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Original Research Article

Ocular Manifestations in Head Injury: A Clinical Study

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ABSTRACT

Introduction: Incidence of head has increased more drastically with urbanisation, vehicular congestion, poor maintenance of road and alcoholism in India. Head injuries are often associated with ocular manifestations and consequent morbidity.

Aim: To study the various ocular manifestations and it's severity in head injury patients.

Material and Methods: It is a cross sectional study in tertiary care hospital, Total 200 patients with head injury were screened for ophthalmic manifestations, age, sex, modes of head injury, signs and symptoms following head injury. Initial examination with torch light and bedside visual acuity was done, then a detailed assessment with Snellen acuity chart and slit lamp biomicroscopy was done. Intraocular pressure and gonioscopy performed wherever necessary. Fundus examination done with direct, indirect ophthalmoscopy. CT scan was done.

Results: The incidence of simultaneous involvement of ocular injury in head injury patient was 78%. Most of the study subjects were Males and most common age group was 21- 30 years. Road traffic accident was the most common mode of head injury.

Conclusion: Lid ecchymosis was the most common ocular manifestation. Traumatic optic neuropathy was most common cause of visual loss.

Keywords: Head Injury, Ocular Manifestations, Visual Loss.

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INTRODUCTION

Head injury is a major medical social economic health priority issue. Incidence of head injury has increased more drastically with urbanisation, vehicular congestion, poor maintenance of road, alcoholism. Over 50% of all trauma deaths are associated with head injury.[1] A frequency of upto 84% ocular involvement in head injury has been reported.[2] Many of the ophthalmic findings are often ignored and present much later to the neuro-ophthalmic clinics. About 25% of head injuries requiring hospitalization are associated with ocular problems and visual defects. Early recognition and clinical correlation of ophthalmic manifestation is important. Although the eyes represent only 0.1% of the total body surface and 0.27% of the anterior body surface, their significance to individuals and the society very high as more than 80% knowledge we receive is through eyes. The role of ocular injuries secondary to head trauma in causation of blindness continues to be an immense health problem. As head injuries occur most commonly in productive age group, the socioeconomic impact of ocular trauma is grave. Those affected often have to face loss of career opportunities, major lifestyle changes and occasionally permanent physical and mental disability.

Considering the above facts we had conducted a study with objectives of:

1. To study the incidence of simultaneous involvement of ocular injury in head injury patient.
2. To determine the age and sex incidence in head injury.
3. To determine the various modes of head injury.
4. To determine the incidence of ocular blindness and ocular morbidity in head injuries.

MATERIAL AND METHODS

It is hospital based observational cross sectional study. The study was carried out in tertiary care hospital which was reasonably equipped and there was no neurosurgical unit. Also there was no special neurosurgical diagnostic equipment. Study was done during period of 1st December 2014 to 30th May 2016. All the patients with both gender and all ages of head injury first were received in casualty. Patient with ocular manifestations due to tumours and other pathologies which are precipitated by head injuries were excluded. A Detailed history was taken with special emphasis on the etiology of head injury. In conscious co-operative

mobile patients, the visual acuity was recorded by Snellen chart.In conscious but uncooperative and immobile patient the vision was recorded by finger counting. Slit lamp aided ocular examination was done to examine any abnormality in the Eyelid, Conjunctiva, Sclera, Cornea, Anterior chamber, Iris, Pupil, Lens.

Defects in continuity of orbital rim were palpated for any crepitus and the position of outer canthus and inner canthus was seen for any displacement. Proptosis, if any, was noted. In conscious and co-operative patient, ocular movements were tested in 9 direction of gaze. Fundus examination was done by direct ophthalmoscopy in every patient and with indirect ophthalmoscopy and slit lamp biomicroscopy whenever required. Data analysis was done using Microsoft Excel and results were concluded in the form percentages, tables and graphs.

Table 1: Age distribution of head injury

Sr. No.	Age Group	No. of Patients	Percentage
1)	Less than 10	3	1.5 %
2)	11—20	24	12 %
3)	21-30	80	40 %
4)	31-40	44	22 %
5)	41-50	26	13 %
6)	51-60	18	9 %
7)	61-70	4	2 %
8)	71-80	1	0.5 %
	Total	200	100 %

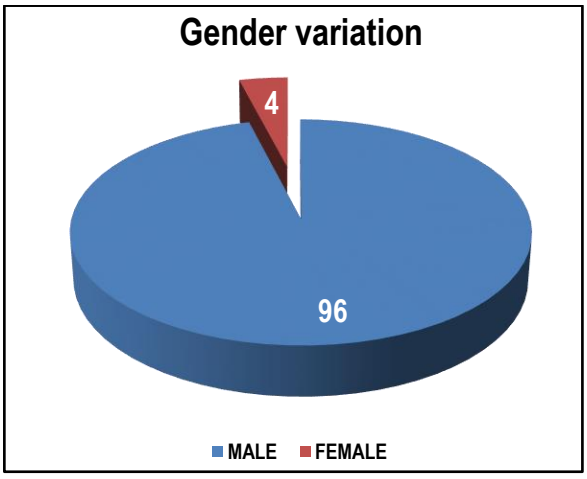
Table 2: Ocular findings in 200 cases of head injury

