IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 11 Ser.2 (November. 2021), PP 24-32
www.iosrjournals.org

Ocular Manifestations in Road Traffic Accidents

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Abstract:
Background*: Road traffic accidents are events of human tragedy that involves at least one moving vehicle and result in injury or death of one or more individuals. Road traffic accidents account for a major proportion of human suffering all over the world. Ocular injuries contribute to major part of trauma in road traffic accidents. Trauma to eye can cause severe and permanent visual impairement owing to its delicate and complex architecture. Ocular trauma due to road traffic accidents resulting in visual loss create enormous effects both to the victim and to the society. Ocular involvement may include eyelids, lacrimal canaliculi, orbital wall, periorbital structures, conjunctiva, cornea, sclera, extraocular muscles. Ocular trauma is regarded as one among the common causes of ophthalmological morbidity and blindness. These are often preventable and hence the need to increase public awareness of this public concern all over the globe. This study is performed to evaluate the pattern of different types of ocular injuries in road traffic accidents and assess the visual outcome.*
Materials and Methods*: In this cross sectional observational study, 200 patients who sustained ocular injuries during road traffic accidents were studied from December 2017 to August 2020.*
Results*: This study included 200 cases who had sustained ocular injuries due to Road traffic accidents. Commonest age group was found to be 21 - 30 years. Male preponderance was noted. Number of accidents was more due to 2 wheelers. The most common clinical manifestation was found to be ecchymosis, followed by lid laceration, then subconjunctival hemorrhage and orbital fractures. Conjunctival tear, corneal abrasion, corneal tear, traumatic hyphema, traumatic mydriasis, sphincter tear, scleral laceration and iris prolapse were less commonly seen.*
Conclusion: *It was found that most of the injuries involved the ocular adnexa, which, while causing a certain degree of cosmetic disfigurement, did not lead to any permanent visual sequelae. Injuries involving cornea or sclera had a bad prognosis, and those with optic neuropathy had the worst prognosis.*
Key Word*: Road traffic accidents; injury; Ecchymosis; Lid laceration; Orbital fractures.*

Date of Submission: 28-10-2021 Date of Acceptance: 11-11-2021

I. Introduction

An injury to the eye or its surrounding tissues is the most common cause for patients attending an eye hospital emergency department. The extent of trauma ranges from simple superficial injuries to devastating penetrating injuries of the globe. The surgical management of injuries is primarily aimed at restoration of normal ocular anatomy. The ultimate goal is to prevent secondary complications and maximise the patients' visual prognosis.

There are dramatic improvements in the surgical management of ocular trauma over the past two decades. However, there are limitations like persistent inadequacy in the standardized documentation of eye injury morbidity and treatment outcome.

Eye injuries are a major cause of disabling ocular morbidity that especially affect the young. Injuries to eye generate a significant and often unnecessary human suffering, long term disability, productivity loss, medical care, rehabilitation services and socioeconomic cost.

II. Material And Methods

This cross-sectional observation study was carried out on patients of Department of Ophthalmology at Rangaraya Medical College, Kakinada from December 2018 to August 2020. A total 200 subjects (both male and females) were for in this study.

Study Design: Cross sectional observation study

Study Location: This was a tertiary care teaching hospital based study done in Department of Ophthalmology at Rangaraya Medical College, Kakinada

Study Duration: December 2018 to August 2020.

Sample size: 200 patients.

Subjects & selection method: The study population was drawn from patients with history of ocular injuries following road traffic accidents presenting to casualty and out-patient department of Ophthalmology, GGH, Kakinada

Inclusion criteria:
1. Patients who sustained ocular injuries during road traffic accidents.

Exclusion criteria:
1. Ocular injuries due to accidental fall or domestic trauma.
2. Ocular injuries due to assault.
3. Injuries due to burns and chemicals.
4. Previous history of road traffic accidents and ocular trauma.

Selection of subjects:

Patients with history of ocular injuries following road traffic accidents presenting to casualty and out-patient department of Ophthalmology, GGH, Kakinada.

Socio-demographic data and details of the patient were obtained. Information regarding the type of vehicular accident, time and location were noted.

