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To Analyze the Outcomes of Ocular Trauma on the Basis of Zone of Injury

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Abstract

Purpose: To analyze the outcome of ocular trauma based on the zone of injury.

Material and Method: A total of 244 patients with eye injuries were included in this study. The study was conducted at Department of Ophthalmology, General Hospital Lahore in Lahore from January 1 2016, to September 30 2018, and data was collected through pre-designed Proforma. Data about age, sex, causes, affected ocular zone, and visual acuity (VA) before and after treatment were recorded. Patients were grouped into 3 groups: Zone 1, 2, and 3 according to the damaged ocular area.

Results: This study included a total of 244 patients having ocular trauma. Zone 1 group included 136 patients. VA before treatment ranged from light perception (LP) to 6/60 in 130 patients, 4 patients had 6/36 to 6/12, and 2 patients had 6/9 to 6/6. VA after treatment was between LP and 6/60 in 128 patients, 5 patients had 6/36 to 6/12, and 3 patients had 6/9 to 6/6. Zone 2 group included 76 patients. VA before treatment ranged from LP to 6/60 in 52 patients, 18 patients had 6/36 to 6/12, and 6 patients had 6/9 to 6/6. VA after treatment was between LP and 6/60 in 46 patients, 25 patients had 6/36 to 6/12, and 7 patients had 6/9 to 6/6. Zone 3 injury group included 32 patients with VA between LP to 6/60 before treatment VA after treatment was between LP and 6/60 in 31 patients, and 1 patient between 6/36 and 6/12.

Conclusion: Improvement in VA after ophthalmic care is directly dependent upon the extent of ocular damage and VA before the treatment.

Keywords: Trauma, Vision, Zone of injury.

Introduction

Ocular trauma is a significant cause of permanent visual impairment and blindness in the world (1). The World Health Organization program estimated that worldwide, approximately 750,000 cases of ocular trauma are hospitalized per year, and 200,000 cases are open globe injuries (2).

Some eyes cannot be saved, even with the advances in ophthalmic surgery (such as operating microscopes, vitreoretinal techniques, and surgical skills); and with improvements in the awareness (3). The impact is on the individuals, their families, and the country's healthcare system (4).

Based on literature review, the factors likely to predict the final visual acuity (VA) after an open globe injury are: initial VA, mechanism and type of injury, zone of injury, adnexal trauma, relative afferent pupillary defect (RAPD), retinal detachment, uveal or retinal tissue prolapse, vitreous hemorrhage, lens injury, hyphema, delay to surgery, and number of operative procedures

(5-23). One of the most critical uses of knowing about prognostic factors is that it helps the physician in counseling the patient and his family and preparing him for the outcome.

This study was undertaken to share our experience, analyze the visual results based on the zone of injury, and to determine effective methods of management.

Material And Method

The study was conducted at Department of Ophthalmology Lahore General Hospital, between January 1st 2018 to September 30th 2018. Two hundred forty-four patients with ocular trauma were included. We realized an evaluation with: visual acuity and pupil reactions, movements of extraocular muscles, slit lamp examination, and indirect ophthalmoscopy fundus examination. Any patient with a penetrating eye injury had a cranial CT scan to rule out the presence of intraocular foreign body.

We collected the data using a predesigned proforma. The data included: name, age, gender, etiology, the zone of injury, VA pre-treatment, type of foreign body, complementary studies, surgical procedure, and VA post treatment.

We stratified patients in three groups based on the zone of injury: Zone 1 injury involves cornea and limbus, Zone 2 injury involves anterior 5mm sclera, and Zone 3 injury is beyond 5mm sclera.

We analyzed data using SPSS (Statistical Package for Social Sciences) version 22. Frequencies and percentages were taken for all categorical variables, while mean and standard deviations were computed for all numerical variables.

Results

This study included a total of 244 patients having ocular trauma. There were 133 (55.51%) patients who had right eye trauma, while 111 (45.49%) had left eye trauma (Table 1). Lid lacerations were associated with all road traffic accidents (Table 2). One hundred ninety-seven patients (80.7%) were male, and 47 females (19.3%). There were 136 patients in Zone 1 injury group. Visual acuity (VA) before treatment ranged from light perception (LP) to 6/60 in 130 patients, 4 patients had 6/36 to 6/12, and 2 patients had 6/9 to 6/6. After treatment VA was between LP positive and 6/60 in 128 patients, 5 patients had 6/36 to 6/12, and 3 patients had 6/9 to 6/6. Zone 2 injuries included 76 patients. Visual acuity before treatment ranged from LP positive to 6/60 in 52 patients, 18 patients had 6/36 to 6/12, and 6 patients had 6/9 to 6/6

VA. Visual acuity after treatment was between LP positive and 6/60 in 46 patients, 25 patients had 6/36 to 6/12, and 7 patients had 6/9 to 6/6. Zone 3 injuries included 32 patients with VA between LP positive to 6/60 before treatment. Visual acuity after treatment was between LP positive and 6/60 in 31 patients, and 1 patient between 6/36 and 6/12.

