

# CLINICAL PATTERN AND VISUAL OUTCOME IN OCULAR INJURIES AT 6 MONTHS FOLLOWING ROAD TRAFFIC ACCIDENTS- A PROSPECTIVE FOLLOW UP STUDY

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## ABSTRACT

### BACKGROUND

The history of ocular injuries began when primitive men fought with another, hunted their prey for food or first chipped a stone to make his primitive tool. However, in modern times, the scenario has been widened to include occupational, industrial, domestic accidents, as also vehicular accident. The ever increasing number of vehicles on road has ensured that injuries due to the latter cause is on the rise. Eye injuries often resulting in some visual loss, create economic loss both to victim and society. Although, RTA is not the major cause of ocular injuries. Many such injuries that do occur are preventable by the use of safety measures.

### MATERIALS AND METHODS

Prospective case series of 235 patients who sustained road traffic accidents and admitted in medical college, Trivandrum, were followed up for one year to assess the clinical pattern of ophthalmic injuries and the change in visual outcome.

### RESULTS

The commonest group were young males in 31 to 40 years riding two wheelers. A significant number of them were not using helmets. Most RTA occurred at night when wakefulness is less and alcohol abuse is more. Periorbital oedema and subconjunctival haemorrhage was the commonest finding either as isolated or associated with severe ocular injuries. Lid lacerations in 17 eyes, corneal full thickness wound with iris prolapse in 6 eyes, lenticular involvement in 25 eyes and hyphaema in 16 eyes were the significant anterior segment presentations. 53 eyes had posterior segment involvement in the form of vitreous haemorrhage, traumatic optic neuropathy (6), Berlin oedema (14), retinal detachment (5), choroidal rupture (6), orbital and midfacial fracture were seen in 30 eyes with orbital floor fracture being the commonest.

### CONCLUSION

The incidence of RTA is on the rise. The higher incidence of trauma in men is due to the fact that they are more exposed to two wheeler use, highway traffic, night traffic and use of alcohol. Strict adherence to traffic rules, better road conditions and use of public transport systems to reduce the traffic helps in preventing accidents. Use of first aids and tertiary centres to treat accidents primarily and message of early treatment leading to better outcome should be spread among public.

### KEYWORDS

Road Traffic Accidents, Fracture, Visual Outcome, Trauma.

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### BACKGROUND

Road traffic accidents are common occurrences every day. With ever increasing number of various road transport vehicle and the increasing number of new drivers, traffic accidents keeps on increasing causing mild-to-severe human injuries including injuries to the eye.

Eye injuries often resulting in some visual loss, create economic loss both to victim and society. Although, RTA is not the major cause of ocular injuries, many such injuries

that do occur are preventable by the use of safety measures. Ophthalmic involvement in RTA involves any structures of the eye, ocular adnexa with or without involvement of orbital or periorbital structures. These injuries may be caused by either blunt forces or by penetrating injuries or in combination of both. Eye injuries are a major and under recognised cause for disabling ophthalmic morbidity that especially affect the young. The public health importance of ocular trauma is undeniable. Injuries generate a significant and often unnecessary toll in terms of medical care, human suffering, long-term disability, productivity loss, rehabilitation services and socioeconomic cost.

### Objectives

1. To study the common pattern of clinical presentation of ocular injuries following road traffic accidents.
2. To assess the visual outcome of the traumatic eye after a period of six months followup.

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## MATERIALS AND METHODS

Study Design- Prospective study.

Study Setting- MCH, Thiruvananthapuram, and RIO, Thiruvananthapuram.

Study Population- Study population include patients who sustained ophthalmic injuries following road traffic accidents admitted in MCH, Thiruvananthapuram and thereafter followed up at RIO.

Sample Size- The sample size has been calculated using the formula.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}}\right)^2 X pq}{d^2}$$

Where n is the sample size, p is the population of poor visual outcome, i.e. 30% (reference article provided, RJO20110104) d is 20% of p and significant level 5%.

The sample size was calculated as 235 patients admitted in MCH, TVM, with ophthalmic injuries following RTA and thereafter follow up at RIO.

### Exclusion Criteria

- Patients less than 5 years of age.
- Patients who are seriously ill and comatose patients.
- Patients who are not giving consent for the study.

### Sampling Technique

Consecutive cases satisfying sample size.

