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Case Series
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Complex Maxillofacial Trauma with Wide-Spread Soft-Tissue Defects

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Abstract

The management of soft tissue injury after complex facial trauma poses unique challenges to the plastic surgeon, given the specialized nature of facial tissue and the aesthetic importance of the face. We report 8 cases with wide-spread soft-tissue defects due to complex facial trauma who presented at Odonto-stomatology center- Hue central Hospital during the year 2018. Of these cases were surgically managed by fixation and facial reconstruction at odonto-stomatology center- Hue central hospital; and they were very well recovery in function and aesthetics. The general principles of trauma management and wound care are applied in all cases. The management of severe injuries to the face is discussed in relation to the location and the mechanism of injury.

Keywords: Complex maxillofacial trauma; Wide-spread soft-tissue defects; Reconstruction

Introduction

Maxillofacial injuries are frequent cause of presentations in an emergency department. Varying from simple, common nasal fractures to gross communition of the face, management of such injuries can be extremely challenging. The complex maxillofacial trauma with wide-spread soft-tissue defects has the potential to cause disfigurement and loss of function; for example, blindness or difficulty moving the jaw can result [1-3]. Furthermore, the complex maxillofacial trauma usually connects closely to traumatic brain injury, thoracic trauma and nearby organs injury [2,4,5].

The management of maxillofacial trauma involves organs and regions managed by various well-established health care disciplines and is therefore multidisciplinary such as emergency, neurology, gastroenterology, thoracic surgery, anesthesiology, orthopedic, ophthalmology, otolaryngology (ENT), hematology, etc [1].

Therefore, maxillofacial surgical procedures to reconstruct the wide-spread soft-tissue defects oftentimes a huge challenge for oral and maxillofacial surgeons. We report a number of clinical cases involving complex maxillofacial trauma and wide-spread soft-tissue defect in odonto-stomatology center- Hue Central Hospital.

Case Series

A total 8 patients with complex maxillofacial trauma who presented at odonto-stomatology center- Hue central hospital during the year 2018. There were 6 males and 2 females. Age range 19 years to 38 years. Of these patients, 7 were traffic accidents victims, 1 was living accident victim. All cases had maxillofacial fractures and wide-spread soft-tissue defects. The time to hospital was within 4 hours after accident occurring. The patient characteristic is showed in Table 1.

All cases were surgically managed by fixation and facial reconstruction at Odonto-stomatology center- Hue central hospital; and they were very well recovery in function and aesthetics. Photography from all patients before and after surgery was done (Figure 1-8).

Discussion

Maxillofacial trauma has become one of the major health problems worldwide, and injury patterns vary in different societies [6,7]. The incidence varies according to geographical area and socioeconomic status of the population investigated [8]. This group of patient is a huge burden and workload for maxillofacial surgeons, due to many vital structures and significant aesthetic consideration of the facial area [9].

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Table 1: Patient characteristics.

Patient No	Age	Sex	Type of accident	Time to hospital	Characteristics of trauma
1	30	Male	Traffic accident	3 hours	Maxillary fracture and Zygomatic arch fracture
2	23	Female	Traffic accident	2 hours	Zygomatic arch fracture
3	19	Male	Work-related accident	3 hours	Maxillary fracture and Zygomatic arch fracture
4	32	Male	Traffic accident	4 hours	Maxillary fracture and Zygomatic arch fracture
5	35	Male	Traffic accident	1 hours	Maxillary fracture and Zygomatic arch fracture
6	35	Male	Traffic accident	4 hours	Maxillary fracture and Zygomatic arch fracture; Mandibular fracture
7	38	Female	Traffic accident	3 hours	Maxillary fracture and Zygomatic arch fracture; Mandibular fracture
8	45	Male	Traffic accident	3 hours	Maxillary fracture and Zygomatic arch fracture; Mandibular fracture

Figure 1: Case 1 (Male, 30 years old).

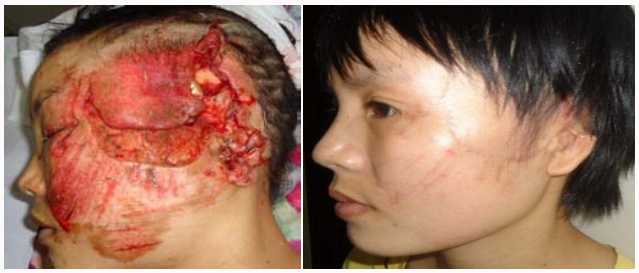

Figure 2: Case 2 (Females, 23 years old).

