VISUAL OUTCOME IN OCULAR TRAUMA AND ITS CONTRIBUTING FACTORS IN DAR-ES-SALAAM

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AND ITS CONTRIBUTING

FACTORS IN DAR-ES-SALAAM

BY



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DECLARATION

I hereby solemnly declare that this dissertation is my original work and has never been submitted for a diploma or degree in any other university.

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DEDICATION

To my wife PHILOMENA and my son RONALD

In appreciation for the patience and encouragement you gave me; without which this study would not have been possible.

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ABSTRACT

This study was conducted among 120 inpatients with eye injuries admitted in Muhimbili Medical Centre from 1st January, 1993 to 30th June 1993. The objectives were to determine visual outcome following ocular trauma and its contributing factors like delay in initiating definitive treatment and the reasons for such delay, use of traditional medicines to the injured eye, management efficacy of post-trauma complications, site and severity of injury.

The results showed that visual outcome in our environment is poor as only 42% of the injured patients achieved vision better than 6/18. About 42% of patients presented late for definitive treatment half of whom did so due to late referral to consultant hospital and 24% did so due to their own ignorance.

Post-trauma blinding complications were found in 61% of patients, of which corneal and vitreous opacities were most prevalent - 30% and 27% respectively. None of these complications got treated due to lack of appropriate facilities in our environment.

It was also found that, the use of traditional medicines in the injured eyes was significantly associated with poor visual prognosis as only 15% of patients who used pre-consultation traditional medicines remained with normal vision despite other treatments given later at the consultant hospital.

It was thus recommended that, efforts must be done to secure treatment facilities for post-trauma complications; and health education programmes be carried out extensively in the community with the aim of stopping the habit of using traditional medicines to the injured eye; and educating people on the importance of early referral for definitive treatment of the injured eye.

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INTRODUCTION:

Blindness is a major health problem in developing countries like Tanzania; and one of the main causes of blindness is ocular trauma. Ocular trauma is the commonest cause of unilateral blindness in the world; and in Tanzania, ocular trauma causes 26% of unilateral blindness(58). Therefore ocular injuries assume immense socio-economic importance involving great loss of human economic insufficiency and monetary loss.(1)

Since ocular injuries are often related to particular socio-economic and geographical factors then types of injuries and visual prognosis are not necessarily similar to those in developed countries where apart from socio-economic and geographical factors being different, management and rehabilitative modalities are more improved to the betterment of visual outcome.

Moreover the pattern of ocular trauma is also likely to change with time because society is not static; e.g. small and medium industries are increasingly mushrooming in Tanzania as time goes on. Therefore, with them ocular injuries from industrial accidents assume greater problem than before.(59)

Information concerning the visual outcome from ocular trauma in general is lacking in Tanzania. It is in the light of these variables that this study was done to determine visual outcome resulting from ocular trauma and factors contributing to such outcome in our environment, so as to improve our knowledge on management and preventive strategies.

OBJECTIVES

(1) **BROAD OBJECTIVE**

To determine visual outcome in ocular trauma and its contributing factors.

(2) **SPECIFIC OBJECTIVES:**

(a) To determine visual outcome in ocular trauma in relation to:-

(i) Time interval between injury and getting definitive treatment.

(ii) The use of pre-consultation traditional medicines to the injured eye.

(iii) Management of post - trauma complications.

(iv) Site of injury to the eyeball.

(v) Severity of ocular trauma.

(b) To analyse specific factors related to the above mentioned specific objectives. These factors were:-

(i) Reasons given for not coming to hospital early.

(ii) General literacy of the injured patients.

REVIEW OF THE LITERATURE

(1) Epidemiology:

Well over half a million people in the world are blind as a result of eye injuries (67); and trauma is the commonest cause of unilateral blindness in the world (2).

Age: Ocular trauma occurs generally in young healthy people (3). Most surveys both in Africa and elsewhere show that children and young adults constitute the majority of patients with eye injuries (4,5,6,7). Adala (8) found that 64% of ocular trauma affected people at 20 years of age or below. From a study done by Masesa (9), it was observed that about 71% of patients affected by ocular trauma were below 30 years.

Sex: Ocular injuries affect males more frequently than females. Many studies on ocular trauma reveal male: female ratio in the range of 3-6:1 (6,8,9,10,11,12,18).

(2) Aetiology:

Majority of authors classify aetiological factors in ocular trauma into:

(a) Domestic eye injuries

(b) Occupational

(c) Assault

(d) Traffic accidents

(e) Sports

The aetiological pattern changes according to geographical location, civilization and socio-economic activities.

(2) (a) Domestic ocular trauma. These are injuries to the eyes that occur while one is engaged in domestic activities such as children at play within the home compound, chopping of wood and kitchen activities. Few studies on ocular injuries in Africa show that the majority of injuries are associated with domestic activities (8).Islar (6) reported 56% of ocular injuries as domestic. Similar findings were observed by other authors (7,13,14). However, domestic ocular injuries have been shown to decrease in incidence in some other parts of the world. Johnson (16) and Eagling (4) observed a decrease from 46 to 30% and 47 to 40% respectively.

(2) (b) Occupational ocular trauma.

These are ocular injuries that occur while one is engaged in payed or economic work. They include industrial, agricultural and other

payed work. In some parts of the world, occupational activities are the commonest cause of ocular injuries. Masesa (9) observed about 40% of ocular injuries being due to occupational injuries. Similar findings were observed by Blomdahl (10). Like domestic ocular injuries, occupational eye injuries have been reported to be decreasing in incidence (4,16).

