European Journal of Molecular & Clinical Medicine

ISSN2515-8260 Volume 09, Issue 01, 2022

A study on ocular complications following orbital fracture at a tertiary care hospital

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Abstract
Trauma can result in fracture of one or more wall of the orbit, floor being most common affected, followed by combined floor and medial wall fracture, followed by combined floor and lateral wall fracture, combination floor, lateral wall and medial wall together, isolated lateral wall and isolated medial wall in decreasing frequency. Pupils were checked for both direct and indirect light reflex and swinging flash light test was done to rule out any relative afferent pupillary defect. Slit lamp biomicroscopy and indirect ophthalmoscopy was done to rule out involvement of Posterior segment. Inspection palpation and auscultation of the orbit and orbital margins were done Hertelsexophthalmometer was done to check Enophthalmos and exophthalmos. Extra ocular movements were examined in all nine gazes both ductions and versions. Forced duction test was done in case of restricted ocular movement. Our study had 8 patients with diplopia. Out of which 3(37.5%) had floor fracture, 4(37.5%) had combined medial, lateral and floor, 4(37.5%) had combined medial and lateral and 1(12.5%) medial wall fracture.
Keywords: Ocular complications, orbital fracture, maxillo facial trauma

Introduction

The orbits are the bony cavities that contain the globes, extraocular muscles, nerves, fat and blood vessels. Each bony orbit is pear shaped, tapering posteriorly to the apex and the optic canal**.** The orbit resembles a quadrilateral pyramid whose base, directed forwards, laterally and slightly downwards, corresponds to the orbital margin and whose apex is between the optic foramen and medial end of the superior orbital fissure.The widest dimension of the orbit is approximately 1 cm behind the anterior orbital rim [1].

The orbital septum arises from the orbital rims anteriorly. The paranasal sinuses are either rudimentary or very small at birth, and they increase in size through adolescence. They lie adjacent to the floor, medial wall, and anterior portion of the orbital roof. The orbital walls are composed of 7 bones: ethmoid, frontal, lacrimal, maxillary, palatine, sphenoid and zygomatic.

Orbital injuries are seen in nearly 70% of patients with maxillo facial trauma [2].

Trauma can result in fracture of one or more wall of the orbit, floor being most common affected, followed by combined floor and medial wall fracture, followed by combined floor and lateral wall fracture, combination floor, lateral wall and medial wall together, isolated lateral wall and isolated medial wall in decreasing frequency [3].

Clinical ocular findings and injuries are relatively common following orbital fractures. These injuries occur more often in patients with orbital blowout fractures (orbital floor fractures). Patients with orbital fractures can present with traumatic iritis, corneal abrasion, hyphema, acute glaucoma, lens trauma, vitreous hemorrhage, commotio retinae, retinal tears and detachment, and traumatic optic neuropathy [4].

ISSN2515-8260 Volume 09, Issue 01, 2022

A multidisciplinary approach may be required in complex cases, using expertise from plastic surgery, facio-maxillary surgery, ear, nose and throat (ENT) and neurosurgery, depending upon other associated injuries.

Methodology

A pre-structured and pretested questionnaire was used to gather information after obtaining an oral informed consent from the study subject and maintaining confidentiality. The relatives or attendants will be interviewed where the condition of the victims did not warrant the interview.

Following history about patient is collected

Patients general information, demographic details, date of injury, date of presentation were recorded.

Information regarding type of vehicle and use of any protective gear were recorded. Visual assessment was done using.

1. Snellen's chart for distance.
2. Jaegers chart for near and best corrected visual acuity was determined with adequate correction.

Confrontation method was used to assess the visual field.

Ocular alignment was check with Hirschberg test and cover test was used to confirm any findings.

To rule out anterior segment involvement Slit lamp examination was done.

Pupils were checked for both direct and indirect light reflex and swinging flash light test was done to rule out any relative afferent pupillary defect.

Slit lamp biomicroscopy and indirect ophthalmoscopy was done to rule out involvement of Posterior segment.

Inspection palpation and auscultation of the orbit and orbital margins were done.

Hertelsexophthalmometer was done to check Enophthalmos and exophthalmos.

Extra ocular movements were examined in all nine gazes both ductions and versions. Forced duction test was done in case of restricted ocular movement.

Diplopia charting was done for patients complaining of diplopia.

CT images were used to assess the side and the type of fractures.

