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Ocular Injuries in Road Traffic Accidents (Rtas)

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Abstract:
Purpose*: Aim of the study was to assess the visual outcome in patients attending tertiary care hospital with ocular injuries following RTA and compare various associated risk factors.*
Method: *In this prospective study 125 patients with ocular and periocular injuries underwent complete ocular examination including visual acuity, anterior segment examination by torch light to access pupillary action, slit-lamp examination and posterior segment examination by 78 D Lens or Indirect ophthalmoscope using 20 D lens. Patients with suspected posterior globe rupture underwent USG B-Scan and CT Orbit.*
Results: *In this study the male female ratio was 1:0.29 that means male are more prone to RTAs. Maximum case of RTA with ocular injury found in 21-40 year of age group (38.40%) followed by 41-60 year of age group (30.40%). Alcohol influence (71.2%) was present in majority of the drivers who sustained ocular Injuries. maximum incidence of ocular manifestation in case of RTA was Periorbital oedema with ecchymosis (83.2%) followed by eye brow laceration (68.8%). Two wheeler riders (73.6%) are more prone to ocular injuries when compared to persons travelling in auto, four wheeler or pedestrians etc. About 20% of patients with ocular injury had decreased vision and in about 3.3 % of cases the eye sight was lost due to irreparable injury like ruptured globe with prolapsed intraocular contents.*
Conclusion: *Ocular injuries in RTAs are preventable cause of blindness worldwide. Meticulous observation of traffic rules, maintain speed limits, wearing helmets when driving two-wheelers and not driving under the influence of alcohol are some of the measures to minimize RTAs in our country. Increasing public awareness of safety precautions is crucial to prevention of RTAs.*

Keywords: *CT-orbit, indirect ophthalmoscope, ocular injury, RTA, slit-lamp examination, USG B-sacn.*

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I. Introduction

Road traffic accidents (RTA) are events of human tragedy that involve at least one moving vehicle and result in injury or death of one or more individuals. RTAs account for a major proportion of human suffering all over the world and according to the world health organization it is the sixth leading cause of death in India [1].

Ocular trauma is the cause of blindness in more than half a million people worldwide and of partial loss of sight in many more, and it is often the leading cause of unilateral loss of vision particularly in developing countries.[2] Head injuries cause the hospitalization of 200–300 persons per 100 000 populations per year,[3] and about 25% of these are associated with ocular and visual defects. The role of ocular injuries secondary to head trauma in the causation of blindness has become a subject of immense importance. [4] The manifestations of head injury and its numerous other systemic complications are so compelling that damage to the visual system is most likely to be ignored. Often times, when the eye is examined as part of neurological assessment of a patient with head injury, the purpose is mainly to gauge the severity of the head injury itself.[4,5] Since the mechanisms underlining ocular manifestations of head trauma are not fully understood, many hypotheses have been advanced to explain these defects. However, most of these hypotheses have remained untested and unproven. [6] With respect to soft-tissue injuries to the globe and adnexae in the anterior segment of the eye, one hypothesis suggested that energy is transferred to these structures from the sturdy frontal bones to the orbit and from the lateral orbital margin to contiguous facial structures during the impact following head injury.[7] Disorders of eye movement are thought to result from direct trauma to orbital contents, cranial nerves, and other brain areas.[8]

Ocular injuries contribute to a major part of trauma in RTAs and can involve injuries to the eye lids, lachrymal apparatus, orbital wall, periorbital structures and extra-ocular muscles, conjunctiva, cornea, sclera, uveal tissue, vitreous, choroid, optic nerve or can involve the entire globe at times [9]. Ocular trauma is also

regarded as one among the common causes of ophthalmological morbidity and unilateral blindness [10].These ocular traumata are often preventable and hence the need to increase public awareness of this public health concern all over the globe. Preventive measures include mandatory use of safety seat belts, laminated glass windscreens for all vehicles, children restrained in car seats on the back seat, education of the public about observation of road safety rules, wearing seat belts and use of unbreakable plastic spectacles. Clear road signs and markings, guiding traffic and drivers using fluorescent clearly visible during darkness are a helpful measure to prevent RTAs. [11]