### Study Procedure

All patients admitted in MCH, Trivandrum, with a history of ophthalmic injuries following RTA were seen by the investigator in connection with the consultation from RIO. This study includes 235 cases of ophthalmic injuries following RTA. Information regarding their age profile, sex distribution, type of vehicle and location, number of persons involved in RTA, use of alcohol and eye injured were noted. Signs and symptoms occurring after the injury were recorded. Detailed clinical examination with torchlight, visual acuity and direct ophthalmoscopic examination were conducted. Plain x-ray skull AP view, lateral view/CT were taken. Depending on the presentation, patients were subjected to detailed examination by ENT surgeon, general surgeon, maxillofacial surgeon and general physician. Patients were followed up after 2 weeks at RIO and the findings of bedside examination at medical college were confirmed with the assessment of visual acuity, slit lamp examination, IOP direct/indirect ophthalmoscopy and x-ray/CT reviewed. Repeat CT/MRI ordered if needed. Patients were followed up at 3 months and 6 months for visual acuity, slit lamp exam, direct/indirect ophthalmoscopy.

### Statistical Analysis

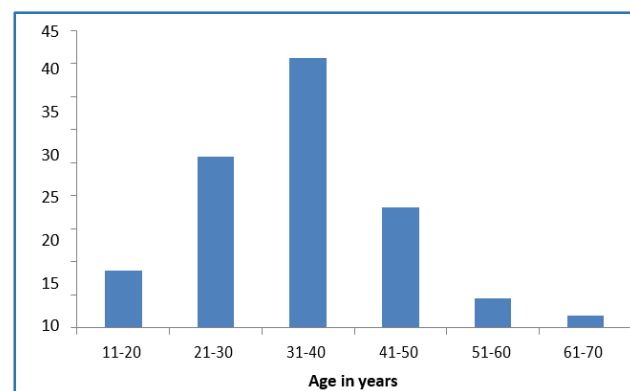
Data was entered into excel sheet and statistical analysis was done using SPSS software. Statistical analysis was carried out by-

1. Mean.
2. Standard deviation.
3. Proportion.

## RESULTS

### Age Wise Distribution of Ocular Injuries in RTA

The majority of ocular injuries (40.9%) occur in the age group of 31-40 years and the least number of cases, i.e. 1.8% were seen over the age of 60 years, the prevalence of ocular injuries is more in males (77.7%).

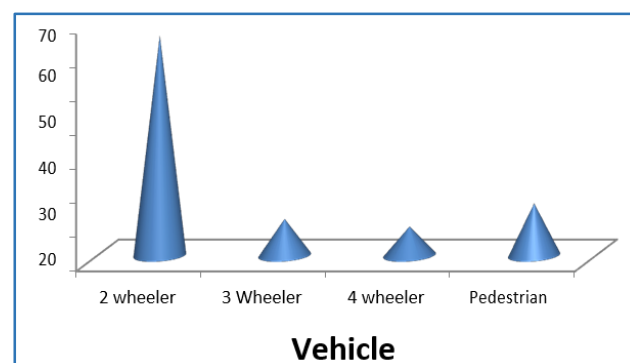


### Influence of Alcohol in RTA

Intake of Alcohol	Frequency	Percentage
Yes	101	45.9
No	119	54.1
<b>Total</b>	<b>220</b>	<b>100.0</b>

45.9% of patients were under the influence of alcohol, all of them were males.

### Distribution According to the Vehicle Involved in RTA



Most common cause (65.0%) of ocular injuries in RTA is due to two wheelers. Right eye is most commonly affected, i.e. 46.8% and both eye involvement is least common, i.e. 24.5%. Among 143 two-wheeler riders, only 37 (25.9%) were wearing helmet. This contributes to the severe head and eye injury sustained by them.

## Clinical Manifestations at the Time of Presentation.

## Lid and Adnexa

Type of Injury	Number	Percentage
Periorbital oedema	191	69.7
Ecchymosis	134	48.44
Lid tear	17	6.2
Ptosis	3	1.09

A common sign in RTA associated ocular injuries is eyelid oedema associated with periorbital oedema (69.7%) followed by ecchymosis (48.44%).

