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RESEARCH ARTICLE

ROLE OF ALCOHOL INTOXICATION IN CAUSATION AND SEVERITY OF OPEN GLOBE INJURIES

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ABSTRACT

Ocular trauma is the principle cause of unilateral blindness in the world today. Commonly occuring in young, ocular injuries impose an enduring burden through out the most productive years of their life. A prospective study of 50 cases of open globe injury from the casualty and out-patient department of Bapuji Hospital and Chigateri General Hospital, Davangere, India. Details regarding whether the patient was under the influence of alcohol at the time of injury, mode of injury, type, grade and zone of injury was noted. The treatment given and surgeries performed were noted and the patients were followed upto 1 year. 20% of cases with open globe injury were under the influence of alcohol at the time of injury. 100% cases of all assault related open globe injuries were under the influence of alcohol. The commonest type of injury under alcohol influence is globe rupture 50% & penetrating type 50% with equal distribution as opposed to 36% globe ruptures in other cases. 27% of all globe ruptures and 19% of all penetrating injuries occurred under the influence of alcohol. 80% of all zone 3 injuries and 55% of all Grade-5 injuries were under the influence of alcohol. 20% of injuries under the alcohol influence were due to drunken driving. 50% injuries necessitating evisceration occurred under the influence of alcohol. Most severe injuries occurred under the influence of alcohol. Risk behavior combined with alcohol consumption therefore seems to be an independent factor for the incidence of open-globe eye injuries.

INTRODUCTION

Vision is our primary contact with the external world. Loss of sight is the most feared of all disabilities especially so if suffered acutely like in the cases of open globe injuries. Annually, there are in excess of 2.4 million cases of ocular trauma, with more than 40,000 individuals sustaining significant visual impairment on a permanent basis. (Albert, Jakobic 2000) An estimated 500,000 blinding eye injuries occur annually worldwide making ocular trauma the principle cause of unilateral blindness in the world today and the second leading cause of blind eyes. (MacCumber 1998) The Scottish Ocular Trauma Survey (SCOTS) provides a direct estimate of visual impairment attributed to serious ocular injury. 13.2% patients suffered significant impairment of vision and in 5% the ultimate visual outcome was no light perception. (Robert J Cooling 1996) Treatment is time consuming and expensive but despite this there is often a grave prognosis. There is an urgent need to step up the safety precautions to prevent such disabling eye injuries. Improved machines, provision of adequate illumination at work, selection of trained workers with adequate vision and alertness, periodic testing for alcohol and finally making the use of eye protection mandatory are some of the steps that can be taken towards this goal. (Usha Vasu and Andrew Vasnaik 2001)

Definitions

According to Birmingham Eye Trauma Terminology, Open globe injury is defined as full thickness defects in the corneoscleral coat of the eye. It includes “outside in” injuries like penetrating injury (only an entry wound), perforating injury (both an entry and an exit wound are present), intraocular foreign body and “inside out” injury like globe rupture. (Zhang *et al.,* 2010) Assault as a cause of ocular trauma is an important cause of open globe injury. A report quoting the national eye trauma system registry; shows an incidence of 22 % of all open globe injury. 83% of victims of assault are males. 60% of them were between 20-39 yrs of age. Alcohol usage is seen in 48.30% of assault related ocular injuries and these injuries tend to involve posterior segment in 70% of cases. (MacEwen 1999) Other similar studies state that among the injuries caused by assault, 80.5% were males and 18.6% were females. (Caroline J Macewen 1989)

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Classification (Sihota, Tondon 2007; Albert, Jakobeic 2000; Pieramici *et al.*, 1997)

Kuhn and co-worker (1996) proposed a standard terminology to describe ocular injuries. The Ocular Trauma Classification Group and (BETT) Birmingham Eye Trauma Terminology has extended this work and has suggested a standardised grading system for classifying ocular injuries.

