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ASSESSMENT OF VISUAL OUTCOME-EXPERIENCED IN TERIARY CARE HOSPITAL OF BANGALORE CITY

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ABSTRACT

Prospective study of fifty consecutive cases of open globe ocular injuries presenting to Minto Ophthalmic Hospital, Bangalore, between October 2009 and August 2011.The aims to assess the visual outcome of these cases and to analyze the factors influencing the outcome. All the open globe injury cases included in the study underwent a detailed clinical evaluation and were classified according to the International Society of Ocular Trauma classification. A primary surgical repair was performed in all patients at the earliest possible. The final visual outcome was recorded as the best corrected Snellen's visual acuity, six weeks after the primary surgery.We found that fifty-four percent of our patients had a visual acuity <3/60 at the end of six weeks follow-up. Traumatic cataract and posterior segment pathology were the main causes of poor vision. A poor presenting visual acuity, blunt mechanism of injury, posterior location of the wound and the presence of a relative afferent pupillary defect (RAPD) were associated with a poor visual outcome.

KEYWORDS: RAPD, NLP, SAS, Visual Acuity, ISOT

INTRODUCTION

Ocular trauma is a major cause of monocular blindness worldwide. In the United States of America, the lifetime prevalence and the five-year incidence of ocular trauma was found to be as high as 19.8% and 1.6% respectively[1]. The Andhra Pradesh Eye Disease Study found the overall prevalence of eye injury in a rural south Indian population to be 7.5%. It also determined the prevalence of unilateral blindness due to trauma to be 0.6%.[2] most ocular injuries represent a potentially preventable cause of visual impairment. They occur chiefly in the young, economically productive age group of a population and carry profound physical, mental, economic and social repercussions. Open globe injuries with a full-thickness wound of the eyewall, generally carry a worse prognosis. The management strategy of open globe injuries usually consists of a primary surgical intervention to restore the structural integrity of the globe, irrespective of the presenting visual acuity or the extent of damage to the ocular structures. Various secondary interventions can be undertaken at a later date, as appropriate (for example, management of traumatic cataract or retinal detachment, intraocular foreign body removal or enucleation etc).The long term prognosis of open globe injuries vary widely, with final visual outcomes ranging from 20/20 to No Light Perception (NLP). Piermaci et al, in their study, found only a few variables which reliably predicted the long term visual acuity of the injured eye and were also easy to determine during the patient's initial examination or surgery.[3] These included the presenting visual acuity, type of injury, zone of injury and the presence of a relative afferent pupillary defect. Our study aimed to identify the clinical characteristics and the outcome, after surgical repair, of a series of open-globe injury cases presenting to our institution. The study also aimed to analyze and discuss the factors affecting the outcome of such injuries.

MATERIALS AND METHODS

The retrospective and prospective study was conducted at tertiary care Minto eye hospital, Bangalore Medical College and Research Institute. Suspected Patients are Prospectively recruited with written consent for the period of one year, 50 patients male and female were considered for post and preoperative follow up. For each follow up data were recorded systematically with greater accuracy and lesser error. Injury and complication profile were considered for the tool to testing hypothesis. Collected data was analyzed by using SAS-10.50 version Univaraiate analysis was employed to draw the significant inference.

RESULTS

A total of 50 eyes of 50 patients with open globe injuries were included in our study. 36 patients (72%) were males and 14 patients (28%) were females (M: F = 2.57:1)The average age of the participants was 24.48 years (median of 24 years, ranging from 4 years to 61 years).Most of the injuries were seen in the age group of 0-10 years (24%), followed by the age groups of 21-30 years (22%) and 31-40 years (22%). 66% percent of the injuries occurred in patients less than 30 years of age.

Object Causing Injury

Injury with a wooden stick (30%) was found to be the commonest mode of injury in our study. This was followed by injury with metal piece (10%), stone piece (10%). Glass (8%), plastic (6%) and metal rod (4%). Some of the blunt injuries leading to a globe rupture were caused by a fist injury (n=1), injury with a plastic ruler (n=1) and a fall onto the pavement from a bike (n=1).