2 (c) Assaults ocular trauma:

These are eye injuries occuring while one is involved in fight or any other violent attacks. Assault is among the common causes of ocular trauma (21, 22). Islar (6) has reported assaults as the second commonest cause of ocular injuries (21%) in Malawi. The same pattern was observed in Dar es Salaam (9). In Uganda, acts of violence were reported as the commonest cause of ocular injuries (51%) by Davange (22).

In Contrast to domestic and occupational injuries, ocular trauma due to assaults have been observed to be increasing in incidence. Pangling (4) and Johnson (12) reported a rise from 1-8% and 8-15% respectively .

2 (d) Traffic accidents:

Ocular trauma due to trafic accidents are not only increasing in incidence but also cause very severe injury to the eye especially to front seat passengers as observed by Mackay (23). He also noted that 70% of injuries were associated with toughened glass windscreens.

However, in some parts of Africa incidence of ocular injuries due to traffic accidents is still low compared to other causes of eye injury. Islar (6) and Masesa (9) reported the incidence to be 5.9% and 4.3% respectively.

2 (e) Sports trauma:

Blomdahl (10) reported sports as the second commonest cause of penetrating eye injury (23%) in Sweden. However in Africa sports is one of the least frequent cause of ocular trauma as its incidence is reported to be significantly low (6,9). This can be explained by the low popularity of dangerous sports in Africa as far as eye injury is concerned; eg hockey (which is among the commonest causes of sports trauma), baseball and golf.

3. **OBJECTS CAUSING EYE INJURIES:** (as related to visual outcome)

. Objects causing ocular trauma vary according to the activity one is engaged in at the time of injury. Metal and glass fragments have been found to be the commonest objects causing eye injury (49%) in Sweden where occupational ocular trauma is very common. Stick and farm objects are well known to cause visually debilitating ocular trauma as most of them are unsterile and tend to cause penetrating eye injuries hence injecting microbes to the eye. The treatment of the resultant endophthalmitis which is usually fungal is very disappointing given the meagre antifungal medications available.

. Several studies in Africa show that wooden objects and stones are common objects causing ocular trauma (6,13,18,19).

4. CLASSIFICATION OF OCULAR TRAUMA.

Although there's no standard established classification of ocular trauma, an attempt of classification must base on site and extent of intraocular damage which are the two essential determinants of severity of ocular injury. The severity of ocular injury in turn determines the method of management and is helpful in predicting the visual outcome after management. The extent of damage can often

be predicted from the nature of injury at the site of impact (25).

Many authors have tried to classify ocular trauma (4,26,27,28) but the most comprehensive classification is by Roper-Hall (29) who classified ocular trauma into:

(a) Mechanical injuries: Eyeball is injured by the force of impact.

These injuries can be non-perforating (contusion) injuries, perforating or both.

(b) Non-mechanical injuries: Eyeball is injured by contact with heat or noxious substances. These injuries can be due to chemical burn, thermal burn, radiational or electrical trauma.

5. **SEVERITY OF OCULAR TRAUMA:**

Posterior segment trauma (ie trauma involving vitreous, retina, choroid and optic nerve) are more severe than anterior segment trauma (24); and they usually result in permanent visual loss (1,30,32,33,34,35,36).

6. EVALUATION OF THE TRAUMATIZED GLOBE

History:

History must be as complete as possible and the details should include: the time of the incident, the circumstances under which the patient's injury occured such as while pounding a nail with hammer, chopping wood, fighting or involvement in motor accident.

Further inclusion in the history must be any pre-existing ocular abnormality and the reason for the deficit.

Drug sensitivity and general health status of the patient must be determined before starting either medical or surgical therapy to prevent unexpected and disastrous complications in a patient already suffering from an urgent and severe ocular injury.

Visual Acuity (V/A)

V/A must be determined as early and as accurately as possible during the initial examination. If the patient has had his spectacles damaged, the pinhole VA of each eye is the least that should be accomplished.

Pupillary examination:

Its importance cannot be overemphasized. Concussive injury of the optic nerve eliminates the pupillary response to light stimulation on the affected side, and there's no consensual response by the fellow pupil; but

the pupil on the affected eye will respond consensually if oculomotor nerve is intact.

Peaked pupil usually indicates that a corneal perforation has occured and the iris is drawn to the wound.

Visual fields:

A confrontation visual field examination may provide extremely important information. If there's any suspicion that there is visual field abnormality present, then more precise techniques have to be used e.g. tangent screen or electronic visualfield analyser.

External examination:

. All external wounds or swellings involving the face, lids and orbital areas must be thoroughly examined.

. The sclera underlying and adjacent to conjunctival tears requires meticulous scrutiny for possible scleral perforation.

. If the pupil is pear-shaped with iris blocking the corneal perforation, extreme caution in any manipulation of the globe,lids or orbital areas must be exercised; non-compressive but secure eye patch over the perforated globe with an overlying perforated eye shield resting solely on the orbital bony structures must be placed to protect the eye until definitive repair can be accomplished. To those cases with corneal perforations, X-ray of

orbit must be done to rule out retained intraocular foreign body, and then prophylactic antitetanus toxoid must be given.

- For those cases with non-perforating injuries, the intraocular pressure must be determined as early as possible.
- Fundal examination must be done whenever media is clear enough to reveal fundal details. This will enable one to determine the damage to the posterior segment. After this initial evaluation, further management will depend on the specific ocular damage observed.

7. VISUAL OUTCOME

Most studies on visual outcome after trauma have centred on perforating injuries more than on general ocular trauma.

Visual recovery after trauma depends on the extent of the initial damage, the efficiency of management and the satisfactory management of complications.

In general the results of treatment are increasingly becoming better although the severity of ocular trauma has risen (28). General increase in the percentage of patients who get good vision after treatment has been observed in several studies (4,11,63). Eagling (4) and Neubaeur (28) have

reported a rise of good visual outcome (ie 6/12 or better) from 45% in 1959 to 68% in 1976 and from 29% to 38% respectively. Adhikary (25) observed 63% good visual outcome.

