



A CLINICAL STUDY OF OCULAR MANIFESTATION OF BLUNT TRAUMA TO EYE

Ophthalmology

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ABSTRACT

Ocular injury is major cause of treatable visual impairment and blindness and has a major socioeconomic and psychological impact on the patient and their families. **Aims:** Study the nature, clinical manifestation and management of ocular blunt trauma. **Objective:** Determine age and sex distribution of ocular trauma. Determine incidence of ocular blunt trauma. Assess the cause of blunt trauma. Assess improvement of visual acuity after treatment. Assess cause of blindness after ocular trauma. **Sample Size:** 100 patients **Result:** Assault followed by road traffic accidents was the most common cause of ocular blunt trauma. Males are exposed to the ocular blunt trauma, presented most commonly in age group 22-40 years. Edema and ecchymosis of eyelids is the most common ocular manifestation. Patient with mild ocular injuries pointed towards good visual prognosis and with severe ocular injury like corneal tear, sclera tear with iris tissue prolapsed, vitreous haemorrhage, traumatic optic neuropathy showed poor visual prognosis. **Conclusion:** Blunt trauma to eye is cause of concern irrespective of the geographical area, economic status, gender and occupation of the patients. It is important to raise awareness about getting treatment immediately following injuries. It is necessary to educate the working class about exercising caution while working as well as gaining awareness about the traffic rules to reduce the incidences of road traffic accidents.

KEYWORDS

ocular blunt trauma, causes, visual impairment, awareness.

INTRODUCTION

Ocular injury is a major cause of treatable visual impairment and blindness and has a major socioeconomic and psychological impact on the patients and their families. In India, over 500 lakh people suffer from blindness, and every year the blind population increases by 38 lakhs. Of note, 1.2% of cases of blindness are caused by avoidable ocular injuries. A rural population (4.5%) may have a higher prevalence of blindness compared to an urban one (3.97%).^{1,2} The global annual incidence of ocular trauma is around 55 million of which 750,000 cases require hospital admission every year.³

The eyeball is generally well protected in bony orbit. The lids, eyelashes, and orbital margins protect the eye from direct damage. As for physiological protection, it is protected by blink reflex, head-turning reflex, and lacrimation after the entry of any irritating material.⁴

Blunt trauma forms a major part of ocular trauma. Squash balls, elastic luggage straps, falls and champagne corks are the most common causes of blunt ocular trauma.⁵ It causes ocular damage by the coup and countercoup mechanism or by ocular compression. Concept of coup and countercoup injury was first introduced to explain brain damage caused by blunt trauma to the head by Courville.^{6,7} This was later used by Wolter to explain eye injuries during blunt trauma. Few examples of coup injuries in blunt trauma are corneal abrasions, subconjunctival hemorrhages, choroidal hemorrhages and retinal necrosis and the best example of a countercoup injury is commotio retinae.⁸

The basic patho-physiology is that the volume of a closed space cannot be changed and therefore, when the eye is compressed along its anterior-posterior axis, it must either expand in its equatorial plane or rupture.

Hence, the extent of injury suffered is determined by:

1. The amount of energy transferred to the globe and orbit.
2. The physical characteristics of the object.
3. Location of impact area.⁹

Routine ophthalmic examination is not feasible in all trauma cases. Severe ocular injuries are easily detected by an emergency physician or facial trauma surgeon, whereas other subtle injuries are often missed.¹⁰ Therefore, the emergency physician's major responsibility is to identify patients requiring specialist ophthalmological assessment. The available evidence of indications for an ophthalmological referral is extensive but also contradictory.¹¹

Ophthalmic examination for severe ocular injuries may be delayed due to head injury, intoxication, intubation, patient unconsciousness etc. In view of life-saving procedures, given more importance to such patients with a head injury and facial fractures, the need for ophthalmic examination and management is often neglected.¹²

