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Maxillofacial Surgery

Unusual Penetrating Orbital Trauma by A Metallic Fork: A Case Report

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Abstract | **Case Report**

Penetrating orbital trauma (POT) includes both high- and low-velocity injuries that can result in serious complications such as vision loss and globe rupture. It is estimated to account for 30% to 50% of all orbital injuries. Due to the complex anatomy involved, affecting visual function, potential brain injury, and facial aesthetics POT management requires a multidisciplinary approach. This report presents a case of POT caused by a metallic fork. The object was surgically removed, and the patient's postoperative condition was stable. Ophthalmologic evaluation revealed complete resolution of diplopia, with full restoration of ocular motility.

Keywords: Penetrating orbital trauma (POT), Metallic fork, Orbital injury, Case report, Ophthalmologic evaluation.

INTRODUCTION

Penetrating orbital injuries are rare and often involve high-velocity or sharp objects such as knives, glass shards, or metallic tools. Injuries caused by everyday household utensils like forks are exceptionally uncommon and scarcely reported in the literature. Due to the complex anatomy of the orbit housing the globe, extraocular muscles, optic nerve, and adjacent cranial structures even seemingly minor trauma may carry significant functional and neurological risk.

Accurate and rapid clinical assessment, along with appropriate imaging, is essential for evaluating the extent of damage and planning surgical intervention. This case report presents a rare instance of orbital trauma resulting from a metallic fork assault, underlining the diagnostic challenges and therapeutic considerations involved.

CASE PRESENTATION

A 19-year-old female, with no relevant medical history, presented to the emergency department following a physical assault during which a metallic fork penetrated the right orbital region.

Fig 1: A fork penetrating the right orbit

General Examination

On admission, the patient was fully conscious, alert, and hemodynamically as well as respiratorily stable. She did not report any loss of consciousness, vomiting, or other systemic symptoms.

Maxillofacial Examination

The physical examination revealed a metallic foreign body identified as a fork lodged in the right palpebro-supraorbital region. There was marked upper eyelid edema, but no active bleeding. Ocular examination showed:

- Diplopia in both upward (elevation) and downward (depression) gaze.
- Limitation of abduction and depression of the right eye.
- No visual acuity loss.
- Normal globe tonicity.
- Pupillary light reflexes were preserved, with no signs of afferent pupillary defect.
- No rhinorrhea, CSF leak, or signs of globe rupture were noted at this stage.

RADIOLOGICAL FINDINGS

A craniofacial CT scan (fig1) revealed the presence of two linear metallic foreign bodies within the right orbit, measuring approximately 20 mm and 22 mm in length. Both had a trajectory parallel to the lateral orbital wall, with their distal ends in intimate contact with:

- the globe (though its shape could not be fully assessed due to metal artifacts),
- the inferior and lateral rectus muscles, both of which appeared swollen and rounded,
- and the orbital floor, where a possible fracture was suspected.
- Additionally, there was infiltration of the extraconal orbital fat, and the presence of intraorbital air (pneumo-orbit).