## Anterior Segment

Type of Clinical Injury	Number	Percentage
Subconjunctival haemorrhage	149	54.37
Conjunctival tear	13	4.7
Conjunctival FB	10	3.6
Scleral tear	3	1.09
Corneal abrasion	41	14.9
Lamellar laceration	7	2.5
Full thickness laceration	6	2.18
Corneal FB	10	1.1
Hyphaema	16	5.8
Iridocyclitis	22	8.02
Iridodialysis	7	2.6
Iris prolapse	6	2.18
Sphincter tear	21	7.66
Traumatic mydriasis	20	7.3
Miosis	2	0.72
Traumatic cataract	8	2.92
Subluxation of lens	13	4.7
Dislocation of lens	3	1.09
Rupture globe	1	0.36

**Table 1. Anterior Segment**

Subconjunctival haemorrhage is the most common eye sign in conjunctiva (54.37%). Among the total 3 scleral tears, 2 were full thickness scleral tears associated with open globe injuries.

Lamellar laceration was present in 7 eyes. Among the 7 lamellar lacerations, except one all the others healed without any scarring, one needed suturing and lead to nebular corneal opacity. Full thickness lacerations were found in 6 eyes.

Suturing was done for all 6 cases. Corneal FB was found in 10 eyes. All were removed and one deep FB lead to ulceration.

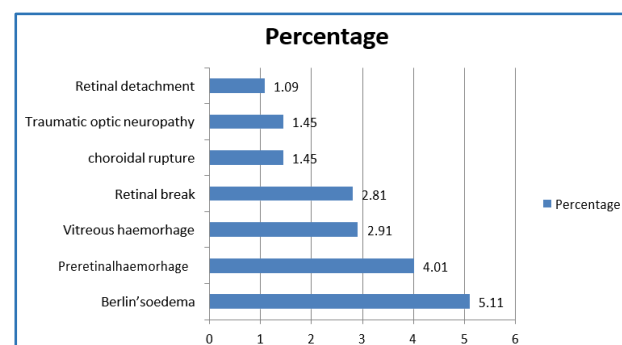
Hyphaema was present in 16 eyes. Two eyes had near total hyphaema and two had rebleed. 3 patients underwent AC wash. Iridodialysis was present in 7 eyes. 4 of them were in the superior aspect under the cover of eyelid, 2 underwent surgical repair.

Traumatic cataract was found in 8 eyes within the 2 weeks period. 5 of them were with significant vision loss and underwent cataract surgery within the three months period. In two eyes, the cataract was associated with full thickness corneal wound, among which one patient underwent

cataract removal along with the primary procedure and was left aphakic, which was also associated with subluxation, intraocular lens was put later on. Subluxation of lens was present in 13 eyes, most of them were associated with traumatic cataract and posterior segment findings. Dislocation of lens was present in 3 eyes. In one eye, cataractous lens was dislocated into the AC, which was removed within the 2 weeks period. In 2 eyes, the lens was dislocated posteriorly. Both of them were removed by vitrectomy later.

Rupture globe was present in one eye with a full thickness corneoscleral tear. Wound repair was done.

## Posterior Segment



Eight eyes had vitreous haemorrhage. Three eyes with vitreous haemorrhage had associated fracture orbit. One had associated traumatic optic neuropathy. In 3 patients, there was associated subluxation and traumatic cataract. 14 cases of Berlin oedema were observed in this study. Some of the cases of Berlin oedema had concomitant orbital fracture. Eleven eyes (4.01%) presented with preretinal haemorrhage<sup>1</sup> of them were associated with vitreous haemorrhage. Retinal tear was seen in 5 eyes at time of presentation. Three eyes presented with retinal detachment at the time of presentation and during early follow up, 2 of them were associated with retinal break and one with retinal dialysis. Four eyes presented with choroidal rupture during time of presentation and early follow up. Four eyes had traumatic optic neuropathy during the time of presentation. Three patients had no PL vision at early follow up. Four eyes were having orbital wall fractures, two eyes with orbital floor fracture, one eye with medial wall fracture and one with both medial and floor fracture.

## Orbital and Mid Facial Fractures

Type of Fracture	Number	Percentage
Le Fort fracture	2	3.77
Tripod fracture	1	1.87
Medial wall fracture	15	28.30
Floor fracture	19	35.85
Roof fracture	5	9.43
Lateral wall fracture	8	15.11
Blow out fracture	3	5.66
<b>Total Number of Fractures</b>	<b>53</b>	<b>100</b>

**Table 2. Orbital and Mid Facial Fractures**

Among the 30 eyes with fractures, 2 eyes were with Le Fort fractures, one was Le Fort type 1 and the other had Le Fort type 2 fracture, both of which required no treatment. There was one eye with tripod fracture and since the zygoma was not much displaced, it did not require any treatment and healed well. Among the orbital wall fractures, 19 eyes had floor fractures, 15 eyes had medial wall fracture, 8 eyes had lateral wall fracture, 5 eyes had roof fracture and 3 eyes had a pure blow out fracture.

