PREVALENCE OF DEVASTATING OCULAR TRAUMA, IT'S EMERGENCY AND SECONDARY MANAGEMENT AND OUTCOME IN A TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND

Usually, young adults are the common victims of ocular trauma in their productive age. Severe ocular trauma most often leads to poor vision, at times total loss of vision, which is not only burden to their family, but also to the entire nation. Proper evaluation of severity of ocular trauma at the time of initial examination may help in planning for skillful management and help in prevention of severe visual morbidity.

The aim of the study is to study the prevalence of ocular trauma and the visual outcome after one year of its emergency management and secondary management in selected cases in a tertiary care center.

MATERIALS AND METHODS

89 cases of ocular trauma who presented to our tertiary care center of different age groups were studied prospectively from July 2016 to July 2017. Evaluation of all ocular trauma case was done primarily by slit-lamp examination, indirect ophthalmoscopy and 90D biomicroscopy, x-ray orbit, B-scan and CT scan orbit. All patients who required immediate admission and emergency management were included in the study and old cases of ocular trauma or underwent previous ocular surgical procedure and had ocular infections or any ocular pathology were excluded. All the subjects were managed either conservatively or surgically as and when required. Primary management like repair of lacerated lid injuries, corneal laceration and penetrating injury with or without iris prolapse, corneoscleral tear suturing, scleral tear suturing and removal of IOFB were done on emergency basis. Secondarily, patients were taken up for surgery for traumatic cataract extraction, posttraumatic glaucoma surgery, vitreoretinal surgery for vitreous haemorrhage, retinal haemorrhage and retinal detachment.

RESULTS

Out of 89 cases, 69 were males and 20 were females. Agricultural injury was the leading cause of ocular trauma in which injury from vegetative matter were the most common causative aetiology followed by objects like knife and axes used in agriculture. Industrial injury is the second most common cause followed by accidental ocular traumas. Mode of injury to eye could be inferred by our study, which revealed that penetrating eye injury cases were maximum in number. In anterior segment, anterior lens capsular rupture, traumatic mydriasis, hyphaema, corneal injury, traumatic cataract and corneal FB are most commonly found in the traumatised eye. Similarly, the traumas found in posterior segment were most commonly in the form of retinal haemorrhage, retinal detachment and Berlin's oedema. Ocular trauma was most commonly found in anterior segment overall. Primary and secondary repair of the ocular injuries could salvage the visual acuity to a great extent in our study, although VA of anterior segment injury was better than that of posterior segment injuries.

CONCLUSION

Incidence of ocular trauma was most common in males due to more exposure and mostly in working age group. Anterior segment injuries had better visual outcome. Cases undergoing only primary repair had better visual outcome than patients who required secondary management. Patients who presented with endophthalmitis, RD and extensive vitreous haemorrhages had poor outcome.

KEYWORDS

Ocular Trauma, Penetrating Injury, Agricultural Injury, Corneal Injury.

HOW TO CITE THIS ARTICLE: Rout JP, Soni S, Samikshya S, et al. Prevalence of devastating ocular trauma, it's emergency and secondary management and outcome in a tertiary care centre. J. Evid. Based Med. Healthc. 2017; 4(85), 4980-4987. DOI: 10.18410/jebmh/2017/993

BACKGROUND

Ocular trauma is one of the devastating cause of visual morbidity and has great diversities and complexities depending on the site of injury, mode and aetiology of injury, visual impairment following trauma and its outcome following management. Ocular trauma not only includes blunt injury and penetrating injury to the eye, but may also include perforating and chemical injury to the eye. Ocular

trauma is one of the leading causes of preventable ocular morbidity. But, due to lack of immediate emergency intervention in such cases, the visual outcome becomes devastating, which can be salvaged by early intervention. Nearly, half a million people are blind monocularly as a result of ocular trauma worldwide according to a survey.[1] Negrel and Thylefors reported that 2-3 million people has low visual acuity bilaterally and 19 million has unilateral blindness or low vision due to ocular injuries.[2] Similarly, Vats S et al found that approximately 75% of the populations suffering ocular trauma are monocularly blind.[3] One out of twenty patients presenting to the ophthalmologist has an ocular injury.[4]

Severe ocular trauma may cause multiple injuries to eyelids, globe and orbital soft tissue.[5] Males are affected more due to their adventurous and aggressive nature, occupational exposure, participation in dangerous sports and hobbies, alcohol use and risk-taking behavior.[6,7,8] A marked preponderance is seen in 6-10 years of age group.[6,7] Ocular trauma follows a bimodal age distribution[9,10] and occurs more frequently in the lower socioeconomic groups.[11] Ocular trauma causes serious functional, structural, economical, social and occupational damage to individuals suffering from it, moreover adding to the medicolegal issues associated with it.