Injuries in RTAs:

Head injury: In the western world, the most common cause of death after trauma is severe brain injury. The incidence of death from head injury is approximately 7 per 100,000[12], and the severely brain-injured also have the highest mean length of stay and mean hospital costs [13]. Head injury is a major cause of morbidity in survivors; disability may occur whatever the initial severity of the head injury and surviving patients with brain injury are more impaired than patients with injuries to other parts of the body. CT-scan is Best modalities to investigate the head injuries.

Spinal injury: The United States Major Trauma Outcome Study estimated the incidence of acute spinal-cord injury to be 2.6% of blunt trauma patients [14].Initial mechanical trauma includes traction and compression forces. Events initiated by the primary injury cause extension of the injury to the spinal cord; damaged tissue releases toxic mediators, which damage intact cells; in particular, the chemical, glutamate, overexcites neighboring neurons and initiates free-radical-mediated cell damage [15]. This process is potentiated by systemic hypotension and hypoxia. MRI is investigation of choice for spinal injury.

Thoracic injury: In modern day civilian trauma centres, thoracic injury directly accounts for 20-25% of deaths due to trauma; thoracic injury or its complications are a contributing factor in a further 25% of trauma deaths [16].

Abdominal injury: It includes Splenic injury, Hepatic injury, Hollow viscus injury (HVI)

Most commonly injured intraabdominal organ following blunt trauma is the spleen. Laparotomy should be performed on haemodynamically unstable patients with suspected splenic injury. Urgent laprotomy required in case suspected splenic injury with unstable patient.

Pelvic injury: Fractures of the pelvis are increasingly recognised as a marker of severe injury, as the force required to disrupt the pelvic ring is substantial [16].

Extremity injury: It includes upper and lower extremities injury.

Ocular and ENT injury: Ocular involvement in road traffic accidents may involve the eyelids, lacrimal canaliculi, orbital wall, conjunctiva, cornea, sclera and the extra-ocular muscles. There may be prolapse of uveal tissue, vitreous loss, traumatic cataract, retinal detachment, vitreous haemorrhage, choroidal rupture, optic nerve avulsion or a ruptured globe. Eye injuries, often resulting in some visual loss, create enormous costs both to the victim and to society.

II. Material and Method

A total 350 RTA cases are evaluated and 125 patients with significant ocular injuries, were included in this study conducted in the Emergency and Trauma center, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India over a period of 15 months from March 2016 to May 2017. The procedures followed were in accordance with the ethical standards committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000. The necessary permission from the Ethical and Research Committee was obtained for the study.

Inclusion criteria:

1. All RTA Patients referred from trauma center and surgical ward for ophthalmology opinion were included
2. Both males and females were included.
3. All age groups were included.

Exclusion criteria:

1. Ocular injuries due to accidental fall were excluded.
2. Ocular injuries due to assault were not included in study.
3. Injuries due to burns and chemicals were not included.
4. Previous history of RTA and ocular trauma were not included.

History and Physical Examination as with all trauma patients, attention should be focused on the ABCs of trauma resuscitation, and any life-threatening injuries should be addressed first.[17,18] It is important to remember that associated facial trauma and swelling may affect airway patency: The airway should be secured, if appropriate, before further examination of the orbit. Once the patient is stabilized attention turns toward the ocular injury, and a thorough evaluation performed. A detailed history of each subject was taken. Past history of

