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Maxillofacial Gunshot and Blast Injuries Seen in a Tertiary Military Hospital

ABSTRACT

Objective: To describe the incidence, pattern and severity of maxillofacial trauma among patients who sustained gunshot and blast injuries of the maxillofacial region in a tertiary military hospital.

Methods:

Design: Retrospective Case Series

Setting: Tertiary Military General Hospital

Participantss: All patients admitted under the otorhinolaryngology service with gunshot and blast injuries to the face

Results: A total of 108 patients were admitted due to gunshot and blast injuries to the face from January 2010 to December 2015. Most sustained gunshot injuries (73, 67.6%) compared to blast injuries (35, 32.4%). Of 108 patients, 71 had maxillofacial fractures (65.7%) while the remaining 37 only had soft tissue injuries (34.3%). Majority of those with maxillofacial fractures had single bone involvement (52, 72.2%); the rest had two or more bones affected (19, 27.8%) The most common bone injured was the mandible (77.5%), followed by the maxilla (35.2%), zygoma (12.7%), and others (frontal, nasal, and temporal bones) at 5.6%.

Conclusion: Gunshot injuries had a higher incidence than blast injuries among military personnel with projectile injuries to the face seen during the study period. There were more fractures and combinations of fractured bones affected in gunshot injuries, although the breakdown of soft tissue injuries was similar among those with gunshot and blast injuries. However, the relation of injury patterns and severity to gunshot or blast etiology, or to other factors such as protective gear cannot be established in this present study.

Keywords: *gunshot injuries; blast injuries; maxillofacial; projectile*

Gunshot and blast injuries are commonly seen in a military hospital and patients come from different areas of the country where insurgency and terrorism are rampant. These patients are managed by multidisciplinary trauma teams including head and neck surgery, trauma surgery, neurosurgery and ophthalmology.¹ Injuries to the maxillofacial area pose a great problem

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because of close proximity to vital structures.¹ They depend on the speed and energy of the projectile and the damage is often very difficult to repair.^{1,2}

Institutional data on maxillofacial injuries is important for patient care, as well as for preparation of plans and programs such as procurement of supplies and implants necessary for the management of these conditions. However, to the best of our knowledge there is only one previous relevant study in our institution and it described mandibular fractures only.³

This study aims to describe the incidence, pattern, and severity of facial trauma among patients who sustained gunshot and blast injuries to the maxillofacial region in a tertiary military hospital. This study also aims to identify the facial bones commonly involved with these types of injuries.

METHODS

With Ethics Review Board approval, this retrospective case series reviewed records of all patients admitted to the otorhinolaryngology-head and neck surgery (ORL-HNS) ward of the Armed Forces of the Philippines Medical Center in Quezon City from January 1, 2010 to December 31, 2015 who sustained gunshot and blast injuries to the maxillofacial area. Data regarding sex, age, mechanism of injury (blast/gunshot), and location and number of fractured bones of the face were gathered from hospital in-patient and radiographic examination records. The data was hand-searched, extracted and tabulated using Microsoft Excel for Mac 2019 Version 16.3 (19101301), (Microsoft Corp., Redmond, WA, USA). Descriptive statistics were used to describe categorical data.

RESULTS

A total of 108 patients were admitted to the ORL-HNS ward due to gunshot and blast injuries to the face during the study period from 2010 to 2015. All of the patients in this study were males. Ages ranged from 21 to 56 years old (median age 32 years old). Most (50) were aged 21 to 30 years old, followed by 41 patients aged 31 to 40 years old. Only 14 and 3 patients were aged 41 to 50 and 51 to 60 years old, respectively.

Out of 108 patients, most sustained gunshot injuries (73 or 67.6%) compared to blast injuries (35 or 32.4%). Most of the patients (71 or 65.7%) had fractures in the maxillofacial area while the remaining 37 (34.3%) only had soft tissue injuries. Of the 71 with fractures, most (54 or 76.1%) were among those with gunshot injuries than those with blast injuries (17 or 23.9%), although the breakdown of soft tissue injuries was similar among those with gunshot injuries (19 or 51.4%) and blast injuries (18 or 48.6%).