The main aim of recognising ocular trauma should focus on its immediate management so that the visual morbidity can be prevented by early intervention. The prognosis of ocular trauma has improved drastically with primary intervention of the injuries. Secondary manipulations has not shown significant improvement in the visual outcome so far in many cases, although have prevented the traumatised eye from being enucleated. But, extensive injuries have led to enucleation of the eyes involved unfortunately.

Preventive measures to create awareness about ocular trauma and its visual outcome following immediate intervention would definitely decrease the prevalence and otherwise resulting visual morbidity. The prognosis for severely injured eyes has improved with the development of advance microsurgical technique and better understanding of reaction to trauma and judicious use of systemic and topical steroid.[12]

Our study not only focused on the prevalence, pattern, extent, cause of injury and its distribution in the population, but also gives a prospect to know the visual outcome following ocular trauma and prognosis following primary and secondary intervention. We also keenly observed the factors affecting the excellent final visual outcome following immediate intervention and secondary intervention and also the factors, which forced for destructive procedures to prevent further complications.

Financial or Other, Competing Interest: None.
Submission 01-10-2017, Peer Review 07-10-2017,
Acceptance 17-10-2017, Published 20-10-2017.
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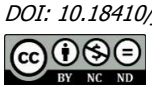
DOI: 10.18410/jebmh/2017/993



MATERIALS AND METHODS

A prospective study of 89 cases of severe ocular trauma with or without diminished vision following trauma was done in a period of 12 months from July 2016 to July 2017 in VIMSAR Burla, Odisha. It included all those cases that presented with trauma to the eye requiring admission in our hospital and needed immediate emergency intervention either conservatively or surgically and those cases that required secondary interventions after our primary treatment also. It included cases of all age groups. Our study excluded old cases of ocular trauma or underwent previous ocular surgical procedure and had ocular infections or any ocular pathology.

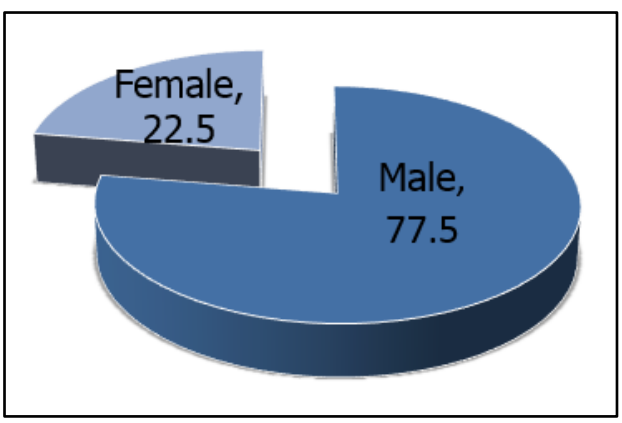
The cases of ocular trauma who came to the emergency or OPD of our hospital and required admission were thoroughly inquired about the history, demographic profile, type of injury, mode of injury, etc. and evaluated through a basic slit-lamp examination. Fundus was examined by indirect ophthalmoscopy and 90D biomicroscopy. The visual acuity was noted at the time of admission by Snellen's chart. B-scan was done to confirm posterior segment trauma and Intraorbital Foreign body (IOFB). X-ray orbit was done in all cases to look for integrity of orbit and any IOFB. CT scan orbit was done in selected cases. Small children and uncooperative patients were Evaluated Under General Anaesthesia (EUA) prior to any intervention. In cases with corneal lacerated injury or lamellar injury, Seidel test was performed. Extraocular movements were checked in all indicated cases.

