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Article A Clinical Study Of Visual Outcome In Ocular Blunt Trauma

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Abstract:*Ocular blunt trauma is one of the most common causes of visual morbidity. It is also a significant cause of preventable impairment of vision and unilateral visual loss worldwide. Early detection and management hold the key to prevention of further complications.****Aim****: Toanalyze the various prognostic factors which will influence visual outcome in patients with bluntocular trauma.****Materials and Methods*** *: This prospective observation study was conducted in all patients with blunt ocular trauma attending ophthalmology OPD in Coimbatore Medical College Hospital between June 2015 to May 2016.The results were obtained using chi-square test and ANOVA test****Results****:A total of 123 patients were studied, in which majority of the study population (48%) were between age group26 to 40 years(n= 59) .Majority ofthe affected population (66.7%, n=82) were males with predominant unilateral involvement of eyes , with urban population predominating (57%, n=70).The common mode of injury was RTA (41.4% ,n=51),with poor prognosis associated with late presentation to the hospital, with zone 1(79.75%) being the common region involved in blunt trauma .****Conclusion*** *: Road traffic accidents involving males of urban population was the commonest mode of blunt trauma .Early presentation to the hospital and visual acuity at the time of presentation following trauma influence the prognosisand injury to the zone 3 carries poor prognosis*
Keywords:*prognostic factors, blunt trauma,visual outcome*

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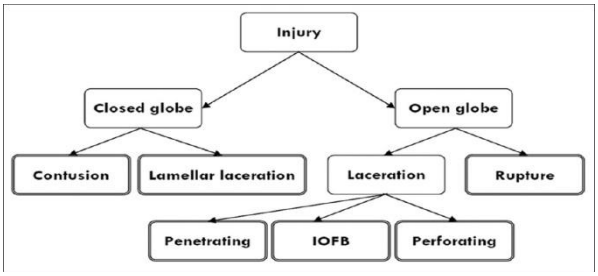
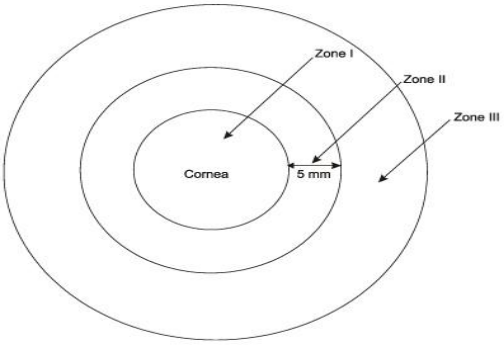
I. Introduction

Ocular trauma is one of the most common causes of visual morbidity. It causes psychosocial and emotional suffering as well as an economic burden to the family and society. Some 55 million eye injuries restricting activities more than one day occur each year including some 2 lakh open globe injuries [2]. The eye injuriesrequiring hospitalization range from 4.9 to 89 per 10 millionpopulationsin developing countries.Early detection and management is important key in the prevention of further complication. Prevention is better than cure. Measures to create awareness about ocular trauma and preventive measures would result in a great decrease in ocular morbidity and mortality due to trauma. We conducted this study to determine etiology, pattern and extent of blunt ocular trauma presenting to us and to manage it appropriately and to evaluate subsequent visual outcome.The Records of all patients were classified by the standardized international classification of ocular trauma (Birmingham Eye Trauma Terminology, BETT)[1], which divided ocular injuries into those involving blunt force, resulting in contusion (closed globe injury) or rupture (open globe injury), and those involving sharp force, resulting in lamellar laceration (closed globe injury) or penetrating, perforating, and intraocular foreign body laceration (open globe injury). Wound location was defined by the Ocular Trauma Classification Group. Zone I injuries were confined to the cornea, zone II injuries confined up to anterior 5mm of the sclera and zone III injuries involved more than 5mm from the limbus.