- **Signs and symptoms** occurring after the injury were recorded.
- Thorough examination using a **torchlight** was done.
- **Visual acuity** was recorded using Snellen's chart.
- This was followed by examination under a **slit lamp** for detailed examination.
- **Gonioscopy** was performed wherever necessary.
- IOP was recorded with an **applanation tonometer**. In few cases, it could not be recorded.
- **Direct and Indirect Ophthalmoscopy** was performed wherever required.
- **Retinoscopy** was performed in cases without media opacities.
- Plain **X-ray** skull AP view, lateral view, Rheese parieto-orbital-oblique view and Water's view were taken whenever necessary.
- **B-scan ultrasonography** was performed in those cases with media opacities who were suspected of having posterior segment abnormality.
- **CT** and **MRI** were done wherever required.
- Depending on the presentation, patients were subjected to detailed examination by **ENT surgeon, General surgeon, Maxillo-facial surgeon, and General physician.**
- Patients were managed mainly at casualty and OPD level, with some patients admitted for further management and specialized care.

Patients were followed up every week after they were discharged from hospital and the patients who were treated on OPD basis were also followed up every week.

III. Result

Table 1 indicates that the majority 60 (30%) of ocular injuries occur in the age group of 21 - 30 years and least 18 (9%) were seen in age group of 51- 60 years.

Table no 1: Age Wise distribution of Ocular Injuries in RTA

Ages	No: of cases	Percentage
< 20	30	15
21 - 30	60	30
31 - 40	44	22
41 - 50	29	14.5
51 - 60	18	9
>60	19`	9.5
Total	200	100.00

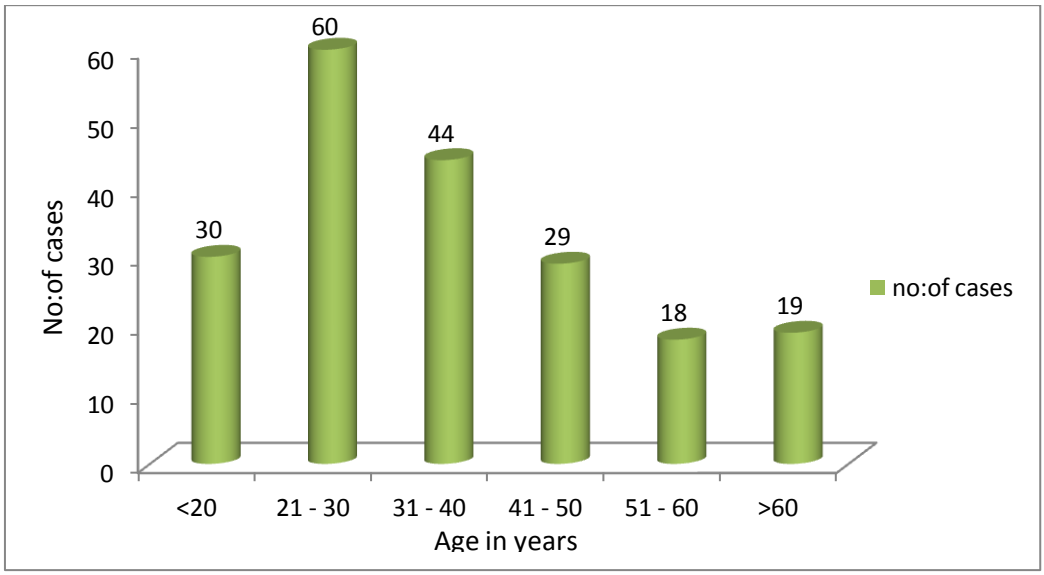


Table 2 depicts the prevalence of ocular injuries is more in males 167 (83.5%).

Table no 2: Sex distribution of ocular injuries in RTA

Sex	Number of cases	Percentage
Male	167	83.5%
Female	33	16.5%
Total	**200**	**100.00**

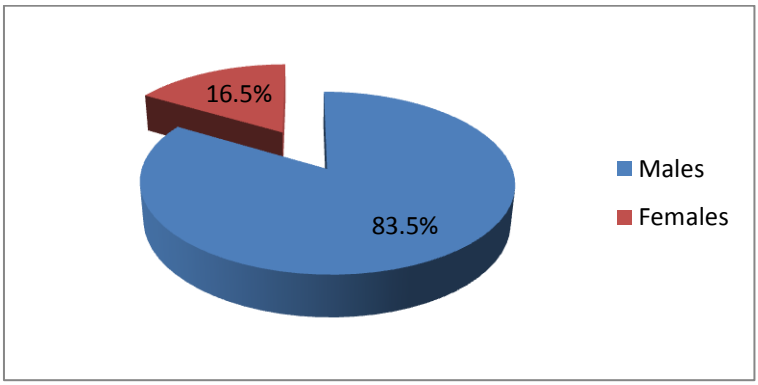


Table no 3 shows that most common 173(86.5%) of ocular injuries in RTA is due to 2 wheelers.

