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## Pattern of Oral and Maxillofacial Injuries Seen During An Insurgency In A Developing Country

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### ABSTRACT

**Objective:** Insurgents use terrorism as a tactic to push government to accede their demands Reports on the injuries inflicted by Boko Haram insurgency are not many. One from Maiduguri found out that over 90% of those affected are male. The objective of this study was to analyze the pattern of oral and maxillofacial injuries encountered during the BH insurgency in the Nigerian North Western states of Kano and Kaduna

**Methods:** A retrospective study covering patients brought from terrorist and other attacks by BH in the North Western Nigerian States of Kaduna and Kano seen at 3 tertiary care centres from 2010 to 2015 was conducted.

**Results:** A total of 56 cases were seen in study and the ratio of 17.7:1. The mean age in years and standard deviation (SD) were 31.3 (9.70) years. The third decade was where most of the victims (37.5%) were found. Over 90% of the victims were brought to the accident and emergency center within 1-3 hours of sustaining injuries.

**Conclusion:** The management of victims of insurgency in the Northwest Nigeria has been a challenge in the sense for lack of facilities and manpower.

**Key words:** Insurgency, Pattern, Maxillofacial, Injury, blast

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### INTRODUCTION

Insurgency is a violent armed attempt to subvert or abolish the authority of the State. Terrorism is a known tactic of insurgents to force the government to accede to their demands. In Nigeria, Boko Haram (BH), an insurgent fundamentalist Islamic group has carried out some of the worst forms of terrorism through deliberate targeting of non-combatants such as women and children, attacks on places of worship especially churches, later mosques and secular educational institutions.<sup>1</sup> From the epicenter in Maiduguri, Borno State, Nigeria, their violence has spread to neighbouring

countries of Cameroon, Niger and Chad resulting in approximately 10,000 human deaths, damage to property estimated at 100 million United States Dollars and displacement of over 5 million people.<sup>2</sup> Both developing and developed countries could be victims of insurgency, but while developed countries have health infrastructure capable of dealing with the devastating effects of prolonged insurgency through terrorism, most developing countries lack protocols for the prevention and containment of such attacks.<sup>3</sup>

There are few reports on the injuries inflicted by the prolonged BH insurgency in Nigeria. A report on the pattern of injuries seen during the BH insurgency from Maiduguri, North Eastern Nigeria found that out of 1339 cases, 91.3% of the victims were males, while 8.7% were females. Gunshot wounds accounted for 91.8% of the injuries, followed by bomb blast (6.7%) and others (1.1%).

Parts of the body most affected were the extremities (54.8%), followed by the torso (31.6%) and multiple injuries (6.9%). The head and neck region accounted for only 6.6% of injuries but 19.5% of fatalities<sup>3</sup> and 16% during the Korean war.<sup>4</sup> However, there are scarce reports on the pattern of oral and maxillofacial injuries encountered during the BH insurgency in Nigeria. Hence, the objective of this study was to analyze the pattern of oral and maxillofacial injuries encountered during the BH insurgency in the Nigerian North Western states of Kano and Kaduna for comparison with other reports with special reference to the challenges in their management.

### PATIENTS AND METHODS

A retrospective study covering patients brought from terrorist and other attacks by BH in the North Western Nigerian States of Kaduna and Kano seen at 3 tertiary care centres from 2010 to 2015 was conducted. All the patients were seen at the A&E of the hospital and/or the maxillofacial clinics, cases brought in dead were not considered. The care given was in conformity with the ATLS for the establishment or maintenance of the airway, monitoring of vital signs and initiation of intravenous line, then oral and maxillofacial specialists were invited to where necessary. Data collected included demographics (age, sex, occupation), mechanism of injury (bomb blast, gun shot, knife attack, arson etc), type of injury (burns, penetrating injury, fracture, soft tissue injury), part of the maxillofacial region affected, associated injuries, and treatment given. Information was filled into a questionnaire with no other patient identifying features and analyzed to get ratios, proportions.

