

PATTERNS OF OCULAR TRAUMA AT THE MAIN REFERRAL HOSPITAL IN RWANDA: KIGALI UNIVERSITY TEACHING HOSPITAL

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ABSTRACT

Background: Eye injuries are the most common cause of referral to the Ophthalmology department, KUTH. No research data is available on ocular trauma in Rwanda. To understand the impact of eye injuries in KUTH and to plan for preventive strategies, it is important to understand the magnitude of this problem.

Aim: The aim of this study was to identify the patterns of ocular trauma at Kigali University Teaching Hospital.

Methods: In this retrospective study, 352 reviewed patients were referred to KUTH, from January 1st, 2007 to January 1st, 2013. Patient's ocular trauma details were recorded and analyzed. Patients' demographic data, medical history, diagnosis, treatment and possible complication were retrieved from files in archive and recorded on a questionnaire for further analysis.

Results: Out of the 352 patient's files, 72.7% were males and 27.3% were females. The male to female ratio was 2.7. Majority of patients were of age group between 11 and 40 years. Among files reviewed, 75.2% sustained blunt ocular injuries whereas 22.1% sustained penetrating injuries. Main risk factors for those injured patients were work place injuries (37%), road traffic accident (21%) and assault (15%). Most frequent offending agents were pieces of wood (21.5%), foreign bodies (16.4%) and vehicle crush (16.1%). However, metal objects, motorbike and stone missile represented important causes of ocular trauma at KUTH respectively 13.9%, 13.06% and 11.07%. A big number of patients were found to have corneo-limbal perforation (29.2%), corneal abrasions (18.4%), sub-conjunctival hemorrhage (17.8%) and peri-orbital injuries (17.6%). The common visual acuity observed on the affected eye on admission was (6/60-3/60) (38%) and below 3/60 (30%). The main post-traumatic complication at KUTH was corneal scarring (42.04%).

Conclusion: Males and young patients were more affected by ocular injuries because of their involvement in high risk activities in their daily life. Blunt and penetrating ocular injuries were two main types of ocular trauma recorded. Work place ocular injuries, road traffic accident and assaults were the main risk factors of ocular trauma at KUTH. Piece of wood, ocular foreign bodies and vehicle crush were the main offending agents causing ocular injuries. Main diagnoses in ocular trauma were corneo-limbal perforation, corneal abrasion and sub-conjunctival hemorrhage. On admission, most of injured patients had visual acuity (<6/60-3/60) and below 3/60. Management of ocular trauma mainly described at KUTH was antibiotherapy and steroid therapy; however surgery was performed for penetrating trauma and conservative treatment for few cases. The most common complication due to ocular trauma at KUTH was corneal scarring.

Keywords: Pattern - ocular trauma - KUTH

RESUME

Pre-requis: Les traumatismes oculaires sont les causes les plus fréquentes de transfert dans le département d'ophtalmologie du CHUK. Dans l'optique d'une bonne compréhension de l'impact des accidents liés au traumatisme oculaire au CHUK et une planification appropriée des stratégies préventives, il s'avère important de comprendre la grandeur du problème basée sur les données tangibles et les définitions standards.

Objectifs: L'objectif principal de cette étude était d'identifier ce qui caractérise le traumatisme oculaire au Centre Hospitalier et Universitaire de Kigali.

Methods: C'est une étude rétrospective, sur 352 malades transférés au Centre Hospitalier et Universitaire de Kigali pour traumatisme oculaire, durant la période du 1er Janvier 2007 au 1er Janvier 2013. Les données liées au traumatisme oculaire des patients étaient enregistrées et analysées. Le triage des fiches des malades avec traumatisme oculaire était fait au niveau du service d'archives. A l'aide d'un questionnaire, la collecte d'informations concernait les données démographiques du patient, l'anamnèse, le diagnostic à l'admission, le traitement ainsi que les complications éventuelles. Ces informations étaient recueillies et analysées.

