OCULAR TRAUMA AMONG HEAD INJURY PATIENTS AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA.

BY

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Muhimbili University of health and allied sciences a dissertation entitled;

Eye and adnexa trauma in head injury at Muhimbili National Hospital. This is done in partial fulfillment of the requirement for the degree of Master of Medicine (Ophthalmology)

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DECLARATION AND COPYRIGHT

I John Stanslaus, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for similar or any other degree award.

Signature----

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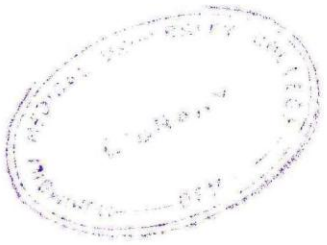
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DEDICATION

To my wife Lanta, and my lovely son Nyange,for their tolerance and support during research period.



ABSTRACT

This study was conducted at Muhimbili National hospital neurosurgery department from May 2008 to September 2008. The study population included 212 patients who were diagnosed of head injury during the study period.
Main objective was to determine ocular trauma in head injury patient. Patients of all ages and sex were included in this study.
Study design. This was a crossection study involving head injury patients. Case note reports were studied regarding causes of head injury and severity of head injury graded on Glascows coma scale as reported by the neurosurgeon. Patients were then thoroughly examined for the presence of eye trauma associated with the head injury. Data were then analysed for age, sex, causes of injury, severity of head injury on admission and associated ocular trauma.

Result; Most of the head injury patients were in the middle ages in which 85.6% of the patient were less than 46 years of age. Motor traffic accidents caused highest incidence of head injury (74.1%) . Majority of the patients had mild head injury accounting to 66%. Incidence of the ocular trauma in the patients was found to be 65.6%.

There was an increased incidence of ocular trauma with increasing severity of head injury. Significant statistical association was found between ocular trauma and severity of head injury (X^2 = 8.38, P value = 0.004). Lid laceration and lid tear were seen in 31.2% of all head injury patients. Subconjunctiva hemorrhage was found in 25.6% of the patients. Defective ocular motility was seen in 4.2%. Occulomotor nerve palsy was seen in 3.3%, abducent nerve in 0.9% and troclear nerve palsy was in 0.5% of the study population. Traumatic optic neuropathy was seen in 1.4% of the study population.

Conclusion; Ocular trauma are commonly associated with head injury. There is increased risk of ocular trauma with increased severity of head injury. Trauma of lid and conjunctiva are frequently seen in head injury than other ocular structures.

Recommendations; Patients with severe head injury needs to be reviewed by an Ophthalmologist and study on visual outcome following head injury need to be done.

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LI ST OF ABBREVIATION

- CT scan- Computed tomography scan
- E chart- Illiterate Snellens chart
- GCS- Glasgow's coma scale
- LE-Left eye
- MNH- Muhimbili National Hospital
- MRI- Magnetic resonance imaging
- MTA- Motor traffic accident
- RE- Right eye
- TBI- Traumatic brain injury
- UK- United Kingdom
- USA- United state of America

INTRODUCTION

Basic anatomy of the eye and orbit ;

The eye is a sensory orgarn situated in the orbit. The orbit are quadrangular pyramid space situated between the anterior cranial fossa above and maxillary sinuses below. It is formed by portions of seven bones, namely frontal bone, maxillary, zygomatic, sphenoid, palatine ethmoid and lacrimal bone. The orbits have four walls namely lateral wall, medial wall, floor and roof. The medial wall is the thinnest wall. Fractures of both medial and lateral wall are frequently seen in trauma of the orbit. The important structures adjacent to the orbits are the sinuses. These include maxillary sinuses below the orbits, frontal sinuses above the orbits, ethmoid sinuses medial to the orbits, and sphenoid sinuses superolateral to the orbital apex.

Orbital contents include eye ball, extraocular muscles, lacrimal gland, blood vessels, nerves, orbital fats and fascia. Nerves passing in the orbit include optic nerve, occulomotor nerve, trochlea nerve, abducent neve, ophthalmic and sympathetic nerve. Part of the maxillary nerve also emerge through the floor of the orbit.

The eye and other soft tissues of the orbit

The eye is a globular structure placed in the orbit where it occupies one sixth of the orbit. It rests on the thickened lower tenon capsule and forms a sling called suspensory ligament of Lockwood. Anterior posterior diameter of the eye ball is 24mm. The eye ball is made up of three coats, the outer most coat is a sclera posteriorly and cornea interiorly. The middle coat is the vascular layer (uvea) consisting of iris anteriorly, ciliary body at the middle and choroid posteriorly. The inner most coat is the retina and this is the layer responsible for vision.

Between the posterior surface of the cornea and the iris forms the anterior chamber of the eye which is filled with aqueous humor. The lens is suspended by the zonules attached to the cilliary body. Vitreous humor fills the posterior

segment of the eye behind the lens. Extraocular muscles are attached to the eye ball at various distances from the limbus. The extraocular muscles are supplied by cranial nerve III,IV and VI. These cranial nerves have their nuclei at the brain stem. Autonomic nerve supply is also present supplying cilliary muscles, iris muscles and the Muller's muscle in the upper lid

The optic nerve anatomically starts from the optic disc but physiologically and functionally it starts from the ganglion cell layer of the retina. It is ensheathed by the meninges and its subdural space containing cerebral spinal fluid is continuous with that of the brain. Two optic nerves meet and form the optic chiasma in which medial nerve fibres cross the chiasma. Optic nerve fibres synapse at the lateral geniculate body from which optic radiation run to the visual cortex. Some nerve fibres leave the optic tract and ascend to the pretectal nucleus from which efferent fibres to Edinger Westphal nucleus start. The Orbit communicate with the middle cranial fossa through optic foramen and superior orbital fissue

Adnexa.

The adnexa includes eye lids, conjunctiva lacrimal gland and the nasal lacrimal drainage system. The eyelids are mobile tissue placed in front of the eyeballs. They act as a shutter protecting the eyeball from injury and excessive light. There is a lower and upper eye lid. When the eye is opened the upper lid covers 2mm of the upper part of the cornea. In a crossection the lid consist of skin, subcutaneous tissue, striated muscle layer, tarsal plate and conjunctiva. The skin, subcutenous tissue and muscle forms anterior lamellar and posterior lamellar is formed by tarsal plate and conjunctiva.

The Lacrimal apparatus consist of the main lacrimal glands, accessory lacrimal glands and the lacrimal drainage system which include the punctum, canaliculi, lacrimal sac and nasalacrimal duct.

LITERATURE REVIEW

Background.

Head injuries are frequently associated with ophthalmic problems [1]. There is a significant incidence of ocular morbidity associated with head injury which often goes unnoticed and untreated at the time of head injury [2]. Ocular trauma has been found to be the leading cause of uniocular blindness and also been known to be a problem of major public importance [3,4].

