Bilateral Blow-in Fractures of the Orbital Roofs caused by the Ballistic Effect of a High-velocity Stone: An Unusual Presentation of Orbital Trauma

Mahmut Sinan Abit¹, Erkut Küçük²

¹ Bingol State Hospital, Ophthalmology Department, Bingol, Turkey
² Nigde State Hospital, Ophthalmology Department, Nigde, Turkey

Abstract

We describe a unique case of bilateral blow-in fractures of the orbital roofs. A previously healthy 6-year-old boy was brought to the emergency department after a stone thrown by a car wheel hit his face while sitting on the sidewalk. Maxillofacial and orbital computed tomography revealed nasoethmoid and anterior skull base fractures involving the superior orbital roofs, which were displaced towards the orbit, diagnosed as bilateral orbital roof blow-in and bilateral medial wall blow-out fractures. The patient had rhinorrhea and massive nasal bleeding. An open reduction was performed by a neurosurgeon. This unusual case had an atypical etiology.

Key words: orbital fractures; Pediatrics; Craniocerebral Trauma

Introduction

We described a unique case of bilateral blow-in fracture of orbital roofs with an unusual etiology. Orbital fractures are common findings in facial trauma. In adults, fractures of orbital floor and medial wall are the most common sides. In children, orbital roof fractures are more commonly seen than adults. Blow in fracture of orbit is described as inwardly displaced fracture of one or more orbital walls. A sudden increase in intracranial or periorbital pressure may result in downward displacement of bony fragments in to the orbit. Close cooperation between the departments of ophthalmology, maxillofacial surgery and neurosurgery is essential to optimize the care for the patients.

Case report

A 6 year-old boy was brought semiconscious to the emergency department (Glasgow coma scale 11; E3 V4 M4). He was hit on his forehead by a high speed stone bounced off a car wheel while he was sitting on sidewalk. On examination only bilateral upper eyelid edema with ecchymosis were noted. There was laceration on glabellar region. He was suffering from massive nose bleed and pain. Initial examination showed visual acuities were at least 16/20 on both sides. Intraocular pressures of both eyes were within normal limits. Slit lamp examination showed normal anterior and posterior segment findings although an optimal examination could not be performed because of patient’s agitation and lack of cooperation. The day after the accident; eye movements were evaluated more comfortably and there was mild upgaze restriction on left side. The pupils of both eyes were equal and reactive. There was no proptosis or enophthalmus. The fundus examination was within normal limits. Orbital and maxillofacial coronal CT scans revealed nasoethmoidoorbital fractures, anterior skull base fracture and bilateral depression of orbital roofs (Figure 1). Schematic representation shows how a hitting stone with minimal skin laceration on glabellar region causes bilateral blow in fractures of orbital roofs by ballistic effect (Figure 2). Orbital and maxillofacial axial CT scans revealed bilateral blow out fractures of medial orbital walls (Figure 3). Expert consultation revealed a cerebrospinal fluid leakage to the nose. The patient was taken up for open reduction by neurosurgeon.

Discussion

Orbital fractures are common results of facial injuries (1). Floor or medial wall fractures mostly result in outward displacement of bony fragments in to maxillary or ethmoidal sinuses. Smith and Regan gave the name of “blow out fracture” to describe these type of orbital fractures (2). Blow in fracture of orbit is inwardly displaced fracture of one or more orbital walls. It was described by Dingman and Nativig (3). Blow in fractures mostly involve orbital roof. In adults fractures of orbital floor and medial wall are the most common and fractures of orbital roof are the least common fractures (4). In children orbital roof fractures are more common...
than adults because of developing bony structures, prominent forehead due to higher craniofacial ratio and lack of frontal sinus pneumatization (5, 6). The common mechanism of orbital roof blow-in fractures is high velocity blunt trauma directed to the orbit or forehead. A sudden increase in intracranial or periorbital pressure and direct extension of high energy to orbital roofs convert in perpendicular components and result in downward displacement of bony fragments in to the orbit. Blow in fractures may cause proptosis, extraocular muscle entrapment and restriction of eye movements, diplopia, vertical dystopia, subconjunctival/subtenon hemorrhage, epiphora/pseudoepiphora (7, 8). Not with only intraorbital injuries it can also be associated with severe neurological, neurosurgical injuries (9). Close cooperation between the experts of the ophthalmology, neurosurgery and maxillofacial surgery is essential to optimize the care for the patients depending on the clinical and imaging findings. Non-displaced or minimally displaced orbital roof fractures can be managed conservatively but displaced orbital roof fractures can cause significant ophthalmologic, neurological and cosmetic deficiency (10). In such cases an open surgical intervention is usually performed to improve clinical outcomes.

The patient in this case presented with a sudden impact was given to the glabella and caused bilateral orbital roof blow in fractures with bony fragments contacting the superior rectus muscle on left side and bilateral blow out fractures of orbital medial walls. The injury also involved frontal sinus and anterior skull base. Clinical examination showed ophthalmological and neurological abnormalities. These findings in conjunction with radiological evidence of severe trauma made our team to plan an immediate neurosurgical intervention.
References