Eyelid lacerations were repaired with 5-0 silk and conjunctival lacerations and scleral tears were repaired with 6-0 Vicryl. Corneal tear and corneoscleral tear were repaired primarily with 10-0 Ethilon and 6-0 Vicryl, if required respectively. Associated traumatic condition in anterior chamber if present like FB in AC, iridodialysis, anterior capsular rupture, dislocated lens in AC, hyphaema and phacocele were simultaneously dealt before repairing the corneoscleral or sole corneal injuries. Prolapsed iris in corneal tear were reposited within 24 hours of injury, but mostly resected if the wound was >24 hours. In capsular rupture and anterior dislocated lens, the lens matter were irrigated and aspirated primarily and secondary IOL were implanted in such conditions in sulcus or sclera fixating as and when needed. Superficial corneal and conjunctival FB was removed with 26 gauge needles, but deep corneal FB was removed followed by suturing the wound. Traumatic iritis and hyphaema were managed by steroid topical eye drops and cycloplegic eye drops. Conditions involving vitreous and retina like vitreous haemorrhage, vitreous detachment, IOFB, retinal haemorrhage, retinal detachment, macular hole, etc. were managed efficaciously. The visual acuity of all cases were recorded at the time of presentation, postoperative or post management and all cases were followed up after 6 months of primary management. High IOP in conditions like angle recession and phacomorphic glaucoma following traumatic cataract

and phacolytic glaucoma were lowered by IOP lowering agents and then managed further with trabeculectomy or peripheral iridectomy, if needed.

RESULTS

89 cases with history of trauma to eye were included in our study, which revealed that unilateral involvement occurred in 84 (94.3%) patients and only 5 (5.6%) cases presented with bilateral involvement. As in Pie Chart 1, ocular trauma has been seen in 69 males (77.5%) as compared to 20 females (22.5%), the male:female ratio being 3.4:1. The adventurous and aggressive nature, occupational exposure, participation in dangerous sports and hobbies, alcohol use, and risk-taking behaviour of males might suggest a reason for this male preponderance. The mean age of presentation is in 21-30 years age group with 46.1% cases suggesting hike in youth age group attributable to their aggressive and adventurous behaviour and exposure. The distribution of ocular trauma according to age group is tabulated in Table 1.



Pie Chart 1. Male:Female Ratio

Age-Group	Frequency	Percentage
1-10 Yrs.	8	8.9%
11-20 Yrs.	6	6.7%
21-30 Yrs.	41	46.1%
31-40 Yrs.	23	25.8%
41-50 Yrs.	11	12.3%

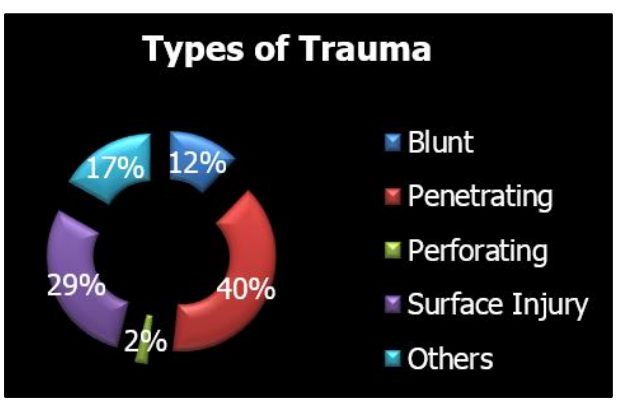
Table 1. Age Distribution

From history, the injuries were categorised and subcategorised based on their occupational category and agents involved in injury respectively as shown in Table 2. It is seen that agricultural hazards has the highest impact on ocular trauma with 40 cases (44.9%), followed by industrial with 23 cases (25.8%), accidental (10.1%), RTA (4.4%), sports (5.6%), blast injury (5.6%) and chemical injuries (3.3%) also contributes to ocular trauma. Among the agricultural agents, vegetative matter has caused the highest injury to eyes, while industrial tools like wire, metal rod, glass, iron nails and needles have attributed to ocular trauma as well.

