



Penetrating Ocular Trauma: A Hospital Based Study

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ABSTRACT

**Purpose:** To know the morbidity profile of patients coming with penetrating ocular trauma.  
**Material and Methods:** The study was conducted at the regional Institute of ophthalmology Patna which included 60 patients within 1 year period. Detailed history was taken with special consideration to the duration of injury and the object causing injury. Visual acuity was recorded using Snellen chart and slit lamp examination included documentation of the size of the tear, its location, involvement of visual axis, iris prolapse, cataract formation, intraocular foreign body (IOFB), and retinal detachment.  
**Results:** Almost 44% ocular trauma occurring in first decade of life. Male: female ratio was 2.7:1. In the present study most of the injuries involved Zone I 83.33%. The Zone II injuries were seen in 16.67%. No Zone III injuries were included in this study. Post op Visual acuity was related to the severity of trauma. The present study shows that penetrating injuries occur most commonly in an sports & related activity (which consist while playing arrow, bow, gilli danda, cricket bat, hockey stick etc.) (36.67%). Domestic activities (26.67%) account for more penetrating injuries than agriculture (23.33%) & industry (10%). 63.33% of patients had only perception of light at presentation.  
**Conclusion:** Prevalence of trauma was much more common in first two decades of life with significantly higher ratio in males than female. Majority of cases presented late with poorer prognostic factors. Awareness of ocular trauma should be increased in the populations to reduce the incidence of childhood blindness

KEYWORDS

Ocular trauma, Intraocular foreign body, clinicoepidemiology of trauma

INTRODUCTION:

Ocular injury is a preventable cause of blindness & yet it remains a significant disabling health problem that affects all age groups. Loss of sight is the most feared of all disabilities especially so if suffered acutely like in the case of penetrating eye injuries. Penetrating ocular injuries in particular carry high risk of visual morbidity in all age groups. 1 Annually there are in excess of 2.4 million cases of ocular trauma, with more than 40,000 individuals sustaining significant visual impairment on permanent basis. 2 From the international perspective, an estimated 5,00,000 blinding eye injuries occur annually worldwide, making ocular trauma the principle cause of unilateral blindness on the world today & second leading cause of blind eyes. 3 Visual outcomes from eye injury vary from full recovery to complete blindness, with physical & psychological loss & enormous costs to society. 4 The burden of corneal disease in our country is reflected by the fact that 90% of the global cases of ocular trauma & corneal ulceration leading to corneal blindness occur in developing countries. 5

The incidence of ocular trauma is extremely high in males. Most of those who are injured are young. The average age is usually less than 30 years. 6,7

Penetrating injuries caused by sharp instruments or foreign bodies are all serious & should be treated as an emergency. Such injuries is due to the immediate damage to the eye, post traumatic iridocyclitis, introduction of infection, traumatic cataract & sympathetic ophthalmitis. We did one year study in our (RIO, Patna) institute which shows both epidemiology, nature of injuries & outcome of penetrating ocular trauma.

MATERIALS AND METHODS

The study was conducted at Regional Institute of Ophthalmology, IGIMS Medical college, Patna. The material for the present study has been drawn from patients attending the Out patient Department of Ophthalmology at IGIMS Medical college & Hospital during the period from March 2013 to March 2014.

A total 60 cases admitted with penetrating eye injury were selected for study. The design of the study was a prospective randomized study. A thorough & detailed history was taken with special emphasis on the nature & the mode of injury, symptoms, time elapsed since injury, vision & activity at the time of injury, condition of the other eye, any systemic illness etc.

All the penetrating ocular trauma patients with grade I & II zone of involvement coming to OPD at RIO or emergency services of the IGIMS Medical college & hospital, Patna were enrolled in the study. Retained intraocular foreign body (IOFB), pregnant & lactating women and rupture of the globe were excluded from study.

special consideration to the duration of injury and the object causing injury. Visual acuity was recorded using Snellen chart where possible and slit lamp examination included documentation of the size of the tear, its location, involvement of visual axis, iris prolapse, cataract formation, IOFB, and retinal detachment. All cases had pre and post op B-scan ultrasound. General physical examination of the patient and laboratory tests for various investigations especially general anaesthesia, total leukocyte count, differential leukocyte count, hemoglobin,

complete urine analysis, x-ray chest and skull, electro cardiogram, electrolyte balance and kidney functions were done to avoid complications. Regular follow ups were done for at least 3 months and final BCVA was recorded on each visit.

