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Original Article:

A Clinical Study of Blunt Ocular Trauma in a Tertiary Care Centre.

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Abstract: Purpose: To analyze blunt eye injuries with respect to mode of injury, sites involved and outcome. **Method:** This was a retrospective study of 32 patients with blunt ocular trauma from 2010 to 2012 in a tertiary care centre. Patient data, mode and extent of injury, management and outcome was noted and analyzed. **Result:** The commonest age of presentation was 10-20 years (28.125%) and the commonest mode of injury was road traffic accident (28.125%). 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). **Conclusion:** This study reinforces that blunt trauma can cause any extent of damage to ocular structures and the final visual outcome is dependent on the structures injured.

Key Words: Blunt ocular trauma; Hyphaema; Commotio retinae; Lens dislocation.

Introduction:

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.[1] 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.[2,3] This was later used by Wolter to explain eye injuries during blunt trauma.[4] 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.

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:[5]

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. Apart from obvious ocular damage, blunt trauma may result in long term effects so that the prognosis is necessarily guarded and a vigilant follow up is required. Proper assessment of ocular damage and starting treatment immediately after the injury has an important effect on the final outcome. Therefore, early diagnosis is imperative to prevent visual morbidity caused by ocular trauma.

Materials and Methods

This was a retrospective study of 32 patients with blunt ocular trauma from 2010 to May, 2012 in a tertiary care centre. Patient data consisting of name, age, sex, mode of injury, extent of injury, management and outcome was noted and analyzed.

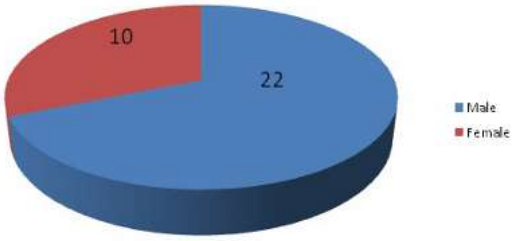
Detailed history of mechanism of injury was noted. Common symptoms at presentation included pain, loss of vision, blurring of vision, redness, increased tearing, swelling around eye and bleeding. Initial assessment also included injury to other organs, whether there has been loss of consciousness, previous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

Examination started with examination of face, orbital area, and eyelids and a close view of the eyeball. Examination of the eyelids, face, eyeball, and orbital rim for presence of injury, visual acuity of both eyes using a visual-acuity chart,

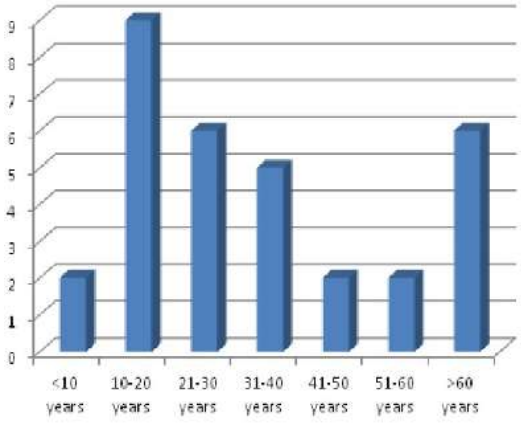
peripheral vision, pupils' reactivity to light and presence of an afferent pupillary defect, extra-ocular movements, anterior segment evaluation by slit lamp biomicroscope, confrontational visual fields, fundus evaluation, gonioscopy, tonometry. X-ray and/or CT scan and/or B-scan were done wherever necessary. This was followed by proper management according to the injury. Close Follow-up was done for complications. At each visit vision was noted and final visual outcome at 6 weeks was noted and analyzed.

Results

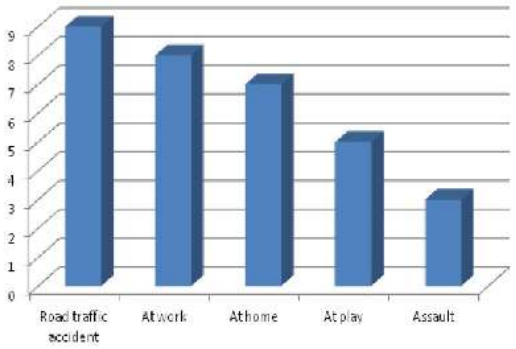
Age and sex distribution of patients suffering blunt trauma are given in Graph 1 and 2. Road traffic accident was found to be most common mode of injury (Graph 3) and conjunctiva was the most commonly involved structure (Table 1). Injuries sustained by various ocular structures are tabulated in Table 2. Out of 32 patients, 18 patients had a best corrected visual acuity of 6/9 or better at presentation (Graph 4). Out of 7 patients having corneal epithelial defect, 3 had vision less than 6/9 which improved on healing of the epithelial defect. 3 patients had total hyphaema, which improved to best corrected visual acuity of 6/18 or better with resolution of hyphaema after conservative management. 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.