There are several factors which contribute to poor visual outcome. They include:

(a) Severity of the damage to the eye particularly to the posterior segment. This is indicated by absence of initial visual potential before treatment. Eagling (4) reported 94% of cases in grade I trauma getting good vision compared to 18% of patients with grade IV ocular trauma. (In Eagling grading of ocular trauma, Grade I is laceration of cornea and anterior sclera; Grade IV is mixed trauma with involvement of both anterior and posterior segments). Mtanda (19) observed that 100% of patients under 15yrs with injuries involving the posterior segment had no useful visual acuity (6/36 or better) after treatment.

(b) Presence of complications inadequately managed, or managed too late or not managed at all due to lack of appropriate facilities e.g. lack of cryotherapeutic facilities in cases suspected to have retinal detachment. Islar (6) could

not do vitrectomy to appropriate patients in Malawi due to lack of facilities and this contributed to poor visual outcome. Many authors in developed countries have reported significant visual improvement following treatment of some post-trauma complications. Masesa et al (22) and Hutton et al (31) reported visual improvement in 61.5% and 64% of their patients respectively after Trans plana vitrectomy. About 55% visual improvement was observed by Fauborn et al (52) after primary vitrectomy.

(c) Delay in starting management. In most cases, this is due to patients presenting late to the appropriate eye centre. Several studies have shown that more the delay in starting management, the worse the prognosis of ocular trauma. (8,19,64).

(d) Wide use of traditional medicines to the already injured eye before seeking medical treatment. They may lead to severe corneal erosions and endophthalmitis as most of them may be unsterile and their chemical concentrations are undetermined.

COMPLICATIONS OF OCULAR INJURIES

(a) Infection: Starts as endophthalmitis then extends to panophthalmitis. It is usually due to penetrating injuries. Adala (8) reported panophthamitis as the commonest cause of enucleation after perforating trauma. Infections also follow use of unsterile (usually traditional) medicines to the injured eye.

(b) Staphyloma:Is usually seen in neglected perforations which are believed to have sealed spontaneously.

(c) "Absolute" glaucoma: This is common after blunt trauma especially those associated with hyphaema or in which angle recession occurs.

(d) Phthisis bulbi: This is a degenerative process which involves shrinking of the eyeball. It's a terminal state of most perforations with severe damage to ocular tissues.

(e) Sympathetic ophthalmitis: This is an unpredictable bilateral chronic inflammatory disorder possibly unique to the human eye and develops exclusively following accidental or surgical penetration of the globe (37). It remains the most severe possible complication of ocular trauma; but fortunately it is

rare. A number of surveys report its incidence rate of less than 1% (4,27,65,66).

MATERIALS AND METHODS

A prospective study was done to 120 patients with eye injuries seen at the eye department Muhimbili Medical Centre.

Data collection was done for six months commencing from 1st January 1993 to 30th June, 1993. Each patient in the study was followed up for six months from the time he was seen first at the eye department.

Study population:

Patients included in the study were all patients presenting with ocular trauma severe enough to be admitted in the eye ward.

Methods:

At the initial visit, identity of each patient was recorded including hospital registration number, name of the patient, address, age, sex, occupation, education of the patient and the parents or guardians (for those still under the care of parents/guardians) and ethnic group.

. Then a detailed history was taken particular attention being paid to the activity in which patient was engaged at the time of injury, type of the injuring agent, mechanism of injury, pre-

existing ocular status, time between injury and first presentation to the eye department in Muhimbili Medical Centre, reason for late presentation and medications (if any) given during the period between injury and presentation (see appendix).

. A thorough ocular examination was conducted in all patients. This included recording of initial visual acuity, intraocular pressure for non-preforated eyes, biomicroscopy of anterior segment and ophthalmoscopy.

Visual acuity (VA)

All patients had their visual acuity tested using Snellen's chart. E-chart was used for illiterates. All patients were refracted to determine their best corrected visual acuity.

Then VA was graded according to W.H.O. categories of visual impairment as shown below (68).

VISUAL IMPAIRMENT	GRADE	BEST CORRECTED VISUAL ACUITY
NORMAL VISION		≥ 6/18
LOW VISION	I	< 6/18 TO 6/60
	II	< 6/60 TO 3/60
	III	< 3/60 TO 1/60
BLINDNESS	IV	<1/60 TO L.P.(Light perception)
	V	N.L.P.(No Light perception)

The severity of injury was graded and then its relationship with visual outcome was determined.

Grading of the severity was as follows:

Classification of the severity of ocular injuries

Grade of Severity	Anatomical damage sustained
I	Extraocular injuries/foreignbodies, uncomplicated corneal perforations, hyphema without increased I OP, Traumatic uveitis.
II	Corneoscleral perforations, Hyphaema with increased IOP, associated lens or iris damage.
III	Large corneoscleral perforations, severe damage to the lens, iris and ciliary body; total hyphaema with vitreous haemorrhage.
IV	Vitreous haemorrhage, retinal detachment.

Explanation: Gr.I are injuries of eyelids, metallic and non-metallic corneal FB, incisional or pin-prick corneal perforations outside the central axial zone with or without small (< 50%) hyphaema uncomplicated by increased IOP, traumatic mydriasis/uveitis

Gr.II Corneoperforation > 6mm passing through the axial zone, corneoscleral perforation, extending upto 3mm beyond the limbus, hyphaema with high IOP, traumatic cataract and/or iris tear or iridodialysis.

Gr.III Corneoscleral perforations extending upto the equator of the globe, damage or loss of lens, severe tear of iris or ciliary body, hyphaema with vitreous haemorrhage.

