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BLUNT OCULAR TRAUMA: OUTPATIENT CLINIC EVALUATION

Ophthalmology

Dr. Jitendra Kumar Associate Professor & Head, Department Of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, UP, India.

Dr. Jyoti Sharma* Junior Resident, Department Of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, UP, India. *Corresponding Author

ABSTRACT

Blunt trauma is the major form of ocular trauma. Injuries to the eyes can be caused by blunt trauma from sport balls, fists, or airsoft/pellet/ guns e.t.c. Blunt trauma to the delicate structures of the eye requires immediate care to minimize the adverse consequences. The key factor for the best outcome possible is education of the patient, and what management is needed. A total of 87 Patients who had history of blunt ocular trauma, were included in this retrospective study. The main aim of this study was to evaluate Mode of injuries, various complications and visual outcome of blunt ocular trauma. Detailed history of mechanism of injury was noted and examination includes examination of the eyelids, face, eyeball, and orbital rim , visual acuity, peripheral vision by using perimetry, pupils reactivity , extra-ocular movements, anterior segment evaluation by slit lamp biomicroscope, fundus evaluation, gonioscopy, tonometry. OCT, X-ray and/or CT scan and/or B-scan and MRI were done wherever necessary. In this study, the male female ratio was 1.72:1 and most commonly affected age group was 20-40 years (45.98%). Most common mode of injuries were road traffic accidents (33.33%) followed by household and agriculture works (20.69%) and sports (19.54%). Most common presentation was subconjuctival hemorrhage (81.61%) followed by Ecchymosis and lid edema (74.71%). Majority of the patients (55.17%) gained their normal visual acuity after 2-3 months and 8.05% patients lost from the study. About 30% of patients with ocular injury had decreased vision and in about 2.3 % of cases the eye sight was lost.

KEYWORDS

B-scan, Gonioscopy, OCT, Perimetry, subconjuctival hemorrhage, Tonometry, Visual acuity,

Introduction

Blunt trauma forms a major part of ocular trauma. Injuries to the eye and surrounding structures can be caused by blunt trauma from sport balls, fists, or airsoft/pellet/paintball guns; sharp trauma such as a stick, projectiles or knives. It causes ocular damage by the coup and countre coup mechanism or by ocular compression. Concept of coup and contre coup injury was first introduced to explain brain damage caused by blunt trauma to the head by Courville.[1,2] This was later used by Wolter to explain eye injuries during blunt trauma.[3] Few examples of coup injuries in blunt trauma are corneal abrasions, subconjunctival hemorrhages, choroidal hemorrhages, and retinal necrosis and the best example of a counter coup injury is commotio retinae. Each year in the United States an estimated 2 to 3 million people seek medical care for eye injuries.[4,5] In general, eye injuries in males outnumber those in females almost 4 to 1, and most serious injuries occur in those under the age of 30.[6] Blunt trauma may occur following – DIRECT BLOW to the eyeball.

ACCIDENTAL BLUNT TRAUMA to eyeball which occurs in roadside accidents, injuries by agricultural and industrial machines.

Mechanism of injury -

Blunt trauma can produce damage by different forces: Direct impact on globe: maximum damage at the point where blow is received. Compression wave force: It is transmitted through fluid contents in all directions and strikes angle of anterior chamber, pushes iris diaphragm posteriorly and also strikes the retina and choroid. Reflected compression wave force: After striking the outer coats the compression waves are reflected towards the posterior pole and may cause foveal damage. Rebound compression wave force: After striking the posterior wall of the globe, the compression waves rebound back anteriorly. This force damages the retina, choroid by forward pull and lens-iris diaphragm by forward thrust from back. Indirect force: ocular damage is caused by forces from the bony walls and elastic contents of the orbit, when globe suddenly strikes these structures.

Mode of damage-

1. Mechanical tearing of tissues 2. Damage to the tissue cells causing damage to physiological activity 3. Vascular damage leading to ischaemia,oedema and haemorrhages. 4. Trophic changes due to disturbances of nerve supply. 5. Delayed complications of blunt trauma such as secondary glaucoma,retinal detachment etc.

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:[7]

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

Although the impact is primarily absorbed by the lens-iris diaphragm and the vitreous base, damage can also occur at a distant site such as the posterior pole.

Materials and Methods

A total of 87 Patients who had history of blunt ocular trauma, were included in this retrospective study conducted in the Department of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India over a period of 12 months from Oct 2016 to Sept. 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. Patients with history of blunt trauma with or without affected visual acuity.
2. Both male and female patients were included in the study.
3. All age groups were included
4. Injuries due to assault, accidental fall, Road traffic accidents, were included in the study

Exclusion criteria:

1. Bed ridden or comatosed patients due to trauma.
2. Chemical and burn injury patients.
3. Patients with history of corneal ulcer, uveitis, retinal/vitreous detachment, and other ocular pathology.
4. Patients with recent history of any ocular surgery.
5. Patients with penetrating eye injuries.