This system classifies eye injuries based on four characteristics

1) Mechanism of injury
2) Initial visual acuity
3) Presence or absence of RAPD
4) Most posterior location of the wound

Mechanical eye injury classification (Albert, Jakobeic 2000; Pieramici *et al.*, 1997)

Open globe injury classification: (Zhang *et al.*, 2010)

Type

A. Rupture- "Inside out" injury due to blunt trauma.
B. Penetrating- Outside in injury with sharp object, only entry wound.
C. Intraocular foreign body
D. Perforating- Sharp object causing one entry wound & exit wound
E. Mixed

Grade : (Usha Vasu and Andrew Vasnaik 2001)

Visual acuity is measured at distance of 6 meters using Snellen's chart with correction. It is graded as follows-

1) $\geq$ 20 / 40 $\simeq$ ($\geq$ 6/12)
2) 20 / 50 - 20 / 100 $\simeq$ (6/18 – 6/36)
3) 20 / 100 - 5 / 200 $\simeq$ (6/36 – CF 3m)
4) 4 / 200 to light perception $\simeq$ (CF 2m – PL+)
5) No light perception (confirmed with bright light with the other eye occluded)

Pupil : *Positive :* If relative afferent pupillary defect is present in the affected eye
Negative : If relative afferent pupillary defect is absent in the affected eye

Zone : I – Isolated to cornea (including the limbus)
II – Corneoscleral limbus to a point 5mm posterior into the sclera
III – Posterior to the anterior 5 mm of sclera

MATERIALS AND METHODS

The study was conducted in the Department of Ophthalmology at Bapuji Hospital and Chigateri General Hospital, attached to J.J.M. Medical College, Davangere. The material for the present study has been drawn from patients attending the casualty and Out-patient Department of Ophthalmology at Chigateri General Hospital and Bapuji Hospital, Davangere during the period from October 2011 to September 2013. Approval for the study protocol and clearance were obtained from the Ethical Review Committee of the institute to which the two hospitals, where the study was conducted, are affiliated. A total of 50 cases admitted with penetrating eye injury were selected for the study. All the patients were admitted and the patient data was categorized into etiology, age, sex, causative agents and analysed. A thorough and detailed history was taken with special emphasis on the nature and the mode of injury, symptoms, time elapsed since injury, vision of the patient before the injury, history of alcohol intake at the time of injury, whether the patient was treated before coming to the hospital, activity at the time of injury, use of protective eyewear at the time of injury etc.,

Inclusion Criteria

All patients with open globe injuries including penetrating injury, perforating injury, intraocular foreign body and globe ruptures who were willing for admission, treatment and follow up.

Exclusion Criteria

Following patients will be excluded from the study

- Closed globe injury.
- Any intraocular surgery in the past 2 months.

Examination

Careful and detailed examination of both the eyes was conducted along with the general physical examination for any other associated injury over any other part of the body.

Examination of function of eye

Vision : assessed carefully using Snellen's charts.
Pupillary reaction : Both direct and indirect pupillary reaction is checked. Pupil is also tested for any afferent pupillary defect.
Slit-lamp examination : was done.
Fundoscopy : done.

Investigations

- Routine urine and blood examinations
- X-ray orbit to rule out any fracture and lodged foreign body.
- CT scan (in relevant cases)
- USG B-scan (done in relevant cases)

Treatment

All the patients were admitted and treated as an emergency. In those cases where the wound of entry was small, the two lips of the wound were well apposed without any prolapse of uveal tissue and the anterior chamber was well formed, were managed conservatively. For large leaking wounds, primary repair was undertaken. In cases of traumatic cataract, the cataract extraction was done. Cases that involved the posterior segment, endophthalmitis and vitreous haemorrhage were referred to a vitreo-retinal surgeon for further management. For

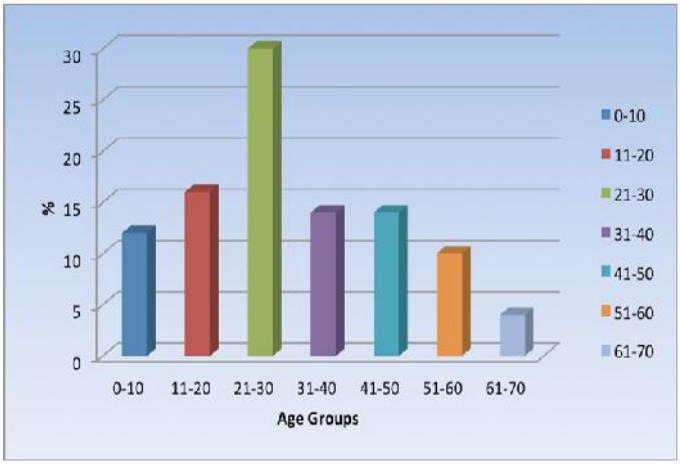
large irrepairable wounds extending to zone 3 and expulsion of intraocular contents, evisceration was done. All cases were followed up for 1 year.