Ocular injuries secondary to head trauma in the causation of blindness has become a subject of immense importance. Often when the eye is examined as part of a neurological assessment during head injury, the purpose is mainly to gauge the severity of the head injury itself and not to establish extent of associated eye trauma post head injury[5,2]. The true incidence of ocular trauma and post traumatic visual problems may be higher than generally believed[6]. Patients with orbital fractures, base of skull fracture, eyelid lacerations, and superficial eye injuries should be assessed by an ophthalmologist as part of the early management of their trauma to determine whether an ocular injury is present [7]. Despite the importance of this subject, there are few studies available covering the subject in this area.

Causes of head injury.

Head injury is a broad term that describes a vast array of injuries that occur to the scalp, skull, brain and underlying tissue and blood vessels in the head. Head injuries are also commonly referred to as brain injury, or traumatic brain injury (TBI) [8]. There could be alteration in mental or physical functioning related to a blow to the head [5,9]

The severity of head injuries most commonly are classified by the initial postresuscitation Glasgow Coma Scale (GCS) score, which generates a numerical summed score for eye, motor, and verbal abilities. The Glasgow Coma Scale, based upon eye opening, verbal and motor responses has proved a practical and

consistent means of monitoring the state of head injured patients. Observations made in the early stages after injury define the depth and duration of coma and, when combined with clinical features such as a patient's age and brain stem function, have been used to predict life outcome[10]. A score of 13-15 indicates mild injury, a score of 9-12 indicates moderate injury, and a score of 8 or less indicates severe injury[10]

Structural changes

Gross structural changes in head injury are common and are often obvious both on autopsy and conventional neuroimaging. The skull can fracture in a simple linear fashion or in a more complicated depressed manner, in which bone fragments are pushed beneath the calvarial surface[10].

Both direct impact and contrecoup injuries, in which the moving brain hit onto the distant skull opposite the point of impact, can result in focal bleeding beneath the calvaria. Such bleeding can result in an intracerebral focal contusion or hemorrhage as well as an extracerebral hemorrhage. Extracerebral hemorrhages are primarily subdural hemorrhages arising from tearing of bridging veins, but epidural hemorrhages from tearing of the middle meningeal artery or the diploic veins are also common. Occasionally, subdural hemorrhages can result from disruption of cortical arteries. This type of subdural hemorrhage is rapidly progressive and can occur after trivial head injury in elderly patients [5,9]

The head injury can be associated with scalp cut wound, scalp bruises and other facial injuries but also it may not be associated with obvious external injuries. Hypotension and hypoxia cause the most prominent secondary trauma-induced brain insults[9].

Head injury causes hospitalization of 200- 300 people per 100 000 population per year worldwide[11]. In UK, 900,000 are hospitalized in a year because of head injury. The major cause of head injury was found to be motor traffic accident. Of all people getting involved in motor traffic accident, 70% of them manifest with

head injury[5]. In a retrospective study that was done in UK, motor traffic accident was found to be responsible for 52.5% of all patients who were admitted because of head injury followed by assault which was found to be 34%[12]. Motor traffic accident has also been found the most common cause of head trauma, occurring in 195 (59.8%) patients in a retrospective study that was done in Atlanta USA of which a total of 326 patients with head injury were studied [13].

Fall from height is another important cause of head injury that has been documented. A study in Korea showed that, among all causes of head injury to children, fall from heights contributed to 35.2% [14].

In Nigeria however, a prospective study of 225 head injury patients which was done on ocular and visual complications of head injury revealed that,motor traffic accident (MTA) accounted for 84% of all causes of head injury followed by assault which was found to be 7% and fall from heights 7% [15].

In Libya, twelve hundred and ten patients were included in the study on eye trauma in road traffic accident in which among eye injuries of all types, 248 (20.5%) patients were found to have been caused by road traffic accidents[16].

On the other hand, a retrospective study that was done in Bugando hospital Tanzania on epidemiology of injury patients recruited all patients admitted and seen in casualty with injury. In this study 3590 cases were recorded. The leading causes of injuries were found to be falls, (28.7%) and motor traffic accidents (17.9%) [17], while a similar study done at Muhimbili orthopaedic institute in Dar es Salaam revealed that 80% of admission was due to motor traffic accident[18].

Sports has also been mentioned among causes of head injury however its contribution to causes of admission is little as compared to its contribution to admission due to eye trauma not related to head injury[19]

Mechanism of ocular trauma in head injury

The mechanism of eye trauma in head injury is either direct or indirect trauma of the eye. Direct trauma is when there is a force applied directly to the eye while indirect injury is when the force of impact in the head injury is transmitted to the eye and other structures in the orbit and in most cases it is related to the severity of head injury[20]. Blunt trauma to the superior orbital rim or frontal temporal region of the cranium transmits compression force to the optic canal and orbital apex causing injury to the optic nerve [20,21]. During head injury both direct and indirect trauma to the eye and adnexa may happen simultaneously.

Palsy to cranial nerves could be due to increased intracranial pressure or haemorrhage but also the long course of the cranial nerves at the base of the skull account for many neurological sequele of head injury[5,22].

Adnexa injuries

In the eye lid, injuries may be ecchymosis, traumatic ptosis, laceration or evulsion of the lid. Periorbital ecchymosis, is commonly known as a "black eye," (blood accumulation in the subcutaneous tissue of the eyelids). It occurs because of the loose connective tissue beneath the skin that allows collection of blood. It is usually more noticeable in the lower lid and occasionally forms an organized hematoma or firm purplish-black mass. The lacrimal gland can be torn and any part of the lacrmal drainage apparatus may be traumatized. Injury to the medial part of the eyelid may cause trauma to lacrimal drainage apparatus[28].

Eyeball injuries

The conjunctival trauma include subconjunctival hearmorrhage, chemosis and tear. Subconjunctival heamorrhage occurs when there is bleeding beneath the conjunctiva. Subconjunctival heamorrhage may be localized or diffusely spread. With lacerations, the conjunctival edges have a tendency to be rolled due to the conjunctiva's elastic nature. There may be cornea abrasion, or perforation and

blood may be found in the anterior chamber which is a result of injury to the iris or ciliary body[2, 28].

Trauma to the iris may manifest in several ways. There may be rupture of the pupillary margin sparing the rest of the iris but also a radiating tears of the iris stroma may reach the ciliary body. Detachment of iris from its root at the cilliary body (iridodialysis) occurs resulting into a D shaped pupil. Traumatic aniridia is also known to occur in which the iris is completely torn and sinks to the bottom of the anterior chamber. Blunt trauma to the eye may lead to tear of the iris vessels causing hyphema[28].

On the anterior capsule of the lens a circular ring of brown pigment called Vossius ring may be seen. The ring occurs due to striking of the contracted pupillary margin against the crystalline lens. The lens may be catarractous , dislocated or subluxated. Lens subluxation occurs when there is partial tear of the zonules while lens dislocation occurs when there is complete tear of the zonules. Traumatic cataract occurs when the lens capsule is damaged. There may be vitreous detachment, hearmorrhage or vitreous herniation into the anterior chamber. Other conditions that may happen include retinal detachment traumatic uveitis and glaucoma[2, 28].