Figure 01(Birmingham Eye Trauma Terminology, BETT)





II. Materials And Methods

Study Design:A prospective study of visual outcome in blunt trauma patients.
Study Setting: The study was conducted at the Department of Ophthalmology, Coimbatore medical College Hospital, which is a tertiary care centre and a regional referral centre.
Duration ofStudy: One year period from June 2015 to May 2016.
Study Population: Patients attending Coimbatore medical College Hospital with ocular blunt trauma were included in the study based on selection criteria.
Case Selection: All Patients attending ophthalmology outpatient department with ocular trauma with or without decreased vision were included on the basis of inclusion and exclusion criteria.
Inclusion criteria:1. Patients with blunt ocular trauma with or without decreased vision. 2. Age more than 15 years.
Exclusion criteria: 1. Unconscious / comatose patients. 2. Head injury patients. 3. Penetrating eye injury. 4. Age less than 15 years. 5. Patients not willing for regular follow up.
Methodology: Consent was obtained from patients after selection of cases for the study. Detailed history was obtained in the specially designed proforma regarding 1. Age and sex 2. Occupation 3. Address with contact number. 4. Time of injury. 5. Time interval between injury and presentation. 6. Mode of injury. 7. History of alcohol intake. 8.History of previous ocular problem.9.History of drug intake. General examination of the patient was done including assessment of cardiovascular and respiratory status andblood pressuremeasurement.
Detailed Ophthalmic examination was done including 1. Uncorrected and best corrected visual acuity in both eyes using Snellen's chart. 2. Intraocular pressure measurement using noncontact tonometry for selected cases 3. Anterior segment examination with slit lamp. 4. Detailed pupillary examination including i. Direct and Indirect pupillary light reflex. ii. Reaction to accommodation. iii. Presence of RAPD. 5. Extra ocular movements and 6.fundus examination using direct and indirect ophthalmoscope.
Investigations done were blood count, blood sugar, renal function tests. Electro Cardiogram., X-ray orbit and CT, MRI scan brain and orbit where ever necessary.
Statistical Analysis: Data were analyzed with SPSS software, version 18.0 (SPSS, Inc., Chicago, IL, USA). Frequency distributions were calculated for injury types and causes. Statistical analyses of the quantitative data, including descriptive statistics and parametric and nonparametric comparisons were performed for all variables. Frequency analyses were performed using the Pearson's Chi-square test. A one-way analysis of variance (ANOVA) was used to evaluate differences in parametric variables. Categorical evaluations were performed for the numeric scores representing the likelihood of the final visual acuity in the OTS study. Correlation analyses were performed using the Spearman's test. All p values in our study were two-sided, and a value of less than 0.05 was considered statistically significant.

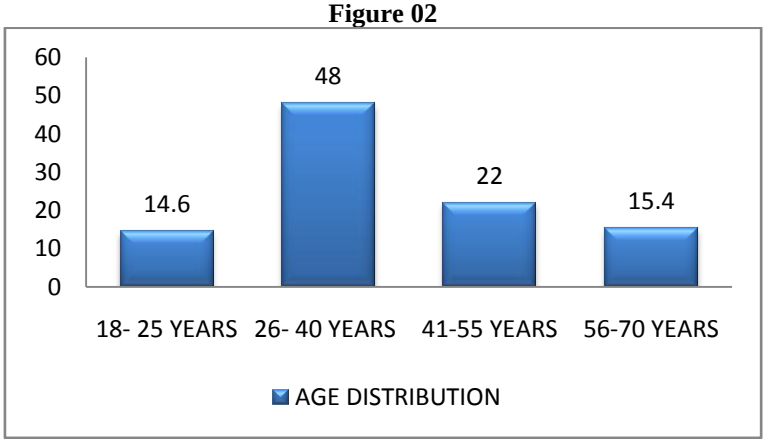
III. Results

Age wise distribution of the 123 patients studied showed that the age of patients ranged from 19 years to 70 years,with mean age and standard deviation of 39.34 $\pm$ 13.96. Most of the patients were between 26-40 years age group (48%, n=59)(Figure02 and Table 01.) Maximum age of the patient was 70 years and minimum age was 18 years.