Resultats: D'un total des 352 patients avec traumatisme oculaire, 72,7% étaient des hommes et 27,3% des femmes, avec un ratio de 2,6. La majorité de patients avait l'âge entre 11 et 40 ans. 75,2% de ces patients avaient un traumatisme à œil fermé alors que 22,1 % avaient un traumatisme à œil ouvert. Les principaux facteurs de risques liés au traumatisme oculaire étaient les occupations dangereuses journalières à 37%, les accidents routiers à 21%, la violence à 15%. Les outils impliqués dans la blessure de l'œil étaient essentiellement les morceaux de bois avec 21,5%, les corps étrangers invalidant l'œil à 16,4% et les accidents de véhicules à 16,1%. Cependant, les objets métalliques, les accidents de moto et les coups de pierres occupaient une place importante dans les traumatismes oculaires au CHUK avec respectivement 13,9%, 13,06% et 11,07%. En ce qui concerne le diagnostic, 29,2% de patients avaient une perforation cornéenne, 18,4% avaient des écorchures cornéennes, 17,8% avaient l'hémorragie conjonctivale et 17,6% avaient des lésions péri-orbitaires. L'acuité visuelle de l'œil traumatisée à l'admission était détériorée, de sorte que 38% avaient une vision (<6/60-3/60) et 30% avaient une vision inférieure à 3/60. La complication post traumatique la plus observée au CHUK était l'opacification cornéenne avec 42,04%.

Conclusion: Les traumatismes oculaires ont affecté principalement les hommes et les sujets jeunes; ceux-ci étant plus impliqués dans les activités à risques dans leurs vies de tous les jours. Deux principaux types de traumatisme oculaire ont été observés (traumatismes fermés et ouverts). Les principaux facteurs de risques liés au traumatisme oculaire étaient les occupations dangereuses journalières, les accidents routiers, ainsi que la violence. Les outils impliqués dans la blessure de l'œil étaient essentiellement les morceaux de bois, les corps étrangers invalidant l'œil et les accidents de véhicules. Les principaux diagnostics de traumatisme oculaire observés au CHUK étaient la perforation cornéenne, les écorchures cornéennes, l'hémorragie sous-conjonctivale. La majorité de patients à l'admission avait une acuité visuelle détériorée de l'œil traumatisé. La complication post traumatique la plus observée au CHUK était l'opacification cornéenne.

Mots clés: Modèles - traumatisme oculaire - CHUK

INTRODUCTION

Ocular trauma is an important cause of blindness and ocular morbidity worldwide. The proportion and patterns of ocular trauma among Rwandan patients is unknown. This prevents us to know the real figures of ocular trauma in our settings. Furthermore, the complications related to

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ocular trauma in Rwanda are not yet documented. All these will enable us getting real information about ocular trauma in our setting [1]. Eye injuries can be grouped within two major categories: closed globe injuries and open globe injuries. Closed globe injury is defined as a full-thickness wound and can be subdivided into contusion and lamellar lacerations. This later consists in full thickness wound of the eye-wall usually caused by a sharp object. On the other hand, open globe injuries are subdivided into ruptures (where full thickness wound of the eye is caused by a blunt object) and deep lacerations. Among deep lacerations we have penetrating injury which is a single laceration of the eye-wall caused by a sharp object; intra-ocular foreign body which is a retained foreign object causing entrance laceration and perforating injury which is two full-thickness lacerations of the eye wall [2]. Eye injuries do not occur as random events: there is evidence that some population groups are at increased risk because of greater exposure to hazards, decreased ability to avoid or detect hazards, and/or a lower likelihood of functional recovery following eye injury. Majority of injuries in males and females occurred in the 15-44 age groups and 0-14 age group, respectively and males are more affected than females. Blunt eye injury and penetrating eye injury were the most common types of ocular trauma [3, 4, 5, 6]. The highest proportion of injuries occurred at work place, at home, on the streets and roads [5, 7, 8]. Many studies carried out previously showed that sticks, foreign bodies, stones and metallic objects were the major offending agents of ocular trauma [3, 4, 9]. Corneo-Limbal perforation, corneal abrasions, sub-conjunctival hemorrhage, peri-orbital injuries, traumatic cataract and superficial corneal foreign bodies were the main ocular emergencies seen [3, 4, 9]. The visual acuity on admission between 3/60 and 6/60 comprises highest number (64%) and on discharge 6/60 comprises highest number of cases (50%) [10, 11, 12, 13, 14]. Most closed-globe injuries (92.1%) did not cause any final visual impairment in the affected eye, whereas open-globe injuries (55.3%) caused severe visual impairment or blindness. And the visual outcomes of most of eye injury patients were poor; half of injured eyes ended with visual acuity worse than 0.1. Therefore, despite therapeutic methods to ocular trauma make a great progress in recent years, the visual outcome of patients with major eye injuries is still poor. Ocular scar was the major post traumatic complication of the eye [4, 9, 15, 16]. However keratitis, endophthalmitis and panophthalmitis were the main ocular complications seen more in patients with a positive history of using traditional eye medicines than those with a negative history. Also poor visual outcome was seen more in patients who used traditional eye medicines than in those who did not use them [17, 18, 19].