Graph 1: Sex distribution of patients presenting with blunt ocular trauma.



Graph 2: Age distribution of patients presenting with blunt ocular trauma.



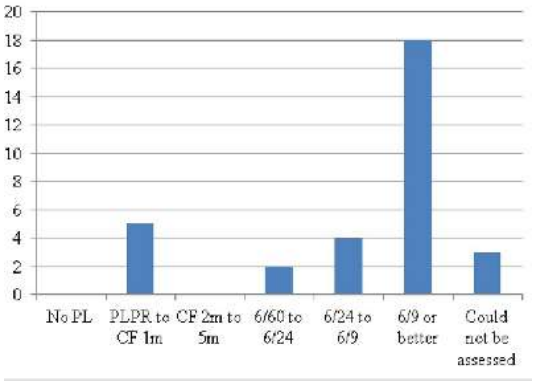
Graph 3: Modes of blunt trauma.

Table 1: Structures injured in patients with blunt trauma

	No. of Patients	Percentage
Lid and adnexa	20	62.5%
Conjunctiva	27	84.375%
Cornea	12	37.5%
Anterior chamber	6	18.75%
Iris / pupil	5	15.625%
Lens	3	9.375%
Posterior segment	3	9.375%
Orbit	Restriction of extra ocular movements -4	12.5%

Table 2: Injury sustained by ocular structures in trauma

Ocular involvement	No. of patients
Lid and adnexa	
Lid laceration	10
Edema and ecchymosis	10
Conjunctiva	
Congestion	14
Sub conjunctival haemorrhage	10
Cornea	
Epithelial defect	7
Pigments on endothelium	2
Edema	1
Anterior chamber	
Hyphaema	4
AC reaction	3
Iris and pupil	
Traumatic mydriasis and sphincter tears	5
Lens	
Anterior dislocation	1
Pigments on lens	2
Posterior segment	
Vitreous haemorrhage	1
Commotio retinae	2
Others	
Restriction of extra ocular movements	4 (Out of them, 2 had blow out fractures)



Graph 4: Vision at presentation immediately after trauma.

Image 1: Anterior dislocation of lens.

Image 2: Traumatic mydriasis with pupillary sphincter tears.

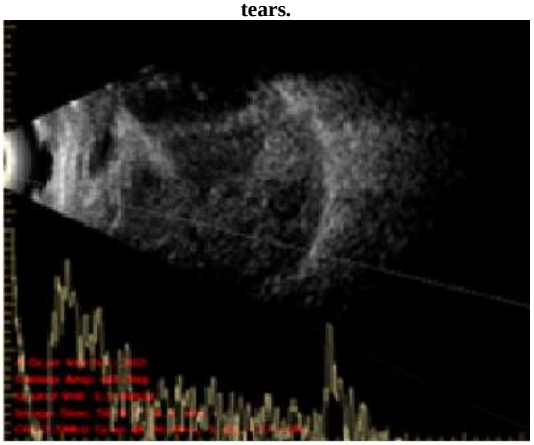


Image 3: B- scan showing vitreous haemmorhage.

Discussion

There are approximately 2.5 million new eye injuries in the United States each year[6] and the number in India is even more. Young males are more likely to have ocular injuries than older individuals or females. Blunt objects account for the largest percentage of eye injuries (30%)[6,7] and the most common objects to strike the eye are rocks, fists, baseballs, lumber, and fishing weights. In recent years, there has been greater awareness of injuries secondary to bungee cords, and airbags.[8-13] Assault and motor vehicle injuries are usually the most severe and cause severe ocular damage.[14] According to an article on blunt trauma in Journal of screening and geographical medicine, the most common causes of trauma included projectiles (48.8%) and assaults (36.6%). Whereas in our study road traffic accident was found to be the commonest mode of blunt ocular injury (28.125%). The most commonly involved eye structure was conjunctiva (84.375%), followed by lid and adnexa (62.5%).

Table 3: Comparison of our study with a study by Akbar BA et al.