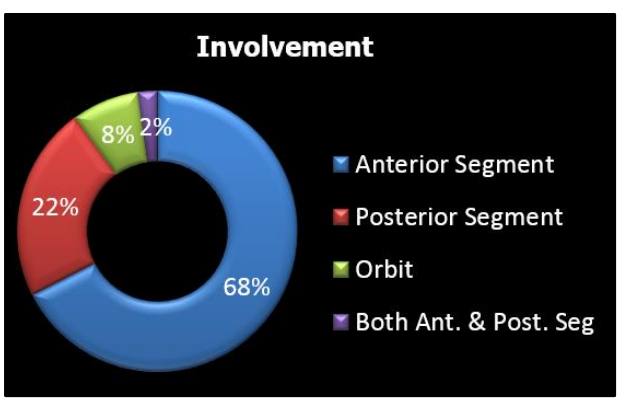
Category	Agents	No. of Cases/%	Total No. of Cases/%
RTA	Blunt	2	
	Fall	1	
	Stone	1	4
Agricultural	Wooden particle	8	
	Vegetative	22	
	Knife/axe	7	
	Fish-hook	3	40
Chemical	Acid	1	
	Alkali	2	3
Industrial	Stone	3	
	Metal rod	4	
	Glass	4	
	Wire	9	
	Iron nail	2	
	Needle/pin	1	23
Sports	Ball (blunt injury)	3	
	Cricket bat	1	
	Racket/shuttle	1	5
Blast	Bullet	1	
	Fire crackers	3	
	Pellet	1	5
Accidental	Toys	2	
	Fingernail	3	
	Pin	2	
	Others	2	9

Table 2. Categorisation of Agents of Ocular Injury

All ocular traumas in our study was categorised into blunt injury constituting 11 cases (12%), penetrating injury (40%), perforating injury (2%), surface injury, which constitutes ocular injury due to dye, chemicals, etc. (29%) and others (17%) as described in Pie Chart 2.



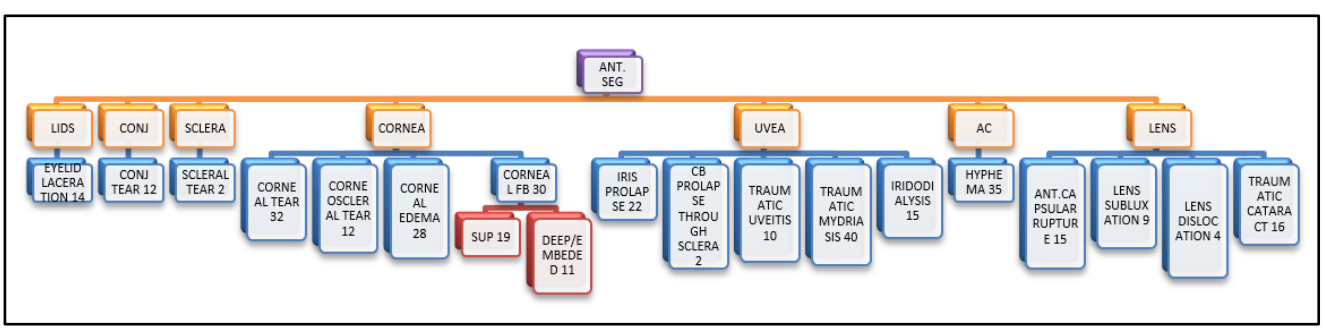
Pie Chart 2. Types of Trauma



Pie Chart 3. Site of Involvement

The ocular injuries are then broadly divided based on site of involvement of eye into anterior segment injuries described in Flow Chart 1 and posterior segment injuries described in Flow Chart 2 and all the trauma were categorised accordingly. Anterior segment involvement was found in 67.4% of cases, involvement of posterior segment, orbit and both anterior and posterior segment were seen in 22.4%, 7.8% and 2.2%, respectively (Pie Chart 3). It was seen that among the injuries sustained in anterior segment, cornea was the most vulnerable part to be affected amongst, which corneal tear was the most common as it was seen in 32 patients, followed by corneal foreign body (both superficial and deep) in 30 cases and corneoscleral tear in 12 cases without uveal prolapse. But, corneoscleral tear with uveal tissue prolapse, iridodialysis, hyphaema, phacocele, etc. were seen in 27 cases as graphed in Table 3. Following cornea, the next most important part involved was uveal tissue. The scenario seen here was elaborated in Flow Chart 1, traumatic mydriasis due to sphincter tear occurred in 40 cases, followed by iris prolapse (22 cases), iridodialysis (15 cases), traumatic uveitis and ciliary body prolapse through scleral tear in 10 cases and 2 cases, respectively. Crystalline lens was also affected devastatingly in many cases contributing a huge burden of diminution of vision in our study group. Traumatic cataract was seen in 16 cases, anterior capsule rupture in 15 cases and lens subluxation and dislocation in 9 cases and 4 cases, respectively.