Table 01: Age distribution

S.NO.	AGE	FREQUENTY (n)	PERCENTAGE (%)
1.	18 – 25 years	18	14.6
2.	26 – 40 years	59	48.0
3.	41 – 55 years	19	22.0
4.	56 – 70 years	19	15.4
	Total	**123**	**100.0**

Figure 02

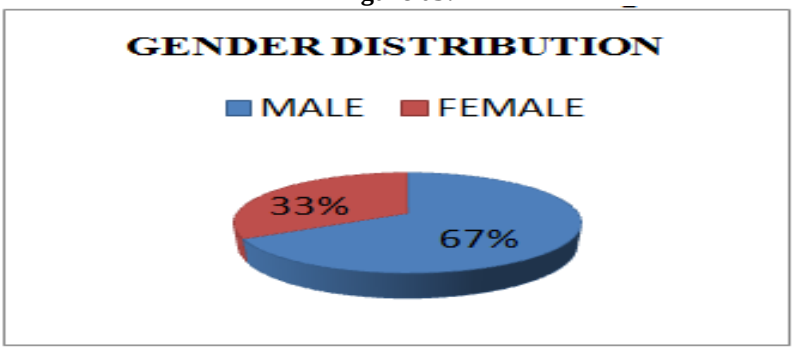


Within this patient population 41 (33.3%) were females and 82(66.7%) were males. Ratio of male and female were 2 : 1.(Table 02 and figure 03.)

Table 02: Gender distribution

S.NO.	SEX	FREQUENTY (n)	PERCENTAGE (%)
1.	MALE	88	66.7
2.	FEMALE	41	33.3
	Total	**123**	**100.0**

Figure 03:

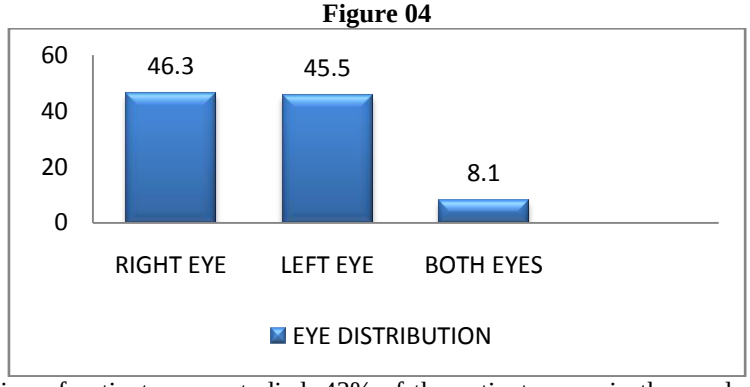


Among 123 patients, right eye was involved in 46.3% (n=57) cases, left eye was involved in 45.5% (n=56) cases and both eyes involved in 8.1 (n=10) cases were mentioned in Table 03& figure 04.

Table 03: Laterality

S.NO	EYE	FREQUENTY (n)	PERCENTAGE (%)
1.	RIGHT	57	46.3
2.	LEFT	56	45.5
3.	BOTH	10	8.1

Figure 04



The area of distribution of patients were studied, 43% of the patients were in the rural areas and 57% of the patients were in urban areas.(Table 04)