The globe can also rupture and this is due to the compresional force caused by the impact which result in momentary increase in intraocular pressure. The superonasal limbus being the most common site of globe rupture usually as a result of a pressure transmitted from most exposed lower temporal quadrant. Avulsion of the optic nerve may also happen during trauma[24].

Orbital injuries

Orbital fracture can occur in head injury, which may be accompanied by orbital hemorrhage which causes acute proptosis. Emphysema may also be the accompanying sign when fracture has involved any of the sinuses. Orbital

fractures commonly involve the medial and inferior walls of the orbit. Any of the nerves supplying ocular structures may also be traumatized. Trauma may be anywhere along the course of the nerve from the orbit to the intracranial part. Some of the nerve palsy may not recover at all, while some may recover partially and some may recover completely. Earliest recovery of the neurophthalmic palsy is known occur from a month[25].

Diagnosis of ocular injury

How the injury was sustained gives clues about what to look for during the examination. It may not be possible to get an accurate and reliable history from children or unconscious patient if an adult has not witnessed the injury. In all causes of head injury both direct and indirect eye trauma may occur. Accompanying direct trauma to the eye caused by glasses, metals or vegetation has to be anticipated. If there has been a forceful blunt injury (such as a punch), signs of a "blowout" fracture should be sought.

Visual acuity is the first test done when examining the eye. However, a normal visual acuity does not necessarily exclude serious ocular trauma even in a penetrating injury yet it is a very informative aspect of ocular examination[26].
After taking the visual acuity different ocular structures are examined one after another. The lids are examined earlier followed by the conjunctiva. Cornea is the next ocular structure examined after the conjunctiva. In the anterior segment of the eye, structures that are examined include aqueous homour, pupil, iris and lens. In the posterior segment of the eye, structures that are examined include vitreous, retina, choroid, and optic disc. Extraocular muscles are examined by testing ocular motility [2, 26].

Systematic ophthalmological examination may suffice to diagnose a traumatized eye. There is distinctive aspect of eye trauma resulting from direct and indirect ocular trauma that may not be recognized by clinical examination and needs to be further investigated. Investigations which are frequently employed in diagnosing

eye injury are imaging investigations which include ultrasonograhy, X-ray, CT or MRI[26]. These investigations are able to localize the lesion and rule out presence of the foreign body in the eye and orbit.

Incidence and pattern of ocular trauma.

The outcome of the associated ocula trauma in head injury is among other things that influences the quality of the life on recovery from head injury. Although sophisticated imaging techniques are available to localize lesions, early ophthalmic assessment in correlation with the Glasgow's coma scale aids in prognosticating outcomes[12]. There are approximately 2.4 million ocular and orbital injuries in the US per year.. In the US trauma is the leading cause of unilateral blindness[12].

There was an association between severity of the injury, fracture of the base of the skull, and its foramina and the frequency of cranial nerve involvement[2]. Pupillary involvement, papilloedema, and ocular motor paresis point to a more severe head injury[12]. An abnormal neuro-ophthalmic examination was noted in 185 of 326 patients (56.7%) in a retrospective study that was done in Atlanta, USA. In this study, loss of consciousness was not associated with any outcome, but the presence of a neuroimaging abnormality, particularly intracranial hemorrhage, was significantly associated with specific neuroophthalmic deficits.[13] A retrospective study of 210 patients with closed head injury which was done in Michigan USA, revealed that Cranial Nerve III, IV and VI injury were found to have been associated with a significantly higher severity of head injury, more CT abnormalities, and worse short-term neurological outcomes as compared with the patients without cranial nerve involvement . Those with cranial nerve III palsy had the most severe head injury; those with cranial nerve IV palsy had an intermediate level of head injury; and those with cranial nerve VI palsy had the lowest level of head injury[11]. Though cranial nerve IV palsy can occur even in mild and moderate head injury, closed head injury has been reported to be the

most important cause and the palsy is known to occur even in the absence of CT abnormalities[27,28].

A prospective study that was done in Congo on aetiology of third cranial nerve palsy, frequently third cranial nerve palsy was found post trauma without pupilary dilatation (63.2%). In this study, trauma was found to be responsible for 12.9% of all causes of cranial nerve III palsy[29]. Isolated third cranial nerve palsy in head injury patients can be the result of direct or indirect damage to the oculomotor nerve and they are usually associated with severe head trauma[30]. A case of oculomotor involvement in minor head injury however has been reported[31]. A prospective study that was carried on cranial nerve damage in Pediatric following head injury involved a long term follow up of 741 children with head injury. In this study it was reported that, after head injuries often the cranial nerves of the oculomotor system are affected 20.2% being transient trauma and 7.0% was permanent, followed by optic atrophy (4.88%) [22]. In a prospective study carried in Nigeria on ocular complications of head injury in children in 1990, neuro-ophthalmological lesions were found to be one-third of these complications. In this study, neuropthalmic lesion which was seen most involved the optic nerve, and were associated with other focal neurological signs more frequently than non-neural ocular complications[23].

In Australia, a prospective study on ocular manifestation of head injury involving 161 patients with head injury was done. In this study commonest ocular problems which were reported include accommodative disorders which occurred in 16%.

Other accompanying ocular manifestation of head injury reported include convergency defect (14%), pseudomyopia in 19% and optic atrophy[1].Traumatic optic neuropathy was reported in several studies as one of ocular complications of head injury. Traumatic optic neuropathy can be caused by optic nerve compression from displaced surrounding tissue or optic nerve transaction due to fractured bone or penetrating trauma. Injuries of the optic nerve occurs in the

setting of head injury which is often a consequence of road traffic accident or fall[20]. Optic nerve injury however, most commonly arises from indirect damage, occurring in 0.5% to 5% of all closed head trauma[3,20,32]. A prospective study that was carried out on cranial nerve damage after pediatric trauma involving a total of 741children with head injury reported that 4.88% of the children had optic atrophy[22]. Optic nerve avulsion usually follows severe orbital trauma but cases have been reported following relative trivial injury. Ophthalmoscopy examination shows absence of optic disc and a ring of heamorrhage[33]. Intraretinal and preretinal hemorrhages, predominantly in the posterior pole were reported in the study on crush head injuries. Hemorrhage under the internal limiting membrane or extending to the ora serrata were only seen in situations where crush injury was part of a fatal trauma scenario related to motor vehicles[34].

In a prospective study that was done in UK, a total of 200 patients with closed head injury were recruited in the study in which incidence of ocular and adnexa trauma in head injury has been reported in up to 83.5% of all patients with head injury[12].

The patterns of ocular involvement have been varying in different studies done in different settings. In a prospective study that was done in UK recruiting 200 patient with closed head injury, ecchymosis was found in 46% of all patients who had head injury, orbital fractures in 12%, pupillary involvement 6.5%, papilloedema 5.5%, proptosis was found in 3% corneal sclera tear 2%, lateral rectus palsy 2% and optic nerve trauma 0.5% [12].

In Nigeria, a prospective study was done In Illorin teaching hospital on visual and ocular involvement in head injury recruiting 225 patients of all age groups admitted in the hospital. In this study visual and ocular involvement was found only in 25.3% of all patients with head injury. Multiple ocular injuries were found in 60% of the patients who had ocular involvement. Ocular and adnexa that were reported in this study showed that out of 57 patients who had ocular involvement,

17 had ecchymosis,12 subconjunctival heamorrage ,10 lid laceration ,5 corneal sclera laceration and 2 patient had retinal heamorrhage [15].