Exclusion criteria

1. Ocular injuries without orbital fractures.
2. Brought dead cases or cases that died during the course of treatment.
3. All patients not giving consent.

Results

Table 1: Visual acuity in patients of TON

6/9 or better	3
6/12-6/60	6
CF	2
PL	1

Table 2: Defective EOM

Defective EOM	No of Cases	Comments
Elevation restriction	3	Fracture floor with herniation of orbital contents
Eye fixed in abducted and depressed position	2	Associated 3 rdnerve palsy

All movements restricted	4	3 rd, 4 TH and 6TH

Discussion

19 (19%) cases showed decrease in Visual acuity which is quite favourably comparable with a few other studies. al-Qurainy*et al*. [5] found the visual acuity to be impaired in 15.4% at presentation. Osguthorpe JD [6] observed that 5% had permanent loss of vision and another 5% had permanent impairment in vision. Jayamanne*et al*. [7] found that 74% of multiple facial fractures had 6/9 or better vision. Amrith S *et al*. [8] observed that at presentation 58% of the patients had vision of 6/12 or better 12.5% had vision from 6/18-6/60 and 11.5 had vision <6/60-CF and 4% had HM/PL and 7% had no PL. our observation showed a comparable figure 81% had vision 6/9 or better 9% had vision from 6/18-6/60, 8% had vision <6/60-CF and 2% had PL vision at presentation.

Covington *et al*. [9] noted 19 out of 243 patients (8%) and Jayamanne*et al*. reported [10] reported one out of 45 (2%) to have traumatic optic neuropathy. In the studies mentioned above, the reason for a low incidence of optic neuropathy may be because of the preponderance of zygomatico-maxillary fractures and blow-out fractures and ShanthaAmrith*et al*. [11] analysis shows that the optic neuropathy is significantly lower in zygomaticomaxillary and blow-out fractures compared to orbital roof or base of skull or other complex fractures. On the contrary, Kareshet *al*. [12] found that in seven cases of orbital roof blow-in fractures there were varying degrees of optic nerve involvement in all the seven cases. Similarly, Burstein *et al*. [13] analysed fronto-basilar trauma and found that two of the 14 patients were bilaterally blind due to optic nerve trauma.

Stanley *et al*. [14] found that nine out of 11 cases with impacted lateral orbital wall fractures had traumatic optic neuropathy, however, they conjectured that the traumatic optic neuropathy that accompanied this type of fracture is distinct from the indirect optic nerve trauma that may have responded to steroids or optic canal decompression. Amrith S *et al*. [11] in their case series reported a figure of 20% for traumatic optic neuropathy, similar to our study which reports a incidence of 19.6% and concluded that their figure of 20% does not appear to be high as it includes all the type of fracture.

Our study had 8 patients with diplopia. Out of which 3(37.5%) had floor fracture, 4(37.5%) had combined medial, lateral and floor, 4(37.5%) had combined medial and lateral and 1(12.5%) medial wall fracture. Our study is comparable with Osman MelihCeylan study. According to Osman MelihCeylan*et al*. [15] data for 39 patients with diplopia due to orbital blowout fracture, the inferior wall alone was involved in 22 (56.4%) patients, medial wall alone was involved in 14 (35.8%) patients, and the medial and inferior walls were involved in three (7.6%) patients.

According to John Marquis Converse *et al*. Orbital floor fractures are the cause of traumatic enophthalmos and diplopia.

Among the blow-out fractures, Biesman*et al*. [16] found that the prognosis was worse in combined floor and medial wall fractures.

Forced duction test was used to establish mechanical restriction. The test is not objective; it relies entirely on the examiner. Forced duction test is positive for reasons other than entrapment.

Forced duction test reveals information about mechanical limitations to full ocular rotation. When voluntary ocular rotation is limited and the forced duction test is completely free, paresis of an extraocular muscle is suggested.

The prism and alternate cover test was done for all patients presented with diplopia. It belongs to the group of strabismus tests. A prism compensates for the deviation and gives the angle of deviation which is read from the strength of the prism. The test measures the extent of diplopia but does not measure motility. The Maddox rod test was used primarily in strabismus diagnosis. It measures vertical and horizontal deviations by intentionally giving the images from each eye a different shape or colour. The amount of dissociation between the two images in diplopia is measured by means of prisms.

Conclusion

Orbital floor fractures are associated with higher incidence of Traumatic optic neuropathy compared to other wall fracture.

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