

FP 35: Patterns Of Craniomaxillofacial Fractures Among Military Personnel: A 3-Year Retrospective Analysis In A Tertiary Military Hospital

A Study by Allan N. Labotan, MD

Department of Otorhinolaryngology-Head and Neck Surgery

VLMC-AFPHSC

Abstract

Craniomaxillofacial fractures outnumber other cases in terms of admission and surgery done in the Department of Otorhinolaryngology - Head and Neck Surgery (ORL-HNS) at the Victoriano Luna Medical Center-Armed Forces of the Philippines Health Service Command (VLMC-AFPHSC). It was observed that the craniomaxillofacial cases admitted, referred to, and operated on in this department is multi-factorial and is not limited to combat-related causes. Further, such injuries are seen in military personnel of any age, gender, and rank.

This study aims to identify and stratify the craniomaxillofacial fractures among military personnel diagnosed with the use of imaging studies such as craniofacial or facial Computed Tomography (CT) Scan or X-rays. Demographic variables are age, gender, etiology of injury, Branch of Service (BOS) of the patient and military rank. Data will be gathered from the records section of this hospital and will be tabulated and statistically analyzed. Subject cases are active military personnel who were admitted, treated or operated on, or those referred to the Department of ORL-HNS due to craniomaxillofacial fractures confirmed by imaging during the period of 01 January 2015 – 31 December 2017.

Craniomaxillofacial fractures occur throughout the world. These are associated with severe morbidity, loss of body function, disfigurement, and psychological problems. Management of patients with these cases entails substantial resources.

It is expected that the results of the study will provide data to the policy-makers of the Armed Forces of the Philippines (AFP) as a whole or any of its three branches of service with regard to creation or revision of existing policies and guidelines or in the prevention and management of such injuries.

Background of the Study

There have been no extensive studies or researches pertaining to craniomaxillofacial fractures incurred by active military personnel of the AFP whether or not combat-related. If there is, it is limited only to identification of the most commonly fractured facial bone, or specific part of that facial bone which is mostly involved. The craniomaxillofacial skeleton consists of the bones of the cranial vault, skull base, midface, and the lower jaw. In this study, the craniomaxillofacial skeleton is grouped based on the involved bones within the bound of the ORL-HNS practice. These are the upper third segment, middle third segment, and lower third segment. The upper third segment includes the anterior table of either the left or right frontal bone; the middle third segment contains the nasal bones, maxilla, zygomatic body and process, inferior portion of the orbits, premaxilla, and palate; the lower third segment involves the left and right mandible.

The function of the AFP in nation building is undoubtedly important. This is through the performance of its traditional role as defender of the national sovereignty and territorial integrity, consistent with the universal role of the armed forces of any country. Non-traditional role of the AFP includes offering of developmental project to rebels. All of these lead to national and economic development. The AFP significantly relies on its military personnel. Currently, there are about two hundred fifty thousand (250,000) active military personnel distributed to all military installations of the three Branches of Service (BOS) namely the Philippine Army (PA), Philippine Navy (PN) and Philippine Air Force (PAF). These military personnel are exposed to various kinds of injuries due to the nature of their duties.

Head and neck trauma is increasing in frequency in modern combat. In general, the incidence of maxillofacial fractures has increased in the last decades. These are a common sequel of blunt or penetrating trauma. Blunt trauma includes road traffic crash, altercation, industrial/occupational accidents, sports, and falls. Penetrating injuries are from gunshots, explosions, missiles, and stabbing. In industrialized countries, interpersonal violence (IPV) is the main cause of injury, while traffic accidents and falls dominate in the rest of the world. Pathological diseases such as tumors, osteomyelitis, cysts, osteoradionecrosis may also contribute to fracture of any of the craniomaxillofacial skeleton. Craniomaxillofacial fractures often involve serious morbidity and sometimes fatal consequence. Injuries to this region can result in serious dysfunctions of sight, smell, breathing, eating and talking which impact negatively on the victim's quality of life. This type of injury can cause more years of working years than heart diseases and malignancies combined. Further, owing to the high premium placed on facial appearance in many societies, esthetic disturbance could result in adverse psychological consequence. All of these could lead to productivity loss. Furthermore, management of these patients requires substantial resources.