In a prospective study that was done on eye injuries in patients with major trauma in Australia, 178 patients with major trauma, head injury inclusive were studied. In this study 16% of the 178 patients studied had ocular or orbital trauma.. 55% of patients with injuries involving the face had ocular or orbital injuries[7]. In Libya, a cross section study on eye trauma in road traffic accident was carried out in which 1200 patient involved in road traffic accident were studied. In this study, it was reported that right eye was injured in 116 (42%) patients and the left eye in 104 (37.7%) and bilateral eye involvement was seen in 28 (20.3%) patients[16].

Age and sex

The age with the highest incidence of ophthalmic complications related to trauma in different studies has been reported to be between 11-40years[4,5,11]. A study that was done in India on non fatal road traffic accidents revealed that out of total 423 subjects, 363 (85.8%) were male while only 60 (14.2%) were female subjects. The majority of the victims (75%) were in the age group 18- 37 years. There is a much greater probability for young males to be affected

In the Beaver Dam Eye Study, 20% of adults reported ocular trauma in their lifetimes and those who had experienced an initial trauma were 3 times more likely to experience trauma[3]. A similar trend has also been observed in a study that was done on gender differences on aetiology and outcome of globe injuries done in Massactusates USA. In this study men were found to have more frequencies of eye injury than females[31]. A cross section study that was carried in Libya on eye trauma in road traffic accident involving 1200 reported that 82% of the cases occurred in the patient bellow 32 years of age. In a prospective study done in Nigeria on ocular and visual complication of head injury, the youngest and oldest patients were 9 and 57 years respectively mean age being 28[15].

In Dar es salaam, a retrospective study on motor traffic accident contribution to death between 1985 to 1990, found that age between 19-30 had the highest incidence of being involved[3]

PROBLEM STATEMENT

The eye is one of the structure of the body that is commonly involved in head injury. Studies carried out in different countries have reported that eye injury of varying severity occurs in head injury. A frequency of up to 84% ocular involvement in head injury has been reported [11]. In Muhimbili National hospital more than 1200 patients with head injury are admitted annually.

The manifestation of head injury and its numerous other systemic complications are so compelling that visual system examination is likely to be ignored. Thus early eye care to patient with head injury may not be the priority. Some eye injuries are left undiagnosed when ophthalmological examination is not done[40]. Eye examination needs special instruments and skills and therefore needs to be done by an ophthalmologist. Conditions such as endophthalmitis could be prevented if cornea perforation would have been noted and managed earlier. Similarly, ambylopia could have been avoided if traumatic ptosis is noted and managed earlier in a child of below 7 years. This study aims at establishing the magnitude of the ocular trauma associated with head injury. This will provide a focus an importance of thorough ophthalmological examination to the patients with head injury and therefore early eye care for patients with head injury at Muhimbili National Hospital.

RATIONALE OF THE STUDY.

The presence of differences in frequencies of ocular manifestation of head injury in different setting in the previous studies invite for a need to establish magnitude at our setting. There is no such study which has been done in Tanzania, therefore the magnitude of the problem is not known at our setting. Muhimbili being a national hospital where consultancy in different specialities is offered, a question of associated eye trauma in head injury need to be addressed.

The result of this study will help to alert doctors of the possible associated eye injuries when managing patients with head injury thus providing required attention in holistic management of head injury. This will stage up ophthalmic care in associated eye trauma in the course of head injury. Resulst of this study will also help the policy makers in planning for having an ophthalmologist in the neurosurgery team for providing early eye care whenever an eye problem is encountered during head injury. This study will also strengthen the link between neurosurgery and ophthalmology departments in terms of interdepartmental referral and consultations of cases with head injury.

OBJECTIVES

Broad objective; To determine ocular trauma among head injury patients at Muhimbili National hospital

Specific objectives;

1. To determine incidence of ocular trauma in head injury patients
2. To determine occurrence of ocular trauma in head injury according to age and sex
3. To determine occurrence of ocular trauma according to cause of head injury.
4. To determine occurrence of ocular trauma according to severity of head injury

METHODOLOGY

Study design;

This was a crossection study of patients with head injury admitted in the neurosurgery ward at Muhimbili national hospital, between May and September 2008.

Study area description;

The Muhimbili National Hospital is the largest government owned hospital working as a consultant national hospital and also a teaching hospital. It is located at the center of the Dar es salaam city. It serves the patients who are referred from regional hospitals whoever most of the patients come from Dar es salaam city. It offers consultancy services in various disciplines neurosurgery and eye services inclusive. About 1000 people are attended daily at Muhimbili National Hospital as outpatient on week days (Monday to Friday). There is an average of 3 patients admitted daily with a diagnosis of various degree of head injury in the neurosurgery ward. All the patients are seen at the casualty department then admitted in the respective ward depending on diagnosis made. Once head injury is diagnosed the patient is admitted in the neurosurgery ward.

A preference to carry out this study at Muhimbili National Hospital was made considering the number of patients with head injury admitted daily which gives assurance on coverage of the required sample size on the provided time for the study.

The presence of neurosurgeons in this hospital has also been considered for choosing Muhimbili National Hospital as a right place to carry out this study. With the presence of neurosurgeon, thorough neurological examination and correct diagnosis is expected. Moreover, Muhimbili National Hospital is also the centre where advanced diagnostic investigation can be offered.

Study population;

All patients who were diagnosed of having head injury and admitted in the neurosurgery ward at Muhimbili National Hospital between May and September 2008 were taken as the study population. Patients of all ages and sex who were diagnosed of head injury were recruited in this study.

Exclusion criteria

Patients who gave history of previous eye injury or any previous eye problems were not included in this study. Information about previous eye problems were inquired from the patient or relative in case the patient was unconscious. This aimed at avoiding some ambiguity as to whether the encountered eye problem was the result of the associated eye trauma in head injury or previous underlying eye problems. Patients who did not consent were not included in this study.

Sample size;

. A sample size was calculated from the following formula

$$N=Z^2P(1-P)/E^2$$

Where, N= Sample Size

Z= 95% confidence interval (Z=1.96)

P= Estimated proportion of the patient with head injury who had eye and adnexa involvement (P=83.5%, study done in UK)

1-P= Estimated proportional of patient with head injury without eye and adnexa involvement.(1-P=0.165)

E= Desired precision (marginal error= 0.05)

From the above formula, a sample size of 212 patients was obtained.

Instruments;

Several instruments were used to conduct this study. These instruments included, Snellen's chart, ophthalmoscope, torch, slit lamp, cyclopentolate eye drops, magnifying loope, and sheet papers for collecting data.

Snellen's chart;This is an instrument which is used for assessing visual acuity. Two types of Snellen's charts were used.

These are Literate and Iliterate chart (E chart). Literate chart was used for the patients who can read and Iliterate chart was used for the patients who were not able to read. Visual acuity of the children who were not able to read was also assessed using Illiterate chart.

