Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)

A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

Ophthalmology

Concomitant Maxillofacial and Ocular Injuries with Visual Impairment and Blindness: A Retrospective Analysis of 27 Cases Seen at the University of Calabar Teaching Hospital, Calabar, Nigeria

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Original Research Article

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Article History
Received: 26.06.2018
Accepted: 10.07.2018
Published: 30.07.2018

DOI:
10.36347/sjams.2018.v06i07.002

Abstract: Ocular and periocular injuries are often encountered in major maxillofacial trauma, especially those involving the middle third of the facial region, with attendant visual impairment or blindness. The aim of this study is to retrospectively analyze the category of visual loss in patients with concomitant maxillofacial injuries seen and managed at a Nigerian tertiary health facility. All consecutive patients, with concomitant maxillofacial injuries and associated visual loss that presented to the Oral and Maxillofacial Unit and the Department of Ophthalmology of the University of Calabar Teaching Hospital (UCTH), Calabar, over a 10-year period were retrospectively studied. The information obtained included patients' demographics, aetiological factors; types of maxillofacial injury, the nature of ocular injury and best corrected visual acuity (BCVA) in the involved eyes on discharge from follow up. The data generated was subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS) version 20. A p value of <0.05 was considered statistically significant. A total of 1213 persons had maxillofacial related trauma over the years in review with 83(6.8%) of them having concomitant ocular or periocular injuries. Of the 83 patients who had ocular or periocular involvement, 27(32.5%), all males, with age ranging from 12-54, mean (SD) 31.0 (8.48) years had visual impairment or blindness and formed the basis of analysis of 29 eyes in our results seen over the period of study. The remaining 56(67.5%) had BCVA in the category of normal vision after discharge from care. Zygomatic complex fracture 10 (37%) and isolated orbital blow out fracture 6 (212/2%) were the commonest type of maxillofacial injury encountered. Ocular and periocular injuries occur concomitantly with maxillofacial trauma, especially those involving the mid-facial region. Ophthalmic consultation and intervention is recommended in suspected cases of orbital or ocular involvement in facial trauma to help reduce the incidence of associated visual impairment or blindness on discharge from care.

Keywords: Maxillofacial injuries, Ocular injuries, Visual impairment.

INTRODUCTION

The maxillofacial region is unique because of its aesthetic importance as well as its anatomical relation to vital sensori-neural organs in the body [1,2]. Trauma to this part of the body often result in functional impairment of hearing, smelling and visual impairment or blindness depending on the mechanisms, dynamics and severity of the injury [3]. In addition, maxillofacial trauma patients may experience a variety of injuries to other regions of the body. These concomitant injuries ranged from cranial or cerebral injuries, orthopedic injuries, ocular to abdominal and thoracic injuries [2]. These associated injuries worsen the prognosis of the facial trauma as some of them may result in psychosocial problems, functional disabilities or even death [1,2].

Ocular injuries in relation to maxillofacial trauma may be non-occupational domestic injuries, vehicular accidents, sports-related injuries, industrial hazards, assaults, as well as self-inflicted injuries [4,5]. The injuries vary from lacerations of the lids and abrasions of the cornea to wounds, intraocular hemorrhages, dislocation of the lens, and detachment of

the retina as well as ruptured globe which may result in various category of vision loss [5-9]. Visual loss involving one or both eyes has been reported globally as one of the concomitant injuries associated with maxillofacial trauma [8].

Vision, using visual acuity (VA) is classified by World Health Organization (WHO) into normal vision (VA= 6/6 – 6/18), visual impairment (VA <6/18 – 3/60) and blindness (VA <3/60) after the best correction in the better eye [10]. This classification also covers monocular vision status commonly encountered in ocular conditions like eye injuries. Worldwide in 1998, there were approximately 1.6 million people blind from eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss [11]. A more recent literature search does not provide new data on the global magnitude of visual impairment and blindness from ocular trauma but rather re-echoed the fact that trauma related visual loss is an unrecognized public health problem even though it remains a leading cause of monocular visual impairment and blindness [12].

Although some studies in Nigeria have previously reported the occurrence of ocular injuries in major and minor trauma with attendant visual outcome [13,14,15], only few authors presented it as concomitant findings associated with maxillofacial injuries [16,17]. The nature and aetiology of maxillofacial injuries in relation to visual impairment and blindness have been documented but report from sub-Saharan Africa is sparse [18]. However, loss of vision was not clearly categorized in the sparse literature.