Gr. IV All of grade III with traumatic retinal detachment.

Ocular Motility: Eye movements were tested in six cardinal positions of gaze. This was done to determine traumatic damage to extraocular muscles and/or their nerve supplies.

Pupils were examined for size, shape, equality and both direct and consensual reactions to light using torch light.

Tonometry: For non-perforated eyes, intraocular pressure was measured using Godmann's applanation tonometer Haag -streit Bern type. General anaesthesia was used only for those patients too apprehensive to cooperate under topical anaesthesia.

Gonioscopy: This was done to those patients with cleared hyphaema to determine anterior chamber angle abnormalities such as angle recession and PAS. Indirect Gonioscopy was done using Godmann's one-mirror goniolens - Haag-streit AG Bern type.

Slitlamp biomicroscopy:

Anterior segment of each patient was thoroughly examined with slit-lamp for any traumatic damage. The type of slit lamp used was TOPCON SL-3D .

Ophthalmoscopy:

All patients except those with unclear ocular media underwent both direct and indirect ophthalmoscopy to determine damage to the posterior segment.

Indirect ophthalmoscopy used was mono-ocular type (Binocular indirect ophthalmoscope was not available at the time of study).

Then management given to each patient was recorded.

Follow up examination:

Follow ups were made every 1 to 3 weeks after discharge from the ward depending on the condition of the eye. At every follow up visit, VA, slit lamp biomicroscopy, tonometry and ophthalmoscopy were done by the Author. All findings were recorded in a questionaire form.

RESULTS

TABLE I: Age and Sex distribution of 120 patients.

AGE(Yrs)	No.of Cases	%	Males	Females	M:F
0-5	8	6.6	2	6	1:3
>5-11	21	17.5	11	10	1.1:1
>10-15	21	17.5	19	2	9:5.1
>15-20	13	10.8	8	5	1.6:1
>20-25	14	11.6	12	2	6:1
>25-30	15	12.5	15	0	14.1
>39-35	10	8.3	5	5	1:1
>35-40	4	3.3	2	2	1:1
>40-45	5	4.2	4	2	4:1
>45-50	4	3.3	3	1	3:1
Over 50	5	4.3	3	2	1.5:1
TOTAL	**120**	**100**	**84(70%)**	**36.30%**	**2.3:1**

Range of age=2-67yrs

mean age=22.35yrs

M:F ratio =2.3:1

- During the study period, there were 120 patients with ocular injuries admitted in the eye ward. 84(70%) patients were males and 36(30%) were females. Male:female ratio was 2.3:1.

- Their ages were in the range of 2yrs to 67yrs and the mean age was 22.35yrs. Majority of the patients (70%) fell in the age of 6-30yrs.

  - Peak age groups for males were 11-15yrs and 26-30yrs.

  - Peak age group for females was = 10yrs.

  - Female patients at age group 11-15yrs and 26-30yrs (ie peak ages for males) were very low; M:F=9.5:1 and 14:1 respectively.

LIBRARY

TABLE II: Distribution of study population by occupation:

Occupation	No. of Cases	%
Domestic	10	8.3
Agriculture	11	9.2
Schooling	44	36.7
Factory worker	9	7.5
Bussiness	17	14.2
Carpenter	4	3.3
Police	4	3.3
Coolie	5	4.2
Car Mechanic	4	3.3
Unemployed	12	10
TOTAL	120	100

- Majority of patients were in the occupation of Schooling, business, agriculture, Housewife and factory work arranged in that order of decreasing frequency. Together they accounted for 75.8% of all patients.
- Carpentry, police and car mechanic had 4 patients each, and there were 5 patients with occupation of coolie.
- 12 patients (10%) had no known occupation some of whom were those children who had not yet started schooling.

TABLE III: Distribution of study population by level of education of patient:

Highest education of the patients	No. of Cases	%
NONE	21	17.5
≤ STD VII	89	74.3
> STD VII to FORM IV	8	6.6
> FORM IV	1	0.8
Not known	1	0.8
TOTAL	120	100

- 21 patients (17.5%) had no formal education.
- 89 (74.3) patients had primary education.
- Only 9 (7.4%) patients had education higher than primary level.

TABLE IV: Distribution of 120 patients by activity in which they were engaged at the time of injury.

Activity at the time of injury	No. of Cases	%
Play	40	33.3
Chopping Wood	3	2.5
Assault	28	23.3
Working in the farm/ garden	12	10.0
Factory	14	11.6
Road motor accident	9	7.5
Sports	2	1.6
Kitchen Work	9	7.5
House Building	3	2.5
TOTAL	120	100

. Activities in which the patients were engaged at the time of sustaining ocular injury were play, assault, factory work, agriculture, motor accident and kitchen work, 93.2% of patients were injured while in one of these activities - children at play leading the list (33.3% of all patients).

. Other activities were: chopping wood 2.5%, sports 1.6% and house building 2.5%.

TABLE V: Distribution of 120 patients by the type of the injuring object.

Object	No. of Cases	%
Stones	27	22.5
Sticks	25	20.8
Iron particles	16	13.3
Chemical substance	8	6.6
Fist	8	6.6
Piece of Wood	10	8.3
Nail scratch	2	1.6
Door knob	2	1.6
Bottle explosion	1	0.8
Unspecific objects	21	17.5
TOTAL	120	100

- Stones, sticks and metallic objects(like iron bar, projectile iron particles, wires, nails) were the commonest injuring articles; together accounting for 56.6% of patients.
- 21 (17.5%) patients were injured by unspecified objects most of whom were injured in assaults and road motor accidents.
- Other injuring articles were pieces of wood 8.3% chemical substances (like cement and chemical fluids) 6.6%, fist 6.6% fingernail scratch 1.6% doorknob 1.6% and bottle explosion 0.8%.