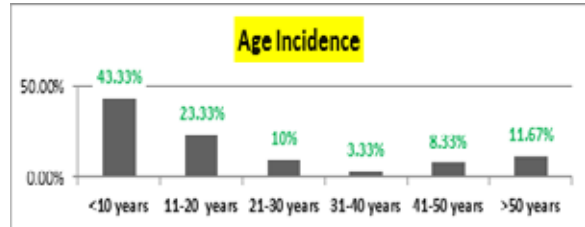
All the patients were admitted & treated as an emergency. Informed consent & high risk bond was taken from all patients for management . All the patients were started on broad spectrum antibiotics & cycloplegic drops . Surgical management for large leaking wound consist repair of the wound with abscission of the prolapsed uveal tissue with AC reformation using either air or saline. In case of traumatic cataract the cataract extraction was either done at the same time ,if possible or else were advised cataract extraction as a secondary procedure . Cases that involved the posterior segment, endophthalmitis & vitreous haemorrhage were referred to a vitreo-retinal surgeon for further management . The patients were followed up at intervals ,weekly in the first month & again at the end of 2nd month. At every visit the patients underwent a detailed ocular examination as described above .

**RESULT**

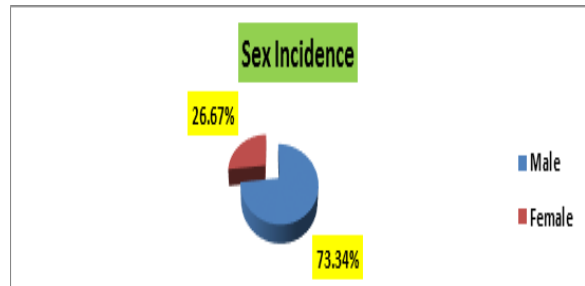
This was a OBSERVATIONAL RANDOMISED ONE YEAR COHORT STUDY (PROSPECTIVE STUDY) had Sample Size total 60 patients .

The incidence of penetrating ocular trauma is found to be highest in the 1st & 2nd decades of life (43.33 %) that is 26 cases out of total 60 cases ,having age less than 10 yrs & (23.33%) that is 14 cases out of total 60 cases were in between 11-20 yrs. Males ( 73.34 %) are at far higher risk for penetrating trauma than females (26.67 %). Right eye ( 53.34 %) was predominantly affected. Zone I ( 83.33 %) injuries were observed more frequently .This study showed that (70%) of patients first contact with the Ophthalmologist within 24 hours up to one week of injury . (53.33 %) of patients presented to the hospital (RIO,IGIMS Medical college, Patna-Bihar ) after 24 hours up to 1 week of injury.(30%) of patients came after more than 1week of injury with only (16.67 %) reporting within 24 hours.

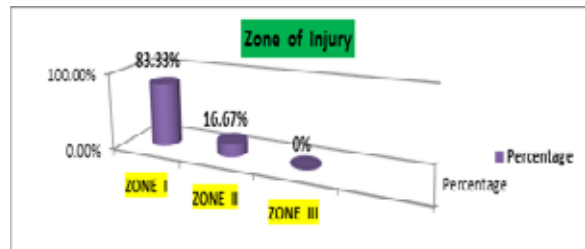
A ETIOLOGICAL PATTERN : (activity at the time of injury) : 36.67 % of penetrating ocular injuries occurred while engaged in sports & other activities. Only (10%) of injuries occurred in industry is due to the fact that this part of state is less industrialized & most patients come from a rural areas . As sports & related injury (total 22 cases out of 60) which consist while playing arrow (3), bow (5), gilli danda (4), cricket bat (6), hockey stick (4) etc. 53.33% of cases were operated under general anaesthesia because maximum patients included in this study are less than 10yrs of age & are non co-operative. Injuries with thorn (30%) were are the commonest agents causing penetrating ocular injury in this study .Cornea, lens & iris were the most common structures involved as observed in this study .In the present study 63.33% of patients (that is total 38 cases out of 60) had only perception of light at presentation. Vision were recorded in terms of BCVA ( Best Corrected Visual Acuity /vision with pin hole) in all cases .All the cases of corneal tear with iris prolapsed were taken for immediate repair with abscission of prolapsed iris tissue .The visual acuity (in terms of BCVA) following complete ( at the end of second month ) management was satisfactory with 31.67 % (19 patients) of patients having vision between 6/24 up to 6/36 & 8.33 % (05 patients) of patients having no perception of light . The most common cause for poor vision was traumatic cataract, hyphema, secondary endophthalmitis .16 cases of traumatic cataract which were presenting late to RIO OPD that were operated with IOL implantation gained good vision .Six cases ( 10.00 %) lost vision secondary to endophthalmitis . 17 cases (28.33 %) lost vision due to development of visual significant corneal opacity & one case (1.67 %) developed retinal detachment