### Pattern of Clinical Injuries at 3 Months

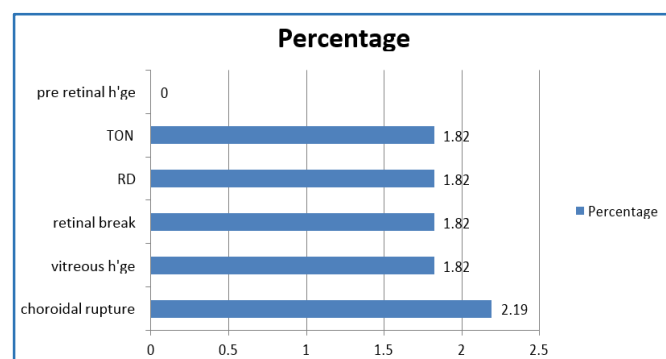
#### Anterior Segment

Type of Injury	Number	Percentage
Corneal scar	5	1.82
Corneal staining	2	0.73
Blood clots in AC	2	0.73
Iridodialysis	5	1.82
Sphincter tear	11	4.01
Traumatic mydriasis	8	2.92
Traumatic cataract	9	3.28
Subluxation of lens	6	2.19
Dislocation of lens	1	0.36
Rupture globe	1	0.36
Pseudophakia	4	1.5

Corneal scarring was present in 5 eyes due to healed corneal injuries like full thickness and lamellar lacerations, which needed suturing. Corneal staining in 2 eyes presented with hyphaema. 2 eyes had blood clots in AC. Iridodialysis was there in 5 eyes, which are superiorly located and covered by eyelid. Sphincter tear and traumatic mydriasis were persisting in 8 eyes.

Five traumatic cataracts underwent removal within the first 3 months. Five more eyes developed traumatic cataract at the end of third month. A total 9 traumatic cataracts were present at 3 months. Five eyes had early rosette cataract and 4 eyes had significant cataract. Three eyes underwent cataract surgery in the next three months. One eye became aphakic, which was associated with >1800 subluxation. Two eyes with dislocation underwent lens removal within the first three months and another patient had posterior dislocation. The eye with rupture globe became phthisical.

#### Posterior Segment

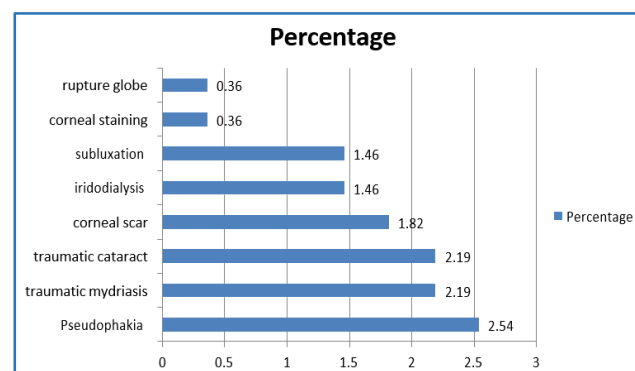


5 patients had vitreous haemorrhage persisting at 3 months, which was associated with preretinal haemorrhage. In 3 patients, associated retinal break was there in 3 eyes. Five eyes had retinal tear without retinal detachment. One eye with retinal tear was found at 3 months after the haemorrhages cleared. Barrage laser was given for 3 eyes with retinal break without detachment. Among 5 eyes with retinal detachment at 3 months, one eye with retinal break in the initial presentation developed rhegmatogenous RD at 3 months. One eye with orbital floor and medial wall fracture developed TON at 3 months. Late reduction was done for that patient, but vision did not improve. Choroidal rupture was present in one patient when the haemorrhages cleared.

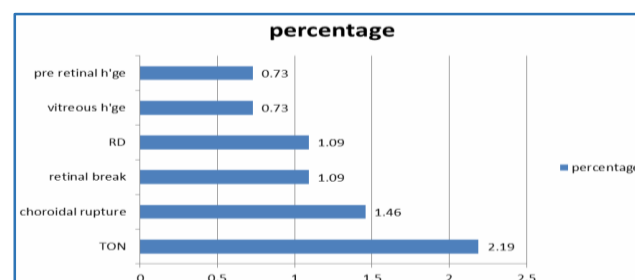
### Pattern of Clinical Injuries at 6 Months

#### Anterior Segment

Corneal staining cleared in one patient and in another patient there was corneal staining at 6 months, which was also clearing. Iridodialysis was corrected in one patient along with the cataract surgery. Traumatic mydriasis was persisting in 6 patients. Six eyes had traumatic cataract, 4 with early rosette and 2 had significant cataract, which needed cataract surgery. Three eyes with traumatic cataract had subluxation also. Seven eyes underwent cataract surgery with IOL.



