

Craniofacial Gunshot Trauma: A Case Study Approach

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ABSTRACT

Ideal management of patients who have undergone craniofacial trauma requires a collaborative interdisciplinary approach that involves the clinical expertise of a number of related specialties. This case study reveals the efforts and the contributions to an example of such type of trauma from eminent practitioners closely involved in the challenging care and management of patients who have required reconstruction of both acute and established injuries to the craniofacial hard and soft tissue. Craniofacial trauma due to Gunshot injuries is a challenging surgical emergency. In this case report we are discussing the whole aspects of managing a case with a compound orbitocraniofacial trauma due to gunshot injury. We are describing here the presentation, investigations and treatment, as well as the aim in managing such emergencies.

Keywords: GunShot Injuries, Air Filled Spaces.

How to cite this Article: Kebsi IA, Dhahir MA. Craniofacial Gunshot Trauma: A Case Study. Arch CranOroFac Sc 2013;1(2):31-33.

Source of Support: Nil

Conflict of Interest: No

Introduction

Facial fractures, particularly those caused by severe injuries with multiple fractures in the craniofacial region, are the most common form of neurocranial injuries [1-5]. Depending on the complexity and level of the fracture, the frontobasal involvement of all craniofacial injuries is accounted in about 30 to 70% [1,6-9]. In addition to the challenging reconstruction of severe craniofacial injuries, specific diagnostic, pathologic and therapeutic challenges arise as a consequence of the accompanying frontobasal fractures. A recognizable optimization in the treatment of these profound injuries can be achieved by a routine team approach of maxillofacial, neurosurgical, and anesthesiologists specialists with the appropriate diagnostic and therapeutic resources at their disposal [1].

Gunshot wounds and tissue avulsions can lead to devastating wounds due to soft- and hard-tissue destruction. Such wounds are produced by projectiles fired from a gun or fragments of a shell. They may be seen in civilian life or war injuries. Depending upon the speed, shape and striking angle of the projectile, the character of the wound will vary [10].



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As the impact velocity of a typical bullet exceeds 600m/s, shock waves and temporary cavitation phenomenon occurs within the penetrated tissues. Cavitation is caused by the tendency of the tissue surrounding the path of the bullet to flow forward briefly, creating a wavelike sucking and vapour-filled cavity lasting several milliseconds. The degree of tissue necrosis, up to 30-40 times the diameter of the bullet, depends upon the elasticity and density of the tissues along the bullet's path. Solid, less elastic tissues tend to suffer the greatest injury while air-filled spaces (e.g., lung or bowel) tend to suffer the least damage. With regard to maxillofacial injuries, highvelocity bullets tend to cause the most damage to bony components, while bullets that cross the air-filled spaces of the oropharynx, nasopharynx, and sinuses tend to cause the least extent of damage. The mandible is affected in about 25%, the maxilla in 25%, and combined mandible, maxilla, and orbit in 50% of cases involving avulsive high-energy ballistic injuries[11-12]. Managing orbitocraniofacial Gunshot Wounds should be done after stabilizing of the patients with the aim to restore the best of form and function of the injured component.

Aim of the Study

The purpose of the current case study is to present an established therapy concept for craniofacial fractures with anterior subcranial involvement, with reference to the surgical approach and the postoperative results. Of particular interest are etiologi-



Figure. 1. Pre Operative

cal, epidemiological, and pathomechanical characteristics in neuro-craniofacial injuries.

Case Report

A 50 years male received a gunshot injury, the injury inlet was left fronto-orbital side through both eyes and frontobasal skull, the outlet was right orbitofrontal side (Figure.1). He was brought to Emergency Room with GCS 7 and in a shock state. After hemodynamic stabilization, ICU care were initiated urgently, then CT scan was performed. Neurosurgical, ophthalmological and faciomaxillary exploration were done by a team of 3 surgeons. Frontobasal hemorrhage were controlled, duroplasty and cranioplasty was performed by neurosurgeon, both eye evacuation performed by the ophthalmologist, nasomaxillary reconstruction done by the facial surgeon The patient survived. Post-operatively; good restoration of the facial structural frame was achieved (Figure.2), regarding eye patient was blind due to complete loss of both eyes and was sent later for plastic ophthalmolo-



Figure. 2. Post Operative

gist for artificial eye implantation, and neurologically patient was normal except for transient frontal lobe psychosis and smell loss.

Discussion

Although in the first 45 years of life personal assault is the most common cause of craniofacial injury, massive tissue loss is most often associated with motor vehicle accidents and gunshot wounds. Injury and death rates are declining from motor vehicles and increasing from gunshots. In the United States, the majority of gunshot injuries are caused by handguns [12].

Gunshot injuries are in reality penetrating wounds, but are classified separately, because of the extensiveness of the wounds and the special problems which arise throughout their management. They are divided into: (a) penetrating wounds, when the missile is retained in the wound, (b) perforating wounds, when the missile produces another wound of exit, (c) avulsive wounds, when large tissue components are destroyed [10].

Despite the advancements in imaging modalities, microsurgical technique, neuroanesthesia, and specialized intensive care medicine, the treatment of patients with penetrating cranio-cerebral trauma remains a challenging task for the neurosurgeon.

The ultimate goal of modern craniomaxillofacial trauma care is immediate or early restoration of both form and function of all structures of the face and cranium, with complete, predictable, and complication-free healing. Depending on the type and extent of craniofacial injuries, this ideal goal cannot always be achieved. For example, when specific tissues are severely damaged or lost, like eyeballs (like in this case), teeth, and nerves, anatomy or function cannot be restored. However, even in these severe cases, the patients should be treated as completely as possible; always keeping the ultimate goal in mind which is to reach the best possible result.

Conclusion

The Ultimate goal of modern craniofacial surgery is to achieve the highest possible outcome i.e. the optimal restoration of patient's quality of life by returning the patients to the best possible condition. Modern trauma care is based on a number of requirements:

- Multi-specialty interactional team approach involving all specialties needed according to the specific injuries of the patient
- Proper imaging
- Individual treatment plan based on both scientific basis and individual experiences
- Optimum or near optimum timing of surgery
- Treatment, especially surgery, should be performed according to the highest standards, involving modern techniques and equipment.
- Case-specific oriented post-operative care and follow-up. All of the aforementioned points are almost similarly essential to achieve advancement in treatment outcome.

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