### RESULTS

A total of 56 cases, comprising 53 males and 3 females, were seen over the period of study, giving a male to female ratio of 17.7:1. The age ranged from 12-51 years, mean (SD) were 31.3 (9.70) years. The victims were mostly in their third (n=21; 37.5%) and fourth decades (n=20; 35.7%) (Table 1). Over 90% of the victims were brought to the accident and emergency center within 1-3 hours of sustaining injuries, with only 2 cases arriving after 3 hours of the insurgent activities. Bulk of the patients were transported to treatment centres by vehicles of the Nigerian Police and that of the Federal Road Safety Corps (n=35; 62.5%). Other means of transportation to treatment centres. More civilians (n= 31; 55.4%) were affected than military personnel (n=25; 44.6%).

Injuries arising from blast accounted for majority of the cases (n=39; 69.6%). Gunshot accounted for the remaining injuries (n=17; 30.4%). Isolated soft tissue injury was the dominant injury type (n=28; 50%). Others were skeletal (n=14; 25%) and combination of soft tissue and skeletal injuries (n=14; 25%). Soft tissue injuries presented in the form of laceration (n=14; 35.8%), avulsion (n=9; 23.1%) and facial burns (n=9; 23.1%) other forms as shown in table 2. Face (n=9; 23.1%) and the cheek (n=9; 23.1%) were the commonest site for soft tissue injuries (Table 2). The mandible was the commonest bone involved accounting for 14 cases. Other skeletal injuries are displayed in Table 3. Associated injuries included penetrating abdominal injury (n=3; 5.4%), upper limb (n=1; 1.8%), lower limb (n=1; 1.8%), and intracranial injury (n=1; 1.8%). There were hearing loss in 3 (5.4%) cases and loss of vision in 2 (3.6%) cases. Maxillofacial team participated at all 3 levels of treatment of victims (Level I, II and III)<sup>5</sup>, but majority of the treatment (n=53; 94.6%) carried out at the tertiary or definitive treatment level. Treatment methods included debridement and soft tissue repair including use of loco-regional flaps, and reduction and immobilization (Table 4).

### DISCUSSION

Nigeria has since independence from Britain in 1960 suffered many challenges to its sovereignty. The earliest was the Nigerian Civil War (1967-1970) between the central government and that formed in the South-Eastern part of the country (then Republic of Biafra). The BH insurgency has no doubt produced many injuries including those of the maxillofacial region but unlike during the

**Table 1: Age and gender distribution of victims**

Age (years)	Gender		Total
	Female	Male	
11-20	1	5	6
21-30	1	20	21
31-40	1	19	20
41-50	0	8	8
51-60	0	1	1
Total	3	53	56

**Table 2: Distribution of different maxillofacial soft tissue injuries according to site**

Injury	Penetrating	Laceration	Avulsion	Contusion	Abrasive	Foreign body impaction	Burns	Total
Scalp	0	2	0	0	0	0	0	2
Neck	0	3	0	0	0	0	0	3
Ear	1	1	0	0	0	0	0	2
Face	0	0	0	0	0	0	9	9
Orbital/peri orbital	0	2	0	0	0	0	0	2
Cheek	0	2	4	0	0	3	0	9
Upper lip	0	0	2	0	0	0	0	2
Lower lip	0	0	0	1	0	0	0	1
Nose	0	0	1	0	0	0	0	1
Submental	0	2	1	0	0	0	0	3
Face & ear	0	1	0	0	1	0	0	2
Face & neck	0	1	1	0	1	0	0	3
Total	1	14	9	1	2	3	9	39

**Table 3: Sites of Maxillofacial Skeletal Injuries (n=28)**

Site	Frequency	percent
Mandible	14	50.0
Zygoma	2	7.1
Zygoma and Le Fort	2	7.1
Zygoma and mandible	2	7.1
Frontal	1	3.6
Lower dentoalveolar	1	3.6
Upper dentoalveolar	2	7.1
Mandible plus frontal	1	3.6
Multiple facial fractures	2	7.1
Mandible plus avulsed maxillary alveolus	1	3.6
Total	28	100.0

civil war, the present armed conflict is occurring without a medical team present at the front line due to its asymmetric nature with attacks in both urban and rural areas. Maxillofacial services in Nigeria achieved prominence largely due to the need to care for victims of the Nigerian civil war<sup>6</sup>. In view of the type of attacks during the ongoing BH insurgency, the pattern of injury and severity are different from those seen in conventional trauma patients. This is in agreement with the findings of Goksel<sup>7</sup>.