Table 04: Area wise distribution

S.NO	AREA	FREQUENTY (n)	PERCENTAGE (%)
1.	URBAN	70	56.9
2.	RURAL	53	43.1
	Total	**123**	**100.0**

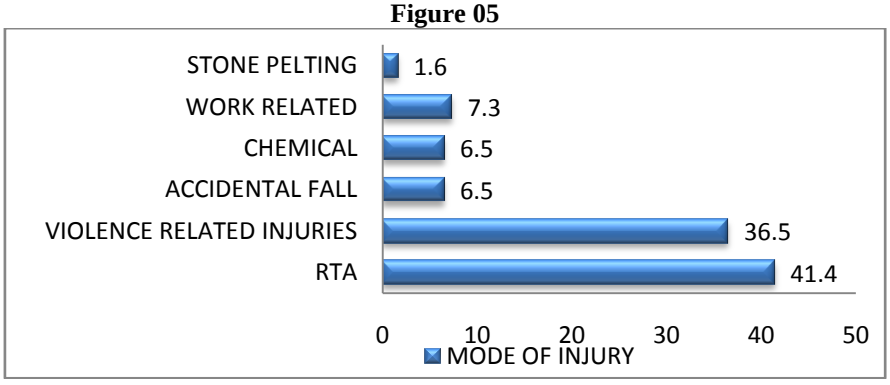
Mode of Injuries

The various modes of injuries observed in this study were road traffic accidents 41.1% (n=51), assault 36.5% (n=45),accidental fall 6.5% (n=8), chemical injuries 6.5% (n=8), work related injuries 7.3% (n=9), fire related injuries 2.4% (n=3), stone pelting 1.6% and animal related 1.6 % (n=2).(Table 05 and Figure 05.)

Table 05: Mode of injury

S.NO.	MODE OF INJURY	FREQUENTY (n)	PERCENTAGE (%)
1.	RTA	51	41.4
2.	ASSAULT	45	36.5
3.	ACCIDENTAL FALL	08	6.5
4.	CHEMICAL	08	6.5
5.	WORK RELATED	09	7.3
6.	STONE PELTING	02	1.6
7.	FIRE	03	2.4
8.	ANIMAL	03	1.6

Figure 05



The time interval between injury and visit to the hospital was 6h (18.7%), 6-12h (60.2%), 12-24h (18.3%) and greater than 24hr (4.9%) (Table 06 &Figure 06). There was a significant difference in the final visual acuity between patients who arrived in the hospital within 24hr and those who arrived after 24 hours of injury

Figure 06

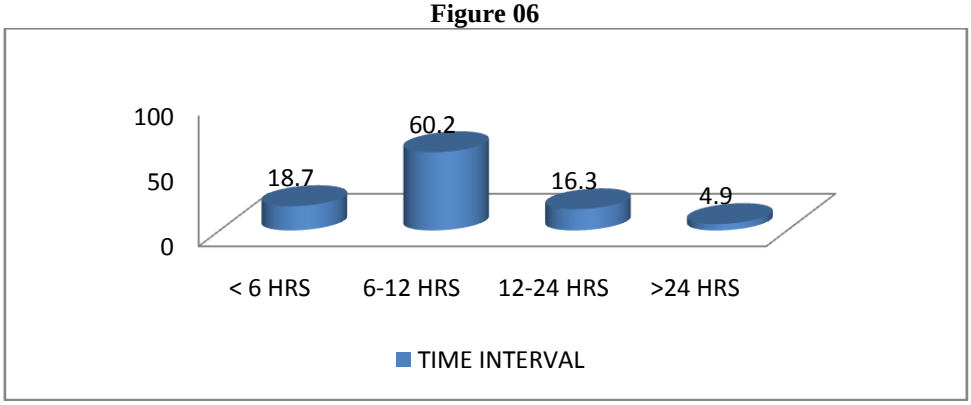
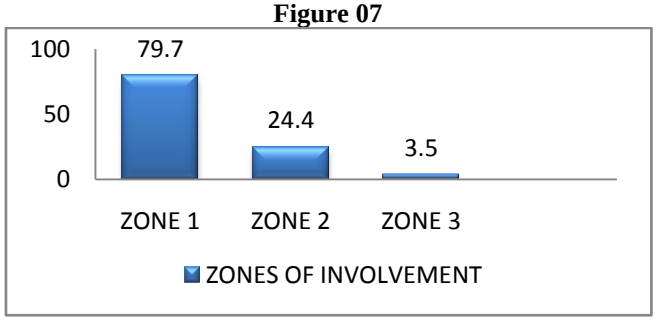