Owing to the foregoing, it is important to explore the etiology and pattern of craniomaxillofacial fractures among military personnel. Periodic verification of the etiology of craniomaxillofacial injuries incurred by military personnel will facilitate the assessment of proficiency of road safety measures such as speed limit, drunk driving, crash helmets, and seat belt laws at least within all of the military installations. It will also help to identify the behavioral patterns of commuting military personnel inside and outside military camps or installations and helps to recommend ways in which injuries to the head and neck can be averted. Further, findings in the study will guide in instituting public health programs of the AFP geared towards prevention, provision of facilities, training of military manpower, and aid in the military healthcare provider to optimize treatment of craniomaxillofacial injuries including fractures.

Review of Related Literature

The VLMC is the highest echelon among the health care providers in the AFP. This is where different cases such as trauma are referred to and admitted from the military station hospitals and dispensaries nationwide for evaluation and management. Craniomaxillofacial fracture is a common encounter in the Department of ORL-HNS and in fact outnumbers other cases in terms of admission and surgery done. Because of its prominent position, the maxillofacial region is vulnerable to injury.¹³ Craniomaxillofacial fractures often involve serious morbidity and sometimes fatal consequence. Injuries to this region can result in serious dysfunctions of sight, smell, breathing, eating and talking which impact negatively on the

victim's quality of life.⁵ This type of injury can cause more years of working years than heart diseases and malignancies combined.¹³ Further, owing to the high premium placed on facial appearance in many societies, esthetic disturbance could result in adverse psychological consequence.⁵ All of these could lead to productivity loss of the military personnel. Furthermore, management of these patients requires substantial resources.³

Head and neck trauma is increasing in frequency in modern combat.⁶ However, it was observed that the craniomaxillofacial cases admitted, referred to, and operated on in this department is not solely combat-related. Some were due to other causes such as Motor Vehicular Accidents (MVA), sports-related, Interpersonal Violence (IPV), falls, and bone pathology. Owing to the nature of their work, military personnel regardless of gender, age, and rank are vulnerable to craniomaxillofacial fractures. In industrialized countries, IPV is the main cause of injury, while traffic accidents and falls dominate in the rest of the world.³ Road traffic crash were major cause of death and injury, especially in low and middle-income countries.⁵ There were studies showing that males between the age group of 20-30 years dominate such injury.^{2,3,5}

There is lack of studies or researches regarding craniomaxillofacial fractures incurred by active military personnel of the AFP. If there is, it is limited only to identification of the most commonly fractured facial bone, or specific part of that facial bone which is mostly involved. Management of these cases entails financial burden on the part of the AFP and productivity loss since patients may have decreased or loss of functions and may need to undergo rehabilitation for some time. It is important that we have knowledge on the patterns of these cases by having periodic verification of the etiology as this will facilitate the assessment of proficiency of road safety measures such as speed limit, drunk driving, crash helmets, and seat belt laws at least within all of the military installations. It will also help to identify the behavioral patterns of commuting military personnel inside and outside military camps or installations and helps to recommend ways in which these injuries can be prevented. The findings in the study will guide in instituting public health programs of the AFP geared towards prevention, provision of facilities, training of military manpower, and aid in the military healthcare provider to optimize treatment of craniomaxillofacial injuries including fractures.

Scope and Limitation of the Study

This study will be conducted to stratify the craniomaxillofacial fractures incurred by active military personnel regardless of the etiology and place of incidence. The fractured segment will further be stratified based on age, gender, etiology, military rank and the Branch of Service (BOS) to which the patient belongs to illustrate its prevalence to a certain demographic. A retrospective analysis of data of active military personnel diagnosed with craniomaxillofacial fractures with the aid of imaging will be used. The data should be from patients personally seen, evaluated, and managed by the Department of ORL-HNS, VLHC from 01 January 2015 – 31 December 2017. The study will not identify if patient was under the influence of alcohol or illicit drugs, use of personal protective device such as helmet or face mask and if the fracture happened during performance of official duty due to lack of information stated in the medical history. Further, this study will not dwell on the management afforded to the patient and the post-surgery complications.