People living in rural areas are also often uninformed about protective devices such as goggles and shields. Agricultural work and handling of animals are also major causes of eye injuries. Due to the financial costs associated with ocular trauma and the economic burden on the healthcare system resulting from the cost of treatment and rehabilitation services, raising awareness and implementing prevention measures are highly justified. Many injuries can be prevented by increasing public awareness about potential risk factors and agents that may cause injury.¹³⁻¹⁴ In light of these aforementioned scenarios, this study aims to provide epidemiological data on ocular injury based on our analysis of patients at a tertiary care hospital in rural setting. We believe that this data can contribute to efforts toward planning and providing improved eye care as well as implementing preventive measures.

AIM AND OBJECTIVE

Aim

To study the nature, clinical manifestation and management of ocular blunt trauma

Objectives

- To determine age and sex distribution of ocular trauma
- To determine incidence of ocular blunt trauma
- To assess the cause of blunt trauma
- To assess improvement of visual acuity after treatment
- To assess causes of blindness after ocular trauma.

MATERIALS AND METHODS

The present prospective observational study was conducted at our tertiary care centre.

The cases were taken from the patient's attending Ophthalmology Department and Emergency Department of tertiary care centre.

The study period was from December 2020 to October 2022.

100 cases of blunt eye injury were taken up for the study.

Cases included those with trivial external injury to gross visual loss.

In proforma all details were recorded for each patient with head injury: age and sex, mode of injury, history of head injury and ocular injury, presence or absence of safety measures and alcohol intake, history of loss of consciousness, any symptoms and signs following the injury.

Following ocular examinations were done in head injury patients:

- A thorough clinical examination using torch light
- Visual acuity by Snellen chart. In few patients vision examination was done bed side considering their general condition
- Pupillary assessment
- Slit lamp examination, whenever it was possible
- Fundus examination by direct and binocular indirect ophthalmoscopy
- B scan - if there is any posterior segment pathology
- X ray or CT scan/MRI scan
- Gonioscopy and Intraocular pressure measurement (if required).

Patients with head trauma with multiple injuries were hospitalized for further management and specialized care. All the patients were reviewed for follow up 1 week after being seen last in the hospital. For those who had unexplained visual loss long term follow up was advised every month. If patients required higher centre management, they were immediately referred.

OBSERVATIONS AND RESULTS

This study includes 100 cases of blunt eye injury with ocular manifestations who presented at Ophthalmology Department and Emergency Department of tertiary care centre December 2020 to October 2022.

Age Distribution

In this study adult groups were most commonly affected. Out of 100 blunt injury patients with ocular manifestations, 12 cases (12%) were seen in the age group of 2-11 years, 6 patients (6%) in 12-21 years, 29 cases (37.2%) in 22-31 years, 23 patients (23%) in 32-41 years, 20 cases (13.4%) in 42-51 years, 2 cases (2%) in 52-61 years, 4 cases (4%) in 62-71 age group, 4 cases (4%) in 72-82 age group.

Sex Distribution

Out of 100 blunt eye injury patients, 95 cases were males (95%) and 5 cases were females (5%).

Mode Of Injury

Out of 100 blunt eye injury patients, assault was the common mode of injury which is seen in 36 patients (36%) followed by RTA in 31 patients (31%), accidental self-fall in 17 patients (17%). Accidental trauma was reported in 15 cases (15%).

Eye Involved

Out of 100 blunt eye injury patients, unilateral ocular involvement was seen in 89 cases (89%) in which right eye was involved in 45 cases (45%) and left eye in 44 patients (44%) and bilateral ocular involvement was seen in 11 patients (11%).

Eyebrow Involvement

In this study, 2 patients had abrasions over eyebrow (2%), 19 patients had contused lacerated wound (19%), 77 patients had normal eyebrow (77%) and 2 patients had sutured wound (2%).