Table no 3: Distribution of cases according to type of vehicle involved

Vehicle	Number of cases	Percentage
2 wheelers	173	86.5 %
3 wheelers	6	3 %
4 wheelers	11	5.5 %
Pedestrians	10	5 %
Total	**200**	**100.00**

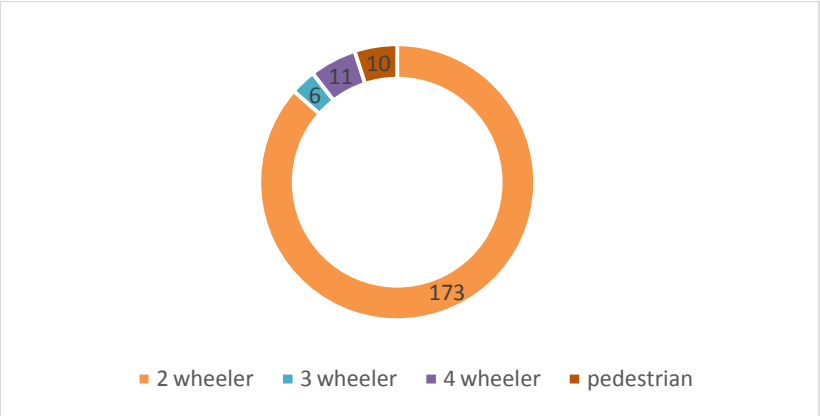


Table no 4 depicts that right eye is most commonly affected, i.e., 99 (49.5%) and both eye involvement is least common, i.e., 14(7%).

Table no 4: Distribution of cases according to eye affected

Eye	Number of cases	Percentage
Right eye	99	49.5 %
Left eye	87	43.5 %
Both eyes	14	7 %
Total	**200**	**100.00**

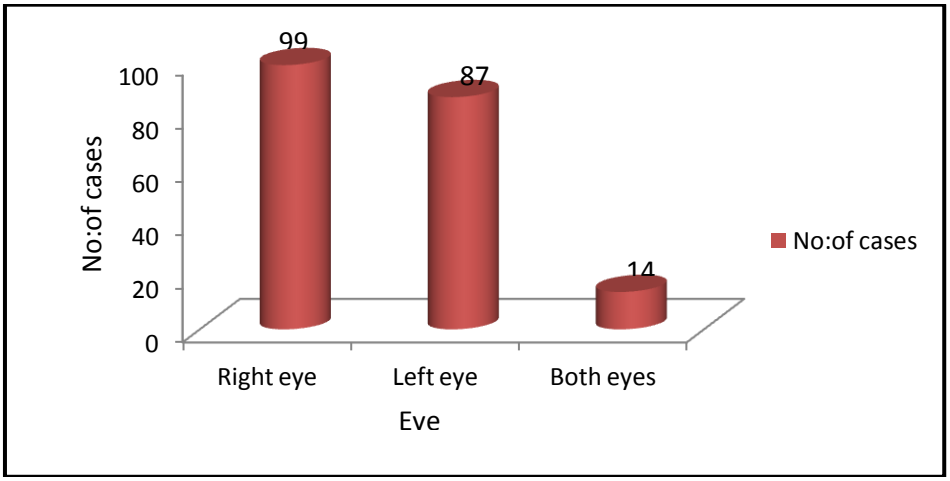


Table no 5 Shows The most common ocular manifestation of RTA is Ecchymosis 112 (56%) followed by Lid tear 91(45.5%).