Pen torch was used for providing illumination when examining the eye and also for testing pupillary reflex. Before subjecting the patient to slit lamp examination, examination using a torch was done on both eyes.

Magnifying loope; this is an instrument that magnifies the size of the objects. It was used for examining external ocular structures. Every patient was examined using magnifying loope before being examined on the slit lamp. This was done with an assistance of the torch.

Slit lamp; This is the instrument which provide special way of illumination that allows to examine different parts of the eye. Parts of the eye that were examined using slit lamp include external eye, anterior segment and posterior segment. For patients who were unable to sit on the chair for slit lamp examination because of severe injury, slit lamp examination was done when the patients have some improvement. Part of the examination which was possible on bed side such as examination with a torch and magnifying loope was done in the bed side.

Mydriatic drug;. This is the drug prepared in form of eye drops which was used for dilating the pupil. . In this study cyclopentolate was used because of easy availability and its short acting property.

Ophthalmoscope; This is the instrument which is used for examining the fundus. Two types of ophthalmoscope were used in this study. These were the direct and indirect ophthalmoscope. Both direct and indirect ophthalmoscope were used interchangeably.

Data sheet were used for collecting information. Every patients had his/her own data sheet. Information recorded in the data sheet include case note report on cause of head injury and Glasgows coma scale as per neurosurgeon examination. Eye examination findings of the patients was also done and recorded on the data sheet. Other informations that were also recorded in the data sheet included Name, age, sex, and residency.

Glasgow's coma scale; this is the consciousness scoring method that grades the level of conscious. It provides some light on the severity of the head injury and also in predicting the prognosis. Glasgows coma scale is graded as mild, moderate and severe. The total score in Glasgows scale is 15. Mild head injury range from 13 – 15. Moderate head injury range from 8- 12 score. Severe head injury range from 3- 7. Scores are based on verbal response, eye opening and motor response.

Data collection;

Patients were seen within 24 hours of admission so that patients who were to be discharged within 24 hours should not be missed but also to be able to visualize ocular traumatic signs before the signs start resolving as time elapse.

Patients who had head injury were identified in the ward.

Information on age, cause of injury and score of the Glasgow's coma scale on admission were taken from the case note as recorded by neurosurgeon.

The patients were then reviewed for signs of ocular trauma associated with head injury. Signs that were assessed are outlined below.

Visual acuity was assessed as part of the general eye examination. Since this study does not aim at assessing visual outcome following head injury then failure

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to assess visual acuity for the patients who were unconsious has no impact on the result of this study. Visual acuity was assessed using Snellens chart. Both literate and Illiterate chart were used. Assessment of visual acuity to children was done according to the age.

For the school children Snellen's chart was used. Visual acuity for the neonates was assessed by grading visual fixation and following objects. Visual acuity of the patients who were unconscious was not assessed.

The signs in the lid were also examined. The signs included presence of ptosis, ecchymosis, and laceration /tear. The conjunctiva was examined for the signs of subconjunctival heamorrhage or tear. The cornea was examined for signs of oedema, laceration or perforation using a torch magnifying loupe and slit lamp. Anterior chamber was examined for the presence of hyphema. Pupil was examined for size and shape and iris was examined for tear. Lens was examined for sublaxation dislocation and cataract.

Pupils were dilated using cyclopentolate followed by the fundus examination using direct or indirect ophthalmoscope. Vitreous heamorrhage was also looked for when examining the fundus. Retina was examined for the signs of heamorrhage, edema and retina tear. Optic disc was also examined when doing fundus examination. Signs in the optic disc that were examined were disc heamorhage, optic nerve avulsion and optic nerve atrophy in subsequent follow up.

Ocular movements were also tested on both eyes. Testing for ocular motility aimed at establishing for presence of cranial nerve palsy. Both duction and version movements were tested. All extraocular muscles were tested by testing movements in all cardinal positions. Paralysis of the individual muscle was picked on ocular motility test. For the patients who were found unconscious, ocular motility were tested after regaining consciousness.

Patients who were found to have eye trauma and got discharged, were followed for a minimum of one month and those who remained admitted in the ward were

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followed in the ward until discharge. Patients who had no eye trauma at all, were not given appointment for follow up. At discharge, patients who had eye trauma were discharged through the eye clinic. On follow up, patients had eye examination again, and condition like optic atrophy was looked for as traumatic optic atrophy is known to be evident from two weeks onward. The informations for every patient were then transferred in the data sheet. Patients found to have eye problems that required medication were prescribed medication. Patients who were unconscious in the risk of exposure keratitis were prescribed eye ointment.

Study limitation;

Examination of the fundus in patients who had massive vitreous heamorrhage was limited as vitreous hemorrhages take a long time to clear. In the presence of blood in the vitreous it was not possible to visualize the fundus. Moreover the state of the pupil, iris, lens, vitreous and fundus was not possible in total hyphaema which ended up with corneal staining.

General ethical consideration;

Research permission was sought from Muhimbili University ethical committee. Permission to conduct the study in the neurosurgery ward was obtained from the head of the neurosurgery firm. Informed consents were obtained from the patients. For those who were unconscious consents was obtained from their relative.

For the children informed consents were obtained from their relatives whether they were unconscious or conscious.

Ophthalmological ethical consideration;

Examination of the eye was conducted in a manner that no pain was inflicted. Before instilling cyclopentolate eye drops to dilate the pupil, patients were explained of the effects of the medication especially temporary short term loss of accommodation after instilling cyclopentolate.

Information that were recorded in the data sheet were used only for the purpose of this study only and not otherwise.

Data analysis;

Data collected in the data sheet were coded then entered in the computer. Cleaning of the data was done. Data analysis was then done using computer Epi info programme. Display of the analysed data was done for checking of the data anomaly. Cross tabulation according to the Dumy tables which were already prepared to answer the objectives was then done. Necessary statistical calculation like chie square were also performed using the same computer programme.