Sr. No.	Features	No. of patients*	Percentage
1)	Lid Ecchymosis (LE)	136	68
2)	Lid Laceration (LL)	19	9.5
3)	Subconjunctival haemorrhage(SCH)	108	54
4)	Corneal Epithelial Defect (CED)	12	6
5)	Corneal Oedema (CO)	14	7
6)	Pupillary Abnormalities (PA)	38	19
7)	Papilloedema (P)	24	12
8)	Traumatic Optic Neuropathies (TON)	5	2.5
9)	Ocular Nerve Palsy (ONP)	9	4.5
10)	Orbital Fracture (OF)	26	13
11)	Ptosis (PT)	4	2
12)	Berlin's oedema (BO)	3	1.5
13)	Avulsion of Globe (AG)	1	0.5

*Multiple Responses

Table 3: Distribution of patients according to Sex (n=200)

Gender	No. of patients	Percentage
Male	192	96
Female	8	4
Total	**200**	**100**



RESULTS

In this study of 200 cases of head injury patients, 192 (96%) were males and 8 (4%) were females. The age ranged from 8 to 73 years. The age range for men was 10–73 years. For women, the age ranged from 8 to 55 years. Young adult males (21–30 years) were more vulnerable to head injury, 40% (n=200).

The commonest eye finding was ecchymosis in 136/200 (78%) followed by subconjunctival haemorrhages in 108/200 (54%) patients. Orbital fractures were seen in 26 patients (13%). Patients had a combination of two or more ocular findings such as ecchymosis, subconjunctival haemorrhage, orbital fracture, hyphaema, and scleral tears.

The more severe injury was taken as the main ocular finding in head injury. Ophthalmic eye signs were found in 156/200 patients

(78%). Lid Ecchymosis (LE) was seen in 136/200 patients (68%). Subconjunctival haemorrhage (SCH) was seen in 54% cases. Pupillary involvement in 38/200 cases (19%) was the commonly seen ophthalmic sign followed by papilloedema in 24/200 cases (12%). Ptosis was found in 4 cases. A majority of the 200 patients with head injury in our study were victims of road traffic accidents (54%), closely followed by assaults (32.5%). Other causes of head injury included falls.

Table 4: Distribution of patients according to Modes of head injury (n=200)

Causes	No. of patients	Percentage
Road Traffic Accident (RTA)	108	54
Assault (A)	65	32.5
Fall from Height (FH)	10	5
Fall on ground (FG)	16	8
Misc (M)	1	0.5
Total	**200**	**100**

Table 5: Incidence of ocular involvement in Head Injury patients (n=200)

	Manifestations	No. of Patients	Percentage
1	**Ocular**	156	78
2	**Non-ocular**	44	22
3	**Total**	**200**	**100**

Table 6: Incidence of Pupillary abnormalities in head injury patients. (n=200)

Sr no.	Pupillary abnormalities	No. of patients	%
1	**Pupils fixed widely dilated of both eyes(BFD)**	21	10.5
2	**Unilateral dilatation with fixed pupil Hutchinson' pupil (UFD)**	7	3.5
3	**Relative afferent pupillary defect (RAPD)**	5	2.5
4	**Traumatic mydriasis (TM)**	3	1.5
5	**Pupils contracted and sluggishly reacting to light (PC)**	2	1
6	**Total**	**38**	**19**

Figure 1: Autoenucleated left eye following blow to frontal region by large stone

Fig 2: Left facial palsy in head injury patient with temporal bone fracture

DISCUSSION

Head injuries can be defined as those in which there is evidence of involvement of the brain including concussion, with loss of consciousness or post-traumatic amnesia, neurologic signs of brain injury or skull fractures. Most head injury cases are mild and can be treated as out-patients. Those that need neuro-observation are treated as in-patients for 24–48 h. Less than one in 100 has a severe injury to the brain.

The eyes are often involved in head injury (directly and indirectly) with neuro-ophthalmic deficits. Most ophthalmologists when faced with injured patients tend to focus on obvious ocular manifestations such as contusions and laceration. Subtle manifestations may be equally important and may go unrecognized. Neuro-ophthalmic evaluation is challenging in head injury patients with reduced consciousness or coexisting injuries.

