

# Management of Maxillofacial Fracture: Experience of Emergency and Trauma Acute Care Surgery Department of Sanglah General Hospital Denpasar Bali

Luciana Luciana<sup>1\*</sup>, Bramastha Aires Rosadi Oggy<sup>1</sup>, I Ketut Wiargitha<sup>2</sup>, Hendry Irawan<sup>1</sup>

<sup>1</sup>General Surgery Department, Medical Faculty, Udayana University, Sanglah General Hospital Denpasar, Bali, Indonesia;

<sup>2</sup>Department of Emergency and Acute Care Surgery, Medical Faculty, Udayana University, Sanglah General Hospital Denpasar, Bali, Indonesia

## Abstract

**Citation:** Luciana L, Oggy BAR, Wiargitha IK, Irawan H. Management of Maxillofacial Fracture: Experience of Emergency and Trauma Acute Care Surgery Department of Sanglah General Hospital Denpasar Bali. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2019.701>

**Keywords:** Maxillofacial fracture; Characteristic; Diagnosis; Treatment

**\*Correspondence:** Luciana Luciana, General Surgery Department, Medical Faculty, Udayana University, Sanglah General Hospital Denpasar, Bali, Indonesia. E-mail: [dr.lucy\\_lucas@yahoo.co.id](mailto:dr.lucy_lucas@yahoo.co.id)

**Received:** 14-May-2019; **Revised:** 22-Sep-2019; **Accepted:** 23-Sep-2019; **Online first:** 08-Oct-2019

**Copyright:** © 2019 Luciana Luciana, Bramastha Aires Rosadi Oggy, I Ketut Wiargitha, Hendry Irawan. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUND:** Maxillofacial fracture is one of the major trauma; the cases were increasing because of the high number of motorcycles in Bali. The goal of the treatment is proper positioning of the occlusion, and it depends on rapid diagnosis and proper treatment.

**AIM:** This study aims to know the characteristics of the maxillofacial fracture patients in Sanglah General Hospital Denpasar Bali.

**METHODS:** A retrospective study, based on medical record were concluded, samples taken in Sanglah General Hospital from January to June 2015. Total recorded patient were 35 patients. The data obtained include age, gender, type of the fractures, and operation management.

**RESULTS:** The injury was more common in male compared to female (80% vs 20%). Age 20 to 40 years old were more common (48.57%), followed by the child to adolescent (aged 0 to 20 years old) were 31.43%, and adult to elderly (aged 40 to 60 years old) was 20%. The mandibular fracture was most common (51.43%), other fractures such as a zygomatic fracture (31.43%) and maxillary fracture (17.14%). Internal fixation was the gold standard of the treatment (65.71%), and the other was an arch bar (34.29%).

**CONCLUSION:** Diagnosing the right injury to the facial bone is a key step in determining a treatment plan. Rapid diagnosis and proper treatment lead to good occlusion, both internal fixation and arch bar were an effective treatment. The importance of dealing with almost all maxillofacial fracture problems in the first surgery.

## Introduction

Emergency and Trauma Acute Care Surgery has been established since 2001 at Bali, where various trauma cases are expected to be seen. Maxillofacial trauma is the highest cases seen at Sanglah Hospital Bali. Maxillofacial fracture is one of the major traumas; the cases were increasing because of the high number of motorcycles in Bali. The standard operating procedure of the management maxillofacial fracture in Sanglah General Hospital is using open reduction and internal fixation (ORIF) using mini plates and screws. This procedure has

proven to be the most effective procedure associated with early mobilisation and minimal morbidity. Maxillofacial trauma also knew as facial trauma can be classified into three parts, such as the upper face (the frontal bone and frontal sinus), the midface (the nasal, ethmoid, zygomatic, and maxillary bones), and the lower face (the mandible) [1].

Fixation procedure can be performed with intermaxillary fixation (IMF) or maxillomandibular fixation (MMF) with arch bars, 4-point fixation, and mini plates [2], [3]. There are advantages and disadvantages to both methods of fixation. The closed reduction does not endanger vessels and lower costs for patients. However, this is related to a significant

period of oral immobilisation and closure and requires intact teeth. Unlike ORIF, it can get direct visualisation, reposition fractured bone segments, and restore occlusion of mandibular and maxillary patients [5]. One important factor to consider is patient compliance. About 60% of patients with facial fractures may not adhere to treatment [4], [6], [7]. The IMF or MMF is a technique to immobilise the mandibular segment by locking the occlusion externally, using the teeth as a point of stability [3], [4], [5], [7].