Figure 1



Flow Chart 1. Distribution of Cases with Anterior Segment Involvement

Posterior segment structure involvement (Flow Chart 2) proved to be visually morbid in many cases, although number of cases were fewer than cases with anterior segment involvement. About 12 cases had Berlin's oedema, 5 cases were seen with vitreous haemorrhage and 3 cases had Retinal Detachment (RD) and 3 cases each with retinal and subretinal haemorrhage and macular hole. Orbit was found to be involved in many cases to be specific 7 cases had orbital haemorrhage, 4 had orbital fracture and 4 had orbital cellulitis as evidenced by CT scan orbit. Patients also presented with endophthalmitis (4 cases) and panophthalmitis (2 cases) following recent history of trauma.

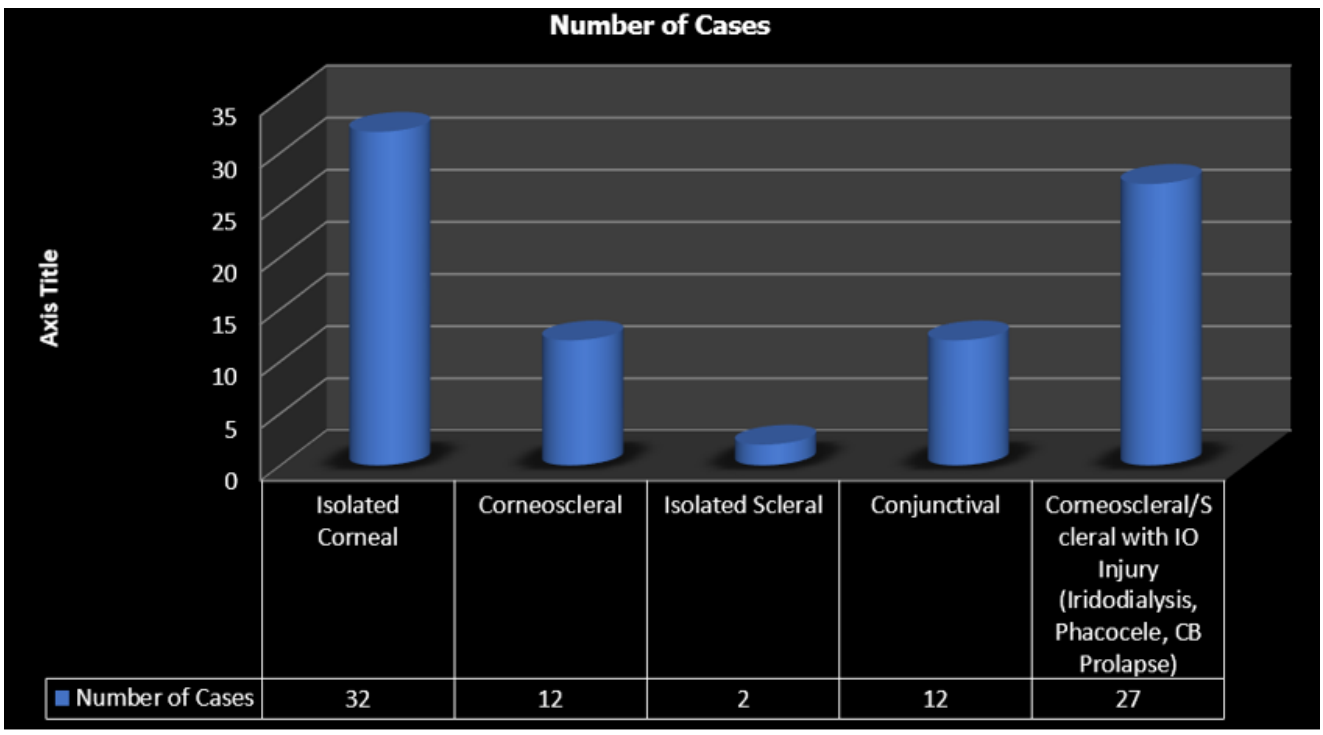
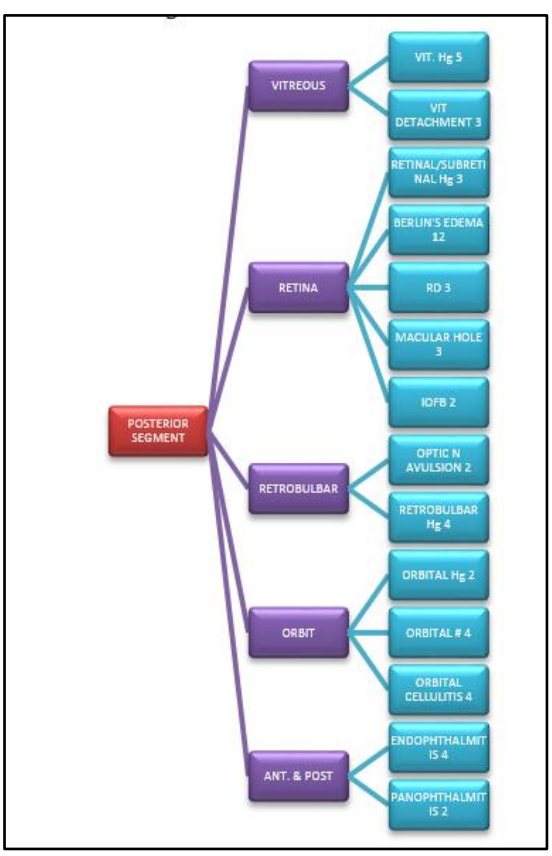
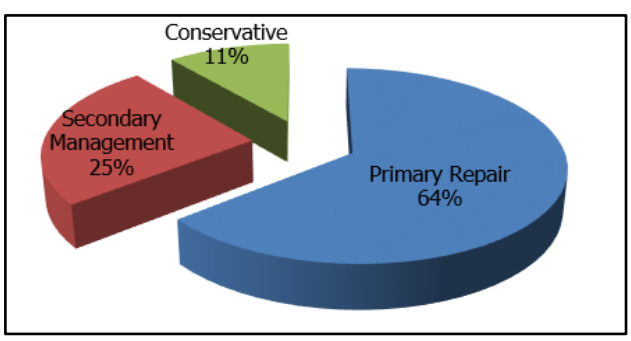