#### Posterior Segment



Three eyes with vitreous haemorrhage cleared at 6 months follow up. Two eyes underwent PPV. 2 eyes had VH persisting at 6 months. 2 eyes with RD underwent RD surgery, one scleral buckling and the other with associated VH underwent PPV. Choroidal rupture was present in 4 eyes. In two eyes, the rupture was near the disc and caused defective vision. Traumatic Optic Neuropathy (TON) was present in total 6 eyes at 6 months. One eye developed TON

during 6 months follow up. Two patients with TON had no PL at initial presentation, but improved to HM at 6 months when the haemorrhages cleared.

### Visual Acuity

Visual Acuity	At Presentation		At 3 Months		At 6 Months	
	N	%	N	%	N	%
6/6-6/12	211	77	229	83.58	237	86.49
6/18-6/36	38	13.87	18	6.57	20	7.29
6/60-CF	15	5.47	8	2.29	10	3.65
HM-PL	7	2.55	6	2.19	6	2.18
No PL	3	1.09	1	0.36	1	0.36

#### Visual Acuity at Presentation and During Early Follow up.

##### At Presentation

Visual acuity at presentation and during early follow up was 6/6-6/12 (good vision) in 77% eyes. In 13.8% patients, the visual acuity at presentation and during early follow up was 6/18-6/36 (moderate vision loss). The causes of low vision in this group are some cases of hyphaema, iridocyclitis, traumatic cataract, vitreous haemorrhage, choroidal rupture and Berlin oedema. 5.47% eyes had 6/60-CF (marked vision loss) vision at time of presentation and during early follow up. The causes were hyphaema, traumatic cataract, vitreous haemorrhage, preretinal haemorrhage and TON. 2.55% eyes had HM-PL (poor vision) vision at early period. The causes were near total hyphaema, total traumatic cataract with subluxation, lens dislocation, dense vitreous haemorrhage and TON. 1.09 eyes had no PL. The causes were rupture globe and TON.

##### Visual Acuity at 3 Months

83.58% eyes had good vision (6/6-6/6) at 3 months. 6.58% improved to good vision at 3 months. 6.57% eyes had moderate vision loss at 3 months. The causes were corneal scar, traumatic cataract, vitreous haemorrhage, preretinal haemorrhage and choroidal rupture. Eight eyes had marked vision loss at 3 months. The causes include corneal staining, traumatic cataract, TON and RD.

One eye had no PL vision that was a case of globe rupture. Other two eyes with no PL improved to PL; both were TON.

##### Visual Acuity at 6 Months

Out of the 274 eyes, 237 (86.49%) had good vision at 6 months follow up. 20 (7.29%) eyes had moderate vision loss. The causes were corneal scar, traumatic cataract, pseudophakia and subluxation of lens. 10 (3.65%) eyes had marked vision loss. Causes included 3 cases of TON, retinal detachment and choroidal rupture, vitreous haemorrhage. 6 (2.18%) eyes had very poor vision. The causes were TON, retinal detachment, preretinal and vitreous haemorrhages. The eye with rupture globe had no PL at 6 months also.

### DISCUSSION

This study includes a total of 235 patients who sustained ophthalmic injuries following road traffic accidents. Out of 235 patients, 17 patients did not report back for the 6 months follow up. 220 patients were finally included in the study. Among the 220 patients, 54 patients had both eye involvement. So, the total eyes involved in the study were 274. In this study, patients above the age of 10 years were selected. The majority of ocular injuries occurred in the age group of 31-40 years. In Tripoli study,<sup>2</sup> mean age of patients was 32.5 and they included all age groups in the study. Out of 350 cases of RTA, males were 288 (82.3%) and females were 62 (17.7%) with M:F ratio 4.6:1. This may be due to the fact that males are more exposed to the highway traffic when compared to females. Eyes involved in RTA were mainly right eye 46.8%. Left eye was involved in 28.5%. Both eyes were involved in 54 (24.5%). Out of 220 patients with ocular injuries, most were due to motorised two-wheelers (65.0%) followed by 3 wheeler (10.9%), pedestrians (15.5%) and 4 wheelers (8.6%). In the study done by Supriya Patil et al,<sup>3</sup> majority (35%) were due to motorised two-wheelers followed by 4 wheelers (25.9%). Out of 220 patients, 101 (45.9%) were under the influence of alcohol while driving vehicle or walking along the road irrespective of age group. 119 (54.1%) patients had not taken alcohol during the accident. No female patients were found to be under the influence of alcohol.