Location of the Injury

Out of the 50 patients in our study, 22 sustained injuries at home, 15 at the workplace (industry or agriculture), 5 at the playground, 4 at the school, 3 in a road traffic accident and 1 at a market place. Out of the 22 patients who sustained an injury at home, 45.5% were of age less than 20 years. Of the 15 patients who sustained injuries at the workplace, 86.7% were of the age group of 20-40 years.

Eye Involved

The right eye was involved in 24 patients (48%) and the left eye in 26 patients (52%). None of the patients had bilateral open globe injuries.

Ocular Examination Findings

The initial visual acuity, the type of injury, the zone of injury and the presence of a RAPD was noted in very patient and classified according to the ISOT classification of open-globe injuries.

Table 1: Frequency Table for Grade of Injury, Type of Injury, Zone of Injury and Presence of a RAPD

Grade			Type			Zone			RAPD		
	No.	%		No.	%		No.	%		No.	%
1	1	2	**A**	5	10	**I**	27	54	positive	9	18
2	5	10	**B**	39	78	**II**	20	40	negative	35	70
3	14	28	**C**	6	12	**III**	3	6	not checked	6	12
4	28	56	**D**	-	-						
5	2	4	**E**	-	-						

Initial Visual Acuity

The initial visual acuity was classified into five grades according to ISOT classification of open globe injuries.Grade 4 injuries were the maximum (56%) followed by grade 3 injuries (28%). Only 1 (2%) patient had presenting visual acuity of grade 1. A grade 5 visual acuity of No Perception of Light was found in 2 (4%) patients. Penetrating injuries (Type B) were most frequent in our study (78%). Injuries with retained IOFBs (Type C) constituted 12% of the injuries in our series, while blunt injuries causing a globe rupture constituted 10% of the injuries. They were no perforating (Type D) or mixed (Type E) injuries in our study. Of the 6 patients with intraocular foreign bodies (Type C injury), 4 patients had anterior segment foreign bodies and 2 patients had foreign bodies in the posterior segment. Of the patients with anterior segment foreign bodies, 2 patients had intralenticular foreign bodies (stone and stick respectively), 1 patient had an intracorneal foreign body (stick) and I patient had multiple intracorneal, intracameral and intralenticular foreign bodies (rubber, stone pieces).

All the anterior segment foreign bodies were removed at the time of primary repair. Of the 2 patients with posterior segment foreign bodies, one had an iron piece impacted at the scleral wound and another had an iron piece in the vitreous cavity. The foreign body impacted at the scleral wound was removed with forceps at the time of primary repair. For the patient with the foreign body in the vitreous cavity, a pars plana vitrectomy was performed as a secondary procedure and the foreign body removed using an endomagnet.

Zone of Injury

The location of the wound was classified into three zones according to ISOT classification of open globe injuries. We found that zone I injuries (isolated to the cornea) were the commonest in our study (54%). Zone II injuries constituted 40% of the total cases while Zone III injures constituted only 6%. In this series of 50 patients with open globe injuries, 54% patients had isolated corneal tear, 32% patients had corneoscleral tears and 14% patients had isolated scleral tears.

Relative Afferent Pupillary Defect

The swinging flashlight test was not performed in 6 patients to check for the relative afferent pupillary defect (RAPD). Out of the remaining 44 patients where the RAPD was tested, 9 patients were RAPD positive and 35 patients were negative.

Hyphaema

18 of the 50 patients in our series had Hyphaema at presentation. Out of those 18 patients, 11 (61.11%) had a total Hyphaema.

Lens Damage

The lens was examined, in all patients, at presentation for signs of damage. In 11 patients with total Hyphaema and 1 patient with total corneal opacity, the evaluation of the status of the lens could not be done at presentation.

