

Visual Outcome of Corneal Laceration Repair in a Tertiary Hospital, Southwestern, Nigeria

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Abstract

Objective: This study aimed at assessing the visual outcome of patients that had corneal laceration repair with their influencing factors in order to reduce the significant consequential vision loss in the patients. **Design:** A cross sectional study. **Subjects:** All patients who had open globe injury and corneal repair procedures. **Methods:** Clinic and theatre records of all patients who had open globe injury and corneal repair procedures between January 2015 and July 2017 were retrieved. Demographic characteristics, main eye complaints, duration of symptoms, laterality, presenting visual acuity, corneal repair procedures and six weeks post operative visual acuity were obtained from the records. All patients who had open globe injury but had primary Enucleation or Evisceration were excluded from the study. Data obtained were recorded and analyzed using Statistical Package for Social Sciences (SPSS) version 25. **Results:** Forty patients had corneal repair procedure constituting 22.2% of all ophthalmic procedures. There were 30 (75.0%) males and 10(25.0%) females. At the oculoplastic clinic, majority of the patients 33 (82.5%) presented with monocular blindness (VA<3/60) while, only the dependent group of patients 5 (12.5%) presented with normal visual acuity $\geq 6/18$. There was 10% improvement in vision after corneal repair procedure. There was positive correlation between pre-operative visual acuity and post-operative visual acuity. **Conclusion:** Corneal laceration injury has a relatively high incidence with a 10% improvement in vision after corneal repair procedure. Timely presentation, prompt clinical assessment and early intervention when non-avoidable ocular injury occurs remain the key to a good functional post-operative vision.

Key words: Cornea, Globe, Injury, Outcome, Vision.

Introduction

Corneal laceration results from injury to the globe which is a significant cause of visual loss and remains a serious public health problem [1]. Open globe injury is an ophthalmologic emergency and requires definitive management by an ophthalmologist [1]. Over 90% of these open globe injuries are thought to be preventable [2]. Penetrating eye injury accounts for 3.81 injuries per 100,000 annually in USA [3] the incidence of open globe injury in adults was 3.40/100,000 in Turkey [4] while in a tertiary hospital in Nigeria, incidence of 4.50/100,000 was reported during a communal clash [5].

The standard practice of ophthalmologists worldwide in these cases is a primary surgical repair to restore the structural integrity of the globe at the earliest opportunity regardless of the extent of the injury and the presenting visual acuity [2]. The visual outcome following successful surgical repair of open globe injury is of great significance and challenging to the practicing ophthalmologists [6].

The visual outcome despite advances in ophthalmic surgery has been reported to be disappointing [7]. A primary enucleation may be considered for some of the eyes that cannot be salvaged [2]. Post-operative visual outcome is usually a reflection of the extent of damage, size, presenting visual acuity and ocular anatomical

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disruption, damage to the macular and or the optic nerve [8], time lag between injury and surgery and relative afferent pupillary defect (RAPD) [2]. The study was carried out to assess the visual outcome of patients that had corneal laceration repair with their influencing factors in order to reduce the significant consequential visual morbidity in the patients.

Material and Methods

Design: A cross sectional study was conducted in a tertiary centre which is an urban hospital with an established, strategically located tertiary eye care as the eye of the hospital. It runs subspecialty eye facility weekly in Glaucoma, Oculoplasty, Retina and General Ophthalmology.

Subjects: All patients who had open globe injury and corneal repair procedures.

Sample collection: Data was obtained from clinic and theatre records of all Ophthalmic Plastic patients from either self-referral, General Ophthalmology clinics within the centre or other centres within and outside the state who had open globe injury and corneal repair procedures between January 2015 and July 2017. Demographic characteristics, main eye complaints,

duration of symptoms, laterality, presenting visual acuity and corneal repair procedures and six weeks post-operative visual acuity were obtained from the records. Visual acuity were categorized with $\geq 6/18$ as normal, $<6/18$ to $>3/60$ as visual impairment and $<3/60$ as blindness. Infants were classified as either blind or believed not to be blind.

Exclusion criteria: All patients who had open globe injury but had primary Enucleation or Evisceration.