**TABLE 1 : AGE INCIDENCE**



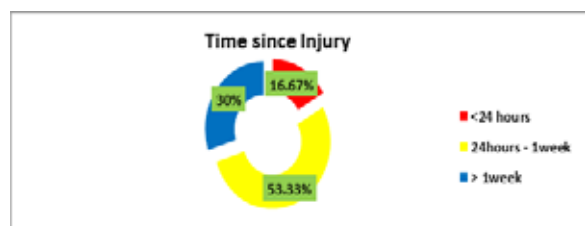
**GRAPH 2 : SEX INCIDENCE**



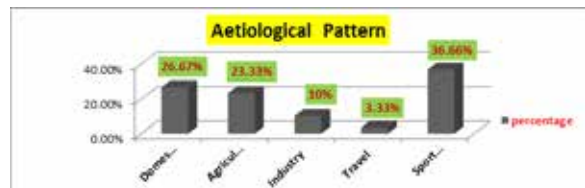
**GRAPH 4 : ZONE OF INJURY**

**TABLE 5 : TIME TAKEN FOR IST CONTACT WITH OPHTHALMOLOGIST**

Time since injury	No. of cases	Percentage
< 24 hours	10	16.67 %
24 hours- 1 week	42	70 %
> 1 week	08	13.33 %



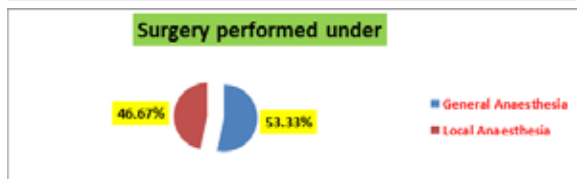
**GRAPH 6 : TIME SINCE INJURY**



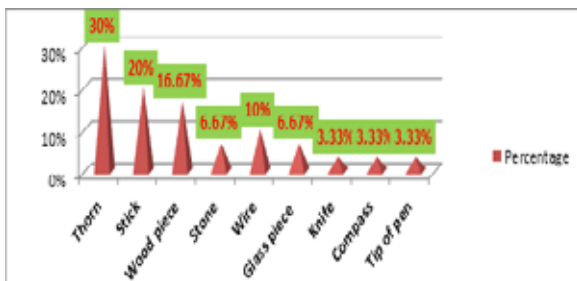
**GRAPH 7 : A ETIOLOGICAL PATTERN**

**TABLE 8 : SURGERY DONE UNDER**

Surgery done under	No. of Cases	Percentage
GA	32	53.33 %
LA	28	46.67 %



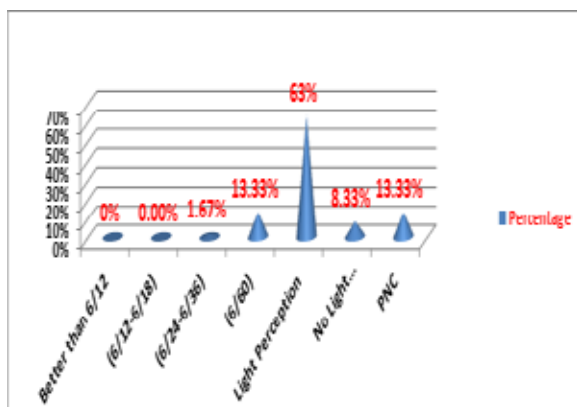
GRAPH 8 : SURGERY DONE UNDERTA



GRAPH 9 : OBJECT CAUSING INJURY

TABLE 10 : VISUAL ACUITY AT PRESENTATION

Vision (BCVA)	No. of Cases	Percentage
Better than 6/12	00	00 %
6/12- 6/18	00	0.00 %
6/24 - 6/36	01	1.67 %
6/60	08	13.33 %
Light Perception	38	63.33 %
No Light Perception	05	8.33 %
PNC	08	13.33 %



GRAPH 11 : VISUAL ACUITY AFTER ONE WEEK OF SURGERY

TABLE 12 : VISUAL ACUITY AFTER 3rd WEEK OF SURGERY

Vision (BCVA)	No. of Cases	Percentage
Better than 6/12	00	00.00 %
6/12- 6/18	00	00.00 %
6/24 - 6/36	12	20.00 %
6/60	25	41.67 %
Light Perception	10	16.67 %
No Light Perception	05	8.33 %
PNC	08	13.33 %