Posterior Segment

The fundus was examined clinically with an indirect opthalmoscope in all patients. In 33 patients no fundus details were visible due to media opacity like cataract and Hyphaema.3 patients had a vitreous hemorrhage and in 14 patients the fundus appeared to be within normal limits. A B-scan ultrasound examination was performed additionally in

45 patients, after the primary repair. 17 patients had a normal scan, vitreous hemorrhage was present in 16 patients, retinal detachment in 7 patients, choroidal detachment in 5 patients, posterior vitreous detachment in 7 patients, intraocular foreign body in 1 patient and vitritis in 5 patients.

Surgery Details

All patients included in the study underwent a primary surgical repair of their eyewall wound (corneal, scleral or both). Intraviteral antibiotic injection (ceftazidime 2.25mg in 0.1 ml and vancomycin 1 mg in 0.1ml) was given in 13 (26%) patients at the time of primary repair. Along with the primary wound repair, 2 patients underwent lid tear repair, 2 underwent manual SICS for traumatic cataract removal with implantation of posterior chamber intra-ocular lens (PCIOL) and 4 patients underwent removal of anterior segment IOFB. Secondary intervention was performed in 9 patients during the follow up period of 6 weeks, details of which are given in

Table 2: Secondary Procedure and Status of Patients with Complications

Secondary Procedure	No. of Patients
Manual SICS with PCIOL (for traumatic cataract)	04
3PPPV with IOFB removal using endomagnet	01
3PPPV + silicon oil insertion + scleral banding + lensectomy (for retinal detachment)	01
Trabeculectomy	01
Anterior chamber wash + intracameral foreign body removal	01
Nd: YAG laser peripheral iridectomy	01

Follow Up Data

All study participations were followed up for a period of 6 weeks. At the end of 6 weeks the visual outcome, in terms of the best corrected visual acuity, was assessed. The final visual acuity was then classified according to the WHO classification of visual impairment.[31] (Table 3)

Table 3: Final Visual Acuity 6 Weeks after Primary Repair

WHO Category	Visual Acuity	Number	Percentage
0 Mild or no visual impairment	≥ 6/18	16	32%
1 Moderate visual impairment	6/19 to 6/60	6	12%
2 Severe visual impairment	6/60 to 3/60	2	4%
3 Blindness	3/60 to 1/60	7	14%
4 Blindness	1/60 to light perception	15	30%
5 Blindness	No light perception	4	8%

At the end of 6 weeks follow up, 32 % of our patients had a final visual acuity of ≥6/18 (WHO definition of mild or no visual impairment). 16% of patients had a visual acuity between 6/19 – 3/60 (WHO definition of moderate to serve visual impairment). 52% of the patients had a final acuity of <3/60 (WHO definition of blindness)

We compared the final visual acuity with the injury characteristics of grade, type, zone and the presence of an RAPD. For this we grouped our patients into those with a final visual acuity of ≥6/18 (mild or no visual impairment) and those with a final visual acuity of <3/60 (blindness).

Table 4: Final Visual Acuity in Injury of Different Grades

Grade of Injury	Visual Acuity at 6 Weeks after Primary Surgery	
	≥ 6/18	<3/60
Grade 1 (n=1)	1 (100%)	0 (0%)
Grade 2 (n=5)	5 (100%)	0 (0%)
Grade 3 (n=14)	5 (35.7%)	4 (28.5%)
Grade 4 (n=28)	5 (17.8%)	20 (71.4%)
Grade 5 (n=2)	0 (0%)	2 (100%)

100% of grade 1 and grade 2 injuries had a final visual acuity of ≥6/18, while only 35.7% of grade 3, 17.8% of grade 4 and none of the grade 5 injury patients could achieve the same. More than 70% of grade 4 and all of grade 4 and all of grade 5 patients had a final visual acuity <3/60.

Table 5: Final Visual Acuity in Injury of Different Zones

Zones of Injury	Visual Acuity at 6 Weeks after Primary Surgery	
	≥ 6/18	<3/60
Zone I (n=27)	10 (37%)	9 (33.3%)
Zone II (n=20)	6 (30%)	14 (70%)
Zone III (n=3)	0 (0%)	3 (100%)

37.3% of zone I and 30% of zone II injuries had a final visual acuity ≥6/18. 70% of zone II and 100% of zone III injury patients had a final visual acuity <3/60.

