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Original Article

Visual Outcome of Open Globe Injuries in Paediatric Patients

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Abstract

Background: To determine visual outcome of open globe injuries in children.

Methods: In this descriptive study children, between 4-16 years (n=80), who had open globe injury and who presented within one week of injury, were included . All patients underwent surgical repair surgery. Corrected post-operative visual acuity at 4 weeks was recorded. Effect modifiers like age, gender, mechanism of injury and time delay in presentation was controlled by stratification. For post stratification chi square was applied. p-value of ≤ 0.05 accepted as statistically significant.

Results: Visual improvement was observed in 70% (n=56) of patients as per operational definition, which was significantly higher in patients who presented before 24 hours (p<0.05). No other significant association was found.

Conclusions: Open globe injuries require emergency surgery as a standard of care. Visual improvement was observed in 70% in this study which was significantly associated with earlier presentation (<24 hours).

Key Words: Open globe injury, Visual outcome, Visual acuity.

Introduction

Ocular trauma is a significant, preventable, worldwide public health problem, accounting almost 8-14% of total injuries suffered by children.[1,2] Approximately 1.6 million people are blind owing to ocular trauma and 2.3 million are bilaterally visually impaired.[1] It has considerable impact on the patient's future worth of life and patients are exposed to a major risk of amblyopia caused by prolonged period of light and formed visual deprivation. About two-thirds of those affected are males, due to their aggressive and hostile nature, predominantly children and young adults, due to their immature motor skills, curious and exploratory nature. [3,4]

Ocular injury occurs in three forms: open globe, closed globe and chemical injuries.[1] Patients with open globe injuries have a rupture or a laceration, with the latter being either a penetrating or perforating injury.[1] Open globe injuries are one of the frequent emergencies in ophthalmology and require immediate operation. They are caused by wooden sticks, including pencils, chopsticks or toothpicks, or by sharp objects like scissors or a knife. Projectile toys, air guns and syringes cause serious permanent ocular damage. These injuries yield the worst visual outcome due to retinal detachment, cataract and postoperative inflammation, infectious endophthalmitis or scarring.[1,2,5-8] Delayed medical and surgical intervention in such trauma cases often leads to poor visual outcome[9,10,11]. They lead to development of a corneal opacity which is a significant cause of blindness the world over, more in developing countries.[5] Most of these patients are young males, who are active members of the society and need a better visual status in order to earn their livelihood or to pursue their professional educational demands.[12] By identifying any underlying factors in the etiology of serious injuries; it may be possible to devise effectual methods for reducing the incidence of visually damaging trauma.[13-15] Previous studies have measured the visual outcome of open globe injuries.[1,2,4] According to these studies visual prognosis of open globe injuries in children is worse than adults due to severe nature of injuries, amblyopia and infectious endophthalmitis due to delayed presentation.[1,2,4]

Patients and Methods

In this descriptive study, performed from January 2016 to December 2016, a total of eighty patients ,of either gender aged between 4-16 years who had open globe injury, who presented within one week of injury, were included. Patients having posterior segment trauma of retina or optic nerve, chemical injuries and patients with phthisis bulbi were excluded. Every patient underwent complete ophthalmic examination including visual acuity by Snellen chart, pupil, intraocular pressure by Perkins tonometer and extraocular movements. Detailed examination of

anterior segment by standard and handheld slit lamp where needed and posterior segment by indirect ophthalmoscope was done. If posterior segment was not visible, B-scan ultrasonography was done to rule out any posterior segment pathology. Every patient underwent corneal/scleral tear repair surgery under general anaesthesia. Corneal lacerations was repaired with 10/0 nylon suture and scleral lacerations with 6/0 vicryl. In case of vitreous /uveal tissue prolapse, reposition of uveal tissue along with vitrectomy was done. Post-operative topical treatment was started after 24 hours which included topical dexamethasone 0.1% suspension (1 drop after every 1 hour), moxifloxacin eye drops (one drop after every 2 hours), 1% cyclopentolate eye drops (one drop after every 8 hours) in every patient to control confounding factors like infection, intraocular pressure and uveitis. Treatment was continued for 4 weeks and steroids were tapered off accordingly. Main outcome measure was final visual improvement. Corrected post-operative visual acuity at 4 weeks was recorded by Snellen chart and visual improvement was entered. Chi square was applied and *p*-value of ≤ 0.05 accepted as statistically significant.