Table 06:Time Interval between Injury and Starting Treatment

DURATION	No. of Patients	PERCENTAGE (%)
< 6 hrs	23	18.7
6-12 hrs	74	60.2
12-24 hrs	20	18.3
> 24 hrs	6	4.9
Total	123	100

The results of wound location involved zone I injuries (98 eyes, 79.7%), zone II injuries (30 eyes, 24.4%) and zone III injuries (20 eyes, 16.3%). (Figure 07)

Figure 07



The visual acuity at presentation and visual acuity at follow up were compared in table 07 and figure 09 and analyzed with the Chi Square test and the visual outcome of our management was found to be statistically significant (p=0.0001).

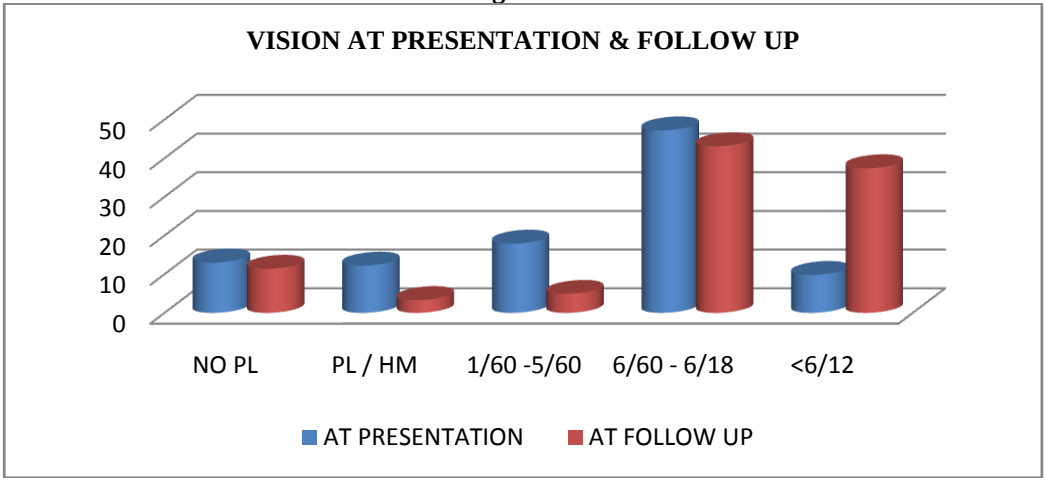
Majority of the patients had visual acuity of 6/18 (47.2%) and others had< 6/12(9.8%). Early diagnosis and appropriate management (medical / surgical) resulted in good visual outcome, 37.4% (Figure 09) of patients were having >6/12 vision at follow up. The final visual outcomes also depended on the visual acuity at presentation.(Table 07 &Figure 08)

Table07:Vision at presentation and Vision at follow up

			VISIONATFOLLOW UP					TOTAL
			NPL	LP/HM	1/60-5/60	6/60-6/18	<6/12	
VISION AT PRESENTATION	NO PL	Count	13	3	0	0	0	16
		% of Total	10.6%	2.4%	0.0%	0.0%	0.0%	13.0%
	PL/HM	Count	1	1	5	8	0	15
		% of Total	8%	8%	4.1%	6.5%	0.0%	12.2%
	6/60-5/60	Count	0	0	1	21	0	22
		% of Total	0.0%	0.0%	8%	17.1%	0.0%	17.9%
	6/60-6/18	Count	0	0	0	24	34	58
		% of Total	0.0%	0.0%	0.0%	19.5%	27.6%	47.2%
	<6/12	Count	0	0	0	0	12	12
		% of Total	0.0%	0.0%	0.0%	0.0%	9.8%	9.8%
TOTAL		Count	14	4	6	53	46	123
		% of Total	11.4%	3.3%	4.9%	43.1%	37.4%	100.0%

Pearson Chi-Square test statistically significant (p=0.0001)

