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Research Article

TO STUDY CAUSES AND VISUAL OUTCOMES IN PATIENTS WITH PENETRATING OCULAR INJURIES

Neha Satish Saswade[1]., Akashkumar[2]., Avinash B Ingole[3]., Darshana B Rathod[4]., Bhagyashree Meshram[5] and Sujit M. Murade[6]

[1]Fellow in Pediatric Ophthalmology at Narayana Nethralaya, Banglore
[2]Fellow in Medical Retina at Shroff Eye Center, New Delhi
[3]Department, TNMC, Mumbai
[4]Head of Unit, TNMC, Mumbai
[5]Fellow in Vitreo-Retina at LVPEI, Hyderabad
[6]LTMMC, Mumbai

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ABSTRACT

Aims and objectives

1. To study causes of penetrating ocular injuries.
2. To study demographic profile of patients presenting with penetrating ocular injuries.
3. To study type of clinical presentations of penetrating ocular injuries..
4. To study visual outcomes and prognostic factors affecting visual outcomes in penetrating ocular injuries.

Method: Study included30 Patients. A detailed history was taken regarding preliminary data like age, sex, occupation time of injury, object causing injury, cause of injury. Examination included preoperative and postoperative best corrected visual acuity, slit lamp examination, intraocular pressure if possible dilated fundus with direct or indirect ophthalmoscope.X-ray orbit was done for all patients and wherever indicated CT scan of orbit was done to rule out any intraocular foreign body.

Result: Majority of the patients were in the age group 20-29 years. Mean age of presentation was 25.57 years. Majority of the study participants were Males (86.3%).33.3% were children followed by 23.3% farmers and 16.7% carpenters. No safety measures were employed by any of the patients. Most common cause of ocular injury was occupational trauma followed by sport related trauma. Most of the patients presented within 24 hours of injury. According to the site of wound, cornea (60%) was the most commonly involved site followed by limbus (16.7%) and sclera (10%). Most of the wound (70%) were of size 5 mm or less. The most common object causing injury was metallic (36.7%) followed by stone (26.7%) and wooden object(16.7%).Iris tissue prolapse, traumatic cataract and hyphema were the most common finding associated with penetrating ocular injuries.73.3 % of patients had visual acuity < 6/60 and 3 % had vision 6/18 or better at presentation .In our study 40% cases underwent corneal tear repair, 10% underwent limbal tear repair, 6.7% underwent scleral tear repair, 6.7% underwent corneo-scleral tear repair. Remaining 11 out of 30 (36.6%) required additional surgery. Corneal opacity was the most common complication at the end of 3 months followed by aphakia, macular edema. The visual outcome in our study appears to be related to size of wound location of wound and Interval between occurrence of injury and surgery.Visual outcome was not to be related to Visual acuity at presentation.

Conclusion: Visual impairment due to penetrating Ocular injuries may be prevented by early detection of cause and Early treatment.

INTRODUCTION

Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world [1]. It leads to psychological, economical and professional crippling of the patient. WHO Programme for the Prevention of Blindness, states that annually 55 million eye injuries causes restriction of daily activities [2]. The demographic pattern (age/gender/ occupation) of ocular injuries depends upon the cause of injury and environment. The general pattern is a curve with two peaks: One in the age group 5-25 years and another in people above 70 years. Ratio of male to female is 4:1.Ocular trauma is second most common cause of vision loss in paediatric population. Injuries occur while playing mostly. The approach to a case of paediatric ocular injury is different from that of an adult. The visual system is often immature, thus necessitating effort to restore visual development[3]. The Birmingham Eye

Corresponding author:* **Neha Satish Saswade
Fellow in Pediatric Ophthalmology at Narayana Nethralaya, Banglore

Trauma Terminology system has standardised the ocular trauma classification and given definitions of each type of injury. According to The Birmingham Eye Trauma Terminology system, penetrating injury is included in open globe injury with laceration[4]. Ocular Trauma Score (OTS) is based on BETTS classification. It helps clinicians to estimate the visual prognosis of an eye injury. It is particularly helpful while counselling to patients and their family members about what to expect. The cornea and sclera are the anterior most part of the eyeball. So are the most commonly involved structures in the ocular trauma. The injury can be in the form of small corneal epithelial abrasion, conjunctival tear to penetrating laceration. The most frequent long-term complications were corneal leucomatous opacity and anterior synechiae formation in these patients[5]. The leucomatous opacity is one of the significant cause of ocular morbidity in corneal lacerations especially when it involves the visual axis. Prompt diagnosis and early management is required to prevent these complication.