TABLE VI(a): Visual Outcome in 116 patients in relation to time interval between injury and presentation.

Time	No of cases	VISUAL OUTCOME					
		INITIAL V.A			FINAL V.A		
		≥6/18	<6/18 to 3/60	<3/60	≥6/18	<6/18 to 3/60	<3/60
<24hrs	66	21(32%)	19(29%)	26(39%)	36(55%)	6(9%)	24(36%)
24hrs to 7days	34	5(15%)	3(9%)	26(77%)	12(35%)	6(18%)	16(47%)
8days to 14days	7	1(14%)	0(0%)	6(86%)	1(14%)	2(29%)	4(57%)
>14days	9	1(11%)	1(11%)	7(8%)	0(0%)	1(11%)	8(89%)
TOTAL	116	28(24%)	23(20%)	65(56%)	49(42%)	15(13%)	52(45%)

Range of time interval = 2hrs to 4months

mean time interval = 3 days.

TABLE VI(a)

Relationship was determined between visual outcome and time interval from injury to presentation for definitive treatment.

(1) There were 66 (56.9%) patients who presented within 24hrs. 34 (29.3%) patients presented between 24hrs to 7 days. 7 (6%) patients presented between 8-14 days and 9 (7.8%) presented after 14 days.

(2) For 66 patients who attended within 24hrs, 36 (54.5%) of them had normal vision at the end of the follow-up period and 36.4% were blind. 47.1% of those patients who presented between 24hrs to 7days were blind; and those who presented between 8-14days 57.1% of them were blind. 88.9% of those who presented after 14 days were blind. This clearly shows that delay in initiating definitive treatment in ocular trauma is related to poor visual outcome. This relationship is statistically significant.

$X^2 = 13.61$ DF 3 so p-value < 0.01).

TABLE VI(b): Time interval between injury and presentation among 120 patients in relation to sex.

Time	No. of cases	%	Males	Females	M:F ratio
<24hrs	66	56.9	52	14	3.7:1
24hrs to 7 days	34	29.3	23	11	2.1:1
8 days to 14 days	11	6.0	6	5	1.2:1
>14 days	9	7.8	3	6	0.5:1
TOTAL	120	100	84	36	2.3:1

1. M:F ratio in general attendance to hospital was 2.3:1.

2. M:F ratio for those who attended late (>24 hrs) was 1.5:1.

3. Therefore there was less preponderance of males among late comers.

TABLE VII: Distribution of 54 patients who presented late; by reasons given for late presentation:

REASONS FOR LATE PRESENTATION i.e > after 24 HRS	NO OF CASES	%
1 did not know it would be so bad	14	26
I was being treated first at the peripheral health unit (ie late referral)	24	44
Village too far	7	13
Transport not available	5	9
There was no one to take the patient early to hospital	4	7
No reason given	0	0
TOTAL	**54**	**100**

Total of 54 patients presented late for definitive treatment due to various reasons. Table VII above shows some of the reasons given:

- Majority of patients 24 (44%) presented late due to late referral.

- 14 (26%) patients presented late due to ignorance.

- Remoteness of the village and transport problems were reasons given by total of 12 patients; 4 patients had no one to take them to hospital early.

TABLE VIII: Visual Outcome of 116 patients in relation to pre-Consultation treatment given.

Treatment	No of cases	VISUAL OUTCOME					
		Initial VA			Final VA		
		≥6/18	<6/18 to 3/60	<3/60	≥6/18	<6/18 to 3/60	<3/60
NONE	68	24(35%)	16(24%)	28(41%)	35(52%)	8(12%)	25(37%)
MEDICAL	35	4(11%)	6(17%)	25(71%)	12(34%)	5(14%)	18(5%)
TRADITIONAL	13	0(0%)	1(8%)	12(92%)	2(15%)	2(5%)	9(69%)
TOTAL	116	28(24%)	23(20%)	65(56%)	49(42%)	15(13%)	52(45%)

Visual outcome in relation to treatments given before presenting for definitive treatment.

(1) Of 116 patients analysed, 68 (58.6%) had no treatment of any kind before presenting for definitive treatment, 35(30.2%) had medical treatment (some with only topical tetracycline instilled once or twice, others with systemic antibiotics e.g. P.P.F. injection etc);13 (11.2%) had traditional treatment most of which were topically applied human milk and plant juice (orally and/or topically used).

(2) 35 (51.5%) of those patients who had no treatment before presenting for definitive treatment had normal vision, final normal vision was noted in 12 (34.3%) of those patients who received medical treatment, and only 2(15.4%) of those patients who had traditional treatment had normal vision.

(3) After 6 month follow-up, blind eyes were seen in 36.8%, 51/4% and 69.2% no treatment, medically treated and traditionally treated patients respectively.

Therefore, those patients with traditional treatment had worst visual outcome when compaired with those patients who had medical treatment or no treatment at all before presenting for definitive treatment.

This relationship is statistically significant X^2 =4.3 P<0.05, DF1.

TABLE IX: Visual Outcome of 116 patients in relation to site of injury.

SITE OF INJURY	No of Cases	VISUAL OUTCOME INITIAL VA ≥6/18	<6/18 to 3/60	<3/60	FINAL VA ≥6/18	<6/18 to 3/60	<3/60
Anterior Segment only	72(62%)	28(39%)	20(28%)	24(33%)	46(64%)	11(15%)	15(21%)
Posterior segment with or without anterior segment	44(38%)	0(0%)	3(5%)	41(93%)	3(7%)	4(9%)	37(84%)
TOTAL	116	28(24%)	23(20%)	65(56%)	49(42%)	15(13%)	52(45%)

There were total of 116 patients evaluated, and were classified into groups according to the site of ocular injury.