#### Ocular Manifestations of Road Traffic Accidents

Periorbital oedema was a common sign in ocular injuries associated with RTA in 69.7%. Ecchymosis in one of the eyes had very poor vision. The causes were TON, retinal detachment, preretinal and vitreous most common clinical finding; out of the total number of 274 eyes, 134 (48.44%) eyes had ecchymosis. 17 (6.20%) patients had lid tear, most of them being partial thickness lid tear. 7 cases had associated fracture orbit. Three lid tears had no associated ocular injuries, one patient had Berlin oedema and one had vitreous haemorrhage. Subconjunctival haemorrhage was the most common clinical finding in our study. 149 (54.37%) cases had subconjunctival haemorrhage. In severe subconjunctival haemorrhage, posterior limit could not be made out. Conjunctival tear was seen in 13 (4.7%) patients. Conjunctival tear did not exceed more than 5 mm. Conjunctival foreign body was observed in 10 (3.6%) patients and chemosis in 21 patients. Most of the foreign bodies were sand particles and were lodged in bulbar and upper tarsal conjunctiva. 69 (25.18%) eyes presented with corneal injuries, 41 (14.9%) patients had corneal abrasion, 6 (2.18%) patients had full thickness corneal tear, 7 (2.5%) patients had partial thickness corneal tear and 10 (3.64%) patients had corneal foreign body. Five patients with full thickness corneal tear were associated with iris prolapse, out of which one patient had posterior dislocation of lens and one patient had subluxated lens. Full thickness corneal wound patients underwent wound repair with suturing. Three (1.09%) eyes had scleral laceration. Two of them were full thickness lacerations. One of them was associated

with uveal prolapse and both underwent repair. In this study, 16 (5.8%) cases had hyphaema. Seven of them had hyphaema involving  $<1/3$  of the anterior chamber, 2 had total hyphaema, 2 of them had hyphaema  $>1/2$  of the anterior chamber and 5 of them had dispersed hyphaema. Seven eyes had elevated IOP and two patients had rebleed. Three of them underwent AC wash. Seven eyes with hyphaema had posterior segment pathologies. One patient with total hyphaema later presented as traumatic optic neuropathy at 3 months follow up. Ocular manifestations of head injury by Kulkarni et al<sup>4</sup> showed 0.5% hyphaema. Iridocyclitis was present in 22 (8.02%) patients. Most of them were associated with other findings like hyphaema, sphincter tear, corneal wounds, posterior segment pathologies, etc. Most common findings in iris and pupils were traumatic mydriasis 20 (7.3%), sphincter tear 21 (7.66%), 6 (2.18%) cases had iris prolapse and 7 cases had iridodialysis. RAPD was present in 10 patients at the time of presentation. Four of them had TON, three had third cranial nerve palsy, two had RD and one of them had choroidal rupture close to the disc.

Our study was comparable with a study of 205 cases by Canavan and Archer<sup>5</sup> in which 79 cases had iris and pupillary injuries.

24 eyes had lenticular involvement. Majority of them 14 (5.11%) had traumatic cataract. Six eyes presented with traumatic cataract during the initial presentation itself, four during the 3 months follow up and four in the 6 months follow up. Five eyes underwent cataract surgery within the first 3 months out of which two along with the primary procedure, three eyes with traumatic cataract underwent cataract surgery within 6 months and one became aphakic. Others had early rosette cataract. 9 (3.28%) eyes had subluxation of lens and 3 (1.05%) had dislocation of lens. Most of the subluxations were associated with traumatic cataract. Three eyes had  $>180$  degrees subluxation, one of which became aphakic after cataract removal. Out of the three dislocations, two underwent removal by vitrectomy in first three months, one after 3 months as opposed to 52 eyes out of 212 eyes in a study by Canvan and Archer.<sup>5</sup> Our study had 3.28% patients with lenticular damage. Our findings were comparable with that of Dabral SM, Mukherjee AK and Saini JS<sup>1</sup> who analysed 82 patients hospitalised for penetrating eye injuries. Concomitant injuries in the eye were laceration of lid (26), lacrimal canalicular injuries (8), conjunctival tears (38), iris tear (30), ciliary body tear (20), lens (45), posterior segment damage (28) and hyphaema (32). In 12.10% of cases, glass caused injury following road traffic accidents.