Table 3. Distribution of Corneal, Sclera and Conjunctival Tears



Flow Chart 2. Distribution of Cases with Posterior Segment Involvement

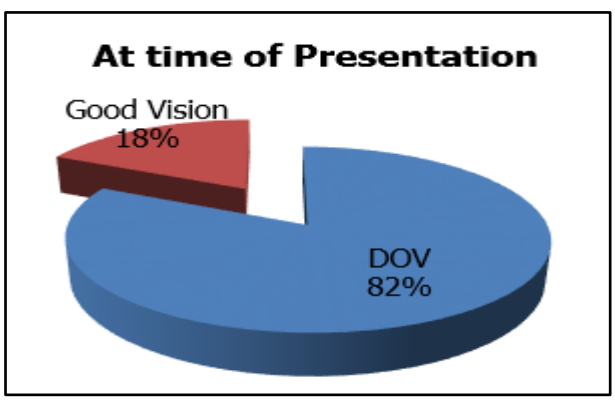


Pie Chart 4. Management of Cases

Primary repair following injury to eyes were done in 64% cases and then followed up. But, subsequently secondary management was done after few weeks in 25% of all cases like in traumatic cataract and dislocated and subluxated lens and cases with posterior segment involvement. While 11% of cases were managed conservatively according to Pie Chart 4. Subconjunctival haemorrhage, hyphaema, traumatic uveitis, vitreous haemorrhage, Berlin's oedema, mild retrobulbar and orbital haemorrhages, orbital cellulitis and endophthalmitis were managed conservatively and if needed were dealt surgically based on treatment response.