Care of the patients seen could be classified into 3 levels.<sup>5</sup> These were level I, II and level III. Level I, involved primary triage and resuscitation of all patients irrespective of whether they were maxillofacial patients or not in association with other surgeons. So, it was basically a multidisciplinary approach since the casualty

**Table 4: Treatment modalities utilized**

Treatment Methods	Frequency	Percent
Foreign body extraction	2	4.7
Repair of soft tissue injury	7	16.3
Forehead flap	1	2.3
Reduction and immobilization	15	34.9
Reconstruction plate	1	2.3
Foreign body extraction plus reduction and immobilization	2	4.7
Forehead flap plus obturator	2	4.7
Wound care plus debridement	6	14.0
Soft tissue repair plus reduction and immobilization	3	7.0
Le Fort I osteotomy	1	2.3
Elevation	1	2.3
Exploration	2	4.7
<b>Total</b>	<b>43</b>	<b>100.0</b>





**Figure 1:Maxillofacial injuries before and after treatment**



**Figure 2: Avulsive maxillofacial injuries before and after treatment**



**Figure 3: Burns to the Maxillofacial region**

officers were overwhelmed. This happened mainly with victims of blast injuries and is in agreement with Peleg et al.<sup>8</sup> who observed that blast victims are usually part of mass casualty. This took place mainly in the accident and emergency of the hospitals using the ATLS. Gunshot wound no matter their severity were handled initially by the Casualty personnel, where necessary such

patients were then transferred to the Oral and Maxillofacial team. Peleg et al.<sup>8</sup> observed that when these patients arrive as an isolated event it can be handled within the resources of the trauma center while management of blast victims demand a multidisciplinary approach.

The mode of transport from site of injury to hospital was by road using civilian vehicles, military vehicles, road safety vehicles and 90% of patients presented within 3 hours. This was within the range given by Chowdhury and Mohan<sup>9</sup>, and Abubakar et al.<sup>10</sup> Non-medical personnel were involved in the transportation and none of the patients received first aid before presentation. Abubakar et al.<sup>10</sup> and Dabkana et al.<sup>3</sup> found out that 93.8% and 95% respectively did not receive any form of first aid prior to presentation. According to Will et al.<sup>11</sup>, Tong et al.<sup>4</sup> and Goksel<sup>7</sup>, oral and maxillofacial surgeons (OMFS) were involved in surgical airway management during the Korean war and of the Iraqi and Afghan patients. They also suggested that patients with pan facial trauma

or severe facial trauma should have tracheostomy before the mobilization. The absence of helicopter ambulances and early access to specialized medical personnel is a feature of the under-developed medical services in Nigeria. Considering the multiple injuries suffered by some victims, it is more likely that some could have succumbed to respiratory failure due to the absence of faster and better resourced means of transport to the hospital. There is need for various levels of government and other agencies in Nigeria to increase access and availability of skilled first responders and provide better, faster modalities of casualty evacuation.

At the level II: Secondary triage took place here and OMFS saw specifically maxillofacial patients. The patients were assessed for their maxillofacial injuries. Further assessment and clearing of the airway from secretion, blood clot, fragmented teeth, bone were done. Those with established middle 3<sup>rd</sup> injuries were also assessed for cervical spine injuries and cerebrospinal fluid otorrhea or rhinorrhea. Management of persistent hemorrhage in the head and neck region using direct pressure, and suture ligation took place also at this level. These methods were advocated and used by Will et al.<sup>11</sup> and Goksel<sup>7</sup>, in addition to clamps and diathermy.

Basically, primary closure of lacerations, wound debridement and wound care were done, in the presence of other injuries, joint surgery was performed in polytrauma patients. Minor debridement was done on the couch and also some major ones since the operating room was often unavailable. Will et al.<sup>11</sup> made mention of the fact that following terrorist attack, the presence of many cases of serious trauma result in long waiting times to gain access to the operating room. In our situation, it could take more based on relative paucity of theatre facilities.

This stage is also where we give patients prophylactic antibiotics, analgesics, tetanus toxoid, fluids and blood. People were encouraged to come to the hospital or go the National Blood Transfusion Service (NBTS) to donate blood.