	Our study	Akbar BA et al [15]
Commonest age group	10-20 years	20-40 years
Males	68.75%	65.9%
Females	31.25%	34.1%
Most common cause	Road traffic accident (28.12%)	Projectiles (48.8%); Assaults (36.6%)

Blunt trauma to eye can affect any structure of eye. Contusion around eye may be the most prominent initial presentation. In a study of 600 patients who had sustained significant head trauma found that 58.3% of patients who had isolated blepharohematoma on examination were found to have an orbital fracture on CT scan.[16] In our study 62.5% of patients presented with lid edema and ecchymosis, out of which 50% had associated lid tears. Treatment included head elevation, cold compresses, and reassurance. Complete resolution typically takes 2 to 3 weeks. In our study, blow out fractures were seen in 2 patients for which open reduction and internal fixation with mesh reconstruction was done.[17] Following surgery, restriction of extraocular movements improved.

Traumatic hemorrhage into the retrobulbar space may result in acute visual loss.[18] In a small series of patients with non-displaced fractures of the orbital walls, they were found to be associated with retrobulbar hematoma.[19]This condition is rare following displaced fractures, however, because the blood will decompress into the sinuses.[20] Early recognition and decompression is warranted.

Subconjunctival hemorrhage is caused by the rupture of small subconjunctival blood vessels. In our study, sub conjunctival haemorrhage was seen in 12 patients of which 2 had associated conjunctival tear which were repaired. Treatment of subconjunctival hemorrhage consisted of reassurance and local cold compresses for 24 hours. Subconjunctival hemorrhages healed spontaneously in 2 to 4 weeks.

In a study on blunt trauma it was found that hyphema is a common complication of eye blunt trauma that occurs in approximately 50% of the patients with eye blunt trauma. The most frequent occurring complications included severe decrease of initial Visual acuity (75.6%) and high IOP (48.8%).[15] Hyphema may occur after blunt or penetrating trauma, and more than 50% have been documented as being sports related.[21] In our study hyphaema was seen in 4 patients of which 3 patients had total hyphaema. Conservative management with bed rest, pressure bandage and oral acetazolamide helped in resolution of hyphaema.

The lens may be visualized when displaced into the anterior chamber or may be viewed after pupillary dilatation when dislocated posteriorly.[22] An anteriorly dislocated lens may cause acute angle closure glaucoma, which may be a vision-threatening complication. In our study, anterior dislocation of lens was seen in 1 patient who underwent lens extraction with anterior vitrectomy, giving a best corrected vision of 6/18 to the patient.

Although most causes of vitreous hemorrhage are nontraumatic (diabetic retinopathy, sickle cell disease, posterior vitreous detachment, retinal vein occlusion, leukemia), trauma accounts for 12% to 31% (depending on study population) and is the most common cause of vitreous hemorrhage in younger patients.[23,24] Traumatic vitreous haemorrhage was noted in 1 patient in our study, who had associated total hyphaema. It was diagnosed on B-scan and managed conservatively.

Trauma is the most common cause of retinal detachment in children and is responsible for about 10% of detachments in the general population.[25] Commotio retina, also known as 'Berlin's edema,' may occur after recent blunt ocular trauma. Studies have demonstrated this injury to be present in 9% to 14% of blowout fractures.[26] We found 2 cases of commotio retinae which were managed conservatively.

Table 4: Comparison of results of our study with that of a study by Zagelbaum et al.[28]

Ocular involvement	Our study	Zagelbaum et al*
Corneal abrasion	21.8%	23%
Traumatic iritis	9.3%	32%
Sub conjunctival haemorrhage	37.5%	23%
Ecchymosis and lid edema	62.5%	40%
Lid laceration	31.2%	13%
Orbital fracture	6.25%	10%
Corneal foreign body	-	5%
Berlin's edema	6.25%	5%
Hyphaema	12.5%	5%
Iris injury	15.5%	4%
Retinal/ choroidal haemorrhage	-	2%
Lens dislocation	3.1%	2%
Vitreous haemorrhage	3.1%	2%
Traumatic cataract	-	2%
Preseptal cellulitis	-	2%
Retinal detachment	-	1%
Ruptured globe	-	1%
Angle recession	-	1%
Choroidal rupture	-	1%

Conclusion

Blunt trauma forms a major part of ocular trauma. Inour study majority of the patients were males, 68.75% and the commonest age of presentation was 10-20 years (28.125%). Our study showed road traffic accident to be the commonest mode of blunt ocular injury (28.125%). The most commonly involved eye 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). This study reinforces that blunt trauma can cause any extent of damage to ocular structures and the final outcome is dependent on:

