Maxillofacial Injuries Sustained During Military Peace Keeping Mission in Liberia: The Nigerian Experience (1990-1997)

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ABSTRACT

Objective: Armed conflicts often cause maxillofacial injuries that could be challenging to manage. These injuries are often disproportionate to the relationship between the maxillofacial region and the entire body. Between 1990 and 1997, Nigerian soldiers were involved in military operations during the Liberian Civil War as part of a subregional intervention force. The aim of this paper is to review some characteristics of the maxillofacial injuries sustained by Nigerian soldiers as seen at a tertiary referral hospital with a view to drawing lessons for future management of maxillofacial and other casualties in the West African subregion.

Methods: Retrospective review of hospital records of patients evacuated from Liberia from 1991 to 1997 was undertaken. Data was collected on demographics, sites of injuries, treatment received and discharge details.

Results: Sixty one patients were seen, all males, between age 21-53years, most (57.4%) were between 21-29years of age. There were more soft tissue and dentoalveolar injuries (60.6%) than facial bone fractures (39.4%). Soft tissue injuries were debrided with secondary suturing while most fractures were treated by closed reduction and immobilisation. Most patients (98.4%) were successfully treated while one patient died.

Conclusion: Maxillofacial injuries sustained during the conflict were mostly of soft tissues and most were treated successfully, This study showed the need for the deployment of maxillofacial trauma registries during armed conflicts for proper documentation victims and for maxillofacial surgeons to be included in combat surgical teams to ensure prompt and adequate treatment of patients closer to the point of wounding.

Keywords: maxillofacial injuries, armed conflicts, Liberia, Nigerians

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INTRODUCTION

The oral and maxillofacial region comprises complex anatomical hard and soft tissues with roles in sight, hearing, smell, feeding, speech and breathing.[1] Injuries to the region assume great importance as well as complexity in management due to its close proximity to vital structures of the head and neck. While the head and neck represented only 12% of total body surface area, Dodson et al.[2] found it was involved in 16% of all wounds sustained in war between 1914 and 1986. Head and neck trauma has increased in relative frequency during recent armed conflicts from 21% to 43% due to use of combat body armour that mostly protected the torso but left the limbs and face exposed, and the more common use of improvised explosive devices in asymmetric military operations such as terrorism and counter-insurgency.[2-4]

The end of the Cold War has not resulted in greater peace and security worldwide. Rather, there are increasingly violent intra and inter-state conflicts with resort to arms to settle political and other disputes.[5] In West Africa, one such important intra-state conflict was the first Liberian Civil War (1989-1997) which pitched various armed factions against each other and the sub-regional intervention force set up to reduce the carnage called Economic Community of West African States Monitoring Group

(ECOMOG). The first Liberian Civil War was largely a conventional armed conflict with the Republic of Nigeria as the largest troop and equipment contributor to ECOMOG.[5] There have been some reports on the human and other consequences of the conflict, but to our knowledge, no data on the pattern of maxillofacial injuries and their management have been reported. Therefore, the aim of this paper is to present clinical presentation and treatment of the maxillofacial injuries sustained by Nigerian soldiers as seen at the tertiary care referral centre for the ECOMOG operations in Nigeria. it is hoped that important lessons can be drawn for future optimal patient management during armed conflicts in the West African sub region.

MATERIALS AND METHODS

Retrospective review of case records (clinic notes, treatment notes and in-patient care notes) of ECOMOG patients treated at the Dental Centre, Base (Military) Hospital, Yaba, Nigeria between 1991 and 1997 were carried out. During this study period, Base (Military) Hospital, Yaba served as referral treatment centre for all Nigerian casualties from the ECOMOG operations after initial and primary stabilisation at ECOMOG Field Hospital at Monrovia, Liberia. During the period studied, there was no maxillofacial surgeon at the field hospital. Cases at the referral centre were managed by the authors and a visiting maxillofacial surgeon. However, records of sources of injuries such as gunshot, bomb blast or shrapnel wounds were not available. From the case records, patient's names and addresses were removed while the rest of the data was used to compile the materials for this study. Data was collected on gender, age, aetiology, sites(s) of injuries, treatment received and discharge details. Patient's injuries were classified into soft tissue and skeletal[6]. Skeletal injuries were sub classified into mandibular, middle third and combination. Treatments given were debridement, delayed secondary suturing, reduction and immobilisation of fractures, reconstruction with bone grafts and fabrication of dental prosthesis. Collected data were analysed and rendered as proportions and percentages using Microsoft Excel software, 2018 version Ethical approval for the study was obtained from the hospital's ethical research committee.