The aim of this study is to retrospectively analyze the category of visual loss in patients with concomitant maxillofacial injuries seen and managed at the University of Calabar Teaching Hospital.

PATIENTS AND METHODS

All consecutive patients, with concomitant maxillofacial injuries and associated visual loss that presented to the Oral and Maxillofacial Unit and the Department of Ophthalmology of the University of Calabar Teaching Hospital (UCTH), Calabar, over a 10-year period were retrospectively studied. The information obtained included patients' demographics, aetiological factors, types of maxillofacial injury, the nature of ocular injury and final BCVA on discharge from follow up. The data generated was subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS) version 20. Discrete variables were presented as frequencies and percentages, while continuous variables as mean (standard deviation). Inferential statistics was performed using chi square test or independent t-test where applicable. A p value of <0.05 was considered statistically significant. Ethical approval was obtained from the ethics and research committee of UCTH, Calabar.

RESULTS

A total of 1213 persons had maxillofacial related trauma including soft and bony tissues over the years in review with 83(6.8%) of them having concomitant ocular or periocular injuries. Of the 83 patients who had ocular or periocular involvement, 27(32.5%), all males, with age ranging from 12-54, mean (SD) 31.0 (8.48) years had visual impairment or blindness and formed the basis of analysis of 29 eyes involved in our results seen over the period of study. The remaining 56(67.5%) had BCVA in the category of normal vision after discharge from care. Zygomatic complex fracture 10 (37%) and isolated orbital blow out fracture 6 (22.2%) were the commonest type of maxillofacial injury encountered.

The occupational distribution of the patients is displayed in Table 1.

Table-1: Occupational Distribution of patients (n=27)

Occupation	Frequency	Percentage
Artisan	5	18.5
Student	7	25.9
Civil Servant	5	18.5
Trader	3	11.1
Farmer	2	7.4
Driver	3	11.1
Night Guard	2	7.4

The left globe was involved in over half (59.3%) of the cases, while the right eye and bilateral involvement accounted for 9 (33.3%) and 2 (7.4%) cases respectively. Twenty-nine eyes of the 27 patients were involved. The mechanisms of injury in relation to BCVA are shown in Table 2. Road Traffic accident (RTA) was the most predominant aetiological factor accounting for 20 (74.1%) of the patients and 69% of the eyes. This was distantly followed by gunshot injuries which was represented by 5 (18.5%) of the patients and 6(20.7%) of the eyes involved. The frequency distribution of the other aetiological factors is as shown in Table 2.

Table-2: Mechanism of Injury of Patients with associated category of residual unilateral BCVA

Injury Mechanism	n(%)	No of eyes affected (%)	BCVA (%)	
			<6/18 – 3/60	< 3/60
Road Traffic accidents	20(74.1%)	20(69)	17(58.6)	3(10.3)
Gunshot	5(18.5)	6 (20.7)	4(13.8)	2(6.9)
Missile (Iron particles)	1(3.7)	1 (3.4)	1(3.4)	Nil
Airbag Deployment	1(3.7)	2 (6.9)	1(3.4)	1(3.4)
Total (%)	27	29(100)	23(79.3)	6(20.7)

The maxillofacial injuries encountered were majorly limited to the middle-facial skeletal region and is shown in Table 3. Co-existing mandibular and zygomatic fractures were recorded in 4 (14.8%) cases. Table 3.

Table-3: Types of Maxillofacial Injuries in 27 patients and 29 eyes with visual impairment or blindness

Maxillofacial Injury	N (%)	No of eyes affected (%)	BCVA (%)	
			<6/18 – 3/60	< 3/60
Zygomatic complex fracture	10(37)	11(37.9)	8(27.6)	Nil
Le Fort fractures	3(11.1)	3(10.3)	3(10.3)	1(3.4)
Orbital Blow Out Fracture	6(22.2)	4(13.8)	5(17.2)	1(3.4)
Naso-orbito -ethmoidal fracture	4(14.8)	4(13.8)	3(10.3)	1(3.4)
Mandibular and Zygomatic fracture	4(14.8)	5(17.2)	4(13.8)	1(3.4)

DISCUSSION

Visual impairment and blindness following maxillofacial trauma is a rare, yet a documented complication in the ocular region which may be immediate or delayed [5,8,19].