Pupil size and reaction to light is very important in the initial assessment of head injury cases. The ocular findings are of secondary importance during emergency management of the patient. The mechanism of injury for optic neuropathy can be direct, indirect, or due to papilloedema.[3] Contusion injuries to the optic nerve are not uncommon after a head injury.

Pupillary signs are of grave importance in indicating the site and severity of injury and in the prognosis of head injury. It aids in localizing the site of supratentorial injuries, extradural and subdural haemorrhages, and pontine lesions.[4] Hutchison's pupillary signs indicate progressive coning and the need for emergent life-saving intervention. In this study, pupillary abnormalities, papilloedema, and lateral rectus palsy pointed towards a poorer outcome.

According to Kulkarni A R et.al[5] young adults males (21-30years) were more vulnerable to the head injury as opposed to the 41 - 50years old females. The incidence of head injury was more common in age group of 21 -30 years in present study. Odebode et.al[6] showed a peak during age group of 21 -30 years of life.

In present study, maximum numbers of patients were of adult age group. The most vulnerable among them were young adults of age group 21 to 30 years and they accounted for 80 out of 200 patients (40%).The youngest patient was 5yearsold and the eldest patient was 73years old.

This vulnerability of the young is due to the increased association with outdoor activities. Thus, the incidence of ocular manifestations in head injury in third decade nearly matches with Kulkarni et al and Muralidhar et al.[7] No cases of head injury following delivery were found as forcep method of delivery not used in our hospital. Incidence of head injury was found to be more in males (82.5%) than in females (17.5%) as observed by N S D Raju.[8]

Majority of patients vulnerable to head injury were male in the study by Kulkarni A R et.al. According to Kanwal Zareen Abbasi, incidence of head injury found to be 71% in males and 28.9% in females.

Pakalapati et al[9] stated in his research paper that the incidence of head injuries was extremely high in males (83.02%) as opposed to female (16.98%).Low percentage of female patients in this study indicates that males are more prone to head trauma, because they involve in outdoor activities much more frequently than females. Thus males are affected in greater number than females.

The highest incidence in males seen in present study and also in various studies indicate men are more likely to involve in risk taking behaviours and which put them at higher risk of head injury. Alcohol was significant contributing factor in males.

In the present study, the highest incidence of head injury was seen in 192 males (96%). The incidence of head injury in females was 4%.Thus males are affected in greater number than females. Since more males operate motor vehicles, high numbers of road traffic accidents are a result of reckless driving, leading to more head injury in them.

The incidence of road traffic accidents is raising with increasing number and advancement of high speed automobiles.

Assault injuries are more common in our country and in present series comprises 65 patients (32.5%), fall on ground i.e. self-fall (8%) and fall from height 10 patients (5%). Other cause included fall from height include 10 patients (5%), fall on ground 16 patients(8%). In present study, the most common cause of head injury leading to ocular manifestations in present study was road traffic accident (54%), second most common was assault (32.5%) followed by fall on ground (8%) and fall from height (5%). One miscellaneous cause was the one where during stormy weather a large stone hits patient right forehead causing autoenucleation of right eye. Hence autoenucleation was evident in one case.

This finding is consistent with Sharma B[10], where road traffic accident was most causative factor (86%). It also matches with Raju NSD where road traffic accident (47.5%) was most common causative factor. Similar finding was found in the study by T O Odebodeet Kulkarni AR et.al, T.O. Odebode et.al, Raju NSD and Sharma et.al. A relatively higher incidence of road traffic accident as the prominent cause of head injury in present study was due to the location of highway nearer to the hospital among the other causes. Faith M et al[11] reported ocular finding in 101 (68.7%) cases of head injury. Kulkarni A R et al reported ocular involvement in 167 (83.5%) cases of head injury. Smruthi et al[12] reported ocular involvement in 76.2%cases.

In present study, ocular findings were observed in 156 patients (78%) out of 200 head injury cases and no ocular findings were present in 44 patients (22%).

In NSD Raju's study, 40 cases of head injury with ocular manifestations, accounting for 30%. AR Kulkarni et al reported the commonest eye finding was lid ecchymosis in 54/200 (27%) followed by subconjunctival haemorrhages in 38/200 (19%) patients. Sharma B et al reported Oedema and ecchymosis of eyelids commonest finding (79%), followed by subconjunctival haemorrhage (75%).

Lid laceration was present in 19 patients. Out of 19, 11 cases were of partial thickness lid tear, 8 cases had full thickness lid tear in which 3 cases had canalicular laceration. Lid repair was done with suture material vicryl 6-0. Patients with canalicular laceration were referred to higher centre for stent operation. Patients with canalicular laceration who were not affording were operated. Ptosis was present in 4 cases, 2 out of them were neurogenic in origin and 2 were traumatic ptosis probably due to traumatic disinsertion or laceration of Levator palpebrae superioris. In present study, corneal epithelial defects were present in 12 patients and corneal oedema was present 14 patients. Relatively lower incidence of corneal involvement was seen in present study probably due to more cases associated with closed globe injuries.