RESULTS

Sixty-one patients were seen during the study period, all were males, between ages of 21-53 years (mean age 27years) with most (n=35, 57.4%) between 21-29years. Table 1 showed the age distribution of patients seen. Soft tissue injuries alone were seen in 2 (3.3%) of patients while it was seen in combination with minor alveolar injuries in 35 patients (57.4%). Facial fractures were recorded in 24 patients (39.4%). Soft tissue injuries were treated by debridement and secondary suturing done under antibiotic cover. 12 patients with missing teeth had dental prosthesis fabricated, of these 10 were for anterior teeth (Kennedy class IV) while two dentures replaced posterior teeth (Kennedy class III). Table II showed the various maxillofacial injuries observed. Among those with facial fractures, there were fractures of the mandible (n=6, 25.0%), middle third including zygomatic complex (n=13, 54.1%), panfacial fractures (n=4, 16.7%) while one case was unspecified (4.2%) shown in Table 2. Fractures encountered were simple, complex and communited types with one patient sustaining almost complete loss of the mandible (Table 2).

Table 1: Age Distribution of Nigerian patients treated for maxillofacial injuries (1990-1997)

Serial #	Age group (years)	Number (% of total)
1	21-29	35 (57.4)
2	30-39	15 (24.6)
3	40-49	7 (11.5)
4	50-59	4 (6.5)
	Total	61 (100.0)

Table 2: Distribution of maxillofacial injuries sustained by Nigerian soldiers from ECOMOG as seen at Base (Military) Hospital Yaba (1990- 1997)

Serial #	Site and Type of facial injury	Number of patients (% of total)
1	Soft tissue alone	2 (3.3)
2	Soft tissue and dentoalveolus	35 (57.4)
3	Mandibular fractures	6 (9.8)
4	Zygomatic complex fractures	8 (13.1)
5	Maxillary fractures	5 (8.2)
6	Panfacial fractures	4 (6.6)
7	Unspecified fracture site	1 (1.6)
	Total	61 (100.0)

Fractures were treated using closed techniques by inter maxillary fixation (IMF) with or without arch bars in 13 cases (54.2%), open techniques using transosseous wires with or without IMF (n= 6, 25.0%), bone plating (n=3, 12.5%) and bone grafting reconstruction (n=2, 8.3%). There was one mortality (1.6%) due to anaesthetic complications out of the 61 patients seen. The rest patients (98.4%) recovered successfully for discharge to their rear military units in Nigeria.

DISCUSSION

This study showed the characteristics of maxillofacial injuries treated in Nigerian patients evacuated from ECOMOG operations in Liberia. Armed forces personnel especially those deployed to the frontline are usually young men, hence most casualties are in the third decade as seen in this study where 57.4% were between 21-29 years of age. Most casualties (24.7%) in the Iraqi study by Aldelmai et al.[1] were aged 20-29years which is similar to our finding. Terrorist attacks cause more head and neck injuries than conventional armed warfare[2, 7]due to greater use of asymmetric methods in the former. The First Liberian Civil War being a conventional armed conflict more likely generated less severe head and neck injuries than the ongoing Boko Haram insurgency in Nigeria due to the extensive use of asymmetric methods in the latter[7]. In the current study, injuries seen among Nigerian soldiers ranged from facial lacerations to avulsion injuries of the head and neck but there were more soft tissue (60.6%) than bone fractures (39.4%). As described by Pitts[5], there are scant reports on casualties from conventional conflicts in Africa, rather most conflicts have been intra-state, hence comparison of injury patterns with the current study was difficult. In recent reviews of non-combatant civilians, combatant civilians and soldiers, Aldelaimi in Iraq reported less maxillofacial soft tissue injuries (10.8%) than facial fractures (89.2%). Also, Dabkana et al., from the *Boko Haram* insurgency in Northeastern Nigeria, recorded head and neck injuries in 6.6% of patients seen at a tertiary referral centre but such injuries were responsible for 19.5% of fatalities[8]. Both studies were from asymmetric fighting environments, with mixed population where improvised explosive devices and blast injuries were common causes of injuries unlike our study. One mortality (1.6%) was recorded in our study which largely reflected the fact that we received more stable and less critically wounded patients than in the Iraqi and Northeastern Nigerian studies. It was also likely that more severe head and neck injuries did not possibly make it to our hospital.

