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A study on aetiology and ocular associations in orbital fractures in a tertiary care center in South India.

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Abstract

Orbital fractures are seen in traumatic eye injuries due to road traffic accidents (RTA), assault, sports injuries and fall from heights. The mechanism of injury, ocular exam findings, and radiographic imaging can provide useful information concerning the severity of the injury and concerns for vision loss.

Aims

To determine the demographic distribution, etiology and types of orbital fractures.

Setting and Design: It is a cross sectional study conducted among patients diagnosed to have orbital fracture on CT scan in a tertiary care center in South India.

Material and Methods

The data collected was detailed history including alcohol consumption, use of protective gear and presenting ocular symptoms. Visual acuity was assessed with Snellen's chart. Slit lamp bio microscopy for anterior segment and Indirect ophthalmoscopy for posterior segment examination was performed. CT Scan of orbit and paranasal sinuses was done.

Statistical Analysis

Data collected was analysed by calculation of mean, z test and chi square test using MS Excel.

Results

Orbital fractures were mostly seen in Males with an average age of 33yrs. The most common cause of injury was RTA and almost all were drivers on a 2-wheeler

without helmet. 35% of the patients gave a history of alcohol consumption.

Lid swelling and ecchymosis were the most common ocular finding. Lateral wall of orbit is most fractured in our study (53%) followed by floor (35%).

Conclusion

There is a need to educate the target population on the importance of using protective gear like a helmet while riding a two-wheeler and the grave consequences of driving under the influence of alcohol.

Keywords: Alcohol consumption, Helmet use, Ocular trauma, Orbital Fractures.

Introduction

Orbital fractures are seen in traumatic eye injuries due to road traffic accidents (RTA), assault, sports injuries and fall from heights. [1] Depending on the location and presence of associated ocular trauma there can be various presentations. Diplopia, limited ocular motility, damage to the infraorbital nerve and rarely even to the optic nerve are some complications that may be associated with these fractures. [2-4]

Identification of high-risk patients who require comprehensive ophthalmologic evaluation may alter management and possibly prevent functional and cosmetic defects or even preserve or restore vision. Identifying the most common associations between orbital fractures and ocular pathologies, such as vision-threatening retinal injuries, will aid in the management and appropriate timing of a dilated fundus exam by ophthalmologists. The mechanism of injury, physical exam findings, and radiographic imaging can provide useful information concerning the severity of the injury, associated intraocular insult and concerns for vision loss.

Data regarding clinical predictors of orbital fractures is limited and continuously changing as societies and lifestyles change.[5] To prevent these fractures, we require adequate knowledge regarding their cause.

Our study aims to determine the demographic distribution and characteristics of patients who presented to our institute and thereby identify a target population that can be educated regarding preventive measures. To gain further understanding of the nature and presentation of orbital fractures we also aim to determine their etiology and their types. We would also like to identify associated ocular findings in orbital fractures to help determine high-risk symptoms and signs that can additionally aid in timely intervention and help us improve our management of these patients.

Materials and Methods

Our study is a Cross-Sectional, Observational study that was conducted over a period of 12 months. The sample size was calculated using Yamane Formula and data was collected for the study from 28 patients.

The criteria for inclusion in the study were patients diagnosed to have orbital fractures on a Computed Tomography (CT) scan and those who were consenting to the study.

Patients not consenting to the study and those with globe injuries without orbital fractures were excluded from the study.

Detailed evaluation of each patient was done starting with history collected from the patient and/or patient by-stander which included the demographic details, cause of the trauma, mechanism of the injury, time between the injury and presentation to the hospital, history of alcohol consumption, use of protective equipment, presenting ocular complaints and any other complaints.

Best corrected visual acuity (BCVA) using Snellen's chart at 6m distance, torchlight evaluation and slit lamp bio-microscopy of the anterior segment, indirect ophthalmoscopy of the posterior segment, ocular motility assessment for ductions, versions and vergences were done as part of a thorough ocular examination.

Ocular motility limitations were graded as Grade 0- full motility; Grade 1- 25% limitation of motility; Grade 2- 50% limitation of motility, Grade 3- 75% limitation of motility; Grade 4- 100% or full limitation of motility.

A detailed assessment of the CT films of the orbit and paranasal sinuses was done for each patient to record the site of the fracture, associated soft tissue injury, extraocular muscle involvement and the presence of other facial fractures.