Eyelid Manifestation

In this study, 25 patients had periorbital edema (25%), 43 patients had periorbital ecchymosis (43%), 6 patients had lid abrasion (6%) Contused lacerated wound was observed in 26 patients (26%) and full and partial thickness lacerated wound was observed in 2 (2%) and 1 patient each.

Conjunctival Manifestation

Amongst conjunctival manifestation, subconjunctival hemorrhage was commonly seen in our patients (36%) followed by conjunctival congestion. (20%), chemosis in 2 patients. Conjunctival lacerations were observed in 3 patients.

Scleral Manifestations

Scleral Tear was observed in 2 patients.

Corneal Manifestation

Out of the 100 patients, 5 patients had corneal tear (5.0%), 6 patients had corneal edema (6%), 1 patient each had iris incarceration and

epithelial defect (1%). However normal cornea was observed in 88 patients (88%).

Anterior Chamber Manifestation

Out of the 100 patients, 6 had hyphaema (6%) and 7 patients had shallow Anterior chamber (7%) and 2 patients had flare while vitreous in anterior chamber was seen in 1 patient (1%).

Iris Manifestation

In this study, out of 100 patients, 3 patients had iris tissue prolapsed while in 2 patients details were not seen (2%). Spincter tear, iris incarceration, iridodonesis, hyphaema was present in 1 patient each.

Pupil Manifestation

Out of 100 patients, pupil manifestations showed fixed semidilation in 4 patients (4%) and traumatic mydriasis in 4 patients (4%) irregular pupils were seen in 3 patients (3%).

Lens Manifestation

Among 100 blunt eye injury cases, 6 patients had immature cataract (4%), 4 patients had traumatic cataract (4%) and 2 patients had hazy lens (2%).

Visual Acuity

Out of the 100 patients, visual acuity of 6/6 was seen in 18 patients, 6/12, with Pinhole 6/6 in 10 patients (10%) and 6/9, with Pinhole 6/6 & 6/12, with Pinhole 6/6 in 10 patients each. Visual acuity of FC 1m-6m seen in 19 patients, no perception of light seen in 3 patients, inaccurate projection of rays in 3 patients, hand movement present in 1 patient. Visual acuity of 6/12-6/60 seen in 19 patients.

Extraocular Movement

Extraocular movement was partially restricted in only 1 patient.

Orbit

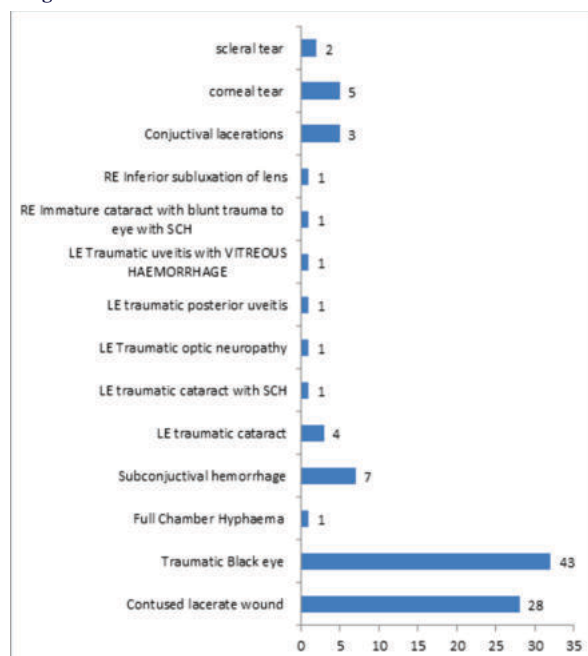
No abnormality in the orbit was detected.

Hazy fundus was seen in 3 patients (3%) and no glow was observed in 15% patients.

Investigations

X ray orbit showed normal appearance. CT Brain Orbit CT Brain Orbit suggested fracture of left lateral wall of orbit in 1 patient, fracture with subarachnoid hemorrhage along right parietal lobe in 1 patient.