MATERIAL AND METHOD

This was an observational study on Patients attending Ophthalmology Out Patients Department in Tertiary Care Hospital willing to give written informed consent after approval from Institutional Review Board from November 2017 to August 2019.30 eyes of 30 patients diagnosed with penetrating ocular injuries to our centre. Patients above18 years willing to give written informed consent, Patients between 5-18 years of age group consent is given by Parents. Examination included preoperative and postoperative Best Corrected Visual Acuity measurement by Snellen's chart for distant vision, Jaeger's chart for near vision, Anterior segment examination by Slit Lamp. Intraocular Pressure by Goldmann Applanation Tonometer, Dilated fundus examination by Indirect Ophthalmoscope using 20 D lens. Dilated fundus examination done by using tropico plus eye drops instilled every 5 minutes for three times. X-ray orbit was done for all patients and wherever indicated CT scan of orbit was done to rule out any intraocular foreign body.

RESULTS

In our study the mean age of presentation was 25.57 years, the youngest patient was 5 years and oldest was 62 years. Most of the patients were in the age group 20-29 years (26.7%).86.6%[26 Patients] of all the patients were males, while only 13.33%[4 Patients] were females in which 33.3% were children followed by Farmers (23.3%) and carpenters (16.7%).Out of 30 cases,15 are associated with work (occupational) related trauma (50%) ,8 are associated with sport related injury (26.7%) and 7 are other causes e.g. Fall on floor(23.3%),In which trauma mainly occur due to metallic objects in 11(36.7%) patients , 8(26.7%) were due to stone, 5 (16.7%) were due to wooden objects and 4 (13.3%) were due to plastic object. Out of 30 cases, 25 patients presented within 24 hours of injury (83.3%), 2 patients presented between 24-48 hours (6.7%) and 3 patients presented after 48 hours(10%) in which wound most commonly involves cornea (60%) followed by limbus (16.7%) and sclera(10%).70 % wounds were less than 5mm and 30 % were more than 5 mm. 15 (50 %) patients presented with iris tissue prolapse, 10(33.3 %) with traumatic cataract while 6(20%) with hyphema. Preoperative vision in 20 patients (70%) had BCVA <6/60,7 patents (23.3%) had BCVA 6/60-6/24 and 3(3.3%) had BCVA 6/18 – 6/6.Out of 21 patients, 20 (95.2%) with wound size less than 5mm had good visual outcome compared to patients with wound size more than 5 mm. On post-operative day 90, BCVA of 18 patients with wound size less than 5 mm was as follows: 11 (61.1%) cases had BCVA 6/18 – 6/6,4 (22.2%) cases had BCVA 6/60 – 6/24 and 3 (16.7%) cases had BCVA less than 6/60.Among the 12 patients with wound size more than 5 mm, 7(58.3%) cases had BCVA less than 6/60, 2 cases (16.7%) had BCVA 6/60 – 6/24 and 3 cases had BCVA 6/18 – 6/6. 3 Patients lost to follow up at 6 months.18 patients had wound size less than 5 mm, Among them, 11cases had BCVA 6/18 – 6/6, 4 cases had BCVA 6/60 – 6/24 and 3 cases had BCVA less than 6/60.Out of 9 patients with wound size more than 5 mm, 6 cases had BCVA less than 6/60, 2 cases had BCVA 6/60 – 6/24 and 1 case had BCVA 6/18 – 6/6.Post-operative day 90, 54.2% cases [Corneal, limbal and combined corneal and limbal tear] had BCVA between 6/18 -6/6, 66.7% [corneal ,limbal and scleral tear] had BCVA between 6/60 – 6/24 and 66.7% [scleral tear only] had BCVA <6/60. In our study, at 6 months post-operative,12 cases of[Corneal, limbal and combined corneal and limbal tear] had BCVA between 6/18 - 6/6, 1cases[corneal, limbal and scleral tear] had BCVA between 6/60 – 6/24 and 2 cases of[scleral tear only] had BCVA<6/60. 