subject, ophthalmologic status post Injury was also recorded. Both eyes were examined, assessing the nature and type of injury. The visual acuity was done with Snellen's chart when possible or finger counting was taken when subject'scondition did not permit .A detailed slit-lamp examination and fundus examination, B-scan,CT –scan, MRI was done. All subjects were followed up for 2 months from the day of enrollment. The injuries were classified into Extraocular and Intraocular. The intraocular injury was further classified into open and closed globe injury according to Ocular Trauma Classification Scheme as those involving blunt force, resulting in contusion (closed globe injury) or rupture (open globe injury), and those involving sharp forces, resulting in lamellar laceration (closed globe injury) or penetrating, perforating, and intraocular foreign body laceration (open globe injury) and the zone of injury. Zone I, II, and III were, respectively, from the anterior to the posterior pole of the globe. It also takes into account pupil response (presence or absence of RAPD in affected eye) and visual assessment at time of injury. Since we are following up our patients for 3 months, the best corrected visual acuity at the end of 3 months was noted. The severity of extra ocular and closed globe intraocular trauma was classified into mild, moderate and severe based on the classification by Duke Elder [19]**.**
The following procedures were carried out-
1. Detailed history.
2. Pictorial & procedural consent.
3. Anterior segment examination with torch light.
4. Slit-lamp examination.
5. Dilatation of pupil & retinoscopy.
6. Fundus examination using indirect ophthalmoscope or slit-lamp biomicroscope using 78 D.
7. CT brain & CT orbit in selected cases. / x-ray PNS water's view / MRI

Ophthalmic injuries and manifestations

Ocular portion involved	Clinical presentations
Orbit	Blow-out fracture of medial wall or floor, Orbital haematoma, Carotid-cavernous fistula
Eyelids	Hematoma, Avulsion of the lower lid
Conjunctiva	Subconjunctival Haemorrhage
Anterior chamber/uvea	Hyphaema, Tears of the iris sphincter and iridodialysis, Angle recession and cyclodialysis
Lens	Rosette cataract, Subluxation of the lens, Rupture of the anterior or posterior capsule
Sclera	Rupture, commonly at the limbus or behind the insertion of the recti
Vitreous	Haemorrhage , and detachment
Choroid	Choroidal rupture, Suprachoroidal haemorrhage
Retina	Retinal or subretinal haemorrhage, Retinal oedema, commotio retinae, Retinal dialysis, Macular oedema or hole
Optic nerve	Optic nerve avulsion, Haemorrhage of the optic nerve sheath

III. Results

Total 350® RTA cases evaluated between March 2016 to May 2017

Table 3.1 Total RTA v/s RTA with ocular injury

	Pt. with ocular injuries	**No significant ocular injuries**	**Total**	**Percentage**
Male	97	173	270	77.14%
Female	28	52	80	22.86
Total	**125 (n)**	**225**	**350 ®**	**100%**

Table 3.1 shows that, in total 350 RTA cases, 270 patients were male (77.14%) and female patients were 80 (22.86). There was drastic difference between male and female numbers.
A total 125 patients of all age group with RTA with ocular injury were included in the study.

Table 3.2 Gender ratio of patients (n=125)

	Male	**Female**
Number	97	28
Percentage	77.6%	22.4%

Table 3.2 shows gender distribution of the patients in the study group. There were 87 (77.6%) males and 28 (22.4%) females. The male female ratio was 1:0.29

Table 3.3 Age and sex wise distribution of patients of RTA (n=125)

Age groups (in years)	**Male**	**Percentage**	**Female**	**Percentage**	**Total**	**Percentage (%)**

00-20	13	10.4%	02	1.6%	15	12%
21-40	33	26.4%	15	12%	48	38.4%
41-60	30	24%	08	6.4%	38	30.4%
61-80	18	14.4%	03	2.4%	21	16.8%
>80	03	2.4%	00	00%	03	2.4
Total	**97**	**77.6**	**28**	**22.4%**	**125**	**100**

Table 3.3 describes that maximum case of RTA with ocular injury found in 21-40 year of age group (38.40%) followed by 41-60 year of age group (30.40%).