- Group one consisted of patients with anterior segment trauma only (ie trauma not involving posterior part of the sclera 6mm from the limbus, vitreous, choroid, retina or optic nerve).
- Group two consisted of patients with posterior segment trauma with or without trauma to the anterior segment.

(1) There were 72(62%) patients with only anterior segment trauma; 44 (38%) patients had posterior segment trauma with or without anterior Segment involvement.

(2) 46 (63.9%) patients with only anterior Segment trauma-had normal final visual acuity, (i.e. ≥6/18) while only 3(6.8%) patients with posterior segment involvement had normal vision.

(3) 20.8% of patients with only anterior segment trauma were blind and 84.1% of those with posterior segment trauma were blind at the end of the study period.

. Therefore ocular trauma to the posterior segment is related to poor visual outcome. This relationship is statistically significant $X^2 = 36.6$, DF=1 So $P < 0.001$.

TABLE X: Visual outcome of 116 patients in relation to severity of ocular injury.

Severity of injury (GRADE)	No of Cases	VISUAL OUTCOME					
		INITIAL VA			FINAL VA		
		≥6/18	<6/18 To 3/60	<3/60	≥6/18	<6/18 To 3/60	<3/60-
I	44(38%)	26(59%)	15(34%)	3(7%)	38(86%)	4(9%)	2(5%)
II	28(24%)	2(7%)	5(18%)	21(75%)	8(29%)	7(25%)	13(46%)
III	22(19%)	0(0%)	2(9.%)	20(91%)	3(14%)	3(14%)	16(73%)
VI	22(19%)	0(0%)	1(5%)	21(95%)	0(0%)	1(5%)	21(95%)
TOTAL 116		28(24%)	23(20%)	65(56%)	49(42%)	15(13%)	52(44%)

The severity of injury was graded and then its relationship with visual outcome was determined.

1. It was found that, there were 44 grade I patients, 28 grade II, 22 grade III and 22 patients in grade IV. 38 (86.4%) grade I patients had normal vision (i.e. VA ≥6/18) at the end of a 6 month follow up period.

2. 20 (71,4%) grade II patients had impaired vision 13 of them blind.

3. In grade III patients, 19 (86.4%) patients had impaired vision and 16 of them were blind.

4. All of grade IV patients had visual impairement, 95.5% of whom were blind.

Therefore visual outcome worsened as the ocular injury became more severe.

This relationship was statistically significant:

$x^2 = 59$, DF 3 $P < 0.001$

TABLE XI: PREVALENCE OF LATE COMPLICATIONS (found at the end 6 - month follow-up period) in 120 patients.

COMPLICATION	NO	%
Entropion with trichiasis	1	0.7
Corneal scar with irregular astigmatism	28	19.9
Corneal blood staining	1	0.7
Glaucoma	1	0.7
Cataract	12	8.5
Vitreous opacity	23	16.3
Retinal haemorrhage	7	5.0
Retinal detachment	7	5.0
Phthisis bulbi	8	5.7
Loss of Eyeball (after enucleation or evisceration)	6	4.3
None	47	33.3
TOTAL	141	100

(1) 73 (60.8%) OF 120 patients presented with Complications at the end of follow up period.

(2) 47 (39.2%) of 120 patients were free of complications at the end of follow up period.

. The late complications at the end of 6 month period were mostly corneal scar 19.9%, vitreous opacity 16.3% and cataract 8.5%.

. Phthisis bulbi was seen in 8 patients and 6 eyeballs were lost after enucleation or evisceration.

. Retinal haemorrhage was found in 7 patients whereas retinal detachment was found in 7 patients.

. Entropion with trichiasis was seen in only 1 patient.

TABLE XII: PREVALENCE OF LATE COMPLICATIONS IN 67 patients with final Poor Vision (VA <6/18):

COMPLICATION	NO	%
Corneal Scar with Irregular Astigmatism	25	30.1
Corneal Blood staining	2	2.4
Glaucoma	2	2.4
Cataract	11	13.3
Vitreous opacity	22	26.6
Retinal haemorrhage	3	3.6
Retinal detachment	6	7.2
Phthisis bulbi	6	7.2
Loss of eyeball(Enucleation or evisceration)	6	7.2
TOTAL	83	100

(1) Cornal scar, cataract and vitreous opacity were most prevalent complications together amounting to 70%.

(2) 6 patients had phthisis bulbi and 6 patients lost their eyeballs after either enucleation or evisceration.

TABLE XIII: INITIAL VISION FOR 67 PATIENTS with FINAL POOR VISION (VA < 6/18)

INTIAL V A	No of Case	%
≥ 6/18	1	1.5
>6/18 - 3/60	8	11.9
< 3/60	58	86.6
TOTAL	67	100%

(1) About 58 (86.6%) patients had visual acuity worse than 3/60 before treatment while 8 (11.9%) patients had impaired vision. Only 1 patient had normal vision before treatment.

(2) Only 13% of 67 patients had initial vision better than 3/60.

TABLE XIV: POST - TREATMENT VISUAL STATUS IN 67 PATIENTS WITH FINAL LOW VISION (VA < 6/18):

INITIAL VA	UNCHANGED	IMPROVED TO		WORSENED TO	
	0	≥6/18	<6/18-3/60	<6/18-3/60	<3/60
<6/18	0	-	-	0	1
<6/18-3/60	2	2	-	-	4
<3/60	43	4	9	-	-
TOTAL	47	6	9	0	5

1. At the end of a follow up period; among the 8 patients with initial vision worse than 6/18 but better or equal to 3/60, 2(20%) had their vision unchanged; 2(20%) improved to ≥6/18 and 4(40%) had their vision worsened to <3/60.

