

## A Comparative Cross Sectional Study of Ophthalmic and Ocular Sequelae Following Orbital Wall Fracture

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### Abstract

**Background:** Orbital wall fractures are commonly seen among adult males and adolescent males, road traffic accidents is important factor in recent admissions. These fractures may be of isolated bone involvement or multiple bone involvement, the fractured orbital walls heals with fibrous union altering the normal anatomy of orbit.

This altered anatomy causes various complications to the refractive state as well as adnexa of eye. This study is about the outcome of visual acuity, refractive status, Ocular tear film stability and various parameters of patients of orbital wall fracture who were either managed conservatively or surgically treated.

**Methods:** This study was done among 50 subjects above 18 years, 25 surgically intervened, 25 conservatively managed, they were periodically followed. Each patient underwent best corrected visual acuity, orthoptic evaluation. refraction, fundus, tear film stability tests with appropriate instruments.

**Results:** The study revealed that most of the patients were adult males involved in RTA related orbital wall fractures, 44 % of persons were in 21-40 yrs. age group, esophoria 14% was the deviation of most common occurrence, 62% patients developed astigmatism as most common refractory error, dry eye was seen in 85% of individuals.

**Conclusion:** Orbital wall fractures are more common with increasing road traffic accidents, young adults are most commonly affected, the sequelae being dry eye, orthoptic deficiencies and significant refractory errors.

**Keywords:** Orbital Injuries, Refractory Errors, Orthoptics, Road Traffic Accidents.

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### Introduction

Orbits are bilateral conical structures; they are pyramidal in shape the walls are not regular they are curvilinear and have foramina and fissures. A blunt trauma to orbital wall may lead to dystopia and

disorganized ocular adnexa, inferior wall being most common fractured wall in many studies, but nowadays the road traffic accidents causes multiple wall fractures along with orthoptic difficulties,

many studies were done for ocular trauma giving importance to the wall fractures and types of injuries, but what is not known is the amount of orbital morbidities these fractures can cause among persons who either were surgically managed or conservatively managed. This study is an attempt to find all the morbidity parameters like visual acuity, sensory abnormalities, orthoptic status and dry eye among those who were managed.

**Aim**

To analyse the presence of orthoptic and ophthalmologic sequelae among the surgically managed group and

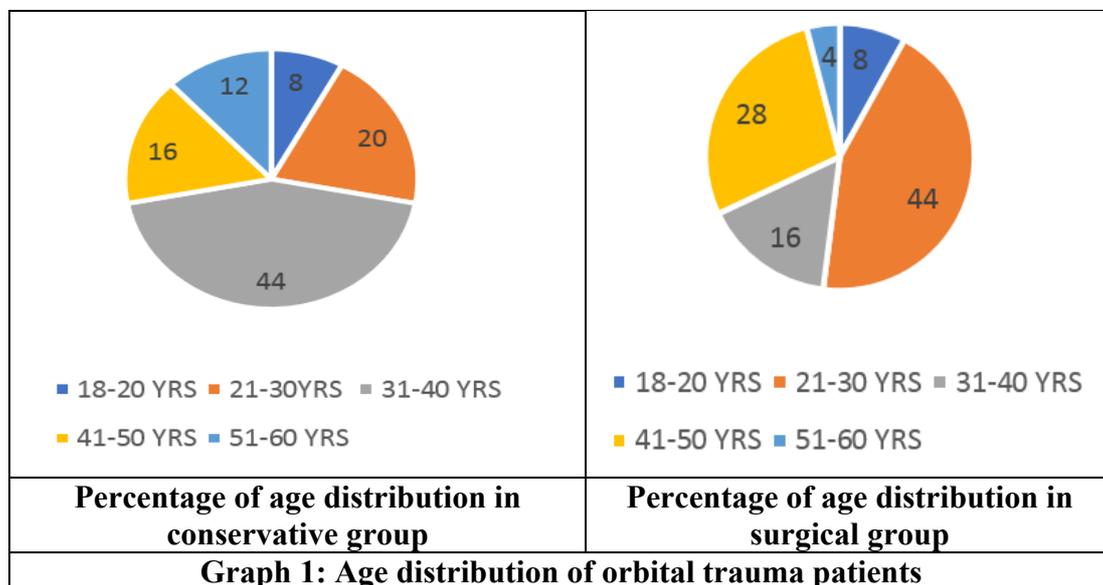
conservative management group of orbital wall fractures.

