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Case Report

MULTIDISCIPLINARY MANAGEMENT OF EXTENSIVE MAXILLOFACIAL TRAUMA WITHIN THE ORBIT FROM A ROTARY INDUSTRIAL MACHINE TOOL

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ABSTRACT

Orbital injury is common and the diagnosis can be challenging for the oral and maxillofacial surgeon called to perform an emergency room assessment. The approach to the patient with orbital trauma is complicated by a wide range of potential ocular and brain injuries with varying pathophysiology. The impact causing orbital injuries are often much greater than those that cause purely ocular injury, hence adjacent non ocular structures like nose, paranasal sinuses, midface and jaw, and brain are also commonly injured. Because of this, extensive orbital trauma is best managed by a multidisciplinary team, on which neurosurgery and ophthalmology must be represented.

Keywords: Orbital injury, Facial injury, Orbit, Blow out Fracture, Naso Ethmoid Fracture

INTRODUCTION

Orbit is defined as the cavity in the skull in which the eye and its appendages are situated. This bilateral 4-sided pyramidal structure is composed of 7 bones and forms the structural boundary between the facial skeleton and jaws and the cranium. Surgery or fractures of the jaws frequently involve the orbit and the surgical approaches and reference points aligned accordingly. By this deduction, the fields of cranial and facial surgery were forever united, creating a cascade of new techniques and possibilities.

Orbital fractures are common facial injuries, occurring more often in men than in women. Orbital trauma is the second leading cause of blindness. Blindness and visual impairment have been reported to occur with an incidence that varies from 0.2% to 22% [1]. Larian et al.[2] in a related study even reported trauma as the second leading cause of blindness so the first priority for these injuries is the health of the globe. There is also a high association with cerebral and ocular injuries.[3]

The physical mechanism of orbital blowout fractures has been debated for years by ophthalmologists, otolaryngologists, plastic surgeons, and maxillofacial surgeons. Because it occurs behind the rim of the orbit, a direct contact of the bony walls with an external object does not occur. Blowout fractures therefore occur indirectly. Most opinions about the mechanism of blowout fractures fall into 3 main theories: the hydraulic theory[4], the globe-to-wall contact theory[5], and the bone conduction theory[6].

We present a case of traumatic orbital fracture with subsequent bony intrusion into the orbit, necessitating urgent exploration. The compound soft tissue and skeletal injury in this patient is typical for patients with associated lacrimal injury. Awareness of the injury patterns and treatment algorithms of these cases allows for appropriate assessment and intervention.

CASE REPORT

A 55-year- old man presented to the emergency department with trauma from a hand rotary industrial machine tool, leading to a large laceration starting from the nasal bridge and extending to the left supraorbital margin, to its lateral limit (Figure 1). The laceration was bleeding and it was full thickness in depth. The patient was not able to withstand a thorough examination in the emergency department due to pain. The upper and lower eyelids were oedematous. The left globe was totally ruptured. The entire left orbital wall i.e left supraorbital rim, medial orbital wall, orbital floor fracture associated with naso-orbital-ethmoid (NOE) complex was

fractured and collapsed. The margins of the eyelid were intact. A maxillofacial computed tomographic scan with axial, coronal, and sagittal images was obtained to determine the presence and extent of bony injury. This demonstrated a unilateral left naso-oribital ethmoidal fracture, with displacement of the medial buttress of the left nasal aperture into the inferiomedial left orbit (Figure 2,3).The patient was operated to restore the left orbital anatomy for esthetic and functional purpose. Surgery involved reconstruction of the NOE complex fracture with a mandibular chin bone graft, fractured supraorbital margin was fixed with wires and the orbital floor fracture was repaired with a prolene mesh to support the globe. Later the ophthalmic surgeon enucleated the ruptured globe in total. The patient was kept on regular follow up to prevent vision loss on fellow eye caused by sympathetic opthalmia. Postoperative paranasal sinus view obtained on the following day showed reduction of the bone fragment with no residual foreign body in the globe Figure 6. Subsequent follow-up in clinic 2 weeks postoperatively demonstrated an acceptable aesthetic result with a good ocular prosthesis (Figure 4).

DISCUSSION

Maxillofacial trauma resulting from high speed rotary machines, although described only rarely in the literature, is becoming more common with the increased use of this equipment by untrained individuals at home or professional mechanics. A recent epidemiologic study of 133 patients who suffered saw injuries to the maxillofacial region over 19 years revealed that all patients were male, with the largest number injured between the ages of 31 and 40 [7]. All cases were accidental and self-inflicted. Isolated soft tissue injuries occurred in 70% of the patients, with 30% having involvement of the facial skeleton. Seventy percent of the injuries were localized to the left side, presumably the result of geometry associated with a right-handed user. Orbital rupture is a devastating injury that could result in diminished visual acuity, blindness or the need to perform an orbital evisceration. Jabaley et al reported a 6% incidence of acute enucleation in 119 patients with orbital fractures[8].When associated with orbital fractures, it is generally considered to be a comorbid event. Early and appropriate surgical debridement, copious irrigation, fixation and immobilization of injured tissues, detailed wound closure, maintenance of clean dressings, nutrition and circulating fluid volume are equally important in this regard[9].

Maxillofacial hard and soft tissue injuries should be treated in the first operation under general anesthesia and reconstruction of the orbital walls has to be done to give a good esthetic appearance and functional purpose of eyeball prosthesis because late repair of cosmetic deformity becomes difficult[10]. Eye-lid sparing orbital exoneration technique was first described by shield et al [11] which reduces the healing time and improves cosmetic results. The surgeon should not ignore the aesthetic considerations of orbital evisceration because this has the potential to be as psychologically disturbing as it is anatomically disruptive[12]. Hence these procedures require a multidisciplinary team approach.

Although historically uncommon, maxillofacial injuries from machine tools have been reported with increasing frequency. Early intervention with operative debridement of devitalized soft tissue and reduction of bony fractures remain the mainstay of treatment. With severe injuries in the setting of NOE fractures, we believe that clinicians should consider it as a medical emergency and treated early although the initial management remains controversial whether to address the orbital injury or the bony segment. A multidisciplinary team approach is needed in such cases and that is the need of the hour.

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Figure 1: Complex orbitozygomatic and midface fractures with severe soft tissue injury

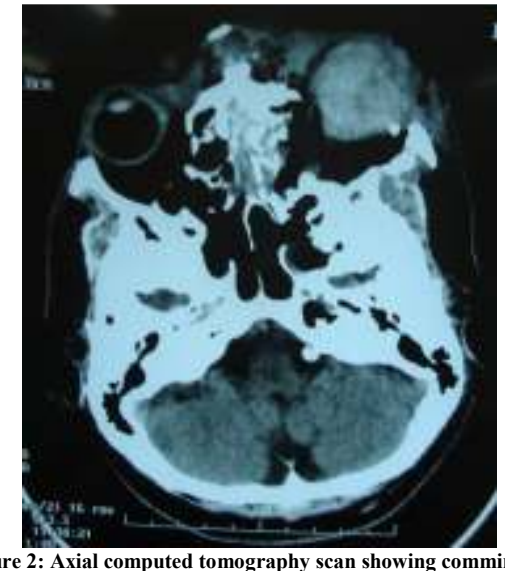

Figure 2: Axial computed tomography scan showing comminuted orbitozygomatic fractures, Naso-orbital-Ethmoid (N.O.E.) fractures, and globe rupture.

Figure 3: DCT depicting complex injuries of orbit

Figure 4: Postoperative appearance with ocular prosthesis in place.

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