



VISUAL OUTCOME FOLLOWING CONCUSSION INJURY OF THE EYE- A CLINICAL STUDY

Dr. Jyoti Bhuyan	Professor, Regional Institute of Ophthalmology, Gauhati Medical College, Guwahati, Assam.
Dr. Santana Sharma*	Associate Professor, Regional Institute of Ophthalmology, Gauhati Medical College, Guwahati, Assam. *Corresponding Author
Dr. Supriyo Dutta	PGT, Regional Institute of Ophthalmology, Gauhati Medical College, Guwahati, Assam.
Dr. Mritunjoy Sharma	PGT, Regional Institute of Ophthalmology, Gauhati Medical College, Guwahati, Assam.

ABSTRACT **AIM:** To evaluate the visual outcome following concussion injury of the eye.
METHODS: A total number of 105 patients with blunt ocular trauma resulting in concussion injury were taken up for this study. A detailed history with complete ocular examination was undertaken & relevant investigations were done.
RESULT: At presentation, visual acuity of 6/18 or better was found in 37 eyes (34.57%), mild visual impairment (<6/18-6/60) in 13 eyes (12.14%), severe visual impairment (<6/60 - 3/60) in 6 eyes (5.60%), blind (<3/60 - PL) in 43 eyes (40.18%) & no perception of light in 4 eyes (3.73%). At 6 weeks, 50 eyes (46.72%) had normal (6/18) or better visual acuity, 18 (16.82%) eyes had mild visual impairment (<6/18 - 6/60), 10 (9.34%) had severe visual impairment (<6/60 - 3/60), while 20 (18.69%) eyes developed blindness (<3/60 - PL) & 5 (4.67%) had no perception of light. The improvement of vision was found in 66.35% cases.
CONCLUSION: Visual outcome depends on timely arrival & proper management.

KEYWORDS : Concussion Injury, Visual Outcome, Commotio Retinae

INTRODUCTION:

Ocular trauma is a major cause of preventable visual impairment and unilateral visual loss worldwide. Every year nearly more than half a million people are blind monocular as a result of ocular trauma.¹

Blunt trauma forms a major part of ocular trauma which may result in closed globe and open globe injuries. Concussion or contusion is a closed globe injury caused by blunt trauma. Closed globe injury is the one in which eye wall (cornea and sclera) does not have a full thickness wound but there is intraocular damage.² A contusion is the injury that results from a concussion (i.e. a violent jerk or shake) caused by external force.³

Epidemiology of ocular trauma and visual outcome in developing countries is little known. Ocular trauma can occur during sport related activities, in the workplace, rural agricultural setting, industrial works, traffic accident, physical assault etc. Despite causing structural and functional visual loss, ocular trauma has profound social, economical, occupational and medico-legal consequences.⁴

Concussion injury causes ocular damage by the coup mechanism, the counter coup mechanism or ocular compression. The best example of counter coup injury is commotio retinae.⁵

Concussion injuries may vary in severity from a simple corneal abrasion to an extensive intraocular damage. Proper assessment of ocular damage and immediate treatment has an important effect on final outcome. Therefore, early diagnosis is imperative to prevent visual morbidity caused by concussion injury.¹

MATERIALS AND METHODS:

The present study was conducted at a tertiary care hospital for a period of one year from July 2015 to June 2016. One hundred and five (105) patients with blunt trauma resulting in concussion injury were taken up for this study. Informed and written consents were taken.

Patients diagnosed as having concussion injuries among all age group of both sexes were included and patients with other types of injuries and with previous ocular surgery and ocular diseases or disorders were excluded from the study.

Detailed history was taken and thorough ocular examinations

including visual acuity, torch light examination, slit lamp examinations, direct and indirect ophthalmoscopy, Tonometry, Gonioscopy, B-Scan ultrasonography and routine x-ray orbit were done. OCT, FFA, CT-Scan orbit and MRI were done whenever required.

Visual acuity for distance and near were recorded whenever possible by illuminated snellen's chart or with E chart (for illiterate patients). In cases of non-ambulatory patients and/or with reduced vision, the vision was recorded as finger counting at a particular distance, hand movement or perception of light in dark room. Functional integrity of different quadrants of the retina was checked by projecting rays with the help of a torch light in a dark room.

The cases were managed both conservatively and surgically. For assessment of the ocular morbidity and visual improvement, inpatient cases were daily observed till discharged and out-patient cases were reviewed after 1 week and follow up after 2 weeks & 6 weeks. The initial examination, visual acuity and relevant procedures were repeated in each case during check up visit.