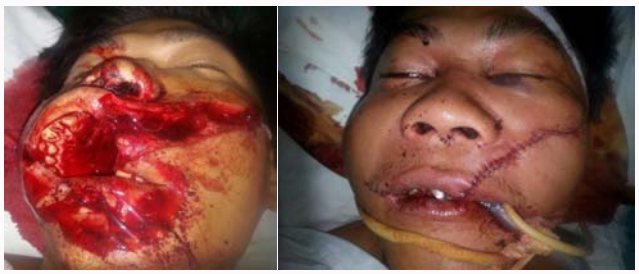

Figure 3: Case 3 (Male, 19 years old).

Figure 4: Case 4 (Male, 32 years old).

Figure 5: Case 5 (Male, 35 years old).

Figure 6: Case 6 (Male, 35 years old).

Severe facial trauma can cause significant morbidity and disfiguration and poses a unique challenge to the plastic surgeon, given the specialized nature of facial tissues and importance of the face for the patient's self-esteem and personal identity. After initial stabilization and life-saving measures, focus turns to a reconstructive process that aims to provide acceptable functional and aesthetic outcomes for the patient [10].

Different etiologies of maxillofacial injuries had been reported in the literature, which include Motor Vehicle Accident (MVA), assault, domestic injury, sport injuries, and others. Due to the differences in social, culture, environmental, and risk factors, both the incidence and the etiology of the trauma vary from one country to another.

Assault and MVA are the two main causes of maxillofacial injury worldwide [11]. Injuries at maxillofacial regions stemming from MVA continue to be the leading cause in many countries [7,12]. It is known that the incidence of MVA is even higher in developing countries, which ranged from 55.2% to 91% as reported in the literature [13-18]. MVA is the main etiology and the second cause of mortality, particularly in Southeast Asia. Vietnam is not spared from the maxillofacial trauma caused by MVA, with the majority involved motorcyclists, as motorcycles constitute half of all vehicles and contributed to more than 70% of casualties in Vietnam.

The key findings of this study were males constituted the higher number in maxillofacial trauma cases compared with females; highest

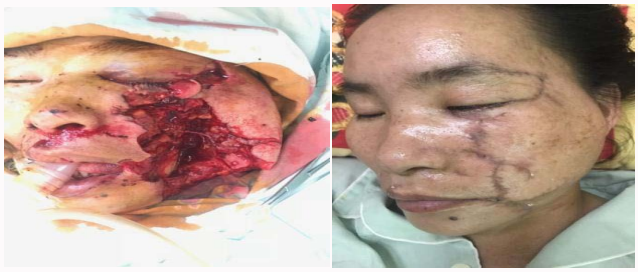

Figure 7: Case 7 (Female, 38 years old).

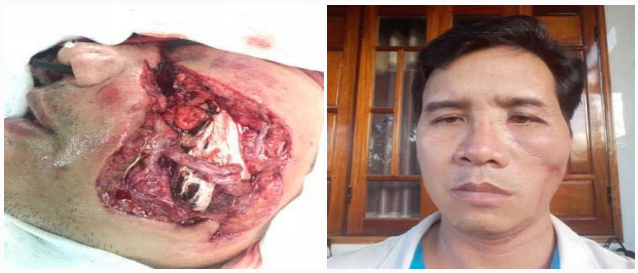

Figure 8: Case 8 (Male, 45 years old).

incidence of maxillofacial trauma cases came from the age group of 19 years to 38 years; the main cause of maxillofacial trauma incidence in Vietnam was MVA; motorcyclists formed the highest number of the MVA victims; most of the maxillofacial injury patients presented with soft-tissue injuries, followed by mandibular fracture.

From the demographic data of maxillofacial trauma in the study of Lee et al. [19], it was shown that maxillofacial fractures were significantly more prevalent in men (538 males, 85.4%) compared with women (92 females, 14.6%). Male-to-female ratio was 5.8:1. The ratio of our study was lower than 13:1 as described by Moafian et al. [20] in a study performed in Iran. These findings demonstrate a lack of established pattern across cultures [7]. The cultural and socioeconomic values of population studied might influence the rates of facial fractures in women [11]. For accidents, men tend to have a higher-risk job as compared with women. Occupation involving physical strain or the use of tools and machine tend to be more dangerous [8].

Highest incidence of maxillofacial trauma was from patients within the age group of 19 years to 38 years. Both gender and age group predilections were similar to the data reported in different researches done in other parts of the world [7,8,11-13,18]. It has been suggested that males, aged between 21 years and 30 years, were more susceptible to maxillofacial trauma due to their high rate of commuting [11].