METHODOLOGY

This is a retrospective study, conducted in KUTH, Ophthalmology department, from 1st January 2007 to 1st January 2013. This hospital receives patients from different district hospitals located in different provinces of Rwanda, both rural and urban. Were included in this study all patients admitted in the ophthalmology department of KUTH with ocular trauma from 1st January 2007 to the

1st January 2013. Patients with missing or incomplete files were excluded. This study was approved by the Research and Ethical Committee of KUTH. Data was collected from patient's files in the records. Patient's demographic data, medical history, diagnosis, treatment and possible complication were retrieved from files and recorded on a questionnaire for further analysis by SPSS 16.0 version.

RESULT

We reviewed 352 patients including 256 male (72.7%) and 96 female (27.3%) aged between 1 and 87 years.

Table 1: Types of ocular trauma at KUTH

Types of ocular trauma	Frequency	Percent
Blunt ocular injury	265	75.2
Penetrating injury	78	22.1
Peri-Orbital Trauma	5	1.4
Burn	4	1.1
Total	352	100

Most found types of ocular trauma at KUTH were: blunt ocular injury (75.2%) and penetrating ocular injury (22.1%).

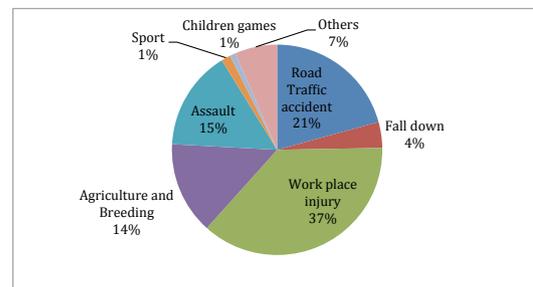


Figure 1: Distribution of risks factors of ocular trauma at KUTH

The main risk factors of ocular trauma at KUTH were work place injuries (37%) (firms, garages, kitchen, etc), and road traffic accident (21%). However assault (15%) and agriculture/ breeding (14%) were also important risk factors.

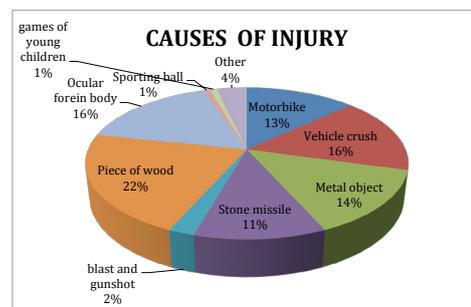


Figure 2: Causes of ocular trauma in KUTH

Main causes of ocular trauma were piece of wood (22%), ocular foreign body (16%) and vehicle crush (16% each). However, metal object, motorbike and stone missile represented important causes of ocular trauma at KUTH with respectively 14%, 13% and 11%.