25 out of 30 (83.3%) patients presented within 24 hours of injury. Out of these 25 patients, 12 patients (48%) had BCVA 6/18 – 6/6,6 patients (24%) had BCVA 6/60 – 6/24 and 7 patients (28%) had BCVA < 6/60.2 out of 30 (6.7%) patients presented between 24-48 hours. Out of these 2 patients, 1 patient (50%) had BCVA 6/18 -6/6 and 1 patient (50%) had BCVA < 6/60,3 out of 30 (10%) patients presented after 48 hours.Out of these 3 patients, 1 patient (33.3%) had BCVA 6/18 – 6/6 and 2 patients (66.7%) had BCVA <6/60. 3 patients lost to follow up at 6 months.13 patients had BCVA 6/18 – 6/6, Among them 10 presented within 24 hours of injury,1 presented within 24-48 hours and 2 presented more than 48 hours after injury.5 patients had BCVA 6/60 – 6/24,All of them were presented within 24-48 hours of injury.9 patients had BCVA less than 6/60.Out of them 8 were presented less than 24 hours of injury.1 presented after 48 hours of injury. In our study, visual acuity at presentation was < 6/60 in 73.3 % cases (22 out of 30) ,6/60-6/24 in 23.3 % cases (7 out of 30) and 6/18 – 6/6 in 3.3 % cases (1 out of 30) .Visual acuity at post-operative day 90 was 6/18 – 6/6 in 46.7 % cases (14 out of 30), 6/60 – 6/24 in 20 % cases (6 out of 30) and < 6/60 in 33.3 % cases (10 out of 30).3 patients lost to follow up at 6 months. Out of remaining 27 patients, 13 (43.3%) had VA 6/18-6/6, 5 (16.7%) had VA 6/60-6/24, 9(13%) had VA <6/60. On post-operative day 1 following complications were seen – 9 patients had iritis, 2 patients had raised intraocular pressure, 3 developed pupillary membrane, 1 had vitritis and 1 had hypopyon. On post-operative day 7 , 4 patients had iritis, 3 had loose sutures,1 had viritis and 1 had endophthalmitis. At the end of 1 month,out of 30 Patients, 9 patients had complications. 6 patients were surgically aphakic, 1 had corneal infiltrate, 1 had vitritis and 1 had endophthalmitis. At the end of 3 months, 1 patients was surgically aphakic, 3 patient had developed corneal opacity, 1 had CME, 1 had vitritis, 1 had endophthalmitis and 1 patient had developed corneal staining. Out of 30 patients – 12 (40%) had undergone corneal tear repair, 3 (10%) had undergone limbal tear repair, 2 (6.7%) had undergone scleral tear repair, 2 (6.7%) had undergone corneo-scleral tear repair. Remaining 11 out of 30 (36.6%) had undergone additional surgery. At the time of primary tear repair, 11 patients underwent additional surgery. Out of them, 3 underwent cataract extraction with

rigid IOL implantation, 1 underwent cataract extraction and corneal foreign body removal with rigid IOL implantation and 4 underwent cataract extraction without IOL implantation due to capsular bag complications.1 previously pseudophakic patient underwent IOL explantation, anterior vitrectomyandlimbal tear repair.1 patient underwent PPV, silicone oil insertion and IOFB removal along with scleral tear repair.1 patient underwent primary wound exploration and canalicular tear repair.Out of 30 patients , 8 underwent surgery at a later date.Among them 4 patients underwent secondary IOL implantation, 1 underwent cataract extraction with rigid IOL implantation, 1 underwent intravitreal injection of antibiotics and 1 underwent pars planavitrectomy with IOFB removal .1 patient underwent cataract extraction .Post-operatively he developed corneal infiltrate which failed to respond to topical fortified antibiotics and was treated by therapeutic penetrating keratoplasty.