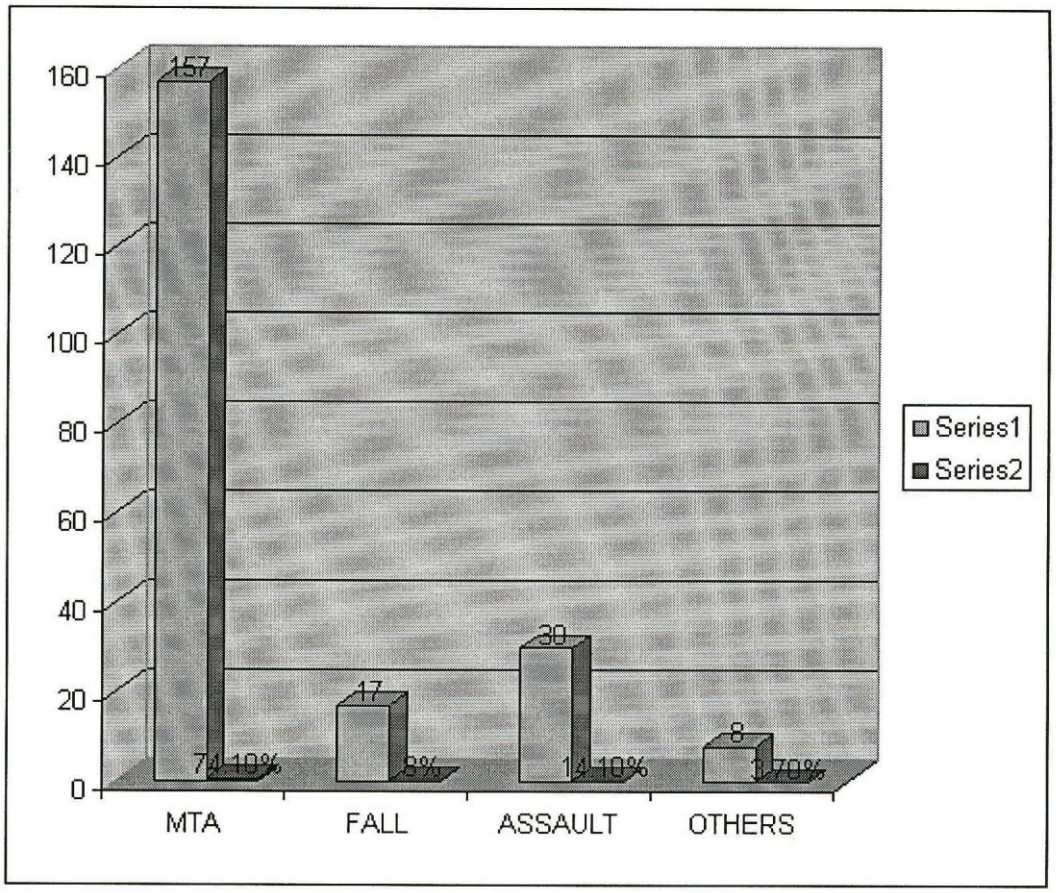
RESULTS

Table1. Age and sex distribution of the study group.

Age in years	sex frequency		Total frequency	%	Cumulative%
	Male	Female			
<5	2	1	3	1.42%	1.42%
5—15	28	3	31	14.58%	16.00%
16-25	28	10	38	17.90%	33.90%
26-35	57	15	72	33.90%	67.90%
36-45	30	6	36	17%	84.90%
46-55	10	4	14	6.60%	91.50%
56-66	10	2	12	5.70%	97.20%
>66	4	1	5	2.40%	100%
Total	170	42	212	100%	

Highest frequency was seen between 26-35 age group and 84.9% of all patients were bellow 46 years of age. Both low and high extremities of age were seen in lower frequencies compared to middle age.

Figure 1; Bar chart showing varies causes of head injury



Motor traffic accident was the commonest cause of head injury.

Table 2. Incidence of ocular trauma in head injury

Presence of ocular trauma	Count	%
Yes	139	65.60%
No	73	34.40%
Total	212	100%

Majority of the patients who had head injury were found to have ocular trauma in which 65.6% had ocular trauma.

Table . Occurrence of ocular trauma according to the sex.

Gender	Presence of ocular trauma		Total
	Yes	No	
Male	110(64.7%)	60(35.3%)	170(100)
Female	29(69%)	13(315)	42(100%)
Total	139(65.6%)	73(34.4%)	212(100)

Ocular trauma was seen in both sex and there was no much difference in the incidence of ocular trauma between male and female in which 64.7% of male and 69% of female had ocular trauma.

Table4. Occurrence of ocular trauma in head injury according to age

Age in years	Presence of ocular trauma		
	Yes	No	Total
<5	1(33.3%)	2(66.7%)	3(100%)
5—15	19(61.3%)	12(38.7%)	31(100%)
16-25	22(57.9%)	16(42.1%)	38(100%)
26-35	48(66.7%)	24(33.3%)	72(100%)
36-45	26(72.2%)	10(27.8%)	36(100%)
46-55	11(73.3%)	4(26.7%)	15(100%)
56-66	8(66.6%)	4(33.3%)	12(100%)
>66	4(80%)	1(20%%)	5(100%)
Total	139(65.6)	73(34.4%)	212(100%)

Ocular trauma was found in all age groups. There was no statistical evidence of association between age and ocular injuries among patients who had head injury ($X^2 = 2.02$, P value = 0.155)

Table 5. Frequency of trauma to external eye structures.

External eye trauma	Count	%
Ptosis	13	6%
Lid tear/laceration	67	31.20%
Lid ecchymosis	54	25.10%
Subconjunctiva heamorrhage	55	25.60%
Chemosis	32	14.90%
Conjunctival tear	2	0.90%
Cornea perforation	0	0%
Cornea sclera perforation	2	0.90%
Sclera perforation	0	0%
Globe rupture	1	0.50%

Lid laceration and ecchymosis were the most external eye trauma which were seen in 31.2% and 25.1% of the patients respectively.

Table 6; Frequency of intraocular structures trauma

Intraocular trauma	Count	%
Hyphaema	9	4.20%
Pupilary dilatation	38	17.70%
Iris tear	5	2.30%
lens dislocation/sublaxation	3	1.4%
Vitreous heamorhage	3	1.40%
Retina tear	0	0%
Retina heamorhages	8	3.70%
Macular oedema	9	4.20%

Pupilary dilatation was the most common intraocular sign seen occurring in 38% of all patients followed by hyphaema and macular oedema.

Table 7. Incidence of neuropthalmic palsy and traumatic optic neuropathy

Nerve	State of the nerve		Total
	Palsy	Normal	
Oculomotor	7(3.3%)	214(96.7%)	211(100%)
Trochlea	1(0.5%)	210(99.5%)	211(100%)
Abducent	2(0.9%)	209(99.1%)	211(100%)
Optic	3(1.4%)	208(98.6%)	211(100%)
Total	13(6.2%)	198(93.8%)	211(100%)

Oculomotor nerve palsy was the most common occurring in 3.3%. Testing of ocular motility in one patient was not possible immediately and patient died later. During follow up, 2 patients who were diagnosed of traumatic optic neuropathy had obvious optic atrophy and one of them had no light perception in the traumatized eye. Defective ocular motility was seen in 9 patients which account to 4.2% of the studied patients. Among all head injury patients who had eye trauma 6.2% had ocular motility defect.

Table 8. Ocular trauma according to the severity of head injury.

Severity of head injury	Presence ocular trauma		Total
	Yes	NO	
Mild	82(57.7%)	60(42.3%)	142(100%)
Moderate	28(75.7%)	9(24.3%)	37(100%)
Severe	29(87.9%)	4(12.1%)	33(100%)
Total	73(34.4%)	139(65.6%)	212(100%)

P value = 0.004, X2 = 8.38

Ocular trauma appeared in highest frequency among patients who had severe head injury (87.9%) followed by moderate head injury(75.7%), and mild head injury (57.7%) . There is a significant association between ocular trauma and severity of head injury (X2 8.38, P value = 0.004).