Objectives

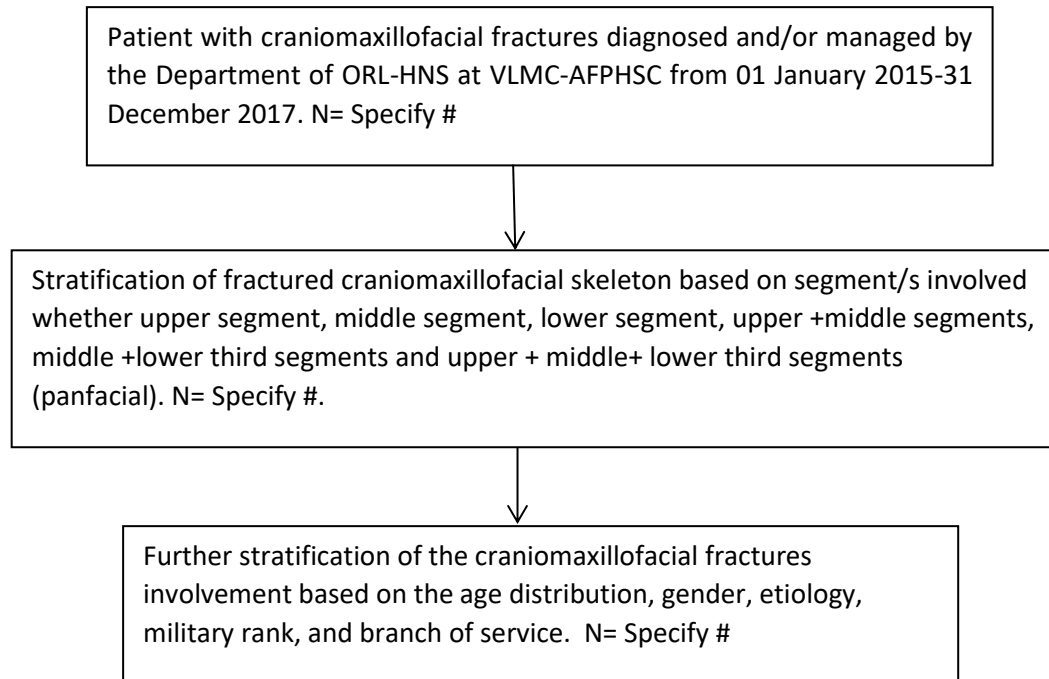
A. General Objective

This study will be done to provide baseline data information to policy-makers in the AFP and its public health arm with regard to review of existing standard operating procedures, guidelines or policies if there is or on possible creation of new policies on addressing issues on prevention and management of craniomaxillofacial injuries such as fractures incurred by active military personnel.

B. Specific Objectives

1. To identify the most commonly fractured segment of craniomaxillofacial skeleton incurred by active military personnel over a three (3) year period from 01 January 2015 – 31 December 2017.
2. To further stratify the most commonly fractured segment of the craniomaxillofacial skeleton based on the following variables:
 - a. Age distribution
 - b. Gender
 - c. Etiology
 - d. Military rank
 - e. BOS to which the patient belongs
3. To Identify the risk association or relationship between the identified variables such as:
 - a. Segment involved and Etiology
 - b. Age and Etiology
 - c. Gender and Etiology
 - d. Military rank and Etiology
 - e. BOS to which the patient belongs and Etiology

Conceptual Framework



Ethical Considerations

The protocol is prepared by Allan N. Labotan, MD. It will be submitted to and will undergo the review process of the Armed Forces of the Philippines Health Service Command Research Ethics Committee (AFPHSC REC). Once approved, the protocol will be explicitly followed. Any variation to the approved protocol will be explained and reported to the AFPHSC REC for action.