2. Only one patient among these 67 patients had initial VA≥6/18 and finally it worsened to <3/60.

3. Of the 56 patients with initial VA <3/60, 43(76.8%) had their vision unchanged; 4(7%) patients improved to ≥6/18 and 9(61%) improved their vision to better than or equal to 3/60 but worse than 6/18.

4. Therefore of the 67 patients with final low vision, 47(70%) had unchanged vision, 6(9%) improved to ≥6/18, 9(13%) improved to <6/18 to 3/60 and 5(7.5%) patients worsened to <3/60. Thus treatment could not improve 77.5% of patients in this group of patients.

TABLE XV: INITIAL VISION FOR 49 PATIENTS WITH FINAL GOOD VISION (VA better than 6/18)

INITIAL VA	No of cases	%
≥ 6/18	29	59.2
>6/18 - 3/60	18	36.7
< 3/60	2	4.1
TOTAL	49	100

(1) 29% (59.2) patients had already normal vision before treatment while 18 (36.7%) patients had impaired vision and 2 patients had visual acuity worse than 3/60.

(2) Therefore 20 (40.8%) patients' improved as a result of treatment given.

(3) All patients had visual potential before treatment.

NOTE: Regarding post - treatment visual status in these patients, all improved from their initial VA.

DISCUSSION

Visual Outcome in Ocular Trauma

Ocular trauma has been well reported to be the commonest cause of unilateral blindness in the world and has been justifiably included among major projects in prevention of blindness year of the World Health Organization.(2)

Previous study done by Sangawe (58) in Dar es Salaam on causes of blindness, showed that ocular trauma accounted for 26.1% of unilaterally blind patients; and this was second commonest cause of blindness - second only to cataracts some of which were due to trauma. Otiti (1976) noted ocular trauma as a leading cause in the four most important cause of blindness in Uganda.

In developing countries, visual outcome following ocular trauma is definitely poor given the inadequate management of some of the treatable post-trauma complications (caused mainly by lack of appropriate facilities) , and wide use of pre-consultation traditional medicines. Mtanda (19) in Dar es Salaam observed that about a third of his patients with ocular trauma remained blind despite the treatment given. This compares well with the present study where 45% of patients with ocular trauma were blind at the end of a follow-up period. Notably, the majority of these blind patients had blinding complications some of which are known to be treated in well equiped centres. Many authors in developed countries have reported visual

improvement following treatment of some of these complications (24,33,34,52). Masesa et al (22) observed visual improvement in 61.5% of her patients and Hutton et al (31) reported 64% visual improvement after pars plana vitrectomy. About 55% visual improvement was reported by Faulbornet al (1977) after primary vitrectomy. Therefore management of such conditions like vitreous opacities, corneal scars, irregular astigmatism which together formed the bulk of late complications in this study (Table XI) definitely could to some extent improve visual outcome.

Hence, with these constraints prevailing especially in third world countries, some workers have shown that the chances of achieving normal vision after ocular trauma are slim; and many showed that less than half of patients with ocular trauma achieve normal vision (6, 19). Mtanda found 35.8% of his patients to be with useful vision at the end of follow-up period in Dar es Salaam, Islar observed only 47.6% of the eye injured patients to have remained with normal vision. These findings are similar to the results in the present study where only 42% had final normal vision.

However, Elder (60) in Jerusalem found a slightly higher percentage of patients with final normal vision 53%. This could be due to better availability of treatment facilities in the area of study like vitrectomy instruments. In the present study, in which many patients were shown to have vitreous opacities, the

vitrectomy which might have improved the visual prognosis could not be performed due to lack of appropriate instruments.

The present study showed that, the difference in visual outcome ($P< 0.001$) is due to severe damage to the eye at the time of injury, in which damages to the posterior segment tissues, definitely have poorer visual prognosis compared to the damage to the anterior segment tissues. Previous studies presented similar observations (19).

Furthermore, keratoplasties and contact lens service are minimally available in Tanzania like in many other developing countries due to many reasons economic constraints leading the list. Hence visually bad complications like corneal scars irregular astigmatism and unilateral aphakia remain untreated. Therefore, had management facilities been better in our centre, treatment of some of these complications would have led to better visual rehabilitation to patients.

Visual outcome in Relation to pre-consultation traditional treatment.

The use of traditional medicines is widely practised in developing countries Tanzania included. Islar (6) noted that many of the patients first resorted to folk medicines, reporting to the hospital only after such traditional methods failed and pain became intractable. This tendency was also observed by Chirambo (62).

In this study, 11.2% of patients sought traditional treatment before seeking medical treatment. These patients were fewer possibly due to urban localization of majority of the study population compared to those patients observed by Islar and Chirambo most of whom were rural-based.

The effects of instilling traditional medicines to the injured eyes are visually devastating. Chirambo (1976) observed that many of his blind patients had extensive scarring and symblepharon due to the aggravating effect of traditional midicines. Such an effect is evident in this study in which patients who had pre-consultantion traditional treatment were shown to be significantly less likely to achieve normal vision (VA better than or equal to 6/18) compared to those patients who did not use traditional medicines ($P<0.05$).

Visual outcome vs Time interval for definitive treatment

The present study showed that late provision of definitive treatment is significantly related to poor visual outcome (Table VI). It was clearly shown that the greater the time of delay for definitive treatment, the less the chances of achieving visual acuity better than 6/18 ($P < 0.01$). Mtanda (1992) had similar observation in which the number of patients with useful vision (better than 6/36) dropped from 63% in patients presenting within 24 hours to 13% in patients presenting within 1 week.

Islar (6) reported an average delay of 10 days. This was greater delay than revealed by this study (3.8 days) may be because his study population were taken from rural areas remote from the referral hospital unlike patients in this study.

