



A CROSS SECTIONAL STUDY OF ASSESSMENT OF OCULAR MANIFESTATION IN HEAD INJURY IN A TERTIARY CARE CENTRE OF NORTH-EAST INDIA

Ophthalmology

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ABSTRACT

Introduction: The involvement of ocular damage as a result of a head injury in the development of partial or total blindness remains a major public health concern. **Aim and objectives:** To study the proportion and involvement of ocular manifestations in head injury patients. **Materials and methods:** A Hospital based observational cross sectional study was conducted in a tertiary care centre of North East India for a period of one year. A total of 170 cases of Head injury with associated ocular manifestations were included in the study. Detailed history and ophthalmic examination were done. **Results:** Out of 170 patients, 88.82% were males and most vulnerable age group for head injury was 21-30 years (42.94%). Road traffic accident was the commonest mode of injury (71.76%). Most of the cases had multiple ocular manifestations. Soft tissue injury was seen among 162 patients in which lid edema was the most frequent manifestations in 40% cases. Most common posterior segment manifestation was macular edema (4.70%). Floor of the orbit was the most common wall involved in orbital fracture (12%). **Conclusion:** In our study, external ocular injury constitutes the major portion of ocular manifestations. It has become necessary to investigate head injury cases in order to determine the cause, pattern, and identification of clinical features, and thus to assist in the restoration of sight through timely interventions.

KEYWORDS

Closed Head Injury, Road Traffic Accident, Ocular Manifestations Of Neurological Origin

INTRODUCTION:

Traumatic brain injury (TBI) is a public health problem across the world and it can manifest in a variety of ways, from minor changes in consciousness to persistent comatose state and even death.¹ Every year, there is an increase in the number of people in India who have traumatic brain injuries, both in urban and rural areas. According to estimates, our country saw between 1.5-2 million injuries and 1 million fatalities per year.² More than 50% of all trauma deaths are associated with head injury.³ A frequency of up to 84% ocular involvement in head injury has been reported.⁴ Many of the ophthalmic findings are often ignored and present much later to the neuro-ophthalmic clinics.^{4,5} About 25% of head injuries requiring hospitalization are associated with ocular problems and visual defects.⁴ Early recognition and clinical correlation of ophthalmic manifestation is important.

PATIENT AND METHODS:

A Hospital based observational cross sectional study was conducted in a tertiary care centre of North East India for a period of one year from August 2020 to July 2021. This study was approved by the Institutional Ethics Committee (Approval number: AMC/EC/PG/8781) and adhered to the tenets of Declaration of Helsinki. Written and informed consent was taken from all the participants.

Inclusion Criteria:

All cases of Head injury with associated ocular manifestations attending department of Casualty, Ophthalmology OPD and admitted in Surgery Department of the hospital.

Exclusion Criteria:

- Patients with primary ocular injury without head injury,
- Post traumatic amnesia,
- very seriously ill patients and non-cooperative patients

Sample Size:

Taking 95% confidence interval with marginal error of 5% and considering the proportion of ocular involvement in head injury to be 78%, the sample size is calculated to be 275. Due to the prevailing Covid 19 pandemic situation and prolonged lockdown only 170 no. of cases could be collected and the same taken as the sample size.

METHODS:

A detailed history regarding the mode of injury was taken and all

patients with sustained head injury and having ophthalmic manifestations were evaluated in two stages. Preliminary ophthalmic examination included bed side visual assessment by counting finger, diffuse torchlight examination for any extraorbital injury, pupillary response, assessment of extraocular movements in 9 direction of gaze whenever possible, palpation of orbital rim to look for any tenderness and crepitus, fundus evaluation by direct ophthalmoscopy. Patients were also examined by other specialities as required.

Statistical Analysis:

The collected data was tabulated in Microsoft Excel worksheet and computer based analysis was performed using the Statistical product and service solutions (SPSS) 20.2 software (SPSS, Chicago, Illinois, USA) and Microsoft Excel 2010. The categorical variables were summarized as proportions and percentages.