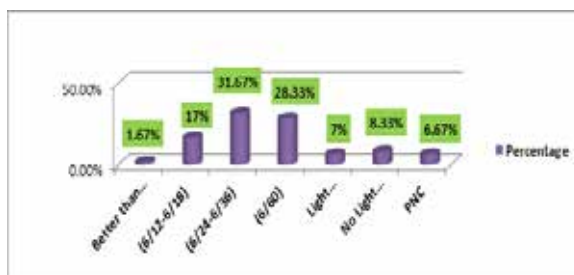
GRAPH 12 : VISUAL ACUITY AFTER 3red WEEK OF SURGERY

TABLE 13 : VISUAL ACUITY AFTER FOUR WEEKS

Vision (BCVA)	No. of Cases	Percentage
Better than 6/12	00	00.00 %
6/12- 6/18	01	1.67 %
6/24 - 6/36	21	35.00 %
6/60	25	41.67 %
Light Perception	04	6.67 %
No Light Perception	05	8.33 %
PNC	04	6.67 %

TABLE 14 : VISUAL ACUITY AT THE END OF SECOND MONTH

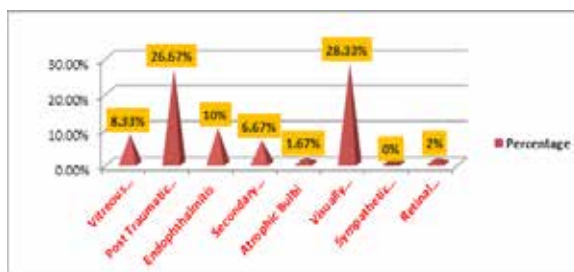
Vision (BCVA)	No. of Cases	Percentage
Better than 6/12	01	1.67 %
6/12- 6/18	10	16.67 %
6/24 - 6/36	19	31.67 %
6/60	17	28.33 %
Light Perception	04	6.67 %
No Light Perception	05	8.33 %
PNC	04	6.67 %



GRAPH 14 : VISUAL ACUITY AT THE END OF SECOND MONTH

TABLE 15 : COMPLICATIONS & SEQUALAE

Complications	No. of Cases	Percentage
Vitreous haemorrhage	05	8.33 %
Post traumatic iridocyclitis	16	26.67 %
Endophthalmitis	06	10.00 %
Sec. Glaucoma	04	6.67 %
Atrophic bulbi	01	1.67 %
Corneal opacity	17	28.33 %
Sympathetic Ophthalmitis	00	00 %
Retinal detachment	01	1.67 %



GRAPH 15 : : COMPLICATIONS & SEQUALAE

DISCUSSION

In the present study the highest incidence of penetrating ocular trauma was observed in the age group less than 10years (43.33%) because children from this age group involved in outdoor activity, sports & they are not aware of hazards of ocular trauma leading to their decrease attentiveness. Mukherjee et al. study reported 44.9% of patients were under the age of 20yrs emphasizing the vulnerability of younger age. Shukla IM et al show 29.5 % of the patients were under third decade. Similarly 86.74% of patients belonged to the first three decade of life proved by Parmar et al in 1985 .Mean age was 36.67 yrs out of 172 eyes with open globe injury by Rupesh Agrawal et al in 2013 in his study regarding prognostic factors

for open globe injuries in Singapore.

In the present study, the highest incidence of penetrating trauma was seen in males (73.34%) than female (26.67%), so M:F ratio was 3:1 which shows males are most commonly involved in outdoor & risky activities. Shukla IM et al : A clinical study of ocular injuries in 1979 give same result that incidence of ocular injuries was 82.25% in males because they are more exposed to occupation & outdoor hazard. 82 patients were hospitalized with penetrating ocular injuries at Goa Medical College of which 60 cases (73.17%) were male by Mukherjee A.K et al in Sept.1984, similarly Parmar et al in 1985: pattern of ocular injuries in Haryana in his study show males (76.01%) were affected more frequently than females (23.9%). Out of 153 patients there were (81.7%) males & (18.3%) females with M:F ratio was 4.5:1 (Kehinde Fasasi Monsudi et al : Nigeria-2013) .

In this study, it was seen that injuries mainly involved the cornea (83.33%) Zone I followed by injuries involving Zone II(16.67%). No injuries involving Zone III were enrolled in this study. Study done by Mukherjee A.K et al : A profile of penetrating eye injuries show cornea was involved in 62.21%, corneo-scleral in 29.26% & sclera in 8.53% of cases . Cornea is anterior placed structure so corneal perforation is most common 89.01% Krishnan et al in his study regarding ocular injuries in union territory of Pondicherry-Clinical presentation. 63.89% has sustained Zone I injury, 27.78% has Zone II injury & 8.33% Zone III injury.