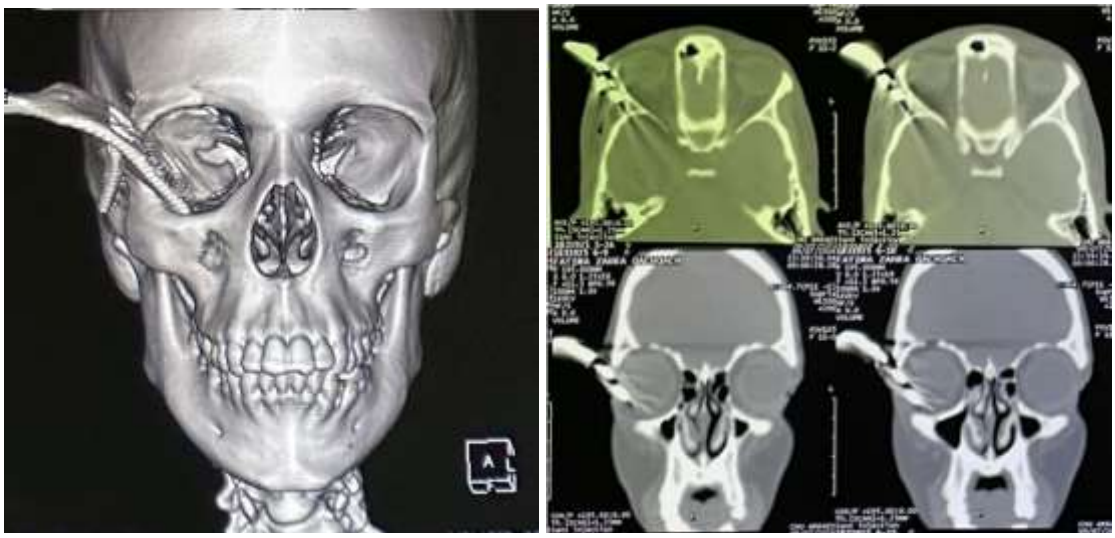

Fig 2: CT scan view shows orbital involvement

These findings suggested a deep penetration, raising concerns about:

- muscle injury,
- globe contusion,
- orbital floor fracture,
- and potential infectious or inflammatory complications.

SURGICAL MANAGEMENT

The patient underwent emergency surgical exploration under general anesthesia, in a multidisciplinary setting. The ophthalmology team first assessed the globe, its adnexa, and the lacrimal pathways. A forced duction test performed before extraction was positive, indicating mechanical restriction likely due to the presence of the foreign bodies.

After ruling out any globe rupture or open-globe injury, the maxillofacial surgery team proceeded with the removal of the foreign body. The fork was extracted slowly and carefully by applying progressive traction, minimizing the risk of secondary injury to orbital structures. A post-extraction forced duction test was negative, confirming the release of mechanical entrapment of the extraocular muscles.

No intraoperative or immediate postoperative complications were observed.

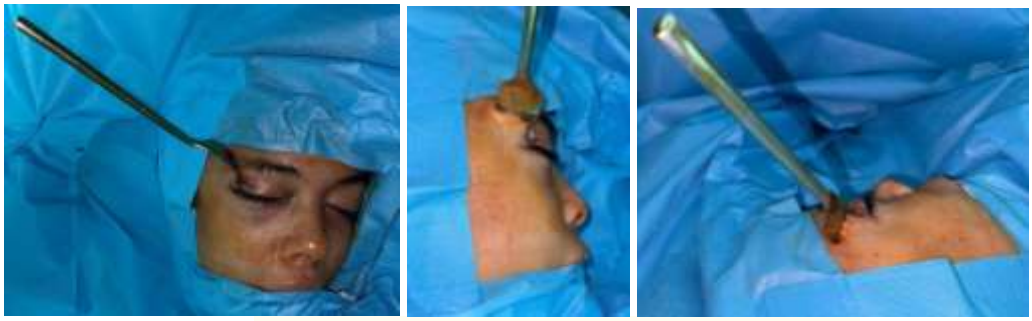

Fig 3 : a fork penetrating the lateral aspect of the right orbit

Fig 4: Patient after removing the fork

POSTOPERATIVE COURSE

The postoperative outcome was uneventful. Ophthalmologic examination revealed a complete resolution of diplopia, with no residual limitation in extraocular movements. Visual acuity remained intact, and no signs of infection, hemorrhage, or delayed complications were noted. The patient was discharged with scheduled ophthalmologic follow-up, showing favorable recovery.