**Materials and methods**

This study was done in the government Rajaji Hospital Madurai, Madurai Medical College. Trauma patients who either were surgically managed from April 2015 to September 2021.

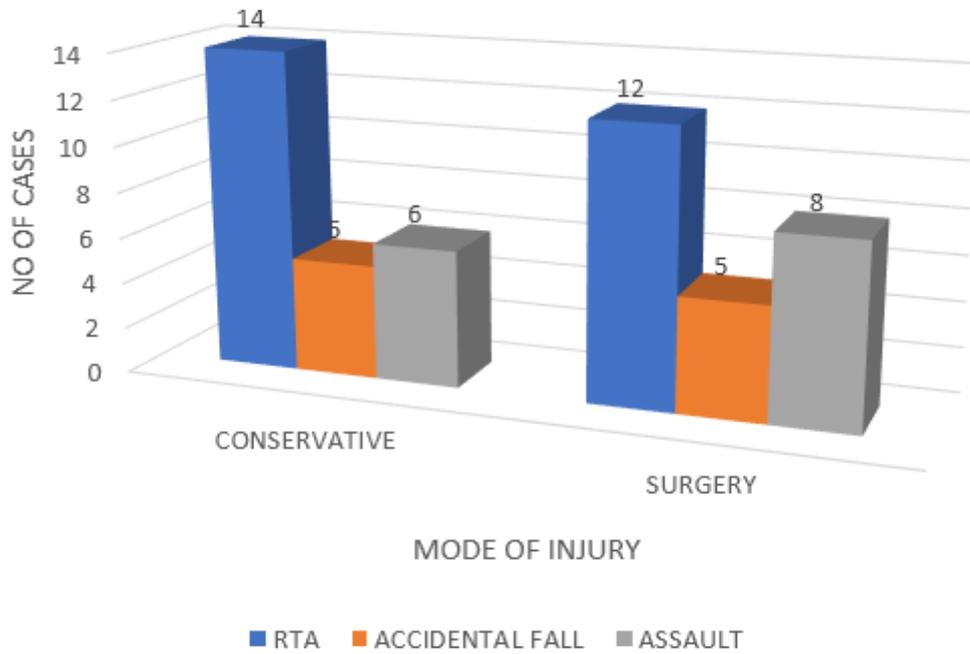
Study was among 50 participants, 25 belonged to each group, above 18 years, proper ethical clearance from research committee and ethical committee was obtained.

**Results**



**Table 1: Gender distribution among trauma patients**

| Gender | No. of Cases | Percentage |
|--------|--------------|------------|
| Male   | 35           | 70         |
| Female | 15           | 30         |
| Total  | 50           | 100        |



**Graph 2: Comparison of mode of injury**

**Table 2: Extraocular movement restriction**

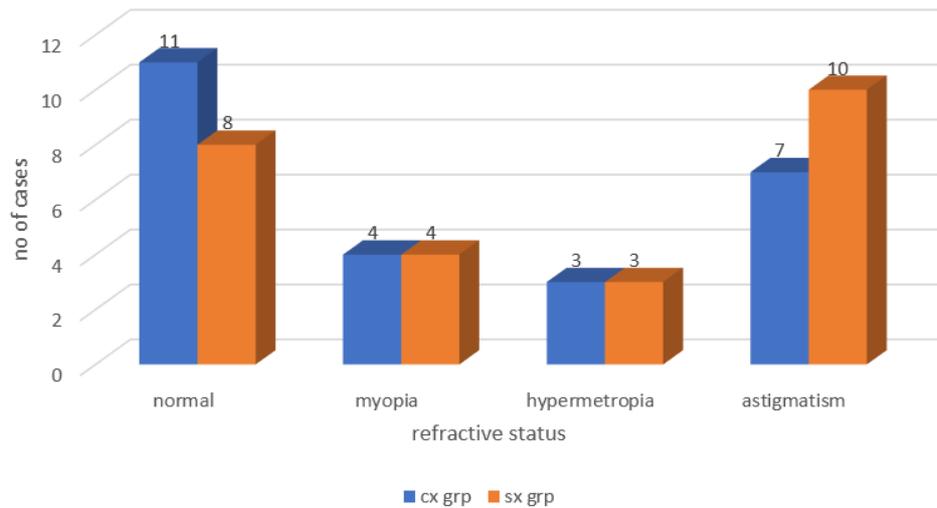
| EOM Status      | Eyes with Mx orbital wall fracture | Other eye | Total no of cases |
|-----------------|------------------------------------|-----------|-------------------|
| EOM restriction | 7(14%)                             | 0         | 7                 |
| Normal          | 43(86%)                            | 50(100%)  | 93                |
| TOTAL           | 50                                 | 50        | 100               |