RESULTS

1) Age Incidence

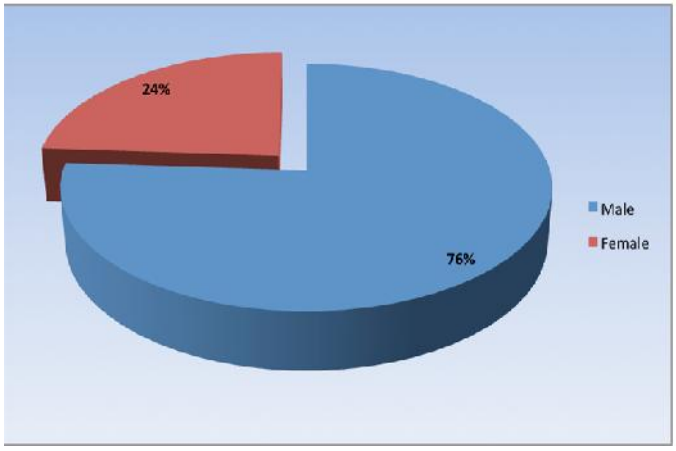
Table 1. Age Incidence

Age Group in years	No. of Cases	Percentage
0-10	6	12
11-20	8	16
21-30	15	30
31-40	7	14
41-50	7	14
51-60	5	10
61-70	2	4
Total	50	100%



Graph 1. Age Incidence

In the present study, the highest incidence of open globe injury was noted in the 3rd decade of life (30%) followed by 2nd decade (16%). The median age of open globe injury here is 29 years. This can be attributed to the fact that they are more active and vulnerable to trauma in this age group. Also note, this can impose an enduring burden through out the most productive years of their life.



Graph 2. Sex distribution

2) Sex Distribution

Table 2. Sex Distribution

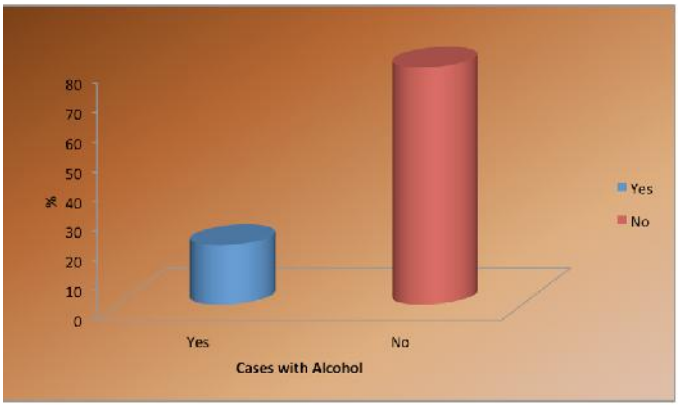
Sex	No. of cases	Percentage	Median age
Male	38	76%	28 years
Female	12	24%	32.5 years
Total	50	100%	

- Males account for 76% of patients who came with open globe injury.
- The male: female ratio is 3.16:1

3) History of Alcohol at the time of injury

Table 3. Alcohol

Alcohol	No. of Cases	Percentage
Yes	10	20
No	40	80
Total	50	100%



Graph 3. History of alcohol at the time of injury

- 20% of cases with open globe injury were under the influence of alcohol at the time of injury.
- 100% cases of all assault related ocular injuries were under influence of alcohol.
- Various activities causing injury when under the influence of alcohol were assault in 40% cases, RTA / drunken driving in 20% cases and 40% while at work.

Table 3A. Activity under alcohol

Activity	No. of Cases	Percentage %
Assault	4	40
RTA	2	20
At work	4	40
Total	10	100%

Table 3B. Type of Injury under alcohol

Type	No. of Cases	Percentage %
A	5	50
B	5	50
C	0	0

Inference: The commonest type of injury under alcohol influence is either globe rupture or penetrating type with equal

distribution. This shows an increase in incidence of globe rupture in patients under alchol (50%) than those who were not (36%).