Table no 5: Clinical manifestations of ocular injuries in RTA

	No: of cases	Percentage
Orbital fractures	22	11 %
Ecchymosis	112	56 %
Lid Tear	91	45.5 %
Sub conjunctival hemorrhage	36	18 %
Conjunctival tear	1	0.5 %
Conjunctival chemosis	5	2.5 %
Corneal abrasion	2	1 %

Corneal tear	1	0.5 %
Scleral laceration	3	1.5 %
Hyphema	2	1 %
Traumatic mydriasis	5	2.5 %
Iris prolapse	1	0.5 %
Sphincter tear	1	0.5 %
Traumatic cataract	1	0.5 %
Traumatic optic neuropathy	3	1.5 %
Lateral rectus palsy	1	0.5 %
3rd nerve palsy	1	0.5 %
Vitreous hemorrhage	2	1%

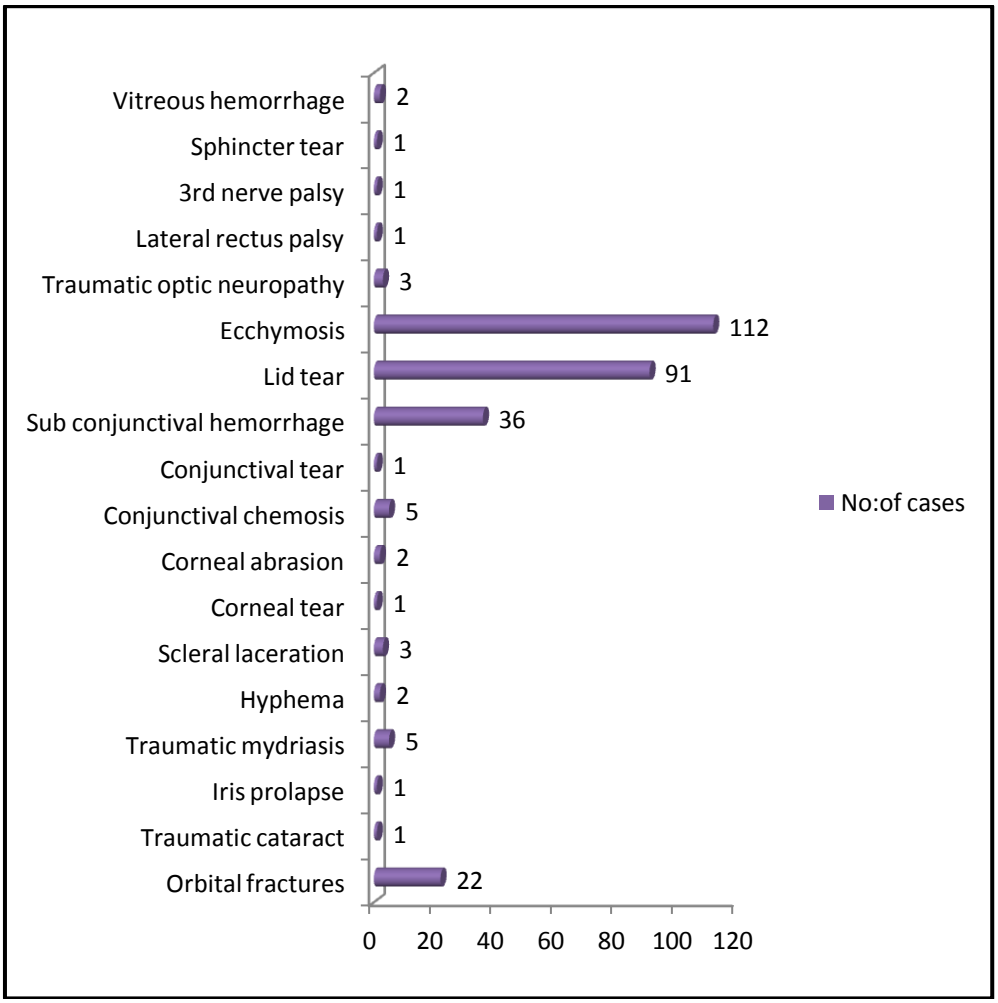


Table no 6 shows that a majority of cases, 188 (94%), had a visual acuity in the range of 6/6 - 6/12, and only 2 (1%) cases had no perception of light after 6 weeks.