**Table 3: Comparison of Diplopia in Both Groups**

| Diplopia Status | Cx group | Sx group | Total no of cases |
|-----------------|----------|----------|-------------------|
| Diplopia        | 2(8%)    | 6(24%)   | 8                 |
| Normal          | 23(92%)  | 19(76%)  | 42                |
| TOTAL           | 25       | 25       | 50                |

**Table 4: Comparison of phorias and tropias**

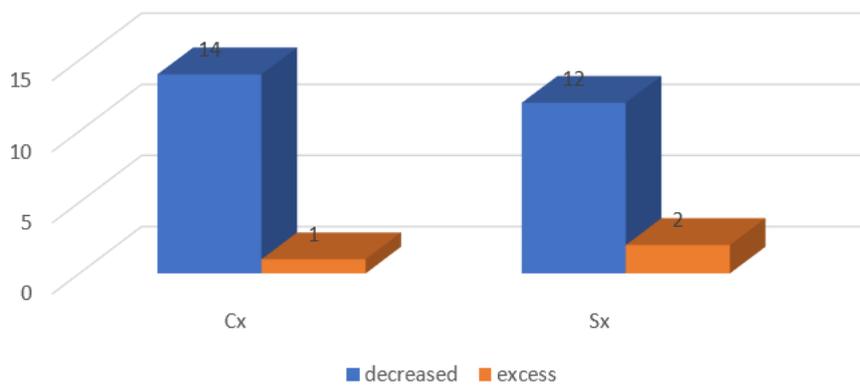
| Phoria/Trophia | Conservative Group | Surgical Group | Total cases in both groups |
|----------------|--------------------|----------------|----------------------------|
| Esophoria      | 3(12%)             | 4(16%)         | 7(14%)                     |
| Esotropia      | 2(8%)              | 2(8%)          | 4(8%)                      |
| Exophoria      | 0                  | 1(4%)          | 1(2%)                      |
| Hypotropia     | 2(8%)              | 1(4%)          | 3(6%)                      |
| Normal         | 18(72%)            | 17(68%)        | 35(70%)                    |
| Total          | 25                 | 25             | 50(100%)                   |



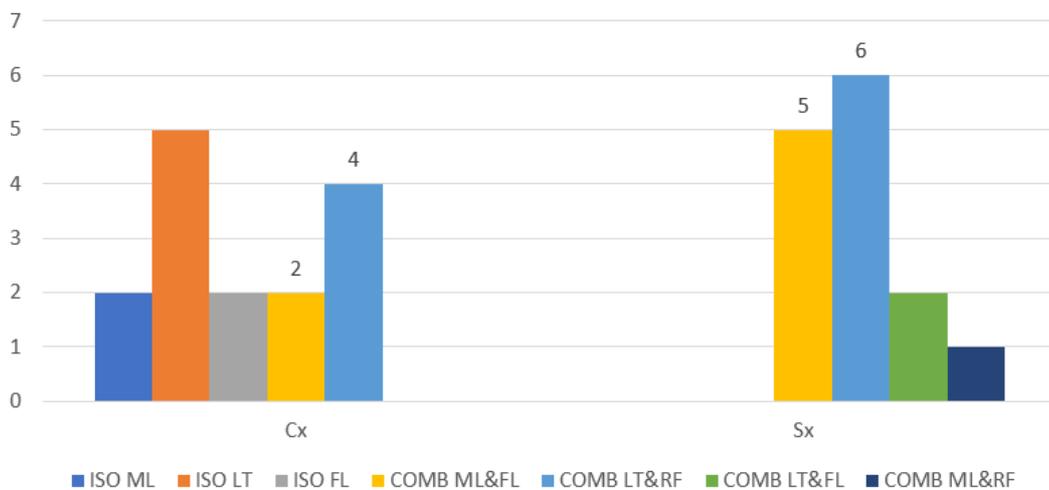
**Graph 3: Comparative of refractive status of eye**