Table 6: Final Visual Acuity in Different Types of Injury

Types of Injury	Visual Acuity at 6 Weeks	
	≥ 6/18	<3/60
Type A (n=5)	1 (20.0%)	3 (60.0%)
Type B (n=39)	13 (33.3%)	20 (51.20%)
Type C (n=6)	2 (33.3%)	2 (33.3%)
Type D (n=0)	0 (0%)	0 (0%)
Type E (n=0)	0 (0%)	0 (0%)

We found that only 20% of type A injury patients had visual acuity of ≥6/18, whereas 33.3% of both type B and type C injury patients had the same. Type A injury patients showed a poorer visual outcome with 60% of type A injuries having a final visual outcome with 60% of type A injuries having a final visual acuity <3/60.

Final Visual Outcome and RAPD

All the 9 patients with a positive RAPD had a final visual acuity <3/60, while only 11 of the 35 patients with a negative RAPD had a final visual acuity <3/60.

Causes of Poor Visual (<3/60) At 6 Weeks Follow-Up

At 6 weeks follow-up 26 patients were found to have a best corrected visual acuity of less than 3/60. We evaluated the cause of this poor visual acuity in each patient, the details of which are given in table 7

Table 7: Causes of Poor Visual Acuity at 6 Weeks Follow Up

Cause of Visual Acuity <3/60 at 6 Weeks Follow Up	Number %
Cataract	11 (42.3%)
Retinal or choroidal detachment or both	8 (30.8%)
Central leucomatous corneal scar	3 (11.5%)
Secondary glaucoma	2 (7.7%)
Opacified membrane or capsule	1 (3.8%)
Total corneal blood stain	1 (3.8%)

* Percentage may not add up to 100 due to rounding up figures

We found traumatic cataract to be the most common cause of poor vision at the end of 6 weeks of follow up. Out of 26 patients with visual acuity <3/60, in 11 the cause was the presence of a traumatic cataract. Only 4 patients with cataract at 6 weeks follow up had visual acuity ≥6/18.Posterior segment pathology (retinal or choroidal detachment or both) was found to be the second most common cause for a decreased visual acuity. All patients with a retinal or a choroidal detachment had a final visual acuity of <3/60.Out of the 18 patients with hyphaema at presentation, 2 had a final visual acuity better than 6/18 whereas 14 achieved a visual acuity less than 3/60. There were no cases of posttraumatic endophthalmitis ophthalmitis in our study.

DISCUSSIONS

The average age of the patients in our study was 24.48 years. This is similar to the mean age of 25 years in Barr's[13] study and that of 28 years in Piermaci et als'study[17]. 44% of our patients were less than 20 years of age with the frequency showing a peak in the age range of 0 to 10 years. Mukherjee et al found 44.9% of their patients to be less than 20 years.[32] This highlights that trauma is an important cause of ocular morbidity in children. Eye injuries in children carry the grave of amblyopia and also significantly impair their quality of life. Majority of the children in our study sustained their injuries at home or at school and most of these were preventable. Children are usually left unsupervised by parents or teacher while they play with dangerous objects like glass, metal, knives etc. This underscores the need to educate parents and teachers about the serious nature of ocular injuries and their adverse effects.

Males were found to be twice as commonly injured as compared to females, in our study (M: F = 2.57:1). This is similar to other studies published in Indian [15,33]and Western [13, 34] literatures where a male preponderance was found. Males are more commonly engaged in industries and other hazardous occupations, where the chances of sustaining an ocular injury are very high.

Object Causing Injury

30% of the injuries in our study were caused by a wooden object. Such injuries were mainly sustained during agricultural or domestic work. Metal injuries occurred in 14% of the patients, mainly during industrial work. Quarry workers also sustained injuries with stone (10%). 3 children were injured with the tip of a pen/pencil at school. In Mukherjee et als' study metallic injuries (33%) were commonest followed by wooden particles (23.18%), stones (14.71%) and glass (12.10%)[32].