Figure 08



In this study, Sub conjunctival hemorrhage constituted 29%. Orbital fracture 12.19%, lid laceration (12.19%) out of which laceration involving canaliculi constitute 1.6%, corneal laceration (2.4%), hyphema (5.6%), iris prolapse (4%), Lenticular involvement (subluxation /dislocation, traumatic cataract is seen in 8.8%, retinal tear/RD (2.4%), choroidal tear / chorioretinal detachment (2.3%), globe rupture (5.6%), traumatic optic neuropathy (8.8%), optic nerve avulsion (0.8%), others (12.19%) which include, third nerve palsy, traumatic mydriasis, iridocyclitis, conjunctival foreign body, sphincter tear, vitreous hemorrhage.(Table 08)

Table 08: Types of manifestations

S.NO	CLINICAL MANIFESTATION	(n)	PERCENTAGE
1	Orbital wall fracture	15	12.19%
2	Lid laceration	15	12.19%
3	Subconjunctival hemorrhage	48	39%
4	Corneal laceration	03	2.4%
5	Hyphema	07	5.6%
6	Iris prolapse	05	4.0%
7	Lenticular Involvement (subluxation/dislocation/cataract)	11	8.8%
8	Retinal tear / Retinal detachment	3	2.4%
9	Choroidal tear / Chorioretinal detachment	3	2.4%
10	Optic nerve avulsion / neuropathy	11	8.8%
11	Globe rupture	07	5.6%
12	Chemical injury	07	5.6%
13	Others	15	12.19%

There were 46 (37.39%) patients treated with conservative treatment. Debridement and suture done in 15 (12.19%), Corneal tear repair in 3(2.4%) lens extraction was done n 5 (4%), Lacrimal repair in 2 (1.6%), Barrage laser in 2(1.6%). Medical management includes systemic and topical medications. IV methyl prednisolone was given traumatic optic neuropathy. (Table 09)

Table 09 : Method of management

S.No	Treatment	No. of Patients (n)	Percentage
1	Conservative	46	37.39%
2	Lid tear repair	15	12.19%
3	Corneal tear repair	03	2.4%
4	Iris abscission	03	2.4%
5	Lens removal	05	4%
6	Globe Rupture repair	07	5.6%
7	Laser	02	1.6%
8	Medical Management	17	13.8%

IV. Discussion

Ocular trauma is a leading cause of ocular morbidity in young adults.This study was a prospective analysis of 123 patients with ocular blunt trauma. Detailed clinical examination was done in all patients. Patients were included in the study after getting written consent.Patients' data included age, gender, occupational

categories, place of residence, cause of injury, initial and final best corrected visual acuity, anatomical site, location and nature of injury, clinical diagnosis, and primary and secondary treatment and follow-up. The patients were classified into four age groups(18-25,26-40, 41-55 and 56-70 years). The data were classified into 6 groups based on the mode of eye injuries occurred: road traffic accidents, assault, work-related injuries, accidental fall, chemical injuries and stone pelting. Visual acuity was measured with Snellen's chart. The results of the study were analyzed statistically.

The study results showed that, the commonest age group affected by ocular blunt trauma ranged 26 – 40 years of age with mean age of 39.34 years. The prevalence was more in males (82 cases) than females (41 cases). In this study, men were affected more than women (2:1) probably due to more exposure to the outdoor environment, workplace. A male preponderance is universally reported and thought to be related to occupational exposure, participation in dangerous sports and hobbies, alcohol use and risk-taking behavior.[1]Most common patients were middle age group patients (26-40 years). A review, undertaken for planning purposes in the WHO Programme for the Prevention of Blindness, suggests that around 55 million eye injuries responsible for restricting activities for more than one day occur annually; they account for 750,000 hospitalized cases each year. These include approximately 2,00,000 open globe injuries[2]; with around 1.6 million people blind from such injuries, 2.3 million people with bilateral low vision from this cause, and almost 19 million people with unilateral blindness or low vision.Thus ocular trauma could cause significant psychological and economic burden.