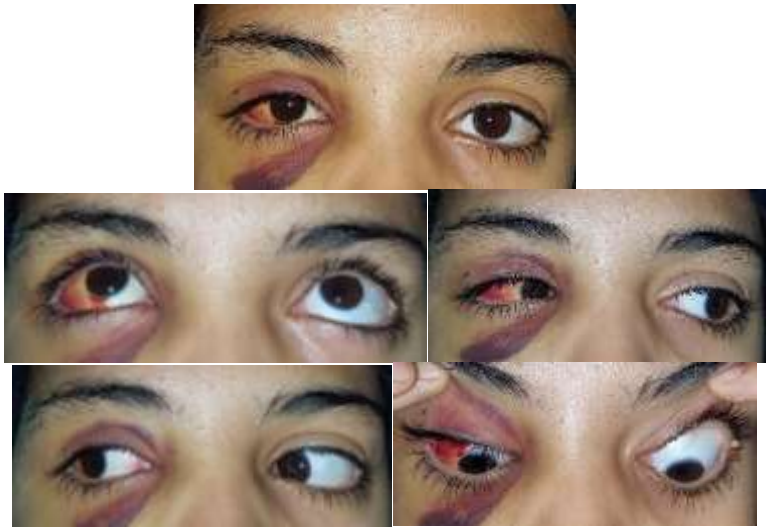

Fig 5: postoperative eye movements

DISCUSSION

POTs caused by sharp instruments or foreign bodies are all potentially serious and should be managed as an emergency. POT causes immediate damage to the eye, post-traumatic iridocyclitis, and traumatic cataract, and might lead to in-fection and, sympathetic ophthalmitis [1]. Missile and non-missile injuries could result in POT. Metallic (magnetic, non-magnetic) and non-metallic (plants, plastics, glass, etc.) orbital foreign bodies are associated with POT [2]. Penetrat-ing or perforating injuries could be caused by foreign bod-ies [1]. Generally, foreign bodies that are placed intraocularly are penetrating and can cross through the cornea (65%), sclera (25%), or the limbus (10%) [3]. These foreign bodies are usually seen in the posterior segment (58-88%) and less frequently in the anterior chamber (10-15%) or the lens (2-8%) [4, 5]. The

presence of foreign bodies increases the risk of post-traumatic endophthalmitis [1].

Management of POT depends on involvement of vital structures such as the globe and brain. A complete physical examination, including full neurological and/or ophthalmological examinations, is essential for diagnosis and treatment of a patient diagnosed with POT. All patients should undergo a comprehensive exam to rule out any penetrating intracranial injury [6,7]. CT scan imaging should be considered as the primary imaging method of choice in the emergency department. Plain radiographic imaging is recommended when a CT scan is not available. While CT can easily detect metallic foreign bodies, its value in detection of wooden foreign bodies is questionable. For the evaluation of wooden objects, contrast-enhanced magnetic resonance imaging (MRI) is suggested [8]. MRI is also useful for differentiating the object from the surrounding air and fatty tissue, particularly in orbital in-juries. CT angiography or magnetic resonance (MR) angiog-raphy is indicated when there is evidence of bleeding or a possible vascular injury, due to either the location and path of the foreign body or sign of a hematoma on CT scan [9]. The principles of advanced trauma support must be followed like any trauma case.

Assessment of POT should be done after stabilization. Removal of the foreign body is postponed until physical examination and full radiological evaluation are completed. Early removal of the foreign body outside of the controlled situation and the operating room may lead to a fatal hemorrhage [8, 10]. Intracranial pressure should be monitored when accurate neurologic assessment cannot be done. When the scalp is not involved, in those with no significant intracranial injury, POT may be treated by simple wound care and closure of the entrance wounds [7]. Broad-spectrum antibiotics should be prescribed to prevent central nervous system (CNS) infection. Clinicians should minimize the degree of debridement and try to provide watertight du-ral and scalp closure in order to decrease Cerebrospinal fluid(CSF) leakage and infections. In the absence of intracranial or ocular injuries, simply removal of foreign body and soft tissue closure is indicated. When POT is associated with soft tissue loss, like in missile injuries, soft tissue reconstruction with local and distant flaps is recommended.

CONCLUSION

This case illustrates the importance of prompt, coordinated intervention in penetrating orbital trauma. Imaging, careful clinical examination, and a cautious surgical approach ensured a favorable outcome without visual or functional loss. Unusual foreign bodies such as forks, while rare, should be managed with the same rigor as high-energy orbital injuries due to their unpredictable trajectory and depth.

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