Table 3.4 Alcohol Influence on RTA (n=125)

Alcohol Influence	No. of patients	Percentage (%)
Present	89	71.2%
Absent	36	28.8%

Table 3.4 describes, in our study Alcohol influence (71.2%) was present in majority of the drivers who sustained ocular Injuries.

Table 3.5 Incidence of various ocular injuries in case of RTA (n-125)

Ocular injuries	Number of cases	Percentage (%)
Eye brow laceration	86	68.8%
Lid laceration	67	53.6%
Periorbital oedema with ecchymosis	104	83.2%
Sub-cojunctival haemorrhage	79	63.2%
Conjunctival tear	03	2.4%
Sclera tear / globe perforation	03	2.4%
Corneal tear	06	4.8%
Orbital wall fracture	11	8.8%
Acute hyphaemia	13	10.4%
Lens dislocation/ Subluxation & cataract	03	2.4%
Choroidal tear	02	1.6%
Vitreous or retinal haemorrhage	08	6.4%
Optic nerve avulsion	00	0%
Traumatic optic neuritis	04	3.2%

Table 3.5 describes that maximum incidence of ocular manifestation in case of RTA was Periorbital oedema with ecchymosis (83.2%) followed by eye brow laceration (68.8%).

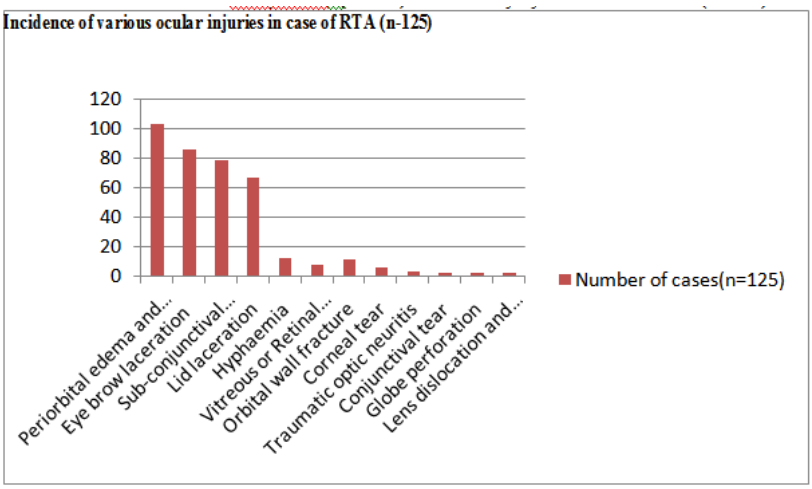


Table 3.6 Mode of Travel while Sustaining RTA

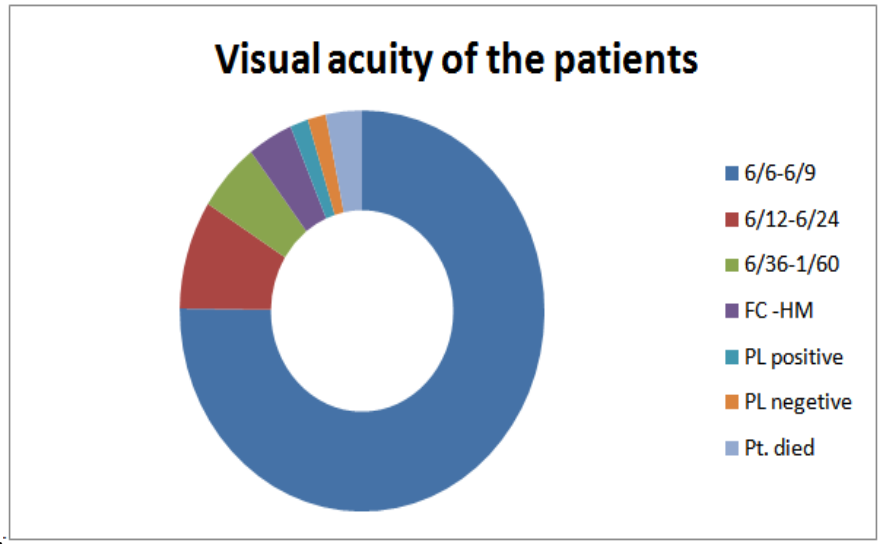
	No. of Persons	Percentage (%)
2 Wheeler	92	73.6%
4 Wheeler (car)	13	10.4%
Heavy 4 Wheeler vehicle	07	5.6%
Auto	07	5.6%
Pedestrian	04	3.2%
Cyclist	02	1.6%
Total	125	100%