Detailed history of mechanism of injury was noted. Common symptoms at presentation included pain, loss of vision, blurring of vision, redness, increased watering, swelling around eye and bleeding. Initial assessment also included injury to other organs, whether there has been loss of consciousness, previous eye surgical history, status of tetanus prophylaxis, possible contamination of the wound. Examination of the eyelids, face, eyeball, and orbital rim for presence

of injury, visual acuity recorded, peripheral vision, pupils' reactivity to light and presence of an afferent pupillary defect, extra-ocular movements, anterior segment evaluation by slit lamp biomicroscope, fundus evaluation, gonioscopy, tonometry. OCT, X-ray and/or CT scan and/or B-scan were done wherever necessary. This was followed by proper management according to the injury. At each visit vision was noted and final visual outcome at 3 months was noted and analyzed.

Results

A total of 87 Patients who had history of blunt ocular trauma, were included in this retrospective study.

After detailed history and examination, it was observe that-

Table 3.1- Sex wise distribution of patients (n=87)

	MALE	FEMALE
No. of patients	55	32
Percentage (%)	63.22%	36.78%

Table 3.2- Age wise distribution of patients (n=87)

Age groups (in year)	No. of patients	Percentage (%)
0-20	15	17.24%
20-40	40	45.98%
40-60	22	25.29%
Above 60	10	11.49%
Total	87	100%

Table 3.3- Mode of injuries distribution in patients (n=87)

Mode of injuries	No. of patients/ eye	Percentage (%)
Road traffic accidents	29	33.33%
Assaults	12	13.79%
Sports	17	19.54%
Blast injuries	02	2.3%
Household and agriculture works	18	20.69%
Others	09	10.35%
Total	87	100%

Table 3.4- Ocular complication in blunt trauma (n=87)

Ocular involvement	No. of patients/eye	Percentage (%)
Orbital wall fracutre	12	13.79%
Ecchymosis and lid edema	65	74.71%
Eyebrow/Lid laceration	31	35.63%
Subcojunctival hemorrhage and chemosis and tear	71	81.61%
Corneal abrasion and tear	12	13.79%
Scleral tear and globe rupture	02	2.3%
Hyphaema	18	20.69%
Iritis and iris tear	09	10.35%
Angle recession	02	2.3%
Lens dislocation	07	8.04%
Traumatic cataract	09	10.35%
Vitreous haemorrhage	05	5.75%
Retinal/ choroidal haemorrhage	02	2.3%
Retinal/vitreous detachment	06	6.9%
Traumatic optic neuropathy	02	2.3%

Table 4.5- Visual acuity of the patients after 3 months (after taken conservative and surgical management)

Visual acuity	No. of patients/eye	Percentage (%)
6/6-6/9	48	55.17%
6/12-6/24	14	16.09%
6/36-1/60	08	9.2%
Finger count to Hand movement	05	5.75%
Perception of light present	03	3.45%
Perception of light absent	02	2.3%
Patient lost from the study	07	8.05%
Total	87	100%

Discussion

There are approximately 2.5 million new eye injuries in the United States each year [8] and the number in India is even more.

In our study, Males (63.22%) had more injuries as compared to Females (36.78%). Approximately similar findings were reported with other studies [9] where 75% patients were male and 25% were female. Young males are more likely to have ocular injuries than older individuals or females and the most common age group was 20-40 years (45.98%) followed by 40-60 years of age group. Similar findings were reported by Akbar BA et al[10].

Assault and motor vehicle injuries are usually the most severe and cause severe ocular damage.[11] Most common cause of blunt ocular trauma in our study was road traffic accidents (33.33%) followed by household and agriculture work (20.69%) and sports (19.54%) , while Akbar BA et al[10] reported most common cause was Projectiles (48.8%), followed by Assaults (36.6%). The most commonly involved eye structure was conjunctiva and most common presentation was sub-conjunctival hemorrhage (81.61%) followed by Ecchymosis and lid edema (74.71%) while Zagelbaum et al.[12] reported most common presentation of blunt ocular injuries was Ecchymosis and lid edema (40%).

Traumatic hemorrhage into the retrobulbar space may result in acute visual loss.[13]. In our study most common cause of acute sudden loss of vision was hypheama, globe rupture and retinal detachment.

About 30% of patients with ocular injury had decreased vision and in about 2.3 % of cases the eye sight was lost due to traumatic optic nerve avulsion and irreparable injury like ruptured globe with prolapsed intraocular contents. Majority of the patients (55.17%) gained their normal visual acuity after 2-3 months and 8.05% patients lost from the study.

Conclusion

Blunt injury to the eye results in a spectrum of damage to the intraocular structures. Traumatic eye injuries are common in the prehospital setting and may occur as isolated injuries or as part of more extensive maxillofacial trauma. Given that the scope of these injuries may range from the minor to the sight-threatening, prehospital providers must be prepared to rapidly identify serious ocular disorders that could cause blindness or other significant complications. Once serious eye injuries are recognized it is important that the patient is stabilized, given appropriate treatment. Serial subsequent examinations are necessary to detect possible late developing problems. Blunt trauma to the delicate structures of the eye requires immediate and later ongoing care to minimize the adverse consequences. The key factor in raising the odds of the best outcome possible is education of the patient about what can happen, and what responses are needed Blindness increases the burden on society, so early treatment of ocular injuries and use of protective wear results in better visual outcome.

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