OBSERVATION AND RESULTS:

Table 1: Clinical profile of head injury patient

1.Age distribution (years)	
Less than 10	2(1.18%)
11-20	17 (10.00%)
21-30	73 (42.94%)
31-40	34 (20.00%)
41-50	19 (11.18%)
51-60	11 (6.47%)
61-70	8 (4.71%)
71-80	3 (1.76%)
81-90	3 (1.76%)
2. Sex ratio	
Male	151 (88.82%)
Female	19 (11.18%)
3.Mode of Injury	
RTA	122 (71.76%)
Physical Assault	33 (19.41%)
Accidental self fall	11 (6.47%)
Fall from height	4 (2.35%)
4. Eye involved	
Unilateral involvement	161 (94.7%)
R/E	43 (26.71%)
L/E	118 (73.29%)
Bilateral involvement	9 (5.3%)

Out of 170 head injury cases, 151 were males (88.82%) and 19 were females (11.18%). Most vulnerable age group for head injury was 21-30 years (42.94%) followed by 31-40 year age group (20%) While children (1.18%) as well as elderly above 81 years (1.76%) were amongst the least affected group. The commonest mode of injury was Road traffic accident (71.76%) followed by physical assault (19.41%), accidental self fall (6.47%) and fall from height (2.35%). Unilateral eye involvement was noted in 161 patients (94.7%), among which left eye was most commonly involved in 118 patients (73.29%). Only 9 patients (5.31%) had bilateral eye involvement. (Table.1)

Table 2: Ocular and visual manifestations in head injury patients

1. Soft tissue injury	162 (95.29%)
a) Lid edema	68 (40%)
b) Lid ecchymosis	36 (21.17%)
c) Lid Laceration	18 (10.58%)
d) Lagophthalmos	4 (2.35%)
e) Ptosis	6 (3.52%)
f) Subconjunctival haemorrhage (SCH)	19 (11.17%)
g) Corneal tear	5 (2.94%)
h) Scleral tear	6 (3.52%)
2. Anterior segment manifestations:	22 (12.94%)
a) Hyphaema	14 (8.23%)
b) Traumatic uveitis	8 (4.70%)
3. Posterior segment manifestations	25 (14.70%)
a) Macular edema	8 (4.70%)
b) Berlin's edema	3 (1.76%)
c) Vitreous haemorrhage	4 (2.35%)
d) Retinal tear	3 (1.76%)
e) Retinal haemorrhage	3 (1.76%)
f) Purtschner retinopathy	2 (1.18%)
g) Papilledema	2 (1.18%)
4. Neuroophthalmic manifestations	62 (36.47%)
a) Abnormal papillary reaction	48 (28.23%)
b) EOM involvement	14 (8.23%)
5. Orbital wall fracture	32 (18.82%)
a) Roof	4 (2.35%)
b) Lateral wall	7 (4.11%)
c) Medial wall	9 (5.29%)
d) Floor	12 (7.05%)

Most of the cases had multiple ocular manifestations. Table 2. shows soft tissue injury observed in 162 patients in which lid edema was the most frequent manifestations in 68 patients (40%) followed by lid ecchymosis in 36 patients (21.17%). Less frequent manifestations were lagophthalmos (2.35%) and ptosis (3.52%). Most common posterior segment manifestation was macular edema observed in 8 cases (4.70%) followed by vitreous haemorrhage in 4 cases (2.35%).

Among neuroophthalmic manifestations, abnormal papillary reactions was seen in 48 cases (28.23%) while EOM restriction was noted in 14 cases (8.23%). In the event of traumatic neuropathy and extra ocular muscle palsy, ocular involvement can range from non-significant symptoms such as edema and ecchymosis to loss of vision and movement.

Out of 170 cases, orbital wall fracture was observed in 32 cases (18.82%). Most common wall involved was the floor of the orbit in 12 cases (7.05%) while least involved was roof of the orbit (2.35%).

Table 3: Type of Head injury in relation to GCS score

Type of Injury	GCS	No. of patients	Percentage(%)
Mild head injury	13-15	103	60.59
Moderate Head Injury	9-12	28	16.47
Severe Head injury	3-8	39	22.94

All the patients of head injury with ocular manifestations were evaluated for GCS at the time of admission to hospital (Table.3). The highest percentage of patients (60.59%) had a GCS score of 13 to 15 followed by GCS score of 3-8 in 39% cases while the lowest percentage (16.47%) had a GCS score of 9-12.