This hospital based study revealed the absence of central registry of trauma cases both nationally (in Nigeria) and in the West African subregion for the recording of trauma due to activities of armed groups and militaries. This finding suggests the need for maxillofacial trauma registries to be maintained by ministries of health and military medical services similar to the Joint Theatre Trauma Registry maintained for Operation Iraqi Freedom and Operation Enduring Freedom by allies and the United States of America for casualties sustained in military operations in Iraq and Afghanistan[9].

Typical armed conflicts cause maxillofacial injuries from gunshot, high velocity missiles, improvised explosive devices blasts, splinter/shrapnels, road traffic accidents, falls to mention a few. To provide care, since the Korean War, many military medical

services have included oral and maxillofacial surgeons in their combat medical support system[10,11]. However, many developing countries like Nigeria are yet to include these specialists in their combat medical support system. This results in inadequate care of casualties and needless rearward referrals as observed in this study where patients with simple lacerations and tooth fractures were evacuated from Liberia to Nigeria for treatment. There is need for oral and maxillofacial surgeons to be included in combat medical support system in Nigeria and other West African countries for prompt management of injuries sustained during military operations.

In the 'counter proxy war' involving the Armed Forces of India, Chowdhury and Mohan, reported the maxillofacial fracture occurrence as follows; middle third (43.8%), mandibular (32.6%), nasoorbitoethmoidal (16.9%) and panfacial (6.2%) from a conventional armed conflict[10]. Among United States of American military personnel involved in asymmetric warfare in Iraq and Afghanistan, Keller et al., reported the distribution of maxillofacial fractures as nasoorbital (41.5%), middle third (28.2%), mandibular (15.8%) and frontal sinus (14.5%)[9]. In table 2, our findings of more middle third and mandibular (79.1%) is closer to the Indian than American reports. These possibly reflect the cause of maxillofacial injuries which were from conventional weapons in the Indian and our studies but from bomb/improvised explosive blasts in the American report. Also, the status of personnel especially the use of personal protective equipment and the availability of more effective battlefield haemostatic products in the cited studies. Other probable reasons could be the forward deployment of highly skilled surgical personnel and faster rearward evacuation for specialised care that reduced mortality from severe wounding often associated with military operations in the American and Indian reports[2,9,10,12]. In view of the relatively high mortality associated with head and neck injuries from the ongoing counter-insurgency operations against Boko Haram as reported from Nigeria by Dabkana et al.[8], the increased availability and use of modern personal protective equipment, availability of forward skilled surgical personnel, equipment and health products could improve survival among Nigerian combatants of the conflict.

Treatment of Nigerian casualties of ECOMOG operations in Liberia with maxillofacial injuries followed the general standard being utilised in Nigeria during the study period, the type of injuries and state of initial surgical treatment received at the Field Hospital in Liberia. Technological techniques like CT and 3D reconstruction used by Chowdhury and Mohan,[10] and other authors from more resourced centres were not available at the study centre during the period of stay of these patients. Treatments performed included debridement and suturing of soft tissues, fracture reduction and immobilisation and a few cases of reconstruction. Out of 24 cases of maxillofacial fractures, closed reduction techniques were used in 54.2%. The use of open reduction techniques like bone plates for maxillofacial fractures was not common in Nigeria during the study period (1990s). Despite these, our results were satisfactory and all but one of our patients was successfully treated and discharged from hospital. A limitation of this study was the poor record keeping that prevented us from relating the injuries to their source such as gunshot, bomb blasts or even 'civilian causes' like road traffic accidents.

CONCLUSION

The results of the present study demonstrated that maxillofacial injuries were predominant in those soldiers of 21-29years of age group, soft tissue and dentoalveolar injuries were more common and jaw fractures were treated with IMF and a low mortality was recorded among this cohort. Consequently, our data highlight the need for the deployment of trauma registries during armed conflicts for proper documentation victims and for maxillofacial surgeons to be included in combat surgical teams to ensure prompt and adequate treatment of patients closer to the point of conflict.

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Conflict of Interest

None declared.

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