In this study, although the gender involvement were only males, the age distribution of the persons involved were similar to other studies where the active age group were involved with a mean of 31years [3,4,9,18,20]. This is probably because of the fact that adult males particularly in their active age group are involved in high-risk behaviour and vocation, and are adventurous and aggressive, thus making them more prone to maxillofacial and ocular trauma which may result in visual impairment or blindness. The occupational distribution of subjects was not significantly skewed to any group although the maxillofacial and ocular injury was slightly higher (25%) among the students and closely followed by artisans and civil servant with 18.5% each. Again, this may be attributed to the earlier explanation because most students will belong to the active age group of the population.

Concomitant ocular and periocular involvement in all maxillofacial trauma recorded over the period in review was 6.8%. Ocular or periocular involvement did not necessarily translate to vision loss as 67.5% of involved eyes had a final BCVA in the category of normal vision. This incidence is particularly low compared to other studies where Mittal *et al*. [20] reported 68.3%, and 67% reported by Holt and Holt [9]. The marked difference in the incidence of ocular and periocular injury in the present study compared to previous studies may be ascribed to the inclusion of all forms of maxillofacial trauma including soft tissue trauma. Most studies with high incidence of concomitant ocular injuries were done on patients with high index of suspicion for facial fractures or confirmed maxillofacial fractures [5,9,18,20,21]. Surprisingly, Ansari in his study of blindness after facial fractures, found that 3.3% were identified as having ocular and periocular injuries [8]. This finding is close to the findings of the present study even though soft tissue maxillofacial traumas were included.

Majority of the maxillofacial traumas with resultant visual impairment or blindness in this study were significantly due to road traffic accidents (RTA). This constituted 69% of the affected eye due to RTA having less than normal BCVA with 58.6% and 10.3% of this subset distributed into the overall visual impairment and blindness categories respectively. The present study further confirms RTA which has been reported in other studies [8,18,21], as a leading cause of maxillofacial injuries with concomitant ocular involvement resulting in visual loss. The prominence of gunshot injuries which accounted for visual loss in 20.7% of affected eyes as one of the major causes of maxillofacial and ocular trauma in this study is not surprising because of the rise in societal violence and gangsterism in urban centres [22]. In further categorization of visual loss, gunshot injuries accounted for 13.8% and 6.9% of monocular visual impairment and blindness respectively in this study. Gunshot injuries to the maxillofacial region has also been reported to cause concomitant ocular and periocular injuries in a study by Hollier *et al*. with resultant visual loss in 26.19% of cases reviewed [23].

That zygomatic complex, and orbital blow out fractures presented with the highest number of associated orbital injuries is not surprising, considering the anatomical relationship of the skeletal structure to the orbit [6]. Injuries to the eye occur in majority of patients who sustained midface trauma severe enough to cause a fracture, and approximately 15% have decreased visual acuity [5,6]. In the present study, 37.9% and 20.7% of ocular involvement of zygomatic complex and orbital blow out fractures respectively had final vision in the categories of visual impairment and blindness. This is different from other studies where visual loss were not categorized based on WHO classification of vision [5,6,18]. In trauma to the midfacial skeletal region, zygomatic fractures are the most common facial fractures second only to nasal fractures and these fractures are also the most commonly occurring fractures of the orbit. These injuries often destroy the integrity of the orbital skeleton and are frequently complicated by injury to the eye, ranging between 2.7% and 90.6% [6,24]. It has been reported that isolated orbital blowout fractures have associated eye injuries up to one third of the patients [25]. In the present review, 37% and 22.2% of our study population were observed to have zygomatic complex fracture and orbital blow out fracture respectively. The result is similar to that by Ugboko *et al.* [18] who also reported more concomitant visual loss in zygomatic fractures.

CONCLUSION

Ocular and periocular injuries occurring concomitantly with maxillofacial trauma are not uncommon; although a relatively lower prevalence was observed in this study when compared to other studies majority of which were carried out in developed countries. The risk of associated residual visual impairment and blindness remains high in concomitant maxillofacial and ocular injuries due to the closely related anatomy of orbital and maxillofacial regions. Therefore, Ophthalmic consultation and intervention is recommended in suspected cases of orbital or ocular involvement especially in mid facial trauma to help reduce the incidence of associated visual impairment or blindness on discharge from care.

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