Location of the Injury

Of the 50 patients in our study, 44% sustained injuries at home, 30% at the workplace (industry or agriculture), 10% at the playground, 8% at the school, 6% in a road traffic accident and 2% at a market place.

Hooi et al in their study found that most of the ocular injuries occurred at the workplace (41.4%).[35] They found motor vehicle accidents, domestic accidents, assault, sports and school relayed accidents accounted for the remaining cases

Eye Involved

The right eye was involved in 48% of our patients and the left eye in 52%. None of the patients had bilateral open globe injuries. Sobaci et al found in their study that the right eye was involved in 49.05% and the left eye was involved in 43.39% patients. 7.54% of their patients had bilateral involvement[14].

Initial Visual Acuity

Various studies have shown the initial visual acuity to be an important prognostic factor in determining the final visual outcome. [13, 17] we classified the initial visual acuity of our patients into five grades according to the ISOT classification. We found that more than half of our patients (56%) had grade 4 visual acuity (4/200 to perception of light). Grade 5 injuries (no light perception) were found in 4% of our patients. Only one (2%) patient had grade 1 visual acuity (≥20/40). Sobaci et al in their study found that 48.6% of their patients had grade 4 injuries and 10.9% had grade 5 injuries[14]. However, their study showed a higher number of grade 1 injuries (10%) as compared to our study. This shows that open globe injury cases usually present with a significant diminution of vision.

At the end of 6 weeks following the primary repair, none of our patients with initial visual acuities of grade 1 and grade 2 attained a vision of < 3/60 (WHO definition of blindness). On the other hand, 71.4% of grade 4 injuries and 100% of grade 5 injuries had a final visual acuity of <3/60. Similar to the findings in our study, Sobaci et al in their study, found that 70% of grade 4 injuries and 100% of grade 5 injuries had unfavorable outcome (final visual acuity less than counting fingers at 1 metre)[14]. This outcome was found in only 4% of grade 1 injuries, 33% of grade 2 injuries and 28% of grade 3 injuries. Piermaci et al also found that 95%of patients with grade 1 injury had a final visual outcome ≥20/40, while only 34% of grade 4 injuries and 0% of grade 5 injuries had a final visual acuity ≥20/40.[17]

Thus, in our study, we were able to confirm the relationship between the initial and the final visual acuity in cases of open-globe injuries. The better the initial visual acuity, the better was the final visual acuity and the poorer the initial visual acuity, the poorer was the final visual acuity.

Type of Injury

We have classified our cases of open-globe injuries into five types based on the mechanism of injury, as classified by ISOT 74% of the cases in our study were Type B (penetrating) injuries, whereas Type A (rupture) injuries constituted 14% and Type C (IOFB) injuries in our study. Sobaci et al in their study found Type C injuries to be the commonest (67.5%), followed by Type B (18%), Type D (5.7%), Type E (5.7%) and Type A (3%) injuries.[14]

We found that 60% of type A injuries and 51.2% of type B injuries had a final visual acuity <3/60. A final visual acuity of ≥6/18 was attained in 33.3% of Type B injuries and only 20% of type A injuries. These results show a general trend towards a poor visual outcome in blunt injuries as compared to injuries caused by sharp objects. This is in agreement with other studies done in the past, where a globe rupture has been found to have a worse prognosis than a penetrating injury. Sobaci et al found that none of their patients with Type injuries had a favorable outcome while 73% of type B injuries had such an outcome[14]. Agrawal et al (2011) found that blunt injuries were 2.278 times more likely to have a poor visual outcome than sharp penetrating injuries[32].