Table 9. Pattern of external ocular trauma according to severity of head injury

External eye trauma	Severity of head injury			Total
	Mild	Moderate	Severe	
Ptosis	8(61.5%)	2(15.4%)	3(23.1%)	13(100%
Lid laceration	42(62.7%)	11(16.4%)	14(20.9%)	67(100%)
Lid ecchymosis	31(57.4%)	13(24.1%)	10(18.5%)	54(100%)
Subconjunctiva heamorrhage	32(58.2%)	10(18.2%)	13(23.6%)	55(100%)

External ocular trauma was seen in all degrees of head injury with highest frequency occurring in mild head injury.

Table 10; Pattern of intraocular trauma according to severity of head injury

Intraocular trauma	Severity of head injury			Total
	Mild	Moderete	Severe	
Cornea scleral perforation	0(0%)	0(0%)	1(100%)	1(100%)
Globe rapture	0(0%)	0(0%)	1(100%)	1(100%)
Hyphaema	3(33.3%)	3(33.3%)	3(33.3%)	9(100%)
Pupilary dilatation	14(36.8%)	6(15.8%)	18(47.4%)	38(100%
Iris tear	2(40%)	0(0%)	3(60%)	5(100%)
H Lens dislocation	1(33.3%)	0(0%)	2(66.7%)	3(100%)
Vitreous heamorhage	0(0%)	0(0%)	3(100%)	3(100%)
Retinal heamorhage	1(12.5%)	1(12.5%)	6(75%)	8(100%)
Macular edema	2(22.5%)	0(0%)	7(77.5%)	9(100%)

There is high frequency of intraocular trauma in severe head injury than other degrees of head injury. All patients who had vitreous hemorrhages had severe head injury and 75% of all patients who had retinal heamorrhages had severe head injury.

Table 11. Neurophthalmic trauma according to severity of head injury

Nerve involved	Severity of head injury			Total
	Mild	Moderate	Severe	
Oculomotor	2(26.6%)	1(14.3%)	4(57.1%)	7(100%)
Trochlea	1(100%)	0(0%)	0(0%)	1(100%)
Abducent	0(0%)	2(100%)	0(0%)	2(100%)
Optic	1(33.3%)	0(0%)	2(66.7%)	3(100%)
Total	4(30.8%)	3(23%)	6(46.2%)	13(100%)

Highest frequency of nerve palsy was found in severe head injury (46.2%).Oculomotor nerve palsy and traumatic optic neuropathy were more frequent in severe head injury than other nerves.

Table 12. Ocular trauma according to the cause of head injury

Causes of head injury	Presence of ocular Trauma		Total
	Yes	No	
MTA	107(68.2%)	50(31.8%)	157(100%)
Fall	9(52.9%)	8(47.1%)	17(100%)
Assault	20(66.7%)	10(33.3%)	30(100%)
Others	3(37.5%)	5(62.5%)	8(100%)
Total	139(65.6)	73(34.4%)	212(100%)

Ocular trauma occurred in all causes of head injury. No significant statistical association found between cause of head injury and ocular trauma ($9X^2$ = 0.41, P value = 0.155).

DISCUSSION

Eye trauma and head injury as a different subject has been separately studied extensively however very little has been published on eye trauma occurring during head injury[1,6].In this study, 212 patients of various age, sex and severity of head injury were studied to determine occurrence of ocular trauma in head injury patients. The majority of these head injury patients were males and this predominance were at all age groups. There is a great probability of young male to be involved in accidents and ophthalmic complication and highest incidence was found between the age 11-46 years[1,2,20,32] . Similar findings were reported in many other studies[1, 3, 12].

In this study, majority of the patients were under the age of 46 years which is similar to report from other studies in different parts of the world. There were low frequencies of head injury among patients who fall in the extremities of age. This trend was thought to be due to activeness of the young adult in production activities which in one way or another exposes them to trauma related to transportation or their activities. Again, this is the group that commonly involve in social activities such as drinking which may further expose them to accidents related to reckless driving and assault.

. In this study motor traffic accident was the major cause of head injury. Motor traffic accident was also reported in other studies as the major cause of head injury[1,2,4,6,9]. The incidence of head injury caused by motor traffic accident reported in other studies has been varying from one place to another. Incidence of head injury contributed by motor traffic accident seems to be closer alike between this study and the study that was done in Nigeria than that reported in UK and Atlanta USA.[3,4,6] . Contribution of motor traffic accident in causing head injury seems to be higher in developing countries than developed countries. Though motor traffic accident appears to be the leading cause of head injury in both developing and developed countries; its magnitude is higher in developing than developed countries. This can be explained by the differences in road

infrastructures between developing and developed countries. Moreover, unlicensed driving and lack of strictness in road traffic regulations which is seen in developing countries is responsible for the high incidence of head injury caused by motor traffic accident seen in developing countries [6] . Furthermore, there has been a recent increase in motorized transport in Tanzania which probably is not accommodated by the available infrastructure and therefore attributes to increased road traffic accidents.

Contribution of assault in causing head injury in this study was found lower than that reported from the study done in UK. The assault that were seen in this study include rubbery, fight caused by interpersonal conflict and the bandits insulted by the citizens. Differences seen between the study done in UK and this study could probably be due to differences in economy in which in developed countries many people can afford legal ownership of the weapons which in turn may be miss used. Excessive drinking has some contribution in accelerating interpersonal conflicts due to impaired decision making in the state of being drunk and probably this add to high incidence seen in UK.

Fall from height in this study was found to be similar to the study that was done in Nigeria[6,3] . In Bugando hospital however, fall was found to have high incidence in causing injuries than motor traffic accidents of which inverse is true in this study[8]. Fall as a cause of injury in this study also differed from report in the study done in rural Tanzania on causes of trauma in which fall was the leading cause[32].The differences in these findings can be explained by several things, including setting of the study area of which in Mwanza motorized transport is not as crowded as in Dar es salaam and therefore represent more of the rural population. Moreover, study in Bugando did not focus on causes of head injury exclusively, but causes of the injuries as a whole were studied. Climbing of coconut tree when harvesting and extensively ongoing long buildings construction are the major cause which seems to be the same between Nigeria and Tanzania.

Incidence of fall from height as a cause of head injury in this study was found low compared to that reported in Korea [5] .

In many developing countries, not only is the incidence of various injuries increasing but also the causative factors are changing from the historical patterns such as falling from trees to injuries due to occupational hazards, interpersonal violence and road traffic accidents, which appear to be the leading cause of traumatic injuries[9] . Nature of the study that was done in Atlanta which was retrospective studies as opposed to this study and the study done in Nigeria which was prospecti.ve study may also contribute to differences noted. Since incidence of the causes of head injury seen in this study and that done in Nigeria are closer alike than those reported in developed countries then this represent similar population, activities and infrastructures.