### Posterior Segment Involvement

Out of 220 patients, 34 (15.45%) patients had posterior segment involvement, i.e. 42 eyes (15.33%) out of 274 eyes. 8 (2.19%) eyes had vitreous haemorrhage. 6 (2.19%) eyes had traumatic optic neuropathy. 14 (5.11%) eyes had Berlin oedema. 6 (2.19%) eyes had preretinal haemorrhage. 5 (1.82%) eyes had retinal detachment. 6 (2.19%) eyes had choroidal rupture. Eight eyes had vitreous haemorrhage. 3

eyes with vitreous haemorrhage had associated fracture orbit and the other eyes had associated ecchymosis and subconjunctival haemorrhage. At the time of presentation, those patients had 6/36 to perception of light and 6 eyes improved up to 6/12 to 6/18 after 3 months. One had associated TON in two eyes. Vitreous haemorrhage persisted even after 6 months. One patient underwent PPV. In 3 eyes, there was associated subluxation and traumatic cataract. Ocular manifestations of head injury by Dr. Kulkarni et al shows that vitreous haemorrhage is more in RTA than with other ocular trauma. According to a study role of USG in ocular trauma,<sup>6</sup> vitreous haemorrhage is the most common finding in posterior segment as in this study. 14 (5.11%) cases of Berlin oedema were observed in this study. Some of the cases of Berlin oedema had concomitant orbital fracture. 11 (4.01%) eyes presented with preretinal haemorrhage and most of them were associated with vitreous haemorrhage. Retinal tear was seen in 5 eyes at the time of presentation; of which, two developed retinal detachment later. 3 eyes were presented with retinal detachment at the time of presentation and during early follow up, 2 of them were associated with retinal break and one with retinal dialysis. 2 more eyes presented with RD at 3 months follow up, which was not visible earlier due to vitreous haemorrhage and preretinal haemorrhage. Two eyes underwent retinal detachment surgeries within the 6 months follow up. 4 eyes presented with choroidal rupture during time of presentation and early follow up. Two more eyes presented with choroidal rupture at 3 months follow up after decreasing the haemorrhages. One eye developed choroidal neovascularisation at 6 months. Six eyes (2.19%) had traumatic optic neuropathy. Four of them were detected during the time of presentation and one at 3 months follow up and one at six months follow up. Three patients had no PL vision at early follow up, but two of them had PL vision at third month, which may be due to clearing of the haemorrhages associated. Four eyes were having orbital wall fractures, two eyes with orbital floor fracture, one eye with medial wall fracture and one with both medial wall and floor fracture. Our study was comparable with a study of indirect optic nerve injury in two-wheeler riders in North-East India by Harsha Bhattacharjee et al.<sup>7</sup> Two eyes of 2 patients presented with traumatic oculomotor nerve palsy with pupillary involvement. Both patients presented with ptosis, anisocoria and ophthalmoplegia. Conservative management was given. A total number of 30 eyes (10.95%) with orbital and midfacial fractures were seen during the period of our study. Among the 30 eyes, 20 eyes had multiple orbital wall fractures. Of these, 15 eyes had medial wall fracture, 5 eyes had fracture roof of orbit, 19 eyes had floor fractures, 8 eyes had lateral wall fracture and 3 eyes had a pure blow out fracture. Two eyes had Le Fort fracture and one eye had tripod fracture. Both were treated conservatively. Two eyes of 2 patients with blow out fracture had TON and two patient with medial wall fracture had TON. Two eyes of 2 patients underwent orbital reduction surgery. In a study of orbital fractures in a tertiary healthcare center by Sumana J Kamath et al<sup>8</sup>, 22 among 35 patients had