The main cause of maxillofacial trauma in our study was MVA followed by work-related accident. The result was comparable to other studies, reporting that developing countries have higher incidence of MVA, ranging from 55.2% to 91% [13-18]. Vietnam shares similar profiles of crash patterns with other developing nations in the world in the past decade. The tremendous increase of motorized vehicles on roads has invariably led to significant rise in the number of traffic accidents. However, the etiology of maxillofacial trauma has changed drastically in developed countries in the past decade; personal assault has overtaken MVA as the main cause [21]. These findings have been reported in countries such as Denmark, Sweden, United Kingdom, France, Finland, and New Zealand [22-25].

All of our patients had soft-tissue injury with wide-spread defects. Soft-tissue injuries included laceration wound, abrasion or contusion on the facial region. Data of the exact anatomical location and severity of the soft-tissue injuries were not collected in this study. Damaged parotid glands were normally referred to and managed by Otorhinolaryngology (ORL) team. The most commonly fractured site at the face was the mandible followed by maxilla and zygoma. Mandible's prominence made it a favorable site for fracture. Parasymphysis was the most frequent site for mandibular fracture followed by condyle and body of mandible. Parasymphysis fracture is a fracture that occurs between the mental foramen and the distal aspect of the mandibular lateral incisors. The anatomical location of parasymphysis around the curvature of the mandible makes it a prominent site for fracture. The thin condylar neck tends to fracture easily during an impact and this mechanism prevents it from being pushed into the middle cranial fossa. Several studies reported similar findings with our study, which mentioned that the most frequent site of maxillofacial fracture was mandible, and the most frequent mandibular fracture sites were symphysis-parasymphysis and condylar region for road-traffic accident cases [11,18,26].

There are many methods available to import tissue to the head and neck region; the management plan is individualized to the case at hand. Local tissue flaps have limited amounts of tissue and a modest vascular supply, and thus are often saved for the final stages of reconstruction for minor contouring. Pedicled myocutaneous flaps offer large amounts of tissue with reliable vascularity for soft tissue coverage, but are often bulky and are limited by the length of the vascular pedicle. Free tissue transfer allows the early reconstruction of damaged bones and provides soft tissue coverage soon after injury [27]. Additional reconstructive techniques and tools include implants, tissue expanders, and epidermal skin grafting, although these are not frequently used in the acute setting [10].

At the initial encounter, after stabilization and the management of life-threatening injuries, the initial reconstruction in the operating room serves to debride the wound, establish proper occlusion, and close the wound in the best way possible. The timing of definitive reconstruction is currently a topic of debate. Some authors suggest that, when possible, patients requiring free-tissue transfer should have their definitive treatment performed immediately (within 24 h to 48 h) [28]. Immediate definitive reconstruction leads to fewer revisionary procedures and improved results, whereas delayed reconstruction has an increased incidence of wound contracture [29-31]. Others suggest providing conservative coverage in the acute setting, then performing more lengthy definitive reconstructions after the patient has been stabilized [27,32].

Of all cases, 6 of the patients chose to be treated with Open Reduction and Internal Fixation (ORIF), 1 case by closed reduction, and 1 case by either conservative management or no treatment. ORIF was mainly achieved via titanium osteosynthesis plates. All our ORIF cases were treated with load sharing mini plates with exception to comminuted mandibular fractures where load-bearing plates were used. Closed reduction was mainly achieved *via* intermaxillary fixation either using arch bar or eyelet wiring. With regard to treatment methods, some research had reported that approximately 98% of all patients with mandibular and middle third facial fractures were treated by closed reduction, followed by ORIF and conservative management (active jaw exercises after short period

of immobilization for condylar fractures) [18]. ORIF may lead to early recovery, segment stability, more rapid return of function, and also improvement of patient's comfort [11]. Indications for ORIF of zygomatic complex fractures include diplopia, enophthalmus, poor aesthetic, and limited mouth opening. We treat condylar fracture with closed reduction with exception for cases indicated for open reduction such as fractured laterally, displacement of condyle into middle cranial fossa, and the presence of foreign body. Nevertheless, patients refused ORIF treatment because of the healthcare cost. Some of the simple fractures were managed conservatively.

Conclusion

Complex maxillofacial injuries can be a devastating ordeal for patients and families. The vast improvement in prehospital care has resulted in typically more-severe maxillofacial injuries being managed by the plastic surgeon. The management of facial fractures and wide-spread soft-tissue defects has evolved so that a multidisciplinary team is best equipped to deal with ongoing issues.

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