Ethical approval was obtained from the institution's ethical review committee though data collection did not directly involve patient's participation.

Analysis- Data obtained were recorded and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Means (Standard deviations) were used to describe the distributions of continuous variables. Categorical variables were described in Percentages. Comparisons of categorical data were performed with the use of Pearson's chi-square test. Furthermore, the Bivariate correlation statistics was done to evaluate the strength of association between preoperative visual acuity and postoperative six weeks visual acuity. $P < 0.05$ was considered statistically significant.

Results

Forty patients (40) had corneal repair procedure constituting 22.2% of all ophthalmic procedures and 2.7% of all ocular surgeries done during this period. There were 30(75.0%) males and 10 (25.0%) females with a male to female ratio of 3:1 ($\chi^2=10.000$, $df=1$, $p=0.002$). The ages ranged from 6 months to 52 years with mean age of 21.67 ± 15.2 years. All the cases were unilateral with 25 (62.5%) occurring in the right eye and 15 (37.5%) in the left eye.

The proportions of males were higher in all age groups except at age group 10-19 years where females had a higher proportion. Table 1

Table-1: Age group and Sex Distribution

Age Group(years)	Male n (%)	Female n (%)
0-9	9(64.3)	5(35.7)
10-19	2(40.0)	3(60.0)
20-29	7(87.5)	1(12.5)
30-39	5(83.3)	1(16.7)
40-49	6(100.0)	0(0)
50-59	1(100.0)	0(0)
Total	30(75.0)	10(25.5)

Figure1 showed majority of the patients presented at oculoplastic clinic with blindness $VA < 3/60$ except the dependant group of patients which presented with normal visual acuity $\geq 6/18$.

Figure 2 Showed that monocular blindness ($VA < 3/60$) was found in 33 (82.5%) of patients while 5 (12.5%) of the patients presented with normal vision ($VA \geq 6/18$).

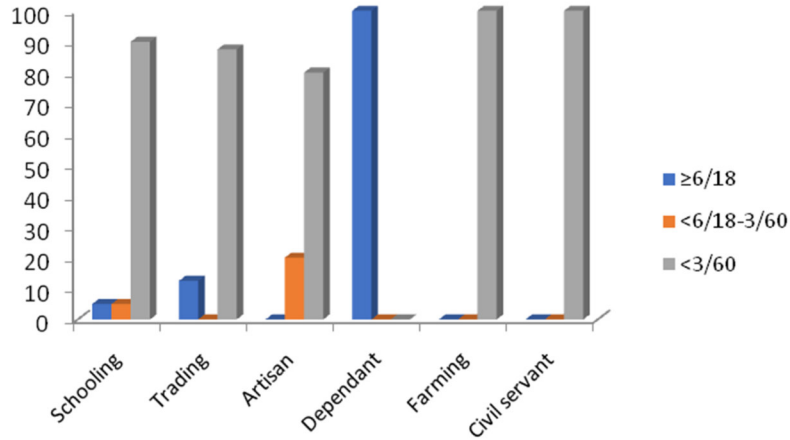


Figure-1: Occupation of Patients versus Presenting Visual Acuity

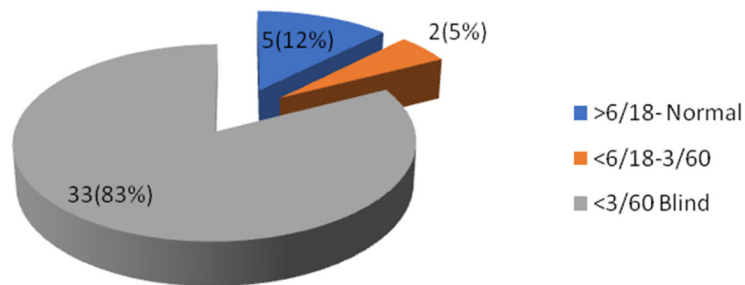


Figure-2: Presenting Visual Acuity of Patients with Corneal Laceration

Table-2: Visual Outcome of Corneal Repair Procedure

Vision	VA1n (%)	VA2 n (%)
≥6/18	5(12.5)	8(20.0)
<6/18-3/60	2(5.0)	3(7.5)
<3/60	33(82.5)	29(72.5)
TOTAL	40(100)	40 (100)