The research will be conducted in accordance with this protocol which is consistent with the ethical principles that have their origin in the Declaration of Helsinki and the National Guidelines for Biomedical/Behavioral Research of the National Ethics Committee (NEC) of the Philippines.

Names, addresses, sensitive medical conditions and other identifying data regarding patients will be omitted and be dealt with utmost confidentiality.

Methodology

1. Study Design

This study will be a three (3) – year retrospective data analysis of patient's records. The patients are active military personnel who were diagnosed and managed by the Department of ORL-HNS, VLMC from 01 January 2015-31 December 2017. All data will be enumerated and tabulated.

2. Setting

The study will be conducted within VLMC-AFPHSC. Patient's data will be gathered from the registrar of the Medical Records Section.

3. Participants

Subject data will be from review of medical records of active military personnel who incurred craniomaxillofacial fractures and were diagnosed and managed by the Department of ORL-HNS, VLMC from 01 January 2015-31 December 2017. The involved segments of the craniomaxillofacial skeleton, age, gender, etiology, military rank, and branch of service of the patient will be the focus of data gathering.

4. Data Collection

Data will be from the medical records of active military personnel diagnosed of craniomaxillofacial fractures, evaluated and managed by the Department of ORL-HNS, VLMC from 01 January 2015-31 December 2017. Data will be collected from the registrar of the Medical Records Section of VLMC-AFPHSC. Data will be tabulated and analyzed for stratification based on the variables mentioned. The following will be the tables for raw data collection.

Table 1. Craniomaxillofacial skeleton segment involved and Age

	Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Panfacial	Total
18-23 y/o							
24-29 y/o							
30-35 y/o							
36-41 y/o							
42-47 y/o							
48-53 y/o							
54-60 y/o							
Total							

Table 2. Craniomaxillofacial skeleton segment involved and Etiology

	Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Panfacial	Total
Gunshot							
Blast							
Motor Vehicular Accident							
Sport- related							
Fall							
IPV							
Bone Pathology							
Total							

Table 3. Craniomaxillofacial skeleton segment involved and Gender

	Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Panfacial	Total
Male							
Female							
Total							

Table 4. Craniomaxillofacial skeleton segment involved and Rank

	Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Pan facial	Total
GEN/ADMIRAL							
LTGEN/VICE ADMIRAL							
MAJGEN/REAR ADMIRAL							
BGEN/COMMODORE							
COL/CAPT							
LTCOL/COMMANDER							
MAJ/LT COMMANDER							
CPT/LT SENIOR GRADE							
1LT/LT JUNIOR GRADE							
2 LT/ENSIGN							
CHIEF MASTER SEGEANT							
SENIOR MASTER SERGEANT							
MASTER SERGEANT/CHIEF PETTY OFFICER							
TECHNICAL SERGEANT/PETTY OFFICER FIRST CLASS							
STAFF SERGEANT/PETTY OFFICER SECOND CLASS							
SERGEANT/PETTY OFFICER THIRD CLASS							
CORPORAL/AIRMAN FIRST CLASS/SEAMAN FIRT CLASS							
PRIVATE FIRST CLASS/AIRMAN SECOND CLASS/SEAMAN SECOND CLASS							
PRIVATE/AIRMAN/APPRENTICE SEAMAN							
Total							

Table 5. Craniomaxillofacial skeleton segment involved and BOS of military personnel

	Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Panfacial	Total
PA							
PN							
PAF							
Total							

Table 6. Craniomaxillofacial skeleton segment involved and Age and Gender

		Upper 3 rd Segment	Middle 3 rd Segment	Lower 3 rd Segment	Upper + Middle 3 rd Segments	Lower + Middle 3 rd Segments	Panfacial	Total
18- 23 y/o	M							
	F							
24- 29 y/o	M							
	F							
30- 35 y/o	M							
	F							
36- 41 y/o	M							
	F							
42- 47 y/o	M							
	F							
48- 53 y/o	M							
	F							
54- 60 y/o	M							
	F							
Total								