Zone of Injury

We have classified the open globe injuries in our study into three zones (based on the posterior most extent of the wound) according to the ISOT classification. Zone I injuries (isolated to cornea, including corneoscleral limbus) were the commonest (54%), followed by zone II injuries (corneoscleral limbus to a point 5 mm posterior into sclera) (40%) and zone III injuries (posterior to the anterior 5mm of sclera) (6%). This is similar to the findings of Sobaci et al where too Zone I injuries were the most common (45%), followed by Zone II (28%) and Zone III (27%) injuries.[14]

We found that 37% of zone I injuries and 30% of zone II injuries had a final visual acuity ≥6/18, whereas none of the zone III injuries could attain this final visual outcome. All the zone III injury patients had a final visual acuity of <3/60. This suggests that the more posterior the extent of the wound, the worse is the visual outcome. This relationship of the wound location with the final visual acuity attained was also shown by Sobaci et al in their study[14]. They found that 74% of their patients with zone I injuries had a favorable outcome, while only 45% of zone II and only 27% of zone III injury patients had a favorable outcome. Piermaci et al in their study found that only 4% of zone I injury eyes had undergo enucleation as compared 42% of zone III injury eyes.[17]

Relative Afferent Pupillary

The relative afferent pupillary defect, tested with a swinging flashlight test, gives a gross measurement of optic nerve and retinal function. In our study of 50 patients, the RAPD was positive in 9 patients and negative in 35. In 6 patients the RAPD was not recorded. 100% of the patients with a positive RAPD test had a final visual outcome <3/60, while only 31.4% of the patients with a negative RAPD test had a final visual outcome <3/60. These results are in agreement with the results of various other studies which have found the presence of a RAPD to be associated with a poor visual outcome. Piermaci et al found in their study that, 41% of eyes with a positive RAPD had to be enucleated while only 8% of eyes with a negative RAPD were enucleated.[17]

Presence of Lens Damage

At the initial examination, the lens was found to be cataractous in 54% of patients of our patients. In 42.3% of patients with a poor final visual acuity, cataract was found to be the cause of the poor vision. Performing a cataract surgery with IOL implantation in these patients may result in a better visual outcome, provided there are no other associated ocular pathology. Similar conclusions were drawn by Barr (1982) in his study, where he found that the absence of lens damage was one of the best predictors of a good final visual outcome.[13]

Presence of Hyphaema

We found that 77.7% of our patients with hyphaema at presentation had a final visual outcome less than 3/60. Barr in his study found that the absence of a hyphaema was one of the predictors of a good visual outcome[13]. Rao et al also found hyphaema to be statistically significant factor in predicting the final visual outcome.[15]

Posterior Segment Pathology

In our study all patients with a retinal of choroidal detachment had a final visual acuity of <3/60 at 6 weeks follows up. Only one patient had undergone a secondary surgery for retinal detachment during the 6 weeks follow up period and had attained a final visual acuity of counting fingers at 2 meters. This shows that the presence of a retinal or choroidal detachment is one of the significant predictors of a poor visual outcome.

Similar findings were seen in Barr's study where out of 14 patients with a retinal damage, 10 had a final visual acuity of 6/60 – NLP [13]. Hutton and Fuller concluded in their study that the presence of a significant rhegmatogenous or hemorrhagic detachment indicates a poor prognosis in traumatized eyes.[16]

Intraocular Foreign Bodies

Most intraocular foreign bodies are magnetic in nature [19] and are associated with striking metal against metal.[20] Minority of IOFBs constitute non-magnetic objects like glass, plastic, stone or copper. It most cases IOFB removal is necessary, although some inert substances (like glass or plastic) can be well tolerated without removal. Modern microsurgical techniques have increased the safety and efficacy of IOFB removal significantly.

Intraocular foreign bodies have been found to produce less acute eye damage than other type of injuries. This has been attributed to the fact that IOFBs are relatively small and sharp, thereby creating are relatively small entry site that may be self-sealing. Sternberg et al (1984) found that the presence of an intraocular foreign body was an important predictor of good final vision in patients older than 18 years [12]. Greven et al, (2000) in a retrospective analysis of 59 cases with retained IOFB found that a final best corrected visual acuity of 20/40 or more was obtained in 42 patients (71%) and ambulatory vision (≥5/200) was achieved in 50 patients (85%).[21] Hammering metal as the mechanism of injury was noted to be a prognostic factor a better visual outcome in their study. In a study of open-globe injuries caused by deadly weapons by Sobaci et al (1999) in Turkey, eyes with toxic intraocular foreign bodies were found to be the most common type of injuries (67.5%). A favorable outcome was found in 45% of eyes with IOFB(s) in their study.[14] Piermaci et al (2003) in their study found that amongst the type C (intraocular foreign body) injuries 53% achieved a final visual acuity of >20/40. The odds of attaining a final visual acuity of ≤20/40 was found to be just 1.3 times more in type C (IOFB) injuries as compared to type B (penetrating) injuries.[17]