DISCUSSION:

In our study involving 170 head injury patients with ocular manifestation, a wide spectrum of ocular manifestations ranging from less severe to serious visual complications were seen. More vulnerable age group was found to be 21-30 years in our study which is similar to study done by Kumari R et al.⁶ Majority of the patients were males

(88.82%) as compared to females (11.18%) in our study which may be attributed to differences in driving behavior and stronger connection to outdoor activities. Similar study done by Dubey R et al (2018) found 83% patients were males and 13% were females⁷. The most common mode of injury in our study was road traffic accidents (71.76%) followed by physical assault (19.41%). Similar study conducted by Perel P et al⁸ (2009) showed road traffic crashes to be the leading cause of head injury.

This may be due to overspeeding of vehicle, poor enforcement of law and orders, poor city planning. In our study, the left eye was most affected (73.29%), followed by the right eye (26.71%) and least involvement of bilateral eyes (5.3%) which is similar with the findings of Hendge et al⁹ (2016) in which right eye was involved in 35% head injury patients and left eye in 62% of patients. Periorbital edema was observed in 40% patient while periorbital ecchymosis was observed among 36 patients (21.17%) which is similar with other study.^{10,11}

In the present study lid laceration was seen in 18 cases which was repaired in the emergency department using 5-0 vicryl suture. While corneal tear was repaired under microscope in 11 cases after explaining guarded visual prognosis to the patient. Hyphaema was observed in 14 cases (8.23%) and traumatic uveitis was seen in 8 cases (4.70%) which is in contrast to study conducted by Rosita J et al.¹² where they found hyphaema in 3% cases while traumatic uveitis in 7.3% cases. This may be due to sudden rise in intraocular pressure brought on by blunt pressures applied to the anterior globe that result in a shearing force across the ciliary body and iris.

In the present study posterior segment involvement was seen in 14.70% cases of head injury patients. Most common posterior segment manifestation was macular edema (4.70%) which is similar with the study done by Kumari R et al⁶ (2017) 4.65%. In our study, papilledema was seen in 1.17% cases while in the study done by Malik A et al¹³ (2016) was 4.76%. Berlin's edema was seen in 1.76% in this study which is similar to study conducted by Sahasrabudhe V et al¹⁴ (2017) who found berlin's edema in 1.5%. Vitreous hemorrhage was seen in 2.35% cases in our study While Gahlot A et al¹⁵ (2015) reported it 1.64%. Retinal tear 1.76% and Purtschner retinopathy 1.18% were seen in our study.

Evaluation of the neuro-ophthalmic system in individuals with head injuries who are unconscious or who have additional injuries is difficult. In our study abnormal papillary reaction was observed in 48 cases (28.23%). Out of 48 cases, relative afferent pupillary defect was seen in 21 cases (12.35%) while study done by Kumari R et al (2017) reported RAPD in 31.39% of head injury case⁶. Non reacting pupil 4.70% and sluggishly reacting pupil 11.18% were seen in the present study. Floor of the orbit was the most common orbital wall involved (7.05%) followed by medial wall (5.29%) in our study which is in contrast to the study conducted by Kumari R et al⁶ where lateral wall of the orbit was most commonly involved in 5.81% cases. This may be due to blunt ocular trauma directly on the globe or on the cheek.

The Glasgow Coma Scale (GCS) was used to grade the severity of the head injury, and each patient's score was recorded. External eye injury indications indicated a mild form of head injury, but intraocular findings indicated a serious form of head injury.¹⁶ In the current study, the highest percentage of patients (60.59%) had a GCS score of 13 to 15, while the lowest percentage (16.47%) had a score of 9-12, which is similar to the findings of Dubey et al⁷ (2018).

CONCLUSION:

RTA-related trauma is connected with high morbidity, which can be drastically minimised by taking precautionary measures such as wearing seat belts and helmets. In cases of head injury, ocular involvement should also be thoroughly investigated, as this can help save the patient's life and sight. Special attention should be given to visual acuity and papillary reaction during initial ocular examination. The GCS contribute significantly to the prognosis and further management of neurological deficits and hence the final visual prognosis.

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