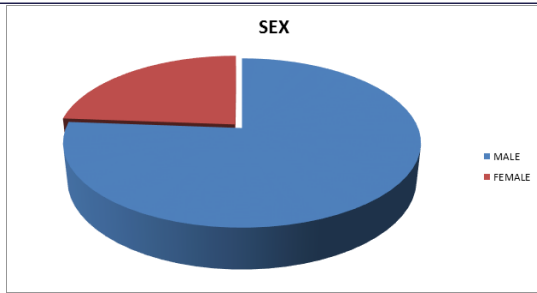
RESULTS AND OBSERVATIONS:

The most commonly affected age group was between 21-30 years (24.76 %) followed by 31-40 years (20.95 %) and 41-50 years (20 %). The incidence was low in the age group less than 10 years and more than 60 years. The mean age was 35.19 ± 15.61 years.

AGE (YEARS)	NO. OF CASES	PERCENTAGE (%)
0-10	5	4.7
11-20	15	14.28
21-30	26	24.76
31-40	22	20.95
41-50	21	20
51-60	10	9.5
>60	6	5.7

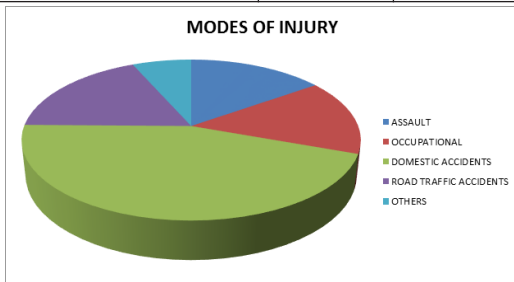
Out of 105 cases, males were more vulnerable to injuries. There were 80 (76.2%) males and 25 (23.8%) female. The male: female ratio was 3.2: 1.

SEX	NO. OF CASES	PERCENTAGE (%)
MALE	80	76.2
FEMALE	25	23.8



The present study showed that the maximum numbers of injuries occurred due to domestic accidents (household accidents/fall/playing) was 44.76 % followed by road traffic accidents (18.10%)

MODE OF INJURY	NO. OF CASES	PERCENTAGE (%)
ASSAULT	16	15.24
OCCUPATIONAL	16	15.24
DEMETIC ACCIDENTS	47	44.76
ROAD TRAFFIC ACCIDENTS	19	18.10
OTHERS	07	6.66
TOTAL	105	100



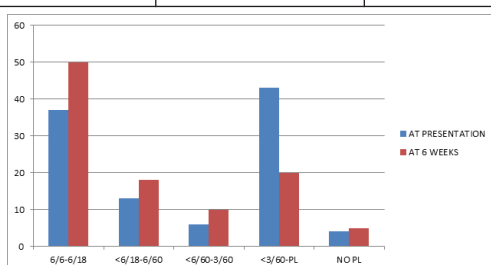
VISUAL OUTCOME AT PRESENTATION:

In our study, according to WHO definition of blindness, at the time of presentation out of 105 cases (107 eyes)- Visual acuity of 6/18 or better was found in 37 eyes (34.57 %), Mild visual impairment (< 6/18 – 6/60) was found in 13 eyes (12.14 %), Severe visual impairment (< 6/60 – 3/60) was found in 6 eyes (5.60 %), Blind (< 3/60 – PL) in 43 eyes (40.18 %). No perception of light was found in 4 eyes (3.73 %). In 3.73% of eyes, visual acuity was unrecordable.

VISUAL OUTCOME AT 6 WEEKS:

Visual outcome in this study is defined as the visual acuity at 6 weeks, compared with initial visual acuity. Out of 105 cases (107 eyes) the visual outcome at 6 weeks was found to be- 50 eyes (46.72 %) had normal vision (according to WHO definition i.e. 6/18 or better visual acuity), 18 (16.82 %) eyes had mild visual impairment (< 6/18 – 6/60), 10 (9.34 %) had severe visual impairment (< 6/60 – 3/60), 20 (18.69 %) eyes concluded with blindness (< 3/60 – PL) and 5 (4.67 %) eyes had no perception of light. At 6 weeks, 3.73 % of eyes had lost follow up.

VISUAL ACUITY	AT PRESENTATION	AT 6 WEEKS
	NO. OF EYES (%)	NO. OF EYES (%)
6/6-6/18	37(34.57%)	50(46.72%)
<6/18-6/60	13(12.14%)	18(16.82%)
<6/60-3/60	06(5.60%)	10(9.34%)
<3/60-PL	43(40.18%)	20(18.69%)
NO PERCEPTION OF LIGHT	04(3.73%)	05(4.67%)
UNRECORDABLE	04(3.73%)	----
LOSS OF FOLLOW UP		04(3.73%)



RISK FACTORS FOR POOR VISUAL OUTCOME:

This study observed that most of the patients who attended late in the hospital, had poor vision at the time of presentation and the final vision of these patients at 6 weeks was also poor.

It has been observed that **delayed in the arrival time to the hospital, delay in treatment, involvement of vital ocular structures** (cornea, lens, vitreous, retina, macula, choroid etc), **raised IOP, secondary infection, low socio-economic status, lack of education and poor compliance** were the common risk factors for poor visual recovery.