Table 7. BOS of military personnel vs. Etiology

	Gunshot	Blast	Motor Vehicular Accident	Sports- related	Fall	IPV	Bone Pathology	Total
PA								
PN								
PAF								
Total								

Table 8. BOS of military personnel vs. Age

	PA	PN	PAF	Total
18-23 y/o				
24-29 y/o				
30-35 y/o				
36-41 y/o				
42-47 y/o				
48-53 y/o				
54-60 y/o				
Total				

Table 9. BOS of military personnel vs. Gender

	PA	PN	PAF	Total
Male				
Female				
Total				

Table 10. Etiology vs. Age

	Gunshot	Blast	Motor Vehicular Accident	Sports- related	Fall	IPV	Bone Pathology	Total
18-23 y/o								
24-29 y/o								
30-35 y/o								
36-41 y/o								
42-47 y/o								
48-53 y/o								
54-60 y/o								
Total								

Table 11. Etiology vs. Gender

	Gunshot	Blast	Motor Vehicular Accident	Sports- related	Fall	IPV	Bone Pathology	Total
Male								
Female								
Total								

5. Variables

a. Cranio-maxillofacial

> Consists of the bones of the cranial vault, skull base, midface, and the lower jaw.

b. Upper third segment

> Includes the anterior table of either the left or right frontal bone

c. Middle third segment

> Consists of the nasal bones, maxilla, zygomatic body and process, inferior portion of the orbits, premaxilla, and palate.

d. Lower third segment

> Involves the left and right mandible.

e. Panfacial

> Refers to involvement of all the three segments identified (upper, middle, and lower third segments).

f. Age

> Age to which military personnel can serve the service from the possible age of enlistment of 18 years old to retirement at 60 years old.

g. Branch of Service

> Refers to the Philippine Army (PA), Philippine Navy (PN), and Philippine Air Force (PAF).

h. Etiology

> Refers to the cause of incurred cranio-maxillofacial fractures whether gunshot, blast, sport-related, fall, interpersonal violence (IPV) (hacking/fist-fight) or bone pathology (tumors, cysts, osteoradio necrosis). Under the influence of alcohol or intoxicating substances and whether or not the incident happened during official military duty will not play role in the study.

i. Rank

> Pertains to the lowest initial enlisting rank to the highest possible rank an active military personnel can.

6. Study Size

Study size will be composed of active military personnel diagnosed of craniomaxillofacial fractures, evaluated and managed by the Department of ORL-HNS, VLMC from 01 January 2015-31 December 2017.

7. Statistical Methods

The relationship between Craniomaxillofacial segment involved and Etiology; Age and Etiology; Gender and Etiology; Military rank and Etiology; BOS to which the patient belongs and Etiology will be determined using a single factor Analysis of Variance (ANOVA).

Data and Records

All data will be recorded on appropriate case data collection forms, which will then be kept in the Department of ORL-HNS, VLMC. The data will be subjected to scrutiny for possible inconsistencies.

Information about the subjects will be kept confidential unless the subject himself has authorized its release or as required by law such as court subpoena. Aside from the investigators, only the subject themselves and authorized representatives of regulatory agencies will be allowed to review subject's information.

All essential data will be retained in the archives of Department of ORL-HNS, VLMC for a period of five (5) years from the time of submission of final the report.

Plan for Data Analysis

Raw numerical data gathered will be tabulated (refer to tables 1-11). Data analysis and other data representation will be placed in separate table/s together with the distribution factors and level of confidence.

Budgetary Requirements

The researches will cover all the expenses to be incurred during the study. The subjects, Department of ORL-HNS, VLMC, and the VLMC-AFPHSC will not shoulder any financial output during the conduct of study.