Table 3C. Percentage of all injuries under alcohol

Type	Cases with alcohol	Total No. of Cases	Percentage
A	5	18	27
B	5	26	19
C	0	6	0

27% of all globe ruptures and 19% of all penetrating injuries occurred under the influence of alcohol.

Table 3D. Zone under alcohol

Zone	Cases with alcohol	Total No. of Cases	Percentage
I	4	31	12.9
II	2	14	14.2
III	4	5	80

Inference : 80% of all zone 3 injuries were under the influence of alcohol.

Table 3E. Grade under alcohol

Grade	Cases with alcohol	Total No. Of Cases	Percentage
1	0	0	0
2	0	4	0
3	2	5	40%
4	3	32	9.3%
5	5	9	55.5%

Inference : 55% of all grade 5 injuries occurred under the influence of alcohol.

DISCUSSION

1) Age Incidence

In the present study the highest incidence of open globe injury was noted in the 3rd decade of life (30%) followed by 2nd decade (16%). Children less than 20 years accounted for 28% of all cases. The median age for open globe injury here is 29 years. This can be attributed to the fact that they are more active and vulnerable to trauma in this age group. Also note, this can impose an enduring burden throughout the most productive years of their life.

2) Sex Distribution

In the present study, results of distribution of injuries according to sex were as follows:

a) In the present study Males accounted for 76% of patients who came with open globe injuries.
b) In the Present study, male : female ratio is 3.16:1
c) In the present study, 100% cases of assault related injuries occurred in men and all of them were under the influence of alcohol at the time of injury.

Other studies

- Among the injuries caused by assault, 80.5% were males and 18.6% were females. (Caroline J Macewen1989)
- 83% of victims of assault are males. (MacEwen 1999)

The present study correlates well with this study.

3) Relation with alcohol

- 20% of cases with open globe injury were under the influence of alcohol at the time of injury.
- 100% cases of all open globe injuries due to assault were under influence of alcohol.
- The commonest type of injury under alcohol influence is either globe rupture 50% or penetrating type 50% with equal distribution as opposed to 36% globe ruptures in other cases.
- 27% of all globe ruptures and 19% of all penetrating injuries occurred under the influence of alcohol.
- 80% of all zone 3 injuries and 55% of all Grade-5 injuries were under the influence of alcohol.

Other studies

- Alcohol usage is seen in 48.30% of assault related ocular injuries and these injuries tend to involve posterior segment in 70% of cases. (MacEwen 1999)
- 13.5% of cases were under the influence of alcohol.[4] Also states that alcohol free environment at work reduces the risk of severe OGI. (Usha Vasu and Andrew Vasnaik 2001)
- A history of alcohol consumption at the time of injury was specifically elicited. (Usha Vasu and Andrew Vasnaik 2001)
- There is an urgent need to step up the safety precautions to prevent such disabling eye injuries including periodic testing for alcohol. (Usha Vasu and Andrew Vasnaik 2001)
- Most of the cases of ocular injury were under the influence of alcohol. (Albert, Jakobic 2000)

  The present study correlates well with the other studies which also emphasises the role of alcohol as a factor in causing severe OGI.

Preventive strategies

- Create awareness among public about the seriousness of ocular injuries, its preventive measures, need for prompt treatment and involvement of social workers.
- Prevention of alcohol abuse, drunken driving and stricter laws should be implemented.
- Selection of trained workers with adequate vision and alertness, periodic testing for alcohol and finally making the use of eye protection mandatory are some of the steps that can be taken. (Usha Vasu and Andrew Vasnaik 2001)
- If injury does occur, prompt treatment to be approached as an emergency, early arrival at hospital, applying eye shield or any available rigid object like even a tea cup in order to prevent any pressure on the already injured eye goes a long way in preventing further damage to the injured eye.

Conclusion

Alcohol appears to play an important role in open globe injury as all cases of assault related eye injuries occurred under the

influence of alcohol. Also more severe injuries i.e., 80% had zone III injuries, 50% suffered globe ruptures and 50% injuries necessitating evisceration occurred under the influence of alcohol. Risk behavior combined with alcohol consumption therefore seems to be an independent factor for the incidence of open-globe eye injuries. There is an urgent need to step up the safety precautions to prevent such disabling eye injuries including periodic testing for alcohol.

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