DISCUSSION

Ocular trauma is one of the leading cause of ocular morbidity in young adult and children. Successful surgical repair of open globe injury and subsequent visual rehabilitation is of great importance. One of the important component in management of open globe injury is counselling of the trauma victim and his family. Ocular trauma score suggested by Kuhn et al [6] is the current system used to predict the visual outcome in patients with ocular injuries.In our study most of the patients belonged to age group 20 – 29 years, the mean age being 25.57 years.Several studies [7, 8] had shown variability in age group due to the inter-population differences in socioeconomic status, lifestyle, culture, occupation. We found that the incidence of penetrating ocular injury in males was 86.6 %, when compared to females it was 13.33%. In our study, male preponderance was seen as they were mainly involved in outdoor activities, high-risk behaviour and were working in an accident prone industries. This is similar to studies done by Falcao et al [7], Smith et al [9]and Mohammed et al [8].50% cases had work related trauma while 26.7 % cases had sport related injuries. We found out that ocular trauma commonly associated with occupational injuries, which agrees with studies conducted by Azusa et al [10], Paramananda et al [11] and Poonam et al. While a study done by Shukla et al[18], reported non occupational injuries were more common i.e. 71% .In our study, none of the patient had used safety measures. The National Eye Trauma System Registry showed that use of safety measures can prevent occupational trauma [19].Most of the patients presented within 24 hours of injury. Out of them 48% cases had visual acuity between 6/18 – 6/6. The present study shown that there is a significant association between time of presentation and final best corrected visual acuity. A study done by Rupesh et al stated that delaying the time of surgery willdeterioratefinal visual acuityby 1.001 times [12]. In our study, 54.2% cases of zone 1 injury had visual acuity between 6/16 – 6/6 and 66.7 % cases of zone 3 had visual acuity less than 6/60. According to our study best corrected visual acuity is better in zone 1 injuries as compared to zone 3 injuries. The studies done at Korea[13] and Nigeria [10] had shown similar results.Most of the cases of our study with wound size less than 5 mm had shown improvement in visual acuity. So best corrected visual acuity is strongly related to size of wound as per chi square test (0.008).Williams et al [14] in their study revealed poor visual outcome in cases with wound size 4mm or more.Out of 30, 73.3% cases had visual acuity less than 6/60 at the time of presentation. While best corrected visual acuity of 43.3% cases was improved to 6/18 – 6/6.Our study found that despite poor visual acuity at presentation the final visual outcome can be better if the causative factors such as hyphema, traumatic cataract are treated surgically. Similar result was found in Agrawal et al[12] study which stated that the initial visual acuity was not the statistically significant preoperative variable in predicting final visual outcome.In our study, most common associated finding with corneal / limbal /scleral tear is iris tissue prolapse followed by traumatic cataract and hyphema. A study by Rosen et al[15] showed that deformity of iris, lens damage, ocular hypotonia, vitreous loss and retinal detachment are prognostic indicators associated with final vision outcome.Along with primary tear repair, 11 patients of our study underwent additional surgeries such as cataract extraction with or without intraocular lens implantation, anterior vitrectomy, pars planavitrectomy and silicone oil insertion.While 8 patients underwent secondary intraocular lens implantation, intravitreal injection of antibiotics and vitrectomy at later date. Studies by Reinecke et al, Havener et al and Duke et al [16,17] opined to operate cataract at later stage after primary repair of penetrating wound.

CONCLUSION

In conclusion, Study illustrated prognostic factors of visual acuity in cases of penetrating ocular injury. We have found the significant association between best corrected visual acuity with size of wound, location of wound and time interval between occurrence of injury and surgery. Identification of the risk factors might aid in better development and implementation of preventive measurements. Population at high risk should be identified and appropriate preventive measures should be applied

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