As table 3.6, two wheeler riders (73.6%) are more prone to ocular injuries when compared to persons travelling in auto, four wheeler or pedestrians etc. But these data depends upon use of helmet, seatbelt, city traffic guideline, alcohol abuse etc.

Table 3.7 Visual acuity of the patients after 2 months (after taken conservative and surgical management)

Visual acuity	**No. of patients**	**Percentage** (%)
6/6-6/9	94	75.2%
6/12-6/24	11	8.8%
6/36-1/60	07	5.6%
Finger count to Hand movement	05	4%
Perception of light present	02	1.6
Perception of light absent	02	1.6
Patient died	04	3.2%
Total	125	100

Table 3.7 describes, about 20% of patients with ocular injury had decreased vision and in about 3.3 % of cases the eye sight was lost due to irreparable injury like ruptured globe with prolapsed intraocular contents. Majority of the patients gained their normal visual acuity after 2-3 months



IV. Discussion

In our study, Males (77.6%) had more injuries as compared to Females (22.4%). Similar findings were reported with other studies [11] where 75% patients were male and 25% were female. Two wheeler riders (73.6%) are more prone to ocular injuries when compared to persons travelling in auto or four wheeler and pedestrians. Marudhamuthu et al found 92% of ocular injuries occurred in two-wheeler drivers who were driving without helmets.[20] In our study Alcohol influence (71.2%) was present in majority of the drivers who sustained ocular Injuries**.**In this study maximum incidence of ocular manifestation in case of RTA was Periorbital oedema with ecchymosis (83.2%) followed by eye brow laceration (68.8%) These were also the commonest ocular injuries reported by Alam J et al and Kumarasamy et al in their studies but the commonest ocular injury reported by Muralidhar et al was sub-conjunctival haemorrhage followed by echymosis.[9,10,22] .Puzari et al reported subconjunctival haemorrhage as the commonest injury (83.33%) followed by lid oedema and ecchymosis (78.33%). In 350 cases of RTA, only 125 (35.71%) patients had significant ocular injuries. Maximum case of RTA with ocular injury found in 21-40 year of age group (38.40%) followed by 41-60 year of age group (30.40%). In this study about 20% patients had decreased vision due to corneal opacity, vitreous/retinal hemorrhage/detachment, rupture of globe etc

V. Conclusion

Blindness increases the burden on society, so early treatment of ocular injuries and use of protective wear results in better visual outcome. RTA being one of the most important and preventable cause of ocular morbidity should be taken up as an important public health problem and protective measures must be used to decrease its incidence. “Precautions are better than cure” Most of the developing countries as like India Alcohol, non-safety measures and not following traffic rules are common causes of ocular injuries in RTAs. The fact that

the lifetime prevalence of ocular trauma is higher than that of diseases like glaucoma, age-related macular degeneration or diabetic retinopathy [23] shows that vision loss due to ocular trauma can be avoided. This can be accomplished by implementing the traffic rules with strict force and imposing heavy fine and license cancellation for drunken driving**.** Meticulous observation of traffic rules, maintain speed limits, wearing helmets when driving two-wheelers and not driving under the influence of alcohol are some of the measures to minimize RTAs in our country. Increasing public awareness of safety precautions is crucial to prevention of RTAs.

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