*VA1=Presenting visual acuity, VA2= Final visual acuity after 6weeks

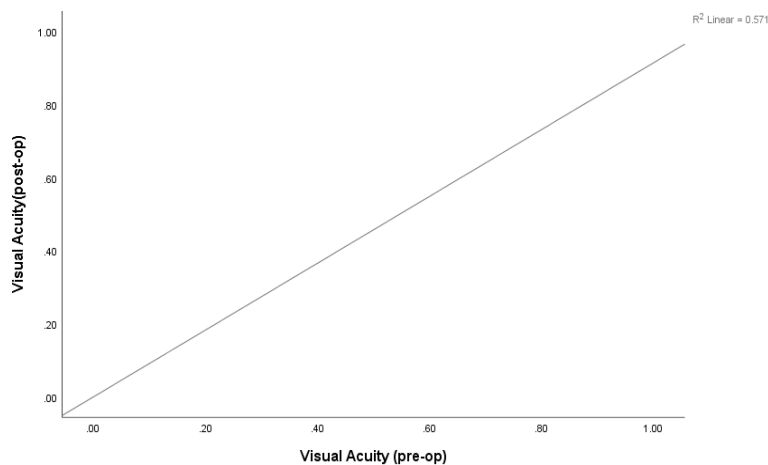


Figure-3: Bivariate Correlation graph of Pre-operative VA and 6weeks Post-operative VA

Table 2 showed that the proportion of patients that had improved vision after corneal repair procedure increased from 7 (17.5%) to 11(27.5%) after six weeks of follow up while blindness reduced from 33 (82.5%) to 29 (72.5%). Figure 3 showed a positive correlation between pre-operative visual acuity and post-operative visual acuity with a correlation coefficient of 57 % (R2 Linear=0.571).

Discussion

Open globe injuries are a major cause of monocular blindness though largely preventable [2]. The standard procedure of carrying out primary surgical repair following corneal lacerations in an open globe injury to restore the structural integrity of the globe formed over one fifth of oculoplastic procedures in this subspecialty clinic during this period. Unless the globe was ruptured and completely disorganized beyond repair, the meticulous procedures were performed by the skilled ophthalmic surgeons after pain-staking and prompt clinical assessments of the patients. Open globe injury has a relatively high incidence in this clinic despite exclusion of all patients that had severely damaged and disorganized globe injury who had primary Enucleation or Evisceration, although lower than a reported minor ophthalmic plastic procedure in Northern part of the country [9] and some other individual procedures [5,10].

Khatry et al reported that over 75% of patients with severe ocular injuries had lacerating injuries in Nepal [11]. In addition, there may even be under-representation of total number of patients as reported in Adeoye study in southwestern Nigeria [5] as some patients that have multiple systemic injuries from communal clashes or road traffic accident might present in the other department like Neurosurgery in another centres [5].

One of the multiple intraocular surgical procedures to be performed was repair of the corneal laceration using microsurgical techniques in order to salvage some useful vision [2].

Amongst other procedures done were lid and scleral repair, anterior chamber wash-out, iris repair/abscission and anterior vitrectomy. These procedures should be meticulously done as soon as the patients present to the ophthalmologist. It was reported that as high as 55% of patients that had open globe injury that were offered pars plana vitrectomy had a favorable visual outcome in their study [12]. The hospital management is thus advised to employ a vitreo-retinal surgeon in this hospital so that our patients can enjoy that management procedure. Furthermore, for a better visual outcome, unnecessary delay from hospital bureaucracy vis-à-vis payment of operation fees before procedure should be reduced to minimize the consequential visual morbidity from the already injured eye.

This can be achieved by government extending the coverage of National Health Insurance policy to the entire citizen thereby reducing out of pocket expenses for the patients.

The male preponderance in this study is similarly found in many studies [5,13-17]. Reasons for the male preponderance have been well documented in the literature being that males are more involved in risk-laden activities than their female counterparts [16,18]. A young age group was also observed to present with corneal laceration for which repair was done in this study as seen in the literature [1,5,7]. The incidence in the young age group could be reduced as documented in the literature by engaging in parental education and closer supervision of children in and outside the home and the use of protective eye wear in sports activities [7].