The statistical analysis of the acquired data was done by calculating mean, range, z test and chi square test using statistical software like MS Excel and SPSS version 23.

Results

Demographic Characteristics

In our study, the patients diagnosed with orbital fractures were predominantly Male (89%, p<0.00001%) with an average age of 33 years. Figure 1: Cause of Injury in Orbital Fractures

Examination Findings

Our examination findings revealed that, majority of the patients presented with left eye involvement (42.8%) however this was not statistically significant (p = 0.5892). 82% of the patients had a BCVA of 6/6. Lid oedema and ecchymosis were the most commonly observed anterior segment findings, seen in 85.7% of patients. The most common conjunctival finding was conjunctival congestion (57.1%), followed by subconjunctival haemorrhage (17.8%) and chemosis (7%). One patient had corneal abrasions and one had a hyphema in the anterior chamber and was found to have angle recession. The remaining anterior segment was normal in most of the patients. Another patient had grade three relative afferent pupillary defect (RAPD) and posterior segment examination revealed vitreous haemorrhage and rhegmatogenous retinal detachment in the same eye. The remaining patients had normal posterior segment findings.

Three (10.7%) of our patients had restricted ocular motility on extraocular muscle assessment. On examination of the orbital margins, we found that 75% had tenderness, in 46.4% of patients margins could not be palpated due to oedema and 17.8% had crepitus at the site of fracture.

CT Findings

Soft tissue involvement was seen in 75% of our cases, which was statistically significant (p = 0.00018). Edema was seen in 39.2%, air foci in 28.5% and medial rectus buckling in one of the cases.

The most commonly fractured orbital wall in our study was the lateral wall which was seen in 15 (53.5%) of the cases.

The average duration from the time of injury to time of presentation to the hospital was 13 hours but ranged from a minimum of half an hour up to a maximum of 48 hrs.

The mechanism of injury in all patients was blunt force trauma. The cause of the injury was most commonly RTA (67.8%, p=0.00758), of which 94.7% of which involved two-wheeler vehicles. The drivers presented with orbital fractures in 73.6% of cases (p = 0.04036), which was significantly more than the passengers (14.2%). The majority (89.5%) of the orbital fractures due to RTAs occurred in patients who did not use a

helmet (p<0.00001). 36.8% were driving under the influence of alcohol (p=0.03236).

Fall from heights (21%) and assaults (11%) were the other causes of orbital fractures.

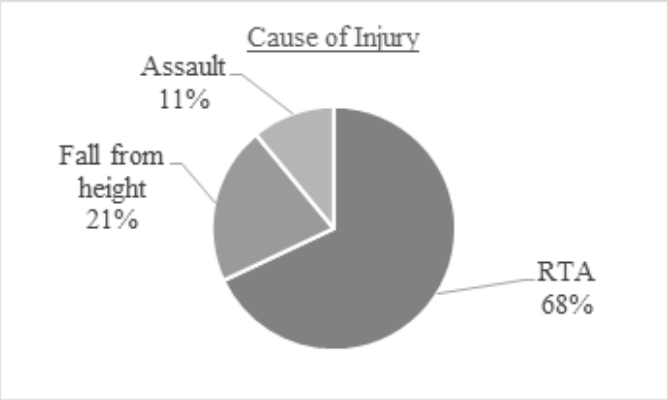

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Figure 2: Axial section of CT orbit showing lateral wall fracture.

However, 13 (86.6%) of these were undisplaced fractures and the remaining were displaced. Along with the lateral wall, seven (25%) of the patients showed other wall fractures as well.

The floor of the orbit was the second most common fractured wall seen in ten (35.7%) of the cases. The floor fractures were the most commonly displaced fractures with six (60%) of them being displaced.

Orbital floor fractures and roof of orbit fractures was seen in nine (32.1%) of the patients, respectively. Among the roof fractures, five (55%) were displaced. Three (33%) each of the posteromedial wall and the lamina papyracea were displaced fractures.