Table no 6: Vision at the time of presentation

Vision	Number of cases	Percentage
6/6 - 6/12	186	93 %
6/18 - 6/36	7	3.5 %
6/60 - CF	2	1 %
PL - PR	3	1.5 %
No PL	2	1 %
Total	**200**	**100.00 %**

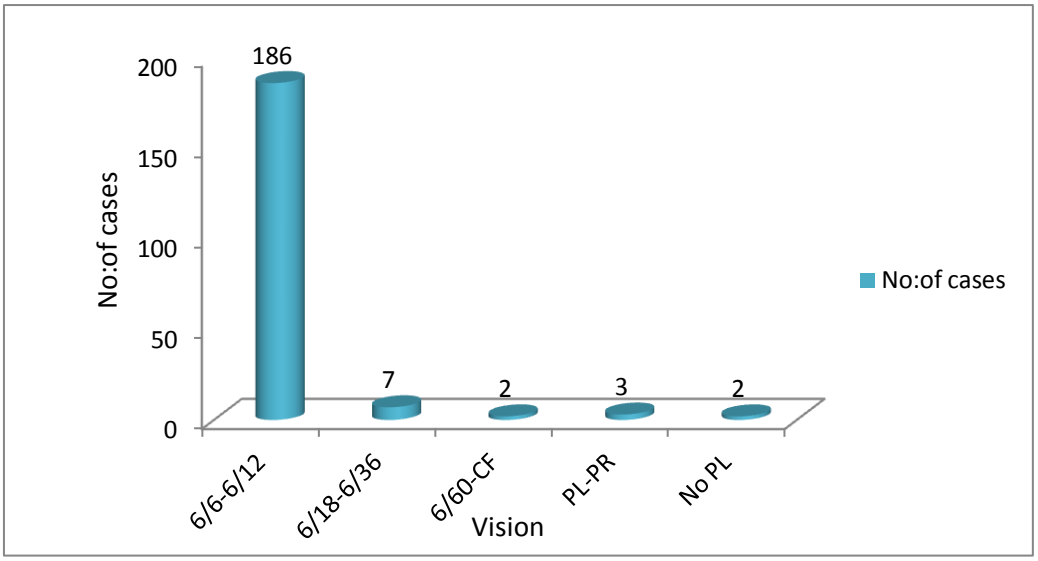


Table no 7 shows improved visual acuity was seen in 196 (98%) cases, in the range between 6/6 - 6/12 at the end of 6 weeks.

Table no 7: Vision at the time of discharge

Vision	Number of cases	Percentage
6/6 - 6/12	195	97.5 %
6/18 - 6/36	2	1 %
6/60 - CF	1	0.5 %
PL - PR	0	0 %
No PL	2	1 %
Total	200	100.00 %

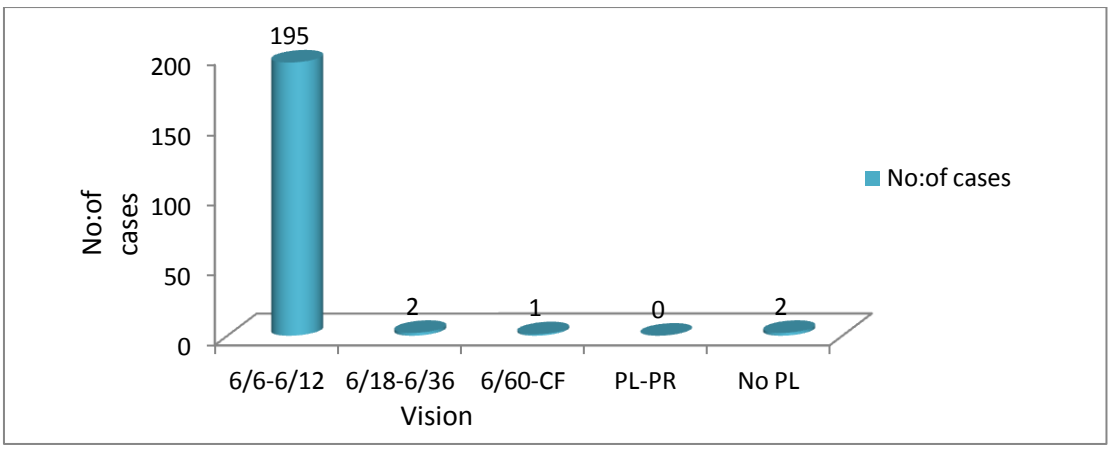
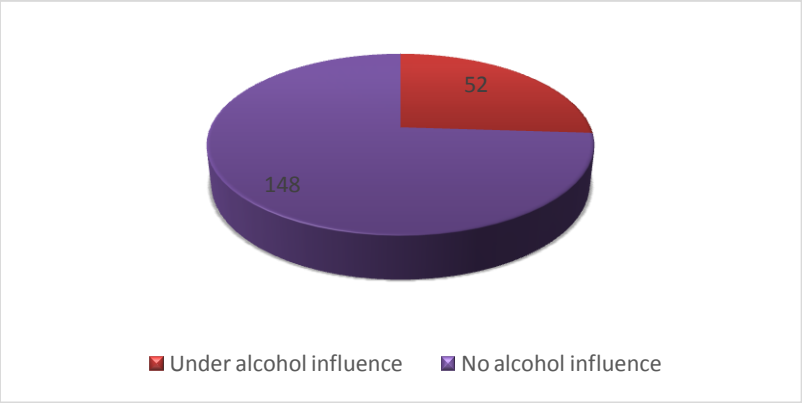