**Comparative of Dry Eye Status**

comparision of altered tear film status



**Graph 4: Comparative of Dry Eye Status**



**Graph 5: comparison of type of wall fracture & tear film status in both group**

**Table 5: Type of Wall Fractures**

| Type of Fracture             | Altered tear film status | Normal tear film status |
|------------------------------|--------------------------|-------------------------|
| Isolated Medial Wall         | 2(6.8%)                  | 4(19.0%)                |
| Isolated Lateral Wall        | 5(17.2%)                 | 4(19.0%)                |
| Isolated Floor               | 2(6.8%)                  | 2(9.5%)                 |
| Combined Medial Wall & Floor | 7(24.1%)                 | 11(52.3%)               |
| Combined Lateral Wall & Roof | 10(34.4%)                | -                       |
| Combined Lateral & Floor     | 2(6.8%)                  | -                       |
| Combined Medial & Roof       | 1(3.4%)                  | -                       |
| Total                        | 29                       | 21                      |

## Discussion

A study was done among two group of patients consisting of 25 cases in each group to analyse the presence of sequelae following both conservatively and surgically managed orbital wall fracture respectively. Evaluation begins from detailed history taking, recording of best corrected visual acuity, ophthalmic evaluation, orthoptic evaluation.

Mean age in managed group is 33.12 ±10.2.

8% & 20% of cases had EOM restriction in conservatively managed group and surgically managed orbita wall fracture group respectively.

8% & 24% cases had diplopia in conservatively managed group and surgically managed group respectively. In our study 15 cases had phoria or trophia in orbital wall fractured eye this suggestive of phoria or trophia as sequelae following orbital wall fracture

62% & 22% of patients had refractive error in eye with managed orbital wall fracture and the unaffected eye respectively. Astigmatism was most common refractive in both surgically & conservatively managed groups [4]. The average visual acuity was slightly lower on affected eye when compared with unaffected eye with p value is 0.001 and statistically significant this suggestive of significant association of refractive error and managed orbital wall fracture.

One possibility is that the BOF changed the orbital cavity in such way that the supporting tissue surrounding the eye bulb exerts pressure on the bulb. This could lead to changed curvature of the cornea and larger astigmatism as suggested by pansel et al [5]

In our study 58% & 26% of patients had altered tear film status in eye with managed orbital wall fracture & unaffected eye respectively the p value is 0.001 and is statistically significant there is association of orbital wall fracture and tear film instability which may lead to dry eye syndrome., combined lateral wall & floor is most commonly associated with altered tear film status but p value is 0.33 there is no significant difference between both group

34.4 % of patients with altered tear film had combined lateral wall & roof fracture suggestive of most commonly association with altered tear film status calculated p value is 0.06 which is >0.05 is not statistically significant. [6]

The lacrimal gland which is located anteriorly in the superolateral aspect of the orbit, within the lacrimal fossa is the major source of tear fluid. So any anatomical disruption and mechanical compression from orbital trauma resulting in injury of the lacrimal gland, including hematoma, edema, and vascular insufficiency may alter the tear film production and predisposes to dry eye syndrome. Therefore, severe orbital fracture, especially orbital roof fracture, may

contribute to the development of DES as suggested by hsu etal [1]

### Conclusion

There are various sequelae of orbital wall fracture in patients even after management. Ophthalmic sequelae such as refractive error & Altered tear film stability are seen even after management of orbital wall fracture.

Orthoptic sequelae such as diplopia, phoria, trophic & restriction of EOM in extreme gazes is persistent even after management of orbital wall fracture. This may lead to low visual acuity hence it is important to do routine visual examination in all patients with orbital wall fracture after ocular status is stabilised.

This is an inexpensive and adequate examination that will reduce or eliminate ocular and visual symptoms

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