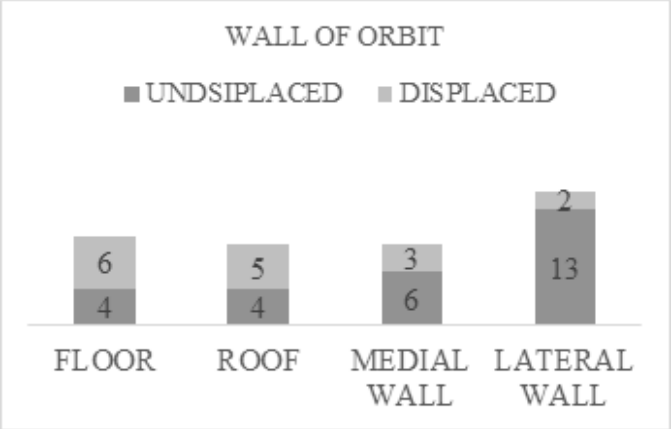

Figure 3: Walls of orbit fractured.

On chi square test, there was no statistically significant difference of incidence of wall fractured with p = 0.29128 and no statistically significant difference when incidence of displaced and undisplaced fractures are compared (p = 0.064702).

Fracture of multiple orbital walls was seen in 13 (46%) of the patients but was statistically not significant (p=0.59612).

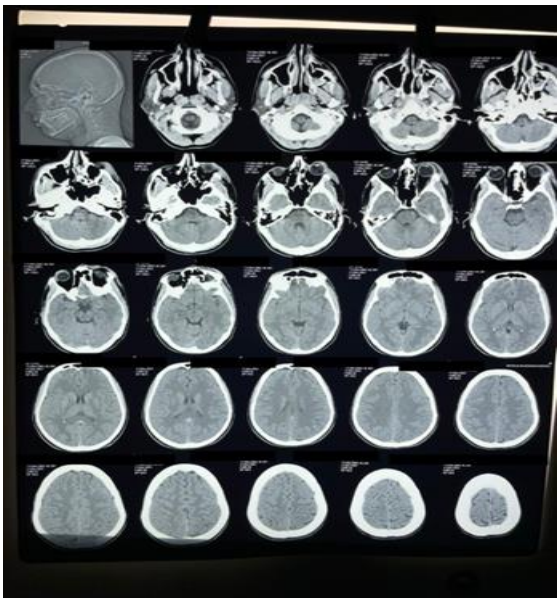

Figure 4: Axial section CT Orbit showing multiple wall fractures of left orbit.

Other associated facial bone fractures were seen in 75% of the cases.

Discussion

The analysis of our data showed that orbital fractures were more common in males, this is consistent with other studies. [6-10] The average age among our cases was 33 years, this was similar to that reported by Philamazan et al and Chiang et al. [6,8]

In our study, RTA was the most common cause of injury, which was also found in another study done in India.[6] However, studies done outside of India reveal assault as the most common cause. [5,8-10]

Among the RTAs, two-wheeler vehicles were more commonly involved. The majority of them failed to use protective equipment such as a helmet, further 35% were under the influence of alcohol. This highlights the need to bring about increased public awareness of the risk associated with these behaviours, especially among the target population of young males.

The left side was most affected in our study, which was also found by Chiang E et al in their study.[8] In a review article, it was found that vision-threatening injuries like globe rupture (2.9%) and posterior segment findings (1.3%) were rare.[11] We had similar findings, that most of the ocular injuries were minor injuries that were not sight-threatening. The most common injury was lid findings like oedema and ecchymosis which were seen in 85.7% and 71.4%, respectively.

Three of our patients had a restriction in ocular motility and they were found to have displaced orbital wall fractures. Therefore, showing that restricted ocular motility is a high-risk finding in cases with an orbital fracture.

An analysis of orbital fractures done in South Korea found that the largest group of fractures included the inferior region of the orbital floor and zygomatico maxillary region[10]. Similar findings, where the inferior

orbital wall was most commonly affected were seen in other studies. [7,8,12]

However, we found the majority were lateral wall fractures that were displaced. The second most common was floor fractures which were displaced and more likely to require surgical intervention. This may be attributed to the mechanism of the injury which most commonly was a fall from a two-wheeler in which the impact may occur laterally. Whereas, inferior wall fractures occur due to buckling of the inferior wall caused by increased intraorbital pressure, a mechanism which is more common in assault injuries.[13]

We also found that 75% had other associated facial bone fractures. Similar findings were reported by Chiang et al and Andrews BT et al. [8]

Conclusion

Our study brings to notice the need to educate the target population on the importance of using protective gear like a helmet while riding a two-wheeler and the grave consequences of driving under the influence of alcohol. Lid oedema and ecchymosis are commonly seen in orbital fractures and should point toward the need for radiological investigations in ocular trauma patients with these signs.

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