan of foreign body lying deep in orbit

They were managed with the help of maxillo - facial surgeon. Lacrimal sac damage by splinter was caused in 11 cases. 61 cases revealed splinter though lying intraorbitally but not causing any problem(Figure 3 ,4). Splinters were removed in 21 cases lying superficially. In 59 cases splinters lying deeply & not causing any problem were left (Table III). In 5 cases splinter removal was tried but we failed to locate the foreign body. In 4 cases damage to blood vessels leading to bleeding & damage to levator occurred in 1 case as part of surgical complications (Table IV).

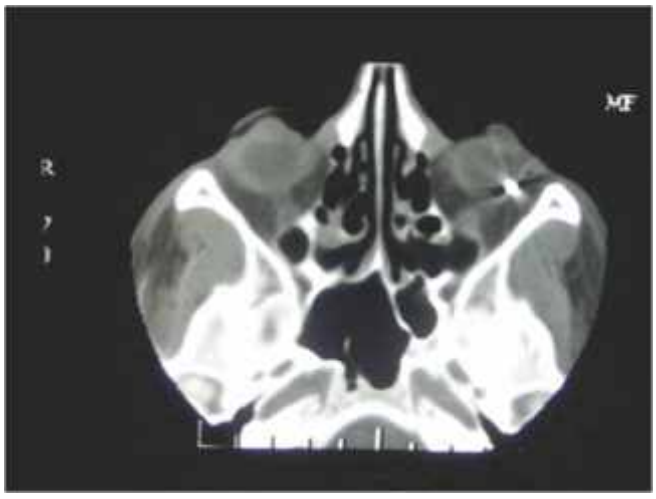

Figure 3: CT of foreign body in apex of orbit

Discussion : Orbital foreign bodies are encountered in modern war scenario. The history of penetrating eyelid or orbital injury should always raise the suspicion of an embedded intraorbital foreign body, especially in a war or war like situation. The nature of injury and foreign object can be elicited by detailed history. On occasion the orbital foreign body may be accompanied by simultaneous ocular, cranial or visceral injuries. The presentation varies from case to case with the patient being asymptomatic or having visual disturbances, double vision, pain, swelling etc. Detailed clinical evaluation for cranial & ocular involvement is of utmost importance. The severity of injury in penetrating orbital trauma is often underestimated in physical examinations[3]. This has also been the noted in our study. Therefore lies the importance of a detailed and meticulous ocular, orbital and systemic examination and radiological investigation.

Radiological images assists in the proper localization of the foreign body, estimation of its consistency and size, and evaluation of the response of surrounding orbital tissue in addition to providing knowledge about the integrity of the globe. The choice of imaging modality chiefly depends on the nature of the suspected foreign body. Plain X-Ray films though useful to localize radiopaque objects lack the capacity to demonstrate the object details, their exact location in relation to surrounding structures and tissue response or damage[4,5]. ophthalmic ultrasonography (combination of standard A-mode and B-mode scanning) has been recommended to particularly evaluate the ocular damage associated with orbital inuries especially with opaque media. Nevertheless, this diagnostic method requires specific expertise and

technology that may not be available in many institutions.[3]

Computed Tomography is the single most informative diagnostic modality for investigating penetrating orbital injuries[6]. It accurately localizes these foreign bodies, demonstrates the missile track & damage of vital structures. This preoperative information facilitates the critical decision making in management. Thin axial and coronal views of 1.0–1.5 mm cuts of the orbit are extremely useful to delineate the shape, size and accurate location of the foreign body in addition to providing the amount of damage done[7,8].Contrast enhanced studies are especially useful in cases where vascular injuries are suspected. CT scan assumes greater role in the evaluation of these cases as MRI is contraindicated in presence of metal projectiles. CT scans may sometimes produce false negative results, particularly in the case of wooden foreign bodies and foreign body less than 0.5mm in size. Non metallic foreign bodies are better seen with magnetic resonance imaging[9,10].An orbital foreign body can cause a variety of signs & symptoms related to the size, location, velocity & composition of foreign object. Tetanus toxoid needs to be administered according to the vaccination status.

As most of the splinters are inert & sterile, they did not cause any infection & damage due to its mere presence in the orbit as seen in our series. Surgical complications in form of inability to localize the foreign body, damage to soft tissue, muscle damage etc may occur in attempt to remove the splinters. Also metallic projectile are easy to detect but difficult to remove. A posteriorly located orbital foreign body not causing any complications may be observed if inert due to the risk of iatrogenic optic neuropathy, diplopia etc. In view of the above, it is recommended that the judgment to remove the foreign body should be made by balancing the risk from additional trauma with surgery against the existing loss of function & potential for further damage for future reaction.

Conclusion : Detection of intraorbital foreign bodies requires a high index of suspicion. Obtaining an accurate and detailed history is absolutely essential. A CT scan of the orbit is the imaging modality of choice for detection and localization of the foreign body. Early diagnosis, surgical exploration and extraction, when indicated, greatly influence the final outcome and at times the visual prognosis

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