Table no 8 shows improved visual acuity was seen in 196 (98%) cases, in the range between 6/6 - 6/12 at the end of 6 weeks.

Table no 8: Distribution of cases according to Alcohol influence

	Number of cases	Percentage
Under alcohol influence	52	26 %
No alcohol influence	148	74 %
Total	200	100.00



IV. Discussion

This study includes a total number of 200 patients who had ocular injuries due to RTA.

Age :

In this study, majority of ocular injuries occurred in the age group of 21 - 30 years and the least number of cases were seen in patients over 50 years of age. In our study, about 15% cases were seen in the age group of below 20 years. This shows that the teenagers were involved in road traffic accidents due to their incapability to handle the vehicle and drive without a license.

SEX:

There were a total of 167 (83.5%) males and 33 (16.5%) females who had ocular injuries due to RTA. The male to female ratio was 5.06: 1. Similar male predominance was found in a study by Supriya Satish Patil et al., in which male to female ratio was 4.6:1.

Type of Vehicle:

Out of 200 patients with ocular injuries, most were due to motorized 2 wheelers 173 (86.5%) followed by 4 wheelers 11 (5.5%), pedestrians 10 (5%) and 3 wheelers 6 (3%). Younger age groups with ocular injuries due to RTA were because of 2 wheelers and the older age group above 60 years were usually pedestrians.

In the present study, most Road traffic accident cases causing ocular trauma were caused by 2 wheelers (86.5%), which was inconsistent with study done by Panagiotidis et al.[28] at Athens University eye clinic in which 86.56% of ocular trauma were following car accidents while 11.95% were occured following motorcycle accidents. This shows that usage of 2 wheelers is more in our country when compared to the western countries.

OCULAR MANIFESTATIONS OF ROAD TRAFFIC ACCIDENTS:

ECCHYMOSIS:

Ecchymosis was the most common clinical finding in our study. 112 (56%) patients have ecchymosis. 66 patients had only ecchymosis, 46 patients were associated with other clinical findings.

A study by Liji Menon et al at MOSC Medical College, Kolenchery, Kerala, showed that among 832 cases, commonest injury was periorbital edema and ecchymoses (68.6%).

LID TEAR:

Lid laceration is the second most common clinical finding in our study. 91 (45.5%) patients have lid tear, most of them being partial lid lacerations. 26 cases had eyebrow lacerations. 8 cases had both upper and lower lid tears. 9 cases had associated fracture orbit.

CONJUNCTIVA:

Sub conjunctival hemorrhage was the next most common clinical finding in our study. 36 (18%) cases had sub conjunctival hemorrhage. They varied from small petechiae to large extravasations. In severe Sub conjunctival hemorrhages, posterior limit could not be made out. 4 patients did not have any associated clinical findings.

Conjunctival tear was seen in 1 (0.5%) patient. It did not exceed more than 5 mm.

Chemosis was observed in 5 (2.5%) patients.

ORBITAL FRACTURES:
A total number of 22 (11%) orbital fractures were seen during the period of our study. Of these 8 cases had medial wall fracture, 4 cases had fracture of orbital rim, 6 cases had floor fractures, 2 cases had lateral wall fractures and 2 had pure blow out fractures.