Table 2: Diagnostic distribution of ocular trauma at KUTH in relation to age and sex

DIAGNOSIS	AGE GROUP (years)														TOTAL		PERCENT					
	<10		11-20		21-30		31-40		41-50		51-60		61-70		71-80		>80					
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F				
Traumatic cataract	1	3	3	0	6	1	4	1	3	0	1	1	0	0	1	1	0	0	19	7	73	27
Corneo-Limbal perforation	18	4	15	2	22	4	16	1	10	5	1	1	1	0	2	0	0	1	85	18	82.5	17.5
Sclera tear	0	0	0	2	5	1	1	0	0	0	0	0	0	0	0	0	0	0	6	3	66.7	33.3
Corneal abrasion	3	3	10	3	11	6	12	4	2	1	3	3	0	3	1	0	0	0	42	23	64.6	35.4
Sub-conjunctival hemorrhage	7	2	6	4	14	7	8	2	3	3	2	1	0	1	1	1	0	1	41	22	65.1	34.9
Hyphema	1	0	4	1	7	4	5	0	0	0	1	0	1	0	0	0	0	0	19	5	79.2	20.8
Peri-orbital injury	7	2	8	5	11	6	8	1	7	2	2	0	1	0	0	2	0	0	44	18	71	29
Total	37	14	46	17	76	29	54	9	25	11	10	6	3	4	5	4	0	2	256	96	72.7	27.3

The most affected patients were aged between 11 and 40 years. However a big percentage of patients were aged below 10 years. Main diagnosis of ocular trauma at KUTH were corneo-limbal perforation (29.2%), corneal abrasion (18.4%) and sub-conjunctival hemorrhage (17.8%). These ocular injuries affected more male than female at a rate of 82.5% vs 17.5% for corneo-limbal perforation, 64.6% vs 34.9% for corneal abrasions and 65.1% vs. 34.9% for sub- conjunctival hemorrhage. The age groups most affected by corneo-limbal perforation were <10 years and 21-30 years. However the interval of age between <10 years and 50 years had high percentage too. Corneal abrasion affected mainly the age group 21-40 years and sub-conjunctival hemorrhage affected mostly the age group 21-30 years.

Management of ocular trauma mainly described at KUTH was antibiotherapy and steroid therapy; however surgery was performed for penetrating trauma and conservative treatment for few cases.

Table 3: Distribution of ocular trauma in relation of visual acuity on admission

Types of ocular trauma	Visual acuity of affected eye on admission					TOTAL
	6/6-6/18	<6/18-6/60	<6/60-3/60	<3/60	missing	
Blunt ocular injury	32	8	101	79	45	265
Penetrating injury	8	5	24	30	11	78
Orbital Trauma	2	0	1	0	2	5
Burn	1	0	2	0	1	4
Total	43	13	128	109	59	352

The common visual acuity observed on the affected eye on admission was <6/60-3/60 (36.4%) and <3/60 (30.9%). Blunt and penetrating ocular injuries were the most common types of ocular trauma affecting most of patient's visual acuity at KUTH. Within 109 cases of <3/60), 72.4% were due to blunt ocular trauma whereas 27.5% were due to penetrating injury. Among 128 cases of <6/60-3/60, 78.9% were due to blunt ocular trauma whereas 18.7% were due to penetrating injury.

POST-TRAUMATIC COMPLICATIONS

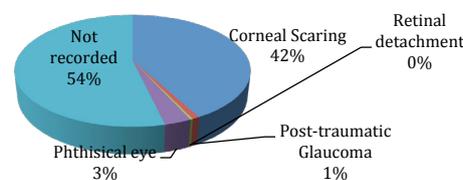


Figure 6: Distribution of post traumatic complications recorded in eye trauma patients in KUTH.

Post traumatic ocular complications at KUTH were mostly corneal scarring (42.04%).