Diagnosis



In our 100 patients with blunt eye injury, traumatic black eye was the most common diagnosis obtained in 43 patients (43%) followed by contused lacerated wound in 28 patients (28%). Traumatic optic neuropathy was observed in 1 patient.

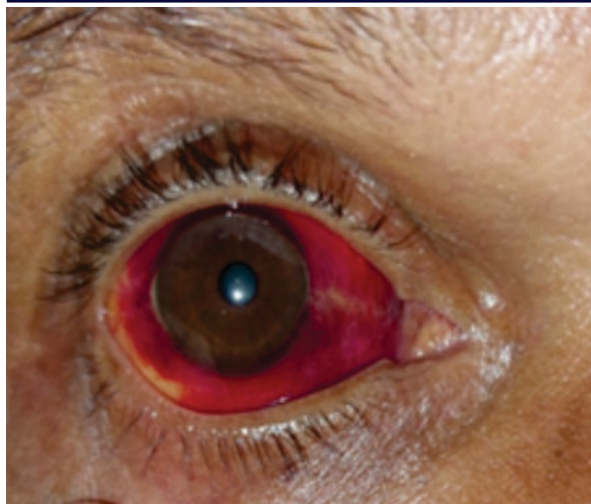


Image 1: Subconjunctival Haemorrhage



Image 2: Traumatic Black Eye

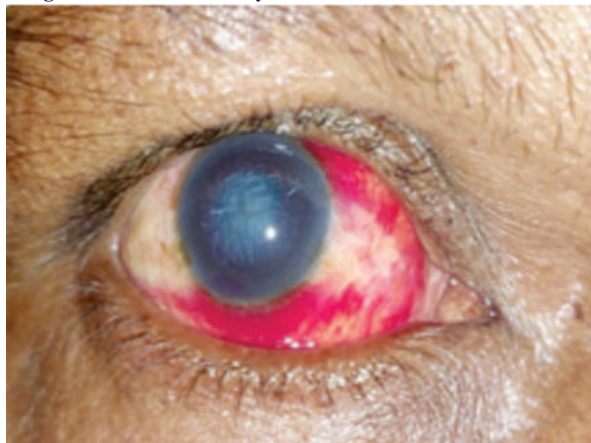


Image 3: Corneal Edema



Image 4: Traumatic Cataract



Image 5: Full Chamber Hyphaema

Treatment

In our 100 patients with blunt eye injury, majority of them (51%) were managed conservatively and the rest (49%) were managed surgically. Edema and/or ecchymosis of eyelids treated medically with oral antibiotics and cold compression.

Suturing done in all cases of lacerated wound. corneal tear and/or scleral tear were managed by corneal tear suturing and scleral tear suturing. Postoperatively patients were given systemic antibiotics and local antibiotics with steroids. patients were followed up weekly, advised to put local antibiotics drops for 1 month.

Traumatic optic neuropathy was treated medically with intravenous methylprednisolone 1gm daily for 3 days followed by systemic steroids in tapering dose.

Patient of subconjunctival haemorrhage were managed conservatively.

Traumatic cataract were managed by cataract surgery.

One patient with corneal tear with iris tissue prolapse with hyphaema with visual acuity NO PL was managed with evisceration surgery.

Conjunctival laceration managed by suturing with 8 0 vicryl suture.

Full thickness laceration and partial thickness laceration of eyelid managed by suturing in two layers with 6 0 vicryl and 5 0 silk suture material.

DISCUSSION

In this study adult groups were most commonly affected. Out of 100 blunt injury patients with ocular manifestations, 12 cases (12%) were seen in the age group of 2-11 years, 6 patients (6%) in 12-21 years, 29 cases (37.2%) in 22-31 years, 23 patients (23%) in 32-41 years, 20 cases (13.4%) in 42-51 years, 2 cases (2%) in 52-61 years, 4 cases (4%) in 62-71 age group, 4 cases (4%) in 72-82 age group. In Anuradha TR 2021 study¹⁵, mean age of the patients was found to be 29.1 ± 13.9 years (range 17-89 years). Most frequent involved age group was 3rd and 4th decades and in Pai SG, 2013 study¹⁶, 10-20 years most common age group.