In this study 57% of injuries were found to occur in urban areas and 43% occurs in rural areas. In urban area road traffic accidents and industrial work related injuries were common whereas in rural area assault and accidental falls were more common.

There is no significant difference in laterality of eye involved (RE 46.3%, LE 45.5%). Out ofthe 123 cases included in the study 92% were unilateral and 8.1% were bilateral injuries. In this study 41.4% constituted RTA cases with maximum casualty in motor cycle accidents. Our study showed that RTA was more common in younger and middle aged group person driving two wheeler without helmet. Next to RTA, assault was the commonest cause constituting 36.14%.

In this study,Patients who presented with initial visual acuity of > 6/60 constituted 58.1% out of which 37.4% had improvement in visual acuity,19.5% maintained the same visual acuity,1.2% worsened. Patients with initial visual acuity <6/60 constituted 43.1% out of which 23.6% improved and 19.5% worsened. Thus, patients who presented with an initial good vision at the time of injury had a better final visual outcome.

There was a significant difference in the final visual acuity between patients who reached the hospital within 24hours and those who reached over 24hours. Initial visual acuity was compared with final visual acuity. Two cases who presented early to the hospital with retinal tear underwent laser application were found to have a good visual outcome, though long term follow up is pending.

In this study 96.2% cases presented within24 hoursof injury,out of this 40.7% had initial visual acuity of <6/60, 55.7% had initial V/A of >6/60, and out of 4.9% who presented after 24hours of injury those presented with V/A of >6/60 constituted 2.4% and those with V/A of <6/60 constituted 2.5%.Out of 96.2% who presented within 24 hours 79.67% showed improvement and 12.19% worsened. Out of 4.9% those patients who presented >24 hours of injury 1.6% showed improvement and 3.25% showed worsening of vision. Those who presented earlier showed a better visual outcome.

In this study, sub conjunctival hemorrhage was the most common manifestation of blunt trauma. Other manifestations found were Orbital fracture, lid laceration, hyphema, iris prolapse,lens subluxation&dislocation, traumatic cataract, retinal tear/retinal detachment,choroidal tear/chorioretinal detachment, globe rupture, chemical injuries,traumatic optic neuropathy, optic nerve avulsion etc.In this study two cases had choroidal rupture were followed up for 3 months after which patient lost follow up.

Those patients who presented with minor anterior segment injuries like subconjunctival hemorrhage, periorbital contusions, and iritis treated with medical management had better visual outcome. Those who suffered from traumatic cataract, subluxation of lens required surgical management with good visual outcomes which correlated with early intervention. Some factors influencing the visual outcome include time interval between injury and management, zone of involvement, open or closed globe injury,and initial visual acuity.

V. Conclusion

Blunt trauma forms a major part of ocular trauma. This study emphasizes the various factors that play a role in analyzing the final visual outcome, in which males are affected more than females probably due to more exposure to outdoor activities. Urban population is more affected compared to rural population due to urbanization and increase in industries, suggesting the need to explore workplace strategies to minimize ocular trauma as a priority.

Emphasis should be made about wearing protective goggles, face shields, availability of immediate emergency eye care management and health education regarding eye protection. The time interval between

injury and presentation influenced the final visual improvement. Visual improvement was better for those who presented within 24 hours of injury with early appropriate intervention.Injuries involving zone III carried worst prognosis compared to zone I and zone II involvement probably related to the extensive damage more posteriorly.

Visual acuity at the time of presentation had an influence on the final visual outcome. Most of the patients with a reasonably good visual acuity after injury had a better final visual outcome. Patients who showed no improvement had developed secondary complications.

Patients who presented early to thehospital after injury and with a fairly good initial visual acuity ended with a reasonably good final visual acuity after proper and early treatment. Eye care programs targeting high-risk ocular trauma groups may need to consider ocular trauma as a priority in eye health awareness strategies to reduce blindness due to trauma.

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