infraorbital wall fracture, floor fracture was seen in 10 patients, lateral wall fracture in 4 patients, medial wall fracture in 6 patients, pure blow out fracture in 5 patients and roof fracture in 1 case. Most of the patients had good vision (6/6-6/12) at the time of presentation, i.e. 211 eyes (77%). 38 (13.87) eyes had moderate vision loss (6/18-6/36). The cause of moderate vision loss included anterior segment pathologies like corneal lacerations, hyphaema, iridocyclitis and traumatic cataract with or without subluxation, etc. 15 (5.47%) eyes were with marked vision loss (6/60-CF). The causes are corneal lacerations, hyphaema, traumatic cataract, vitreous haemorrhage, preretinal haemorrhage involving the macular area, two cases of incomplete traumatic optic neuropathy and one case of retinal detachment. 7 (2.55%) eyes had poor vision (HM-PL). Causes are near total hyphaema, total traumatic cataract, traumatic optic neuropathy and retinal detachment. Three eyes had no PL at the time of presentation and during early follow up. Causes are rupture globe and traumatic optic neuropathy with severe vitreous and preretinal haemorrhages. 229 (83.58%) eyes had good vision at 3 months. 18 eyes improved in 3 months. 18 eyes had moderate vision loss at 3 months. 8 eyes had marked vision loss at 3 months. The causes include corneal staining, traumatic cataract, TON and RD. One eye was with no PL vision that was a case of globe rupture. Other two eyes with no PL improved to PL, both were TON. In the study, ocular trauma in road traffic accidents experience at Mathura Das Hospital, Jodhpur (Rajasthan); Aman Sumeet Arora et al<sup>9</sup> did a prospective analysis of 150 patients of RTA with some or the other forms of ocular injury. Visual acuity at presentation was 6/6-6/18 in 95 eyes (63.33%) and PL in 32 eyes (21.33). Final visual acuity found was 6/6-6/18 in 104 eyes (69.33%) and 8 patients (5.33%) were lost to follow-up.

#### Visual Acuity at 6 Months Follow Up

Out of the 274 eyes, 237 (86.49%) had good vision at 6 months follow up. 8 eyes improved in vision. 20 (7.29%) eyes had moderate vision loss. The causes are corneal scar, traumatic cataract, pseudophakia, subluxation of lens. 10 (3.65%) eyes had marked vision loss. Causes include 3 cases of TON, retinal detachment, choroidal rupture and vitreous haemorrhage. 6 (2.18%) eyes had very poor vision. The eye with rupture globe had no PL at 6 months also.

#### CONCLUSION

Ocular injuries among RTA patients are more common in men in two-wheeler drivers, those who are under influence of alcohol.

Fracture of orbital wall occur in motorists with severe external injuries. However, they do occur even with less severe external injuries. Hence, there should be a high suspicion in all patients with severe pain and defective ocular movements.

Those with severe vision loss should be investigated for direct and indirect causes of traumatic optic neuropathy and those with TON should be treated with high-dose systemic steroids.

The use of public transport system should be encouraged by increasing transport facilities. Vehicle pooling should be advocated as in certain other countries.

Road traffic rules should be a part of the curriculum and school students should be educated to spread the message. Wearing proper helmets, safety goggles and seat belts should again become compulsory.

#### REFERENCES

- [1] Mukherjee AK, Saini JS, Dabral SM. A profile of penetrating eye injuries. *Indian Journal of Ophthalmology* 1985;33(2):95-97.
- [2] EI Shtewi M, Shishko MN, Purohit GK. Road traffic accidents and ocular trauma (Tripoli eye study). *Journal of Community Eye Health* 1999;12(29):11-12.
- [3] Patil SS, Kakade R, Durgawale P, et al. Pattern of road traffic injuries: a study from western Maharashtra. *Indian Journal of Community Medicine* 2008;33(1):56-57.
- [4] Kulkarni AR, Agarwal SP, Kulkarni RR, et al. Ocular manifestations of head injury. *Eye* 2005;19:1257-1263.
- [5] Canavan YM, Archer DB. Anterior segment-consequences of blunt ocular injury. *British Journal of Ophthalmology* 1982;66(9):549-555.
- [6] Chugh JP, Susheel, Verma M. Role of USG in ocular trauma. *IJRI* 2001;11(2):75-79.
- [7] Bhattacharjee H, Bhattacharjee K, Jain L, et al. Indirect optic nerve injury in two-wheeler riders in northeast India. *Indian Journal of Ophthalmology* 2008;56(6):475-480.
- [8] Kamath SJ, Kamath MG, Kamath MM. A study of orbital fractures in a tertiary health care centre. *Journal of Health and Allied Sciences* 2007;6(1):1-4.
- [9] Arora AS, Bhargava G, Chauhan A, et al. Ocular trauma in road traffic accidents: experience at Mathura Das hospital, Jodhpur (Rajasthan). *RJO* 2011;1-3.