This study showed that 70% of patients first contact with the Ophthalmologist within 24 hours up to one week of injury & 53.33 % that is 32 cases came to RIO,IGIMS hospital within first week. This data shows that most of the patients came from rural area of Bihar & they are not aware about hazard - complication of penetrating ocular trauma. The patients which first contact with Ophthalmologist show better visual out come at the end of second month. Shukla IM et al reported : A clinical study of ocular injuries shows 31.50% patients presented within 24 hrs, 48% of patients presented within first week & 20.5% presented later than 1 week. According to time of consultation by Krishnan & Sreenivasan et al ( 1988): Patients with Penetrating injuries sought consultation earlier- 61.27% sought consultation within 48 hours, 26.01% sought consultation within 2-7 days & 12.71% reported after 7 days of injury.

The present study shows that penetrating injuries occurs most commonly in sports & related activity (which consist while playing arrow ,bow, gilli danda, cricket bat, hockey stick etc.)( 36.66%). Domestic activities (26.66%) account for more penetrating injuries than agriculture (23.33%) , industry (10%) & travel (3.33%). Fewer injuries occurred in industry is due to the fact that this part of state is less industrialized & most patients come from a rural areas . Krishnaiah, Nirmalan, et al. (2006) Ocular Trauma in a Rural Population of Southern India-The Andhra Pradesh eye disease study shows ocular trauma was significantly more frequent among laborers . After adjusting for gender injury with vegetable matter such as a thorn, branch of a tree, plant secretion, etc [45.3%]) was the major cause of trauma reported in this population. Shukla IM et al explained amongst the occupational injuries 46.56% are of agricultural origin & is obviously due to predominance of agriculturers in our country.7.

Between the studies conducted in developing countries like India & the developed western countries there is a difference seen in the nature of the agents causing injury. The level of urbanisation & industrialisation changes the profile of the injuries & the agents causing the injury. In this study the most common agent that caused the penetrating trauma was thorn (30%) trauma with stick ( 20 %) followed by injury with chip of wood (16.67%). This can be co-related to the fact that most people who presented to the hospital were childrens (age<10yrs) engaged in sports & agricultural activities. Injury with metal objects is relatively less as this part of state is

less industrialised & less people are exposed to the dangers of metal particle injury.

Visual acuity in the injured eye at presentation is an important prognostic factor in the management of penetrating trauma. The effect of penetrating ocular trauma can be estimated by the fact that in this study the visual acuity at presentation in (63.33 %) of cases was only perception of light. In the present study, (41.67 %) of patients show the final visual acuity 6/60 at 4week & at the end of 2nd month following treatment shows that (31.67 %) of patients got vision better than 6/24-6/36 . Narang S et al. 2004 in his study regarding paediatric open globe injuries explained that visual acuity at presentation was more than or equal to 6/12 in 1.39 %, 3/60 to 6/12 in ( 6.94% ) & light perception to less than 3/60 in ( 72.22 %). Corrected visual gain was 6/12 or better in 44.44 % & 6/18 to 6/24 in ( 22.22%) Parihar JK et al 2000. Visual acuity improved by two lines or more in 68.72% of patients surgically treated by Badrinath SS.1987. 8

Nirmalan PK et al: Ocular Trauma in rural South India population- The Aravind comprehensive eye survey Sept.2004 explained that Prompt & meticulous surgical treatment restored useful vision(better than or equal to 6/18) in 60.5 % of patients . 9

In the present study, post-traumatic iridocyclitis was seen in 26.67 % cases & endophthalmitis was seen in 10.00 %. 6.67% cases of secondary glaucoma along with 8.33 % case of vitreous haemorrhage & 1.67 % case of atrophic bulbi were seen. Visual significant corneal opacity was seen in 28.33 % cases. In the present study the most common structure involved was lens & iris in most of cases. Severe uveitis seen in 22% cases, secondary glaucoma in 16.67% by Parihar JK et al.

## CONCLUSION

Prevalence of trauma is much more in first two decades of life with significantly higher ratio in males than females. Majority of the trauma was caused by sport related injuries and among poor socioeconomic strata with delayed presentation. Awareness of ocular trauma should be increased in the populations to reduce the incidence of this avoidable cause of blindness. Health education and awareness about the morbidity caused by delayed presentation is needed, especially in peripheral areas to save vision. Basic Health Units should provide initial treatment as early as possible and refer serious cases to nearest tertiary care centre.

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