In present study, pupillary abnormalities were seen 38 patients(19 %).Bilaterally dilated with fixed pupil not reacting to light was seen in 21 patients (10.5%), all of them died within few hours after examination. Unilateral dilated fixed pupil was seen in 7 patients (3.5%).Traumatic mydriasis was seen in 3 patients (1.5%) after blunt trauma. Bilateral miosis was seen in 2 patients (1%) were associated with intraventricular haemorrhage. Relative afferent pupillary defect was present in 5 cases (2.5%). Pakalapati et.al reported pupillary abnormalities in 18 cases out of 106 total patients.

Sharma B encountered pupillary abnormalities in 21.4% cases. Faith M et.al reported pupillary finding in 21.7% cases. Smruthi et.al reported pupillary involvement in 19% of cases. In present study, papilloedema was present in 24 patients (12%) out of 200 cases. Papilloedema was of low grade in all patients. Along with it, mild engorgement of veins was present in few patients. Maximum patients had normal fundus. Papilloedema was present in two patients of 6th cranial nerve palsy. These patients went to higher

centre for further management. Smruthi et.al reported 5cases (8%) of traumatic optic neuropathy out of 63 cases of head injuries and 1 case of direct optic nerve injury. In present study, traumatic optic neuropathy was present in 5 (2.5%) patients of head injury and was of indirect type. All the patients with traumatic optic neuropathy were associated with trauma to frontal region. No case of optic nerve avulsion was seen. Patients were given IV methyl prednisone 1gram for 3 days. Visual acuity was noted every day. Thereafter patient was shifted to oral methyl prednisone 1mg/kg body weight in tapering dose for every 3 days. No improvement was seen in visual acuity following treatment with steroid.

In present study, ocular nerve palsy was seen in 9 patients (4.5%). Under ocular nerve palsy the most common nerve involved was of 7thnerve. Facial nerve palsy was seen in 4 patients (2%). Out of 4, 2 had basilar skull fracture 2 had temporal bone fracture. After 7thcranial nerve, 3rdcranial nerve involvement was seen in 2 patients and 6thcranial nerve in 2 patients and 4th nerve in 1 patient. Patients with 3rd nerve palsy had restricted ocular movements in upward, downward and medial direction. Also pupil was mid dilated and ptosis was present.

Present study reported lower incidence of ocular motor involvement, as compared to other retrospective studies which included patients referred specially for ophthalmic problems, even beyond 12months after the initial head injury. In present study, Orbital fracture was seen in 13% cases. Most common orbital wall fracture was lateral wall (10.5%), followed by medial wall (1%), followed by roof (1%) and floor (0.5%).Three patients of orbital wall fracture were complaining of diplopia within 1 week of admission probably due to inflammation and oedema. After 2 weeks of follow up diplopia resolved.

Autoenucleation was evident in one case where undisplaced fracture of lateral wall was present. In present study, no case of severe retinal haemorrhage and choroidal rupture was observed. Traumatic optic neuropathy (2.5%) was the most common cause of blindness in present study. Three patients of Berlin's oedema (1.5%) had reduced vision. Two patients of 7th nerve palsy (1%) suffered from exposure keratitis. Two patients out of 12 with corneal epithelial defect had large epithelial defect and later on progressed to corneal opacity and reduced vision. Two patients developed cosmetic deformity due to traumatic ptosis. Three patients had traumatic mydriasis suffered reduced accommodation. Kulkarni A.R et al reported one case of ruptured globe where autoevisceration was conducted. Smruthi et.al reported one case (1.5%) of globe rupture. Autoenucleation was evident in one case where undisplaced fracture of lateral wall was present following trauma by stone to frontal head region followed by autoenucleation of eye ball. In present study we did not encountered any case cortical blindness.

CONCLUSION

- Various forms of injury can occur to the ocular and visual system in patients with head injury, some leading to various degree of visual impairment including blindness.
- Many of the cases of Road traffic Accident and assault occurred under alcoholic influence.
- Thus every patient of head injury must be evaluated thoroughly for ocular injury with special attention to pupillary reactions and visual acuity. Assessment will reduce the rate of ocular morbidity and blindness.
- Proper early ophthalmic assessment of head injury patient is important for immediate medical attention and appropriate surgical or non-surgical management of the patient in aiding quick rehabilitation of the patient and also the prompt referral of the patient to higher centre.

This study highlights the importance of a detailed early ophthalmological assessment in correlation with an overall clinical assessment of patients of head injury in prognosticating outcomes.

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