Out of 100 blunt eye injury patients, 95 cases were males (95%) and 5 cases were Females (5%). In Anuradha TR 2021 study¹⁵, total of 82 patients, of which 66 were male and 16 were female and in Pai SG, 2013 study¹⁶, 22/32 were male.

Out of 100 blunt eye injury patients, assault was the common cause of trauma which is seen in 36 patients (36%) followed by RTA in 31 patients (31%), accidental self-fall in 17 patients (17%). Accidental trauma was reported in 15 cases (15%). In Anuradha TR 2021 study¹⁵, road traffic accident (RTA) was the most common cause of injury observed in the study and in Pai SG, 2013 study¹⁶, road traffic accident was found to be most common mode of injury.

Diagnosis in our 100 patients with blunt eye injury, traumatic black eye was the most common diagnosis obtained in 43 patients (43%)

followed by contused lacerated wound in 28 patients (28%). Traumatic optic neuropathy was observed in 1 patient. In Anuradha TR 2021 study¹⁵, eight out of 82 had traumatic optic neuropathy (28%), and one patient had retinal detachment (3%) severe vision-threatening complications were traumatic optic neuropathy (28%), globe perforation (8%), and retinal detachment (3%). Larger the orbital fracture, the lesser the intraocular injuries and vice versa. In Pai SG, 2013 study¹⁶, the most commonly involved structure was conjunctiva (84.375%), followed by lid and adnexa (62.5%). Anterior segment involvement included corneal epithelial defect (7 cases), hyphaema (4 cases), iritis (3 cases) and anterior dislocation of lens (1 case). Posterior segment involvement included vitreous haemorrhage (1 case) and commotio retinae (2 cases).

Treatment in our 100 patients with blunt eye injury, majority of them (51%) were managed conservatively and the rest (49%) were managed surgically. In Pai SG, 2013 study¹⁶, patients with anterior chamber reaction had mild blurring of vision which improved on topical treatment. One patient having anterior dislocation of lens improved after lens extraction and anterior vitrectomy to a best corrected visual acuity of 6/18.

We observed that in our 19 patients final visual acuity was 6/6 followed by 6/12, with PH 6/6 in 13 patients. In 7 patients, the visual acuity cannot be assessed. 1 patient had eviscerated eye while 1 patient had no perception to light.

SUMMARY

This is prospective, observational study.

1. Assault followed by road traffic accidents was the most common cause of ocular blunt trauma.
2. Males are exposed to the ocular blunt trauma. Males have to work outside their homes for their jobs more than that of females. So they are more prone to accidents.
3. Ocular manifestation presented most commonly in patient of age group 22-40 years who is the active group and do more outdoor activities.
4. Injuries to eyelids, leading to edema and ecchymosis of eyelids constitute the most common ocular finding in the present study.
5. Prime causal factors affecting visual acuity found in our study were corneal tear, scleral tear with iris tissue prolapse, retinal detachment, vitreous haemorrhage, traumatic optic neuropathy, traumatic cataract.
6. Patient with mild ocular injuries pointed towards good visual prognosis. Patient with severe ocular injuries like corneal tear, scleral tear with iris tissue prolapse, vitreous haemorrhage, retinal detachment, traumatic optic neuropathy showed poor visual prognosis.

CONCLUSION

Based on our findings, blunt trauma to the eye is a cause for concern irrespective of the geographical area, economic status, gender, and occupation of the patients as it causes visual disability that makes a person physically, economically, and psychologically disabled. Men in the age group of 22-40 years were found to be predominantly affected in our study. It is necessary to educate the working class about exercising caution while working as well as gaining awareness about traffic rules to reduce the incidences of road traffic accidents. It is also important to raise awareness about getting treatment immediately following injuries.

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