DISCUSSION

This study reviewed 352 patients affected by ocular injuries including 72.7% of male and 27.3% of female aged between 1 and 87 years. The distribution of ocular trauma during the study period was homogenous; there has been no onset of new event leading to much injury such as war, factory accident, etc. In this period of 6 years, the number of males injured (72.7%) was far superior to the number of females injured (27.3%). This could be due to the fact that males are more involved in road traffic accident and a certain type of work exposing to injury. A. Jafari et al., M. Hossain et al. and T. Babar et al., described same percentage of men involved equivalent to 75.6%, 76% and 80% respectively. The most affected age-group was between 11-40 years old (55.4%), both sex included. This is the group most involved in various activities in order to build their future and finding daily requirements for their own life and families. The third decade itself comprising 29.8% was lower compared to that found by A. Jafari et al. study, who found the third decade involved at a rate of 35.8% in males and 25.8% in females [3, 4, 5]. However, T. Babar et al. found that people aged below 30 years were

OCULAR TRAUMA MANAGEMENT

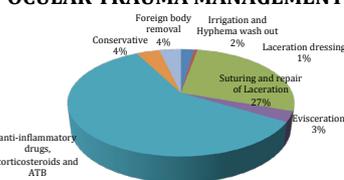


Figure 5: Distribution of ocular trauma management at KUTH

involved at a rate of 69% (both sex), whereas M.M. Hossain et al. described 64.7% of involved people aged 25 years and less [3]. Most studies across the world showed young generation of people being affected by ocular trauma as a result of them being more active and also involved in a certain group of activities exposing them to injuries. Types of ocular trauma mostly found at KUTH were blunt ocular injury (75.2%) and penetrating injury (22.1%) [3, 4, 9]. This could be due to the low level of criminalities observed in Rwanda where most of injuries are related to the type of activities people are involved in, such as farming, traveling or home related activities. P. Desai et al. and Nirmalan et al. found that blunt ocular injuries were more elevated than penetrating injuries with a rate of 54.4% and 54.9% vs. 23.3% and 46.9% respectively. However, Babar et al described a little difference such that penetrating injuries were 46.18% whereas blunt ocular injuries were 42.9% [7, 8]. During this work, main risk factors due to ocular trauma were work place injuries (firm work, garage work, kitchen work, etc) and road traffic accident [5]. As A. Jafari's study stated, work related injury and road traffic accident were the two main risk factors of ocular trauma with a rate of 49% and 42% respectively. Risk factors relating to the work place at KUTH were on the top of risk factors of eye injury with 51% whereas road traffic accident occupied 21% [3]. This was mainly due to the fact that people were injured mostly when they were in their daily work or when they were traveling for different reasons. Likewise, M. Hossain et al. found that occupational eye trauma were elevated at 51.2% and assault less common with 12.8% whereas C. Omolase et al. study reported only 24.2% of work place eye injuries. It was not possible to obtain data on the correlation between penetrating and blunt ocular trauma vs. level of criminality [4, 9]. This could give more explanation in the future because it seems logic to obtain more penetrating injury in a setting with high level of criminalities. Most common offending objects found to be causative agents at KUTH in order of importance were: piece of wood in 21.5%, foreign bodies found at a rate of 16.4%, vehicle crush in 16.1%. The pick of eye injuries from piece of wood was high; many Rwandans being involved in agricultural and firming activities. The frequency of such injuries went decreasing during following years as well as for blast and gunshot injuries due to onset of new activities other than agriculture. Eye injuries from vehicle crush, stone missile and motorbike have been increased recently due to the onset of new businesses and increased use of vehicles and motorbikes. Pieces of wood are common offending agents in African environment as said C. Omolase's study where vegetative material were on the top of offending agents at a rate of 42.4%. In industrialized countries, most causative agents are metal filings (41.8%) as described by A. Jafari et al. and sharp objects (59.2%) as mentioned in M. Hossain's study [9]. Among eye trauma patients found at KUTH, common diagnosis found were corneo-limbal perforation, corneal abrasions and sub-conjunctival hemorrhage [3, 4]. Majority of population concerned with these diagnoses was group aged between 21 and 30 year-old. In 352 eye trauma patients received at KUTH within 6 years, 29.2% were found to have corneo-limbal perforation. The age group most affected was <10 years and between 21 and 30 years group. R.