1. The structures injured and severity of injury
2. Proper initial management
3. Follow up for long term complications

References

1. Kanski JJ. Clinical Ophthalmology. 6th edition. Elsevier; 2008. p.854
2. Courville CB. Coup-contrecoup mechanism of cranio-cerebral injuries. *Arch Surg.* 1942;45:19
3. Courville CB. Forensic neuropathology. *J Forensic Sci* 1962;7:1
4. Wolter JR. Coup-contrecoup mechanism of ocular injuries. *Am J Ophthalmol.* 1963;56:785
5. May DR, Kuhn FP, Morris RE, et al. The epidemiology of serious eye injuries from the United States Injury Registry. *Graefes Arch Clin Exp Ophthalmol.* 2000;238:53
6. MacEwen CJ, Baines PS, Desai P. Eye injuries in children: the current picture. *Br J Ophthalmol.* 1999;83:933
7. Horn E, McDonald HR, Johnson RN. Soccer ball-related retinal injuries. *Retina.* 2000;20:604
8. Hollander DA, Aldave AJ. Ocular bungee cord injuries. *Curr Opin Ophthalmol.* 2002;13:167
9. Da Pozzo S, Pensiero S, Perissutti P. Ocular injuries by elastic cords in children. *Pediatrics.* 2000;106:E65
10. Thach AB, Ward TP, Hollifield RD, et al. Ocular injuries from paintball pellets. *Ophthalmology*. 1999;106:533
11. Fineman M, Fischer DH, Jeffers JB, et al. Changing trends in paintball sport-related ocular injuries. *Arch Ophthalmol.* 2000;118:60
12. Pearlman JA, Au Eong KG, Kuhn F, et al. Airbags and eye injuries: epidemiology, spectrum of injury, and analysis of risk factors. *Surv Ophthalmol.* 2001;46:234
13. Bullock JD, Ballal DR, Johnson DA. Ocular and orbital trauma from water balloon slingshots. *Ophthalmology*. 1997;104:878
14. Akbar BA, Khadadad M, Alaleh ES. Prevalence of hyphaema and its complicatiions in patients with blunt eye trauma. *Medical Science Journal Islamic Azad University*. 4:259-264.
15. Liggett PE, Pince KJ, Barlow W, et al. Ocular trauma in an urban population. Review of 1132 cases. *Ophthalmology.* 1990;97:581.
16. Burnstine AU. Clinical recommendations for repair of orbital facial fractures. *Curr Opin Ophthalmol*. 2003;14(5):236–240.
17. Vasallo S, Hartstein M, Howard D, et al. Traumatic retrobulbar hemorrhage: emergent decompression by lateral canthotomy and cantholysis. *J Emerg Med.* 2001;22(3):251–256.
18. Gerbino G, Ramieri GA, Nasi A. Diagnosis and treatment of retrobulbar haematomas following blunt orbital trauma: a description of eight cases. *Int J Oral Maxillofac Surg.* 2005;34(2):127–131.
19. Popat H, Doyle PT, Davies SJ. Blindness following retrobulbar haemorrhagedit can be prevented. *Br J Oral Maxillofac Surg.* 2007;45(2):163–164.
20. Brandt MT, Haug R. Traumatic hyphema: a comprehensive review. *J Oral Maxillofac Surg*. 2001;56:1462–1470.
21. Netland K, Martinez J, LaCour O, et al. Traumatic anterior lens dislocation: a case report. *J Emerg Med*. 1998;17(4):637–639.
22. Rabinowitz R, Yagev R, Shoham A, et al. Comparison between clinical and ultrasound fndings in patients with vitreous hemorrhage. *Eye* 2004;18(3):253–256.
23. Dana MR, Werner MS, Viana MA, et al. Vitreous hemorrhage. *Ophthalmology*. 1993;100(9):1380–1382.
24. Pieramici DJ. Vitreoretinal trauma. *Ophthalmol Clin North Am.* 2002;15:225–235.
25. He D, Blomquist P, Ellis E. Association between ocular injuries and internal orbital fractures. *J Oral Maxillofac Surg* 2007;65(4):713–720.
26. Zagelbaum BM, Tostanoski JR, Kerner DJ, Hersh PS. Urban eye trauma. A one-year prospective study. *Ophthalmology*. 1993 Jun;100(6):851-856.