Results

Penetrating injury was commonest (Table 1).Out of total eighty (n=80) patients, 75% (n=60) were males with mean age 10.5 years ± 3.3 SD and 25% (n=20) were females with mean age 8.6 years ± 3.3 SD (Table 2).

Table 1: Mechanism of injury in study population

Mechanism of Injury	No	Percentage
Penetrating	66	82.5
Perforating	2	2.5
Blunt trauma(globe rupture)	7	8.8
Penetrating with intra-ocular foreign body	5	6.3

Table 2: Time Delay in injury to presentation in study population

Time delay (Hours)	No	Percentage
< 24	56	70.0
> 24	24	30.0

Baseline visual acuity was 6/60 in 75 (93.8%) patients and 6.2% (n=5) with no light perception or who didn't cooperate (Table 3). Post treatment VA was found to be 6/9 or better in 17.5% (n=14) patients, 6/12 to 6/36 (useful) in 52.5% (n=42) patients and 6/60 or worse in 30% (n=24) patients (Table 3). In the overall study population visual improvement was observed in 70% (n=56) (Table 4).

Table 3: Baseline (presenting) visual acuity in study population

Presenting VA	No	Percentage
6/60 or Worse (HM/PL)	75	93.8
NLP* or did not cooperate	5	6.3

*NLP=No light perception

Table 4 : Post treatment visual acuity

Post treatment VA	No	Percentage
6/9 or Better	14	17.5
6/12 to 6/36 or useful	42	52.5
6/60 or worse	24	30.0

Table 5 : Overall post treatment visual improvement

Visual improvement	No	Percentage
Present	56	70.0
Absent	24	30.0

Discussion

Whenever there is suspicion or definite evidence of globe rupture or laceration, immediate ophthalmic consultation is indicated, with prompt transfer to another hospital if ophthalmology consultation is not readily available. Rapid primary closure of an open globe injury by an ophthalmologist promotes the best visual outcome for the patient.[16,17] Many factors determine optimal timing for surgical repair. In general, closure within 24 hours of injury is ideal.[18,19] Kadappu S, et al found parameters which indicated a poor visual outcome including globe ruptures, zone 3 injuries, poor initial visual acuity, wound length >10 mm and lens trauma. [20,21] Al-Mahdi HS, et al in cases of serious ocular trauma ,found that initial visual acuity was more than 6/60 in 37.3% of patients with open globe injury. Final visual acuity was more than 6/18 in 63% patients.[22] They concluded that most eye injuries in children are preventable so this reflects the importance of health education, adult supervision and application of appropriate measures that is necessary for reducing the incidence and severity of trauma.

Yalcin Tök O, et al found that penetrating injury was the most common type of injury. [23] In a univariate analysis, the factors contributing to a final VA worse than 20/200 included being older than 50 years, injury in zone 2 or 3, blunt injury, rupture-type injury, poor initial VA, and the presence of endophthalmitis, retinal detachment, relative afferent papillary defect, hyphema, vitreous prolapse, and uveal prolapse. In a

multiple logistic regression analysis in which all factors that may influence final VA were analyzed together, poor initial VA, retinal detachment, and vitreous prolapse were found to be statistically significant. They concluded that the most important factors influencing final VA were initial VA, retinal detachment, and vitreous prolapse, all of which are important with regard to informing the patient of the prognosis and determining the approach of treating physician.

Agrawal R, et al, found in patients with open globe injury,that 15.7% eyes had no light perception (NLP). After surgical repair, final visual acuity remained NLP in 66.7% eyes. Final vision improved to Light perception/ Hand movement (LP/HM) in 7.4% eyes, 1/200 to 11.1% in 3 eyes and 20/50-20/200(14.8%) in 4 eyes. They concluded that presence of afferent papillary defect, wound extending posterior to rectus insertion and associated vitreoretinal trauma can adversely affect the outcome in severely traumatized eyes with NLP. Timely intervention may restore useful vision in severely traumatized eyes. [24]

In a study by Ojabo CO et al, of open globe injuries in children, 30.0% presented within the first 24 hours of the injury and 25.6% were blind on presentation.[25] Visual acuity at last follow up indicated that 39.7% patients were visually impaired and 39.7% were blind. In a study by Onyekonwu GC, blunt ocular injury constituted 79.4% cases whereas penetrating injury were 14.7% cases. Visual prognosis was poorer in penetrating injuries than in mild blunt injuries. [26]

Conclusion

1.Visual improvement was observed in 70% in this study which was significantly associated with early presentation (<24 hours).

2.Open globe injuries require emergency surgery as a standard of care.

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