Beyond medical management (11%), primary surgical interventions in required cases were done. Lid injuries were sutured with 5-0 silk and 6-0 Vicryl primarily. Corneal tear, corneoscleral tear with or without uveal tissue prolapse, scleral tear and conjunctival tear were repaired with 10-0

Ethilon and 6-0 Vicryl, respectively, and uveal tissue were reposited, if the repair was done within 24 hours of injury, otherwise were excised. Superficial FB cornea was removed by 26G needle while deep embedded or lamellar FB cornea was removed under operative microscope. Corneal sutures were given in few cases. In Seidel's test, positive small corneal tears BCL was given. Traumatic cataract with or without dislocation were managed either by phacoemulsification or SICS with IOL implantation. Cases with anterior capsular rupture, aphakics and zonular dehiscence SFIOL were given. Retinal detachment was managed by scleral buckling or PPV with SF_6 gas or silicon oil injection, non-resolving vitreous haemorrhage cases underwent vitrectomy, if needed and large subretinal haemorrhage was drained by scleral puncture. IOFB were also removed in 2 cases with vitrectomy. In few cases with high IOP following trauma or as a complication, where topical IOP lowering agents did not give a satisfactory response, trabeculectomy or peripheral iridectomy was done if required.



Pie Chart 5. VA at the Time of Presentation

Around 82% patients presented with diminution of vision at hospitalisation according to Pie Chart 5. At the time of presentation, 30.3% cases had visual acuity between 6/6-6/18, followed by 23.5% with Counting Fingers (CF) and 14.6% cases with <6/60 vision. Only 5.6% had No Perception of Light (NoPL) as discussed in Table 4, 82% cases had DOV at the time of presentation. Visual acuity was taken in all cases at the time of presentation, post management and 6 months follow up.

After management whether postoperative or conservative, the number of patients with VA 6/6-6/18 increased from 27 to 31 and the Table 5 shows somehow improvement in VA post management in almost every group, but the number of patients whose vision could not be rescued increased from 5 to 10 and few subsequently phthisis bulbi amongst them. Out of 44 cases of corneal and corneoscleral tear repaired, 27 cases had VA between 6/6-6/18. Improvement in VA after primary repair was achieved in 39% cases and after secondary management in 12% cases. Out of 9 cases with PL positive, only 1 got better to HM, 3 remained with PL positive and 3 patients had complete loss of vision. Two patients, 1 with CF and 1 with HM at the presentation also presented with phthisis bulbi with NoPL on subsequent follow up at 3 months and 6 months of discharge. Posterior segment surgery achieved <6/60 vision in most cases.

VA	Frequency	Percentage
6/6-6/18	27	30.3%
6/24-6/60	9	10.1%
<6/60	13	14.6%
CF	21	23.5%
HM	5	5.6%
PL	9	10.4%
NoPL	5	5.6%

Table 4. VA at the Time of Presentation

BCVA (Postop)	Number of Cases
6/6-6/18	31
6/18-6/60	10
<6/60	13
CF	10
HM	4
PL	3
NoPL	10
Unfollowed	8

Table 5. BCVA after Management

DISCUSSION

Our study found a very high incidence of ocular trauma presented to our Hospital in a period of 1 year, out of which 69 were males and most were in an age group of 21-30 years suggesting a high preponderance of ocular trauma in young male youth attributed to their aggressive and adventurous behaviour and also high risk of exposure. Many studies have described about male preponderance due to the mentioned risk factors.[6,7,8] Out of all 82% had diminution of vision and around 45% had a fatal effect on visual acuity and 5.6% patients of all became blind. Although, 94.3% had a unilateral involvement, but the rest of 5.6% presented with bilateral involvement becoming a weeping morbidity amongst the patients. Many studies has shown that bilateral ocular injury is rare, but are devastating and visually morbid.[13-15] Occupational impact over ocular trauma has been significantly high in patients working in agricultural sector. 44.9% cases had ocular injury due to objects associated with agriculture. Objects like vegetables/leaves, wooden particles, knife/axe, metal rods, wire, ball, firecrackers, etc. were found to be causative factor for maximum ocular injuries in our study as comparable to study in which vegetative material was the commonest carried out at Al-Ibrahim Hospital[13] and sticks and pencils at Sir Ganga Ram Hospital[16] and hammer on metal injuries at Jinnah Hospital, Lahore.[14] Penetrating injury (40%), mostly laceration was most commonly found in our study. Lacerating injury was found to be predominant in other studies carried out in Lahore,[14,16] Peshawar,[15] Egypt[17] and Nepal.[18] Improvement in VA after primary repair was achieved in 39% cases and after secondary management in 12% cases, 34% cases had improvement in vision 6/18 or better post management. All data of current study matches with Sohail Zia et al study where they had shown improvement in 45% patients up to 6/12 or more with primary repair only[19] and Shubhanshu Gupta et al for

improvement in VA following primary and secondary repair.[20]