The estimated expenses are as follows:

1. Office supplies: Php 500.00
2. Printing/Binding: Php 1,000.00
3. Statistician's Fee: Php 3,000.00-4,000.00
4. Incidental Expenses: Php 1,500.00

Gantt Chart

	June 1	June 10	June 20	June 30	July 1	July 10	August 1	August 20
Formulation of Research Topic								
Formulation of Study Objectives								
Choosing the Study Design								
Review of related Literature								
Writing the Research Protocol								
ERB Approval								
Data Gathering								
Statistical Analysis								
Conclusion and Recommendations								
Final Draft and Revisions								

References:

1. Galvan GN. Evaluation of Mandibular Fractures in a Tertiary Military Hospital: A 10-year Retrospective Study. Philippine Journal of Otolaryngology-Head and Neck Surgery (PJOHNS).2011; 16-20
2. Col PK Chattopadhyay, Maj Gen M Chander. Management of Zygomatic Complex Fracture in Armed Forces. MJAFI 2009; 65: 128-130
3. Espen Helgeland, DDS; Ida Marie Dahle, DDS; Jan Inge Leira, DDS, OMFS; Lado Lako Loro, BDS, Dr. Odont, OMFS. Maxillofacial Fractures Surgically Managed at Aalesund Hospital between 2002 and 2009. Craniomaxillofacial Trauma Reconstruction 2015; 8:321-325
4. Kerim Ortakoglu, DDS; PHD; Yilmaz Gunaydin, DDS; PHD; Yavuz Sinan Aydintug, DDS; PHD; Gurkan Rasit Bayar, DDS. An Analysis of Maxillofacial Fractures: A 5-Year Survey of 157 Patients. Military Medicine. September 2004. Vol. 169
5. Abdurrazaq Olanrewaju Taiwo, Olujide Oladele Soyele, Ndubuizi Ugochukwu Godwin, Adebayo Aremu Ibikunie. Facial Fracture Management in Northwest Nigeria. Journal of Surgical Technique and Case Report. Jul-Dec 2013. Vol-5. Issue-2
6. LCDR Matthew W. Keller, MC USN; Peggy P Han, MPH; Michael R Galarneau, MS; CDR Curtis W. Gaball, MC USN. Characteritics of Maxillofacial Injuries and Safety of In-Theater Facial Fracture Repair in Severe Combat Trauma. Military Medicine. March 2015. Vol. 180

7. Dencio Severo Acop. The Expanded Non-traditional Role of the AFP. A reassessment. pp 1-16. cco.ndu.edu.
8. Germar G. Cruz MA. A Four-Year Study of the Demographic Distribution and Treatment of Maxillofacial Fractures Admitted at the Philippine General Hospital. ACTA MEDICA PHILIPPINA. 2009. Vol 43 No.3
9. Arslan M. et al. Assessment of Maxillofacial Trauma in Emergency Department. World Journal of Surgery 2014 9:13
10. Alves LS, Aragao I, Sousa MJC, Gomes E. Patterns of Maxillofacial Fractures in Severe Multiple Trauma Patients: A 7-Year Prospective Study. Brazilian Dental Journal. 2014. Vol. 25 (6)
11. Arabion, HR, tabrizi R, Aliabadi E, Gholami M, Zarci K. A Retrospective Analysis of Maxillofacial Trauma in Shiraz: A 6-Year Study of 768 Patients (2004-2010). J Dent. 2011; 15 (1):15-21
12. Breeze J. Gibbons AJ, Opie NJ, Monaghan A. Maxillofacial Injuries in Military Personnel Treated at The Royal Center for Defence Medicine June 2001 to December 2017. British Journal of Oral Maxillofacial Surgery. 2010.48 (8):613-6
13. Chalya PL, Mabula JB, Mchembe M, Kanumba E, Gilyma J. Etiological Spectrum, Injury Characteristics and Treatment Outcome of Maxillofacial Injuries in a Tanzanian Teaching Hospital. Journal of Trauma Management and Outcome.2011;5:7