A total of 73 (29.9%) patients from 244 patients had metallic foreign body trauma, and 49 (20.1%) patients had motor vehicle accident (MVA) trauma to the eye (Table 3). Age distribution of patients is given in Table 4; 78 (31.97%) patients were younger than 10 years of age (Table 4).

Table 1: Demographic Characteristics of Patients N: Number

Variables	N(%)
Total Patients admitted (n= 1667)	
Ocular Trauma Patients	244 (14.6%)
Effected Eye (n= 244)	
Right Eye	133 (54.5%)
Left Eye	111 (45.5%)
Gender	
Male	197 (80.7%)
Female	47 (19.3%)

Table 2: Pre- and post-treatment visual acuity of patients according to injury zones.

Zone of Injury	Number of Patients	Visual Acuity	Pre-treatment	Post-treatment
1	136 (55.7%)	PL - 6/60 6/56 - 6/12 6/9 - 6/6	130 (95.6%) 4(2.9%) 2(1.5%)	128 (94.1%) 5 (3.7%) 3 (2.2%)
2	76 (51.2%)	PL - 6/60 6/36 - 6/12 6/9 - 6/6	52 (68.4%) 18 (23.7%) 6 (7.9%)	46 (60.5%) 23 (30.3%) 7 (9.2%)
3	32 (13.1%)	PL - 6/60 6/36 - 6/12 6/9 - 6/6	32 (100%) - -	31 (96.9%) 1 (3.1%) -

Table 3: Causes of Injury

Source	Number of Patients (%)
Metal piece (metal grinder)	73 (29.9%)
Knife	59 (24.2%)
Motor Vehicle Accident	49 (20.1%)
Pen-Pencil	16 (6.6%)
Nail	16 (6.6%)
Needle (Syringe, knitting etc.)	9 (3.7%)
Glass	8 (3.3%)
Scissors-clipper	8 (3.3%)
Screw driver	4 (1.6%)
Beak of bird	2 (0.7%)
Total	244 (100%)

Table 4: Age groups of injured patients

Age Group (year-old)	Number (%)
1-10	78 (31.9%)
11-20	54 (22.1%)
21-30	69 (28.3%)
> 30	43 (17.7%)

Discussion

Ocular trauma is the leading cause of acquired unilateral blindness among children (20-50%) and teens. It is more predominant in males (24). The review in the WHO program to prevent blindness presents more than 55 million eyes damaged with more than 750,000 annual cases. In our study, we included 244 patients suffering from ocular trauma from Jan 2016 to Sep 2018.

There are around 200, 000 open globe injuries in the world, with about 1.6 million of the damage resulting in blindness, 2.3 million people are suffering from poor vision in both eyes because of this trauma, and almost 19 million people with blindness or low vision visibility in one eye (25). In our study, 25 patients suffered from poor vision.

Our study focuses on the causes of eye injuries, ocular damaged area, the age group most affected, sex, and the final vision in these patients. Children and youth are most sensitive to it. In this study, 31.97% of children and 28.28% young age group because of the occupational hazards of minor motor skills, and a curious nature. The majority of patients who experienced Zone1 injury are between 6 to10 year-old. Adult supervision is an essential factor in the prevention of children's injuries. Babies and children of less than 3 years of age suffered few injuries because of supervision by parents. In our study, the males were 80.74% and 31.97% of patients in the group were less than 10 years old. In our study, the mean age of the children was 8.09 years.

A study conducted in Cairo included 146 unilateral and 3 bilateral cases of ocular trauma (26). In our study, all cases were unilateral.

Men are more affected than women, because of boys generally held more freedom than girls in our community, and willing to spend more time outside (27). In our study, number of men were significantly higher (80.74%). A study concluded that the most frequent finding among ocular trauma was laceration by a sharp object and blunt ocular trauma (28). In our hospital the most frequent finding in zone 1 injury involving corneal and

limbal cuts was injury by knife, broken glass, and mirror pieces.

The results obtained showed that the socio-cultural, economic, social, and neglect by the family are an essential factor in the ocular injuries among children occurring during the game. (29) The final visual outcome in eye trauma is orientated by predictor factors depending on: The mechanism and the type of injury, VA before the surgery, deterioration in the time between time of injury and surgery, relative afferent pupillary defect, the area of damage, rupture of lens loss of vitreous, the bleeding inside vitreous cavity, separation of the retina, and intra-ocular foreign body. (30-36) A prompt visit to the hospital and appropriate management at the time is the key to avoid the loss of preventable vision. (37,38)

At the time of presentation, the mean visual acuity was less than 6/60, which was consistent with other surveys held in the Iran (39), Italy (40), and USA (41). The final visual acuity was related to preoperative vision. Timely and appropriate management of ocular trauma may improve the prognostic value and restoration of ocular anatomy. Damage by ocular trauma may cause blindness, which is preventable. So, after getting an injury, early treatment may prevent gross visual morbidity provided pre-treatment visual acuity is better.

Conclusion

Improvement in vision after the treatment is directly related to pre-treatment visual loss, the severity of the trauma, and zone of injury. The majority of patients experienced zone 1 injury and were male children.

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