CONCLUSION

To summarise, the males in working age group are more prone to ocular trauma. Injuries involving only the anterior segment had better visual prognosis. Patients only with primary repair had better visual prognosis than the cases that required secondary management. Patient presented with complications like endophthalmitis and posterior segment involvement like extensive vitreous haemorrhages, RD, etc. had poor visual prognosis.

REFERENCES

[1] Thylefors B. Epidemiological patterns of ocular trauma. Aust N Z J Ophthalmol 1992;20(2):95-98.

[2] Yanoff M, Dukers J. Ophthalmology. 3rd edn. Mosby Elsevier 2009.

[3] Vats S, Murthy GVS, Chandra M, et al. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. Indian J Ophthalmol 2008;56(4):313-316.

[4] Guly CM, Guly HR, Bouamra O, et al. Ocular injuries in patients with major trauma. Emerg Med J 2006;23(12):915-917.

[5] Kunimoto DY, Kanitkar KD, Makar MS. Trauma. In: The Wills eye manual. 4th edn. Philadelphia: Lippincott Williams & Wilkins 2004:14-38.

[6] Robson J, Behrman AJ, Abbuhl S. Globe Rupture. 2007. http://www.emedicine.com/emerg/topic218.htm.

[7] Arunagiri G. Corneoscleral laceration 2016. http://www.emedicine.com/oph/topic108.htm.

[8] Koo L, Kapadia MK, Singh RP, et al. Gender differences in etiology and outcome of open globe injuries. J Trauma 2005;59(1):175-178.

[9] Wong TY, Tielsch JM. A population-based study on the incidence of severe ocular trauma in Singapore. Am J Ophthalmol 1999;128(3):345-351.

[10] Tielsch JM, Parver L, Shankar B. Time trends in the incidence of hospitalized ocular trauma. Arch Ophthalmol 1989;107(4):519-523.

[11] Dandona L, Dandona R, Srinivas M, et al. Ocular trauma in an urban population in southern India: the Andhra Pradesh Eye Disease Study. Clin Exp Ophthalmol 2000;28(5):350-356.

[12] Esmaeli B, Elner SG, Schork MA, et al. Visual outcome and ocular survival after penetrating trauma. A clinicopathologic study. Ophthalmology 1995;102(3):393-400.

[13] Bukhari S, Mahar PS, Qidwai U, et al. Ocular trauma in children. Pak J Ophthalmol 2011;27(4):208-213.

[14] Jahangir T, Butt NH, Hamza U, et al. Pattern of presentation and factors leading to ocular trauma. Pak J Ophthalmol 2011;27:96-102.

[15] Babar TF, Khan MT, Marwat MZ, et al. Patterns of ocular trauma. J Coll Physicians Surg Pak 2007;17(3):148-153.

[16] Arfat MY, Butt HM. Visual outcome after anterior segment trauma of the eye. Pak J Ophthalmol 2010;26(2):74-78.

[17] El-Mekawey HE, Abu El Einen KG, Abdelmaboud M, et al. Epidemiology of ocular emergencies in the Egyptian population: a five-year retrospective study. Clin Ophthalmol 2011;5:955-960.

[18] Khatry SK, Lewis AE, Schein OD, et al. The epidemiology of ocular trauma in rural Nepal. Br J Ophthalmol 2004;88(4):456-460.

[19] Zia S, Khan QA, Iqbal Y, et al. Visual outcome of cataract surgery in cases of penetrating ocular trauma. Gomal Journal of Medical Sciences 2014;12(2):56-59.

[20] Gupta S, Malhotra AK, Gehra A, et al. Pattern of ocular trauma at MLB Medical College, Jhansi (UP)- A retrospective study. IJBAR 2015;6(08):589-593.