TIME OF ARRIVAL (NO. OF PATIENTS)	VISUAL ACUITY AT PRESENTATION		VISUAL ACUITY AT 6 WEEKS	
	6/36 OR BETTER	6/60 OR LESS	6/36 OR BETTER	6/60 OR LESS
WITHIN 24 HOURS (40)	22(20.56%)	18(16.82%)	28(26.16%)	12(11.21%)
24 HOURS- 1 WEEK (46)	24(22.42%)	22(20.56%)	36(33.64%)	10(9.34%)
AFTER 1 WEEK (19)	4(3.73%)	15(14.01%)	6(5.60%)	10(9.34%)

In our study, we found that 46 patients who attended the hospital after 24 hours to 1 week and 19 patients who presented after 1 week, had poor vision at 6 weeks, while better vision at 6 weeks was seen in 40 patients who presented within 24 hours.

Bleeding in the eye (hyphema, 21.05% and vitreous haemorrhage, 28.94%) was the most common cause followed by secondary glaucoma (15.78%) for poor visual outcome in the present study.

It has been observed further that the common anterior segment morbidity causing poor visual outcome were corneal oedema/opacities (10.50%), hyphaema (21.05%), subluxation of lens (15.78%), dislocation of lens (13.15%), Tr aphakia (5.26%) etc. and the common posterior segment morbidity causing poor visual outcome were vitreous haemorrhage (28.94%), retinal detachment (13.5%), macular edema (8.89%), Tr. Optic neuropathy (8.89%) etc.

Increase in IOP (secondary glaucoma) in 15.75% & was also commonly involved in cases of poor visual outcome. The mode and severity of ocular injury and subsequent management, presence or absence of ocular infection, primary eye health care are the determining factors of final visual outcome.

DISCUSSION:

In the present study, the age incidence was found to be highest in the third decade (21 – 30 years) 24.76 %. Shukla and Verma⁶ reported the incidence in the third decade to be highest (29.5%). Karki et al⁷, and Ulagantheran et al⁸ also reported the highest incidence in third decade with 26.60 % and 43.2 % respectively, which is similar to our study. Males were involved more 80 cases (76.20 %) as compared to females 25 cases (23.80 %). The male: female ratio has found to be 3.2: 1. The other studies by Pai et al⁹, Wali and Kulkarni¹⁰ also showed a similar finding.

Regarding the different modes of trauma, in our study the domestic accidents (44.76 %) were found to be the most common mode of injury followed by road traffic accidents (18.10 %), occupational and assault (15.24 % each) which were almost similar to studies done by Canavan et al¹¹ where most injuries followed sports or domestic accidents (58.5%) and by Badrinath¹² where domestic accidents were responsible for the majority of injuries (65%). Titiyal et al¹³ found that about 44.76 % of cases had ocular injury following domestic accidents. G S Titiyal et al in their study about the visual acuity at presentation, 54(32.7%) patients had visual acuity of 6/6- 6/18 while 93(56.5%) patients were blind at presentation i.e. visual acuity <3/60. Visual acuity was NPL in 24 (14.5%) cases.

Y M Canavan & DB Archer found a final visual acuity of 6/36 or better in 80. 2% cases and 12.7% had a visual acuity of 6/60 or worse and total no perception of light was 6% out of which 1.2% had due to extensive fundus injury or optic nerve damage.

Krishnan MM et al in their study on blunt ocular trauma found that 27.27% eyes had no PL, 35.06% eyes had VA less than 6/60, 20.77% eyes had VA between 6/60 & 6/18 while 11.68% had VA better than 6/18.

D B Karki in their study found that 20.7% were blind (vision<3/60), on presentation among the 78 admitted patients. At the time of discharge,

mild visual impairment (vision 6/24-6/60) resulted in 25.6% and severe visual impairment (vision <6/60- 3/60) resulted in 1.2% and 19.2% were blind (vision <3/60)

Dhasmana R et al (2012) in their study visual acuity in cases of closed globe injury at 6 months were found 6/36 or better vision in 87.25% cases, 6/60 or less in 9.08% and in 3.63% cases no perception of light were noted. They further concluded that the patients who presented with better visual outcome, patients with posterior segment involvement in their study group had poorer visual outcome.

The mode and severity of ocular injury and subsequent management, presence or absence of ocular infection, primary eye health care are the determining factors of final outcome.

CONCLUSION:

The anterior segment structures are more commonly involved as compared to posterior segment structures. But the ocular morbidities of posterior segment are more vision threatening than anterior segment morbidities. Timely arrival and management have great impact on visual prognosis.

Efforts must be taken to prevent or to minimize ocular injuries by improving certain domestic habits, wearing protective goggles while working, supervising children while playing. Ocular health education also plays an important role. Visual impairment following concussion injury of the eye is a complex multi-structural involvement which requires specialized ophthalmic training to develop the expertise for corrective and reparative ocular surgeries (both anterior and posterior segment surgeries).

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