Majority of the patients presented at oculoplastic clinic with blindness VA<3/60 except the dependent group of patients which presented with normal visual acuity $\geq 6/18$. The proportion of monocular blindness was over 4/5th of all patients that presented with corneal laceration in the subspecialty clinic. This is in accordance with the earlier report that stated that ocular trauma is a major cause of monocular blindness and visual impairment worldwide [1,5]. It therefore remains a significant cause of vision loss [1].

Although majority of the patients presented with blindness, it was noteworthy that all the dependent group of patients with corneal laceration presented with normal vision compared with the other groups of patients. This could be partly due to the fact that they enjoyed better protection or better catered for by the caregiver and enjoyed closer supervision than other group of patients thus presented earlier to the eye facility. The above reason has not been proven to be among the factors documented in the literature to predict the vision outcome after an open globe injury which include mechanism or type of injury, pre-operative visual acuity, time lag between injury and surgery and size and location of the wound [18]. If these above adduced reasons could be established in a future study, efforts should be put in place to sustain this observation so as to reduce the visual morbidity resulting from home or school-related eye injury.

This study showed that the proportion of patients that had improved vision after corneal repair procedure increased minimally after six weeks of follow up. There was a positive correlation between pre-operative visual acuity and the final visual acuity after six weeks of post-operative period. This was similar to some other studies where final visual acuity after surgical repair of open globe injuries was influenced by the preoperative visual acuity [18,19].

Presenting visual acuity in turn depends on severity of injury. It has been documented that eyes have a greater risk of injury during conflict than other parts of the body due to preferential exposure of the face in combat [12].

This emphasizes the fact that prevention of ocular injury should be prioritized as prevention is cheaper and better than treatment. Blindness prevention campaign should therefore be incorporated into the primary eye care to minimize ocular morbidity in eye injury. A well-structured or planned eye health education workshop should be carried out at the local government area to teach the other health workers on eye health promotion so that the message will be widely disseminated to the rural dwellers.

Furthermore, prompt recognition and ophthalmologic interventions are essential to maximizing functional outcome [20]. Though many badly injured eyes despite micro-surgical procedures might not be salvaged [2], timely presentation, prompt clinical assessment and early interventions [21] when non-avoidable ocular injury occurs remain key to good functional post-operative vision. Finally, ocular injury can be prevented by wearing of protective spectacles at work and through frequent health education to reduce the incidence of eye injury that might result to losing the eye [22].

Conclusion

Corneal laceration injury has a relatively high incidence. There was 10% improvement in vision after corneal repair procedure with a positive correlation between pre-operative visual acuity and post-operative visual acuity.

All the dependent group of patients with corneal laceration presented with normal vision compared with the other groups of patients who presented with some degrees of visual impairment or blindness. Timely presentation, prompt clinical assessment and early intervention when non-avoidable ocular injury occurs remain the key to a good functional post-operative vision.

What this study add to existing knowledge

1. Corneal laceration injury which is an open globe injury has a relatively high incidence in this tertiary referral centre.
2. There was 10% improvement in vision after corneal repair procedure with a positive correlation between pre-operative visual acuity and post-operative visual acuity.
3. All the dependent group of patients with corneal laceration presented with normal vision compared with the other groups of patients who presented with some degrees of visual impairment or blindness.
4. Local government health workers should have a well-structured workshop on eye health promotion programmes for effective dissemination to the rural dwellers.
5. Painstaking and meticulous repair of corneal repair following open globe injury could result in 10% improvement in postoperative vision.

Authors' Contributions

1. OMOTOYE OJ: Conceived the original idea and preparation of the manuscript
2. AJAYI A: Involved in manuscript preparation, drafting and critically revising the work
3. AJITE KO: Involved in manuscript preparation and critically revising the work
4. DADA SA: Involved in manuscript preparation, analysis and critically revising the work
5. ABAH EC: Data collection, drafting and critically revising the work

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