Munga et al. described a similar percentage (30%) of corneo-limbal perforation [10]. However, R. Singh et al. found a high rate of corneo-limbal perforation (44%). Corneal abrasion was described at a rate of 18.4% and common within the age group between 11 and 40 years of age [11]. This percentage seems equal to 17% described by Hany E. El et al. in Kasr El-Aini Hospital in Egypt [12]. Sub-conjunctival Hemorrhage also was found to be common at 17.8% and affected mostly the age group included between 1 and 40 years of age, with a pick in the age group 21-30 years. This percentage was very low compared to 51.7% and 55.3% described by D. Kaimbo wa Kaimbo and T. Mimura respectively. Visual acuity of the injured eye on admission for patients received at KUTH were distributed as follow: visual acuity (<6/60-3/60): 38%, visual acuity (<3/60): 30%, visual acuity (6/6-6/18): 12% and visual impairment (<6/18-6/60): 3%. However 17% were not assessed or difficult to assess due to different reasons such as orbital edema, too young to cooperate, painful eye, etc [13, 14]. Among blind eye assessed, 72.4% were due to blunt ocular trauma and 27.5% were due to penetrating injury; among severe visual impairment assessed 78.9% were due to blunt ocular trauma whereas 18.7% were due to penetrating injury. These percentages were lower compared to C. Iqbal et al. who described 81.1% of visual acuity below 3/60, 12.2% of visual acuity (<6/18-6/60) and 6.7% of visual acuity (6/6-6/18). This could be related to the fact that at KUTH there was a high rate of ocular trauma not due to criminality [15]. However, this could also be due to the fact that 17% of patients were having missing records. However, C. Omolase et al described a little difference while describing 50.8% of visual acuity (6/6-6/18), 32.6% of visual acuity below 3/60, 12.1% of visual acuity (6/18-6/60) and 4.5% of visual acuity (<6/18-6/6) [9]. The management mostly performed at KUTH was based on antibiotherapy and anti-inflammatory therapy (58.8%). However surgery was done in 27.5% of cases, mainly for penetrating ocular injury and conservative management was performed at a rate of 3.9%. For specific cases, an appropriate management was done such as eyelid repair for lacerations, suturing and laceration repair for corneal tear or perforation, evisceration for disorganized ruptured eyeball; foreign body removal if any and conservative management with eye drops and pain killer for less serious injuries. This percentage of antibiotherapy and anti-inflammatory drugs at KUTH was elevated with a low percentage of surgery and conservative management compared to M. Zhang's findings which describes ocular trauma management with 52.6% of surgery and 22.2% of conservative management. The post traumatic complications mostly described at KUTH was corneal scaring (42.04%) [6]. This was due to the fact that all ocular trauma affecting ocular media leave scars. They could also lead sometimes to ocular tissue atrophy and phthisical eye in case of severe damage to the eye structure. The small percentage of retinal detachment could be explained by the fact that no ocular ultra-sound is available at KUTH for diagnosing the posterior segment complications. J. Whitcher et al. described a percentage of post-traumatic ocular complications with 59% of traumatic cataract and 40 % of corneal scaring, which is around the percentage of corneal scaring found at KUTH [16]. J. Serrano et al. described 44.7% without final complication

in visual acuity and 55.3% with final complications leading to severe visual impairment or blindness [17].

CONCLUSION

Males and young patients were more affected by ocular injuries at KUTH. Blunt ocular and penetrating injuries were the main types of ocular trauma seen at KUTH. Work place ocular injuries, road traffic accident and assaults were the main risk factors recorded within eye trauma patients that consulted KUTH. Piece of wood, ocular foreign bodies and vehicle crushes were the main offending agents causing ocular injury. Visual acuity on the affected eye of (<6/60-3/60) and below 3/60 were the most common described on patients at KUTH. Main diagnoses in ocular trauma at KUTH were corneo-limbal perforation, corneal abrasion and sub-conjunctival hemorrhage. Management of ocular trauma was done mainly by antibiotherapy and steroid therapy; surgery was mainly performed for penetrating trauma and conservative treatment was made for few cases. The most common complication due to ocular injury at KUTH was corneal scarring.

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