CORNEA:
3 (1.5%) patients presented with corneal injuries out of which 2 patients had corneal abrasion and 1 patient had corneal tear. 1 patient with full thickness corneal tear was associated with iris prolapse.

SCLERA:
3 (1.5%) patients had scleral laceration. None of them were full thickness and were not associated with uveal prolapse.

HYPHEMA:
In our study 2 (1%) cases of hyphema were presented. In 1 patient hyphema involved <1/3rd of anterior chamber (Grade I). 1 patient had near total hyphema (Grade III).

IRIS AND PUPIL:
Most common findings were traumatic mydriasis 5 (2.5%), followed by 1 patient with iris prolapse and 1 patient with sphincter tear.

LENS:
1 patient had traumatic cataract.

POSTERIOR SEGMENT INVOLVEMENT:
Out of 200 patients, 5 (2.5%) patients had posterior segment involvement.
- 2 (1%) patients had vitreous hemorrhage
- 3 (1.5%) patients had traumatic optic neuropathy

TRAUMATIC OPTIC NEUROPATHY:
3(1.5%) patients had traumatic optic neuropathy. 2 patients presented with no perception of light and even after 6 weeks their vision did not improve. 1 patient presented with perception of light and after 6 weeks vision was improved to counting fingers at 2mts.

VITREOUS HEMORRHAGE:
2 patients had vitreous hemorrhage. Both patients had associated ecchymosis. At the time of presentation both patients had perception of light and improved up to 6/18 and 6/12 respectively after six weeks.

CRANIAL NERVE INVOLVEMENT:
1 patient had abducent nerve palsy of right side showing abduction deficit of right eye. It was associated with orbital fracture, ecchymosis and sub conjunctival hemorrhage.
1 patient had oculomotor nerve palsy. Third nerve palsy was complete pupil involving type. Patient had complete ptosis and downward and outward deviation of left eye.

VISION:
Most of the patients with RTA had vision in the range of 6/6 - 6/12 i.e., 186 (93%) at presentation and 9 (4.5%) patients had vision in range of 6/18 to counting fingers. 3 (1.5%) patients had only perception of light and 2 (1%) patients did not have perception of light.
At the end of 6 weeks most of the patients i.e., 195 (97.5%) had good vision in range of 6/6 - 6/12. Two patients who previously had no perception of light with traumatic optic neuropathy, showed no improvement in visual outcome.

ALCOHOL INFLUENCE:
In our study 52 (26%) patients were under alcohol influence during the road traffic accidents. Majority of patients were in the age group between 25 - 35 years.

This was similar to study done by B.S.Puzari et al. in Assam medical college and hospital showed 21.66% of patients were under the influence of alcohol.

V. Conclusion

In the conclusion of our study, it was found that most of the injuries involved the ocular adnexa, which while causing a certain degree of cosmetic disfigurement, did not lead to any permanent visual sequelae. Injuries involving cornea or sclera had a bad prognosis and those with optic neuropathy had a worst prognosis.

People of the most active and productive age groups are involved in RTA, which leads to cosmetic disfigurement and serious economic loss to the community.

Several human and environmental risk factors were found to be associated with increased risk of RTA like, lack of awareness of traffic rules, inadequate enforcement of existing laws, easy accessibility to license, lack of proper roads, and inadequate warning signs on the roads.

If we control the factors appropriately, mortality and morbidity can be prevented.

Recommendations for the prevention of ocular injuries in RTA.

1) Passengers sitting in the front seats more commonly sustain ocular injuries.
a) Use of safety seat belts must be made compulsory.
b) All road vehicles must have laminated glass windscreens.

2) The practice of seating younger children on the lap of a parent on one of the front seats should not be allowed.

3) Wearing a helmet while driving a 2-wheeler must be made compulsory.

4) There is an urgent need for education of the public through the use of news, media and television programs.
a) Requirement of wearing seat belts in four wheelers and helmets on 2 wheelers
b) Observation of traffic rules on the road.
c) Punishment for reckless driving and dangerous overtaking.

5) Use of unbreakable plastic spectacles should be encouraged.

6) Road markings to guide the traffic and drivers must be re-painted more frequently. Fluorescent paint should be used so as to be clearly visible even in darkness.

7) Repairing the improper roads and proper street lighting must be provided.

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