In Greven et als' study the location of the foreign body was in the anterior chamber in 10% of eyes, embedded in the lens in 2%, in the vitreous in 36% and embedded in the retina/choroid in 52% of eyes.[21]

Jonas et al (2000) in a study of 130 eyes with intraocular or retrobulber foreign bodies found the type of foreign body to be metallic in 123 patients, wooden in 4 patients, glass in 2 patients and plastic in 1 patient.[22] Hutton and Fuller (1984) divided the foreign body injuries in their study by the nature of the foreign body as magnetic, nonmagnetic and BB (ball bearing) pellets. Those with BB injuries were found to have a poorer final visual acuity as compared to the other groups.[16] This was in correlation to Sternberg et als' (1984) study where too eyes with intraocular BB pellets had a significantly poor visual prognosis. [12]

Jonas et al found that patients where the foreign body was removed within the first 24 hours after accident had a significantly lower rate of endophthalmitis than patients in whom the FB was removed later than 24 hours after the trauma[22]. They also found that the type of intraocular foreign body was important in predicting the development of posttraumatic endophthalmitis. While endophthalmitis developed in 4.1% of eyes with metallic foreign bodies in their study, fifty percent of eyes with wooden IOFBs developed endophthalmitis. This emphasizes the need for removal of organic foreign bodies as early as possible.

Perforating Injuries

Perforating injuries are defined as those having two full-thickness wounds (entrance and exit) of the eyewall caused by the same agent. These injuries differ in their prognosis and management from other types of injuries.

Martin et al studied fifty-one eyes with perforating (through-and-through) injuries of the globe that were treated with vitrectomy. [23] Functional success was obtained in 63%, anatomic success was obtained in 17%, and treatment failed in 20% eyes. They found that the final visual outcome attained correlated with the state of the macula and was not predicted by preoperative visual acuity.

Sobaci et al found that Type D injuries constituted 5.7% of their 228 eyes with open globe injuries. These injuries were associated with a favorable outcome in only 23% of cases.[14] Piermaci et al found that the probability of attaining a good visual outcome was the least for Type D injuries. Type D injuries were 12 times more likely to have a final visual outcome worse than 20/40 as compared to Type A (penetrating) injuries.[17]

Mixed Injuries

Injuries which involve multiple mechanisms are classified as mixed or Type E injuries. In Sobaci et als' study13 patients had Type E injuries, out of which 12 patients had an unfavorable outcome.[14]

CONCLUSIONS

Open globe ocular injuries are a major and potentially preventable cause of visual impairment and blindness. They represent an ocular emergency which require a detailed clinical evaluation and skilled surgical and medical management.

In our study, open globe ocular injuries were found to be most common in the young male population. Majority of these injuries were sustained either at home or at the workplace.

Most patients with open-globe injuries presented with a significantly decreased visual acuity. Injuries were caused mainly by sharp objects and a corneal wound of entry was most common. Traumatic cataract and vitreous hemorrhage were found to be the most ocular associations.

At 6 weeks follow up, approximately half of our patients had a final visual acuity of less than 3/60. Cataract was attributed as the most common cause of poor vision followed by posterior segment pathology.

We also found that the initial visual had a positive correlation with a final visual acuity. The better the initial visual acuity the better was the final visual acuity and vice versa. Blunt injuries were found to have a worse outcome than sharp, penetrating injuries. Injuries with a more posterior location of the wound and those with an afferent pupillary defect were also found to have a bad prognosis.

We concluded that even though the prognosis of open globe injuries s poor in general, meticulous surgical intervention and follow up goes a long way in restoring useful vision to the patient.

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