Majority of patients with maxillofacial fractures had single bone

involvement (52 or 72.2%) compared to multiple bone involvement (19 or 27.8%). Of the 52 with single bone involvement, 36 (69.2%) were among those with gunshot injuries while 16 (30.8%) were among those with blast injuries. Among the 19 with multiple bone involvement, 18 (94.7%) involved those with gunshot injuries while only one (5.3%) involved blast injury.

Of the 71 fractures, the most common bone fractured was the mandible (55 or 77.5%), followed by the maxilla (25 or 35.2%), zygoma (9 or 12.7%), and frontal, nasal or temporal bones, (4 or 5.6%). The majority of fractures were from gunshot injuries: 40 of the 55 mandibular fractures, 23 of the 25 maxillary fractures, all of the nine zygomatic fractures, and three of the four frontal/nasal/temporal bone fractures.

DISCUSSION

In our military hospital, wounded personnel come in daily with gunshot and blast injuries. Among them are patients with injuries in the maxillofacial region. The management of maxillofacial gunshot and blast injuries is multifaceted because it involves the facial skeleton, orbit, cranium, airway and resulting deformities are usually disfiguring.⁴

All of the patients in this study were males. Similar to the previous study in our institution on mandibular fractures, the predominant age group in our study was 21 to 30 years old which could reflect the fact that this age group makes up the fighting force of our soldiers engaged in actual combat.³

Out of 108 patients, there were only 35 patients (32.4%) who sustained blast injuries to the face compared to 73 patients (67.6%) who had gunshot injuries in the same area. One explanation may be that blast injuries due to land mines and grenades are more commonly seen in the extremities especially in the lower limbs.⁵

Gunshot injuries compared to blast or shrapnel injuries are expected to have more extensive damage due to their high velocity resulting in greater energy transfer to soft tissues and bones.^{4,6} This may explain why the breakdown of soft tissue injuries was similar among those with gunshot injuries and blast injuries while there were more fractures with the former than the latter.

As expected from other studies, in almost all the facial bones included in our study, gunshots were still the leading cause of injury with higher risk of resulting fracture.⁵ Furthermore, both single and multiple-bone fractures were more common in gunshot than blast injuries. High-velocity projectiles are more likely to cause unstable fracture configurations with butterfly fragments and large amounts of comminution.⁷ This might explain the higher occurrence of both multiple and single-bone involvement (such as comminuted mandibular fractures) in gunshot injuries in our study. On the other hand, in blast injuries the blast wave loses velocity and magnitude



before decaying into an acoustic wave.^{8,9} This might explain less fractures to the maxillofacial region from blast injuries in our study.

Similar to our findings, previous studies about penetrating and blunt injuries to the maxillofacial region also showed that mandible is the most frequent facial bone fractured in these types of injuries.^{4,10} On the other hand, we found that fractures in the nasal, frontal and temporal bone were less common compared to the other facial bones. One possible reason for this may be that the area is mostly covered by protective gear. Another explanation may be the proximity of these bones to the brain, such that patients with injuries in this area may have been referred to neurosurgery and not included in this study. This is a limitation of our study and also extends to patients with primary injuries to the extremities being admitted under the orthopedic service.

Our only including patients admitted in the ORL-HNS ward also excluded patients in other wards who may have had concomitant maxillofacial injuries and future studies should account for these. Another limitation of our study is the unavailability of data on the number of deaths from these type of injuries to account for the mortality rate among such patients.

In conclusion, gunshot injuries had a higher incidence than blast injuries among military personnel with projectile injuries to the face seen during the study period. There were more fractures and combinations of fractured bones affected in gunshot injuries although the breakdown of soft tissue injuries was similar among those with gunshot and blast injuries. Despite possible initial trends and patterns, the relation of injury patterns and severity to gunshot or blast etiology or to other factors such as protective gear, cannot be established in this present study.

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