Delay worsens the visual outcome as the injured eye has defence mechanisms damaged by the injury so the eye becomes more vulnerable to infections. Also delay leads to enough time for the inflammed tissue to organise into visually bad opacities where treatment become more difficult than if inflammation was reversed early. The delay in treating full hyphaema associated with secondary glaucoma may lead to the corneal staining and the glaucomatous optic atrophy. These complications are well known to be extremely difficult to treat once they occur. This means that they are better prevented than treated.

Education of the Patients

This study revealed that, over 90% of patients with eye injuries had low educational level. Whether this has an influence on ocular trauma remains to be researched further.

It can be anticipated that high level of education in a society may increase awareness to the use of preventive measures in the factories and garages; good supervision and provision of safe toys to the children; avoiding use of traditional herbs to the injured eyes and early referral for definitive treatment.

The present study showed that large proportion (41.7%) of patients presented late for definitive treatment (Table VII) and a good proportion of them did so due to their own ignorance. About half of the patients who came for definitive treatment late were delayed in the peripheral health unit possibly due to little awareness of the medical staff in those health units on the visual consequences of the delayed treatment of eye injuries.

Visual outcome vs site of eye injury

Ocular injury involving the posterior segment(vitreous, retinal or choroid) often result in permament visual loss (30 -33). The sequelae of posterior segment injury include vitreous opacity, retinal detachment and proliferative vitreoretinopathy. Other concomitants of posterior segment injury are concussive maculopathy and concussive optic neuropathy (46).

Several authors have observed that posterior segment injuries have worse visual prognosis than anterior segment injuries (3,4). Elder (1993) observed that patients with ocular injuries involving the posterior segment were less likely to achieve final visual acuity of 6/12 or better (0.05 >0.02) than those patients with anterior segment trauma alone. These findings were similarly revealed by the present study in which patients with posterior segment injuries had significantly smaller

chances of achieving visual acuity better than 6/18 compared to those patients with anterior segment trauma alone (X^2 = 36.6 P<0.001).

In this study, it was observed that patients with posterior segment injury were more likely than those with anterior segment injuries to have final visual outcome of less than 3/60 (blindness). (X^2 = 443, P <0.001). This agrees well with Elders observation in which patients, with posterior segment injuries were more likely to have final visual acuity of no light perception. (P <0.001) than those with anterior segment injury.

Visual outcome vs Grade of Severity

It is well reported that severity of ocular injury is related to visual prognosis (4,17) Mtanda et al (17) Observed that visual outcome progressively worsened with severity of the eye injury. A similar trend was observed in this study in which chances of achieving final normal vision became significantly smaller as the ocular injury became severer (P< 0.001). Likewise, chances of remaining blind as severity of ocular injury increased became significantly greater (P <0.001).

CONCLUSION AND RECOMMENDATIONS:

This study has shown that visual outcome in our enviromment following ocular trauma is poor.

It also shows that poor visual outcome in ocular

trauma is significantly related to the use of traditional medicines to the injured eyes before seeking definitive treatment in the consultant hospital.

As studies elsewhere have revealed, this study has also shown that poor visual outcome in ocular trauma is significantly related to delay in seeking medical treatment in appropriate hospitals. This delay in our enviroment is shown by the present study to be mainly due to ignorance of patients themselves and medical staff in the peripheral health units on the visual concequences of delaying ocular trauma however minor it may appear to them in the first instance.

The poor visual prognosis revealed by this study was partly attributed to many late complications known to be treatable in well equiped centres. Therefore, due to lack of appropriate treatment facilities in our enviroment, many of those treatable blinding complications remained untreated leading to worse visual prognosis.

As shown by studies done in other parts of the world, post-trauma poor visual outcome is confirmed by this study to be significantly related not only to the site of ocular injury but also to the grade of ocular injury.

The level of formal education in patients with ocular trauma in our environment is very low. Whether or not this has an influence on the incidence of ocular trauma and time to seek medical treatment, remains to be

researched further.

In view of these findings, it is recommended that big efforts should be made to secure appropriate treatment facilities for treatment of late complications following ocular trauma like keratoplasty facilities, contact lenses and instruments for vitrectomy and retinal surgery.

Health education programmes country wide must include ocular trauma and be carried out both intensively and extensively to raise awareness of patients on the significance of attending to hospital early and stop the habits of instilling traditional medicines to the injured eyes. The medical staff in the peripheral health units must be encouraged to refer the patients with ocular trauma early for definitive treatment.

SUMMARY:

One hundred and twenty patients admitted in Muhimbili Medical Centre eye ward due to eye injuries were studied to determine the post-trauma visual outcome and its contributing factors.

It was found that, visual outcome was poor as only 42% of patients had visual acuity better than $^{6}/_{18}$ at the end of 6 months follow up period; and 45% were blind (VA worse than $^{3}/_{60}$).

Poor visual outcome was found to be significantly related to late presentation for definitive treatment ($P < 0.01$). About 43% of patients presented late the main reasons being ignorance of patients themselves and lack

of awareness of the referring medical personnel in the peripheral health units. These two reasons accounted for 76% of late-presenting patients.

Other risk factors found to be related to poor visual prognosis were pre-consultation use of traditional medicines to the injured eyes in which only 15% of those who used traditional medicines got normal vision. Some blinding complications like central corneal and vitreous opacities whose prevalence was 57%, were not treated due to lack of appropriate facilities. Posterior segment injuries were found to be more associated with poor visual outcome than anterior segment injuries ($P<0.001$). None of grade IV injured eyes got normal final vision while 86% of Grade I injury got normal final vision.

It was thus recommended that great effort must be made to secure appropriate treatment facilities for post-trauma complications, and carry out extensive health educational programmes to the community with the aim of encouraging early attendance to the consultant hospital and avoid use of traditional medicines to the injured eye.

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