A total of 56 cases, comprising 53(94.6%) males and 3(5.4%) females, were seen giving a male to female ratio of 17.7:1. The age ranged from 12-51 years, mean (SD) 31.3 (9.70) years. Dabkana et al.<sup>3</sup> got 91.3% male and 8.7% female with an age range 1 to 80 years and a peak of 21 to 40 years. Peleg et al.<sup>8</sup> got 71% male with the majority between 15 to 29 years. Injuries arising from blast (Figures 1&2) accounted for majority of the cases (n=39; 69.6%). Gunshot accounted for the remaining injuries (n=17; 30.4%). This agreed with Peleg et al.<sup>8</sup>, Chowdhury and Mohan<sup>9</sup>, and Goksel<sup>7</sup>, who had blast injuries most common with 32.71% -54% ,

but was contrary to Dabkana et al.<sup>3</sup> who had blast accounting for 6.7% and gunshot for 91.8%. The majority (n= 31; 55.4%) of those affected were civilians compare to military personnel (n=25; 44.6%). This was similar to findings by Dabkana et al.<sup>3</sup> even though they got 85.4%. As stated earlier, insurgents use terrorism to coerce the government and population to acquiesce to their demands, hence while military personnel could deploy with protective gadgets, the civilians sustain more injuries especially as BH deliberately targeted large places with large concentrations of people such as motor parks, markets and schools. In spite of the prolonged period of insurgent terrorist attacks in Nigeria (2011-2016), not much has been done to improve public awareness of prevention, detection and management of terrorist attacks on the civilian population in Nigeria. There is need to equip the Nigerian Security and Civil Defence Corps to embark on mass mobilization of the citizenry on how terrorists could be recognized and the correct response to terrorist emergencies.

The mandible was the site of the most common maxillofacial fracture observed and this agreed with the literature.<sup>12,13</sup> The reason for this being that IEDs often detonate from below the level of the head placing the mandible and the tip of the nose at risk.<sup>13</sup> According to Will et al.<sup>11</sup>, Le Fort-type fractures dominated in midface injuries. However, our findings in Table 2 do not support this view as Le Fort fractures occurred just as commonly as were those of the zygoma and mandible. Lower proportion of patients seen with LeFort II could be due to the fact severe fractures in the upper and middle face could result in mortality from airway compromise and bleeding, such victims may not make it to the maxillofacial care centre.

According to Will et al.<sup>11</sup>, 2005, the frequency of facial burns is on the increase due to mechanism of injury victims are exposed to: closed ranged blast, IEDs, rocket propelled grenade. In this study, facial burns (Figure 3) constituted 23.1% of injuries and they were treated with Dermazine cream after debridement. This agreed with Will et al.<sup>10</sup> who also debrided with saline and used bacitracin eye ointment while we used chloramphenicol eye ointment. Bagby<sup>14</sup> and Will et al.<sup>11</sup> had stated that these patients present with airway problem and will need intubation immediately. However, none of our cases needed intubation following facial burns.

The 3<sup>rd</sup> level was for the reconstruction of soft and hard tissues, reduction and immobilization, and rehabilitation. All patients with hard tissue injuries and avulsed tissue were treated at this

level. The patients who needed foreign body extract were also treated at this level. The principal means for reduction and immobilization in our centre was arch bar and wire. This mode of treatment was used by both American and British oral and maxillofacial surgeons in their field hospitals<sup>4, 11, 13</sup> and in Israel<sup>12</sup>. The use of plates is not common in our environment due to its cost. The complex nature of facial fractures seen in modern battle field necessitates the use of external fixators especially when there is soft tissue avulsion and bony fragments<sup>11, 13</sup>; but was not used in this series.

It is noteworthy that from the period of the Nigerian civil war till date, there has been an improvement in the treatment of maxillofacial patients. During the civil war, the majority of maxillofacial patients were treated by expatriates<sup>6</sup> but the victims of the crisis boko haram insurgencies have been treated by indigenous maxillofacial surgeons. In the current fight against insurgency, governments pay initial deposits for treatment, but the victims have to contribute to their treatment.

## CONCLUSION

The management of victims of insurgency in the Northwest Nigeria has been a challenge in the sense for lack of facilities and man power. Bomb blast and gunshot constituted the bulk of injuries. Of note is the fact that those deaths at the scene and on arrival at the hospital were not included.

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