In this study, most of the patients with head injury had ocular trauma which indicate the the importance of eye care in head injury patients. Result from this study showed high incidence (65.6%) of the various ocular trauma occurring in the head injury patients. This is a low incidence as compared to the prospective study that was done in UK in which 83.5% of the patient who had head injuries were found to have ocular trauma[3]. Despite of being lower than that reported in UK, incidence of ocular trauma in this study was higher than that reported in Nigeria[6] . The difference seen between these studies is probably attributed to the differences of the magnitude of different causes of head injury as seen above. In UK for instance assault was higher in magnitude than both in Nigeria and in this study. Thus this may explain the differences in the incidence of ocular trauma in these studies. In the scope of this study however, it is not very clear as for why the incidence of ocular trauma between this study and that of Nigeria differs since these studies represent very similar population in many aspects.

Severity of head injury was found to be related to ocular trauma. The finding in this study showed that, the severe the head injury is the patient, the more likely

hood for ocular trauma. The result showed significant statistical association between ocular trauma and severity of head injury,(X^2 = 8.38, P value 0.004). Similar association has been reported in other studies[6,14]. Position of the eyes, its embryological development and mechanism of ocular trauma in head injury explains the association[24]. There is likely hood of delay in ocular trauma treatment in severe head injury patients as sometimes patients has to stabilize before taking the patient to theatre for surgical treatment of the ocular condition.Though motor traffic accident was the major cause of head injury, incidence of eye trauma seen in head injury due to motor traffic accident was not different from other causes of head injury seen in this study. No significant association was found between causes of head injury and eye trauma. From this study, it was revealed that cause of head injury does not dictate the magnitude of ocular trauma, however severity of head injury due to any cause had an effect on magnitude of ocular trauma. It is from this likelihood of ocular trauma in severe head injury that necessitates ocular examination of all patients particularly those with severe head injury.

The lid, conjunctiva and anterior segment of the eye were more frequently seen. Lid laceration/tear was found in relatively high frequency. Being the most external structure, the lids are likely to be traumatized in the event of head injury[6]. Similar result was reported in the study that was done in UK, and higher than those reported in Nigeria[3,6]. The frequency of subconjunctival heamorrhage was found in this study is comparable to that reported in Nigeria. Injury to this part of the eye results from direct impact on the rigid frontal bone and orbital margins producing periorbital ecchymosis, lid laceration, subconjunctival heamorrhage and chemosis [6,24]. These types of ocular trauma are the most common type of ocular trauma seen in head injury patients. They were seen to occur in all degree of severity of head injury.

Though studies on ocular trauma occurring in head injury reported globe rapture in severe head injury, globe rupture may occur even in mild head injury[6]. Globe

rupture seen in one patient was considered as the most fatal eye trauma and pointed out to the severe head injury. The rupture of the globe indicated a strong force applied to eye which may be the same force transmitted to cause head injury. That patient died of the severe head injury and this pointed out that severe ocular trauma may frequently be encountered in severe head injury.

Vitreous heamorrhage (3 patients) was exclusively seen in patients who had severe head injury. Other studies also reported vitreous heamorhage occurring during head injury and were described as rare finding[37]. Though reported as rare findings, its presence in exclusive severe head injury patients points vitreous heamorrhages as the probable accompanying feature of severe form of head injury but also a severe form of ocular trauma.

Retinal hemorrhages were seen in 3.7% of the head injury patients. As vitreous hemorrhage, most of the retinal hemorrhages were found among patients who had severe head injury. Several studies in this subject reported retinal hemorrhages in severe head injury and fatal head crush injury[18,6] . Both direct and indirect eye trauma have been implicated in causing retinal heamorrhages. Usually the heamorrhage start from the posterior pole of the eye and extend peripherally [18].

Variable neurophthalmic lesions were also found in this study. Ocular motility defect accounted for 4.2% of the patients. This is a lower incidence as compared to that reported in a long term follow up of trauma in children in Nigeria in which one third of the patients had neurophthalmic lesion[15] . The difference is probably contributed by differences in the studied population in which the study in Nigeria was done in children exclusively while in this study patients of all age group were included. On the other hand the result from this study resembles that which was reported in a study done in UK[3]. Neurophthalmic paralysis was seen in all degrees of head injury namely mild, moderate, and severe head injury. Though nerve palsies were seen in all degrees of head injury, generally there is a high incidence of neurophthalmic palses in severe head injury than mild and moderate

head injury. Similar findings has been reported in many studies world wide[3,6,11,14]. Occulomotor nerve palsy was the most frequent palsy encountered occurring in 3.3%. This is comparable to 2.6% occulomotor palsies reported in the study done in Nigeria. Even though neurophthalmic palsy has been reported to occur in severe head injury, occulomotor palsy has also been reported to occur in minor head injury as well [13]. In this study 2 patients out of 7 who had occulomotor palsy had mild head injury. Occulomotor nerve palsy has been reported the most frequent nerve injury followed by optic neuropathy[14] however some other studies reported abducent nerve palsy being the most frequently injured nerve during head injury[6]. In this study occulomotor nerve palsy was the most neuroophthalmic pasy found followed by traumatic optic neuropathy. Its mechanism of palsy in severe head injury is contributed by contusion of the nerve at the base of the posterior clinoid processes where it lies beneath petrosphnoid ligment and also heamorrhage at the middle cranial fossae compressing the nerve and causing pressure paralysis either in one side or both[26]. The abducent nerve is one of the most susceptible cranial nerve to trauma, because of its long intra-cranial course[34]. Abducent nerve palsy in this study was found to be 0.9% of all patient studied. This is a low incidence compared to that reported in UK and Nigeria [3,6] . In the view of this study, variability in the magnitude of different causes of head injury remain the reason that can explain difference seen. All patients who had abducent nerve palsy had moderate head injury.

Traumatic optic neuropathy occurred in 3 patients. This finding fall within the incidence that has been reported in other studies. Many studies have reported incidence of 0.5% to 5% of optic neuropathy in head injury [3,10,14,24]. Optic neuropathy has been reported to accompany severe head injury and this was the same trend in this study in which 2 of the 3 patients who were found to have optic neuropathy had severe head injury. Optic neuropathy has also been reported to occur in trivial head injury and this has also been evident in this study in which one patient had mild head injury[26]. Mechanisms of optic nerve trauma is thought to be direct or indirect trauma [6,24]. In indirect trauma, it is the force transmitted

from the superior orbital rim or frontal temporal region of the cranium to the orbital apex and orbital canal as opposed to the direct in which there is force applied direct to the orbit from anterior and is accompanied with severe ocular trauma. One of the three patients who had optic neuropathy had no light perception in the traumatized eye. Two of the three patients had obvious optic atrophy 6 weeks latter. Traumatic optic neuropathy in these patients was found to be due to indirect optic nerve trauma of which long standing swelling of the optic nerve may ultimately end with optic atrophy as seen from these patients.

CONCLUSION

This study showed that, ocular trauma is commonly associated with head injury. Ocular trauma were found in all age groups. Incidence of ocular trauma was found higher in severe head injury. Traumas of the posterior segment of the eye and neurophthalmic manifestation were commonly seen in severe head injury. On the other hand severe ocular trauma was found in severe head injury.

RECOMENDATION

In the view of this study the following are recommended;

1. All patients with head injury particularly those with severe head injury, need to be reviewed by an ophthalmologist.
2. Visual outcome following head injury need to be studied as this will be able to address the seriousness of the problem among patients with head injury.

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