The aim of this study is to know the characteristics of the maxillofacial fracture patients in Sanglah General Hospital Denpasar Bali.

## Methods

A descriptive retrospective study, samples taken in Sanglah General Hospital from January to June 2015. Inclusion criteria were all patients with maxillofacial fractures who underwent surgery. The total recorded patient was 35 patients with maxillofacial fractures. The data obtained from general primary data include age and gender, the type of the fractures derived from radiology expertise, and physical examination. All data is taken from medical records and surgeons records during the operation. The type of fixation in the maxillofacial fracture depends on the type of fracture. Orbital rim fractures, zygomaticomaxillary fractures, and mandibular fractures used ORIF miniplate. Simple loose teeth and alveolar process fractures used interdental wiring (IDW) and if multiple alveolar process fractures used the arch bar. If multiple fractures of mandibular bone or multiple fracture maxilla and mandible, we can immobilise the mandible with MMF. All data were analysed descriptively.

## Results

The injury was more common in male compared to female (80% vs 20%). Age 20 to 40 years old were more common (48.57%), followed by the child to adolescent (aged 0 to 20 years old) were 31.43%, and adult to elderly (aged 40 to 60 years old) was 20% (Table 1).

**Table 1: Distribution according to gender**

Variation	n (%)
Gender	
Male	28 (80)
Female	7 (20)
Age	
0-20 years old	11 (31.43)
20-40 years old	17 (48.57)
40-60 years old	7 (20)

In Table 2, we showed a variation of maxillofacial fracture in Sanglah General Hospital. The mandibular fracture was most common (51.43%), other fractures such as a zygomatic fracture (31.43%) and maxillary fracture (17.14%).

**Table 2: Distribution according to the side of the fracture**

Variation of fractures	n (%)
Mandibular bone	18 (51.43)
Alveolar process of mandible	6 (33.33)
Parasymphysis mandible	9 (50)
Angle of mandible	2 (11.11)
Segmented	1 (5.56)
Zygomatic bone	11 (31.43)
Maxillary bone	6 (17.14)
Displaced	1 (16.67)
Alveolar process of the maxilla	2 (33.34)
Zygomaticomaxillary bone	3 (49.99)

Based on the mechanism of injury (Table 3), the most common cause of the maxillofacial fracture was a traffic accident (90%) followed by violent activities (8.57%).

**Table 3: Mechanism of injury**

Cause of injury	n (%)
Traffic accident	32 (91.43)
Violent activity	3 (8.57)

Operation technique of maxillofacial fracture in Table 4. Internal fixation was the gold standard of the treatment (65.71%), and the other was an arch bar (34.29%).

**Table 4: Distribution according operation technique**

Operation technique	n (%)
ORIF miniplate	23 (65.71)
Arch bar + IDW	3 (8.57)
Arch bar + MMF	5 (14.29)
ORIF miniplate + Arch bar	4 (11.43)

ORIF: open reduction and internal fixation; IDW: interdental wiring; MMF: maxillomandibular fixation.

## Discussion

The common cause of maxillofacial fracture is due to a traffic accident [2], [4]. Male is predominant in our study due to their high-risk activities such as driving vehicles and their social life involving alcohol and violent activity. The age-related of maxillofacial injuries in 20-40 years old, this relates to a more active and productive situation in the life period [2], [4]. In extreme age groups, very young or old, the incidence of maxillofacial fractures will be lower due to limited activity.

Maxillofacial is the prominent site of the human body, and this makes the region is prone to suffer from trauma [7], [8]. Low level of awareness among the population to wear a full-face helmet. Indonesian standard of the helmet with chin can reduce the number of maxillofacial injuries, especially in Bali. The anatomy features of maxillofacial and all

problem mentioned above are the main factors that make the number of maxillofacial injuries quite high in Indonesia. There are several ways to diagnose maxillofacial fractures such as history taking to know the mechanism of injury and physical examination to evaluate any airway obstruction, deformity, lost teeth, and malocclusion. On palpation of maxillofacial, we evaluate false movement and pain at the temporomandibular joint during movement due to dislocation. Radiological examination such as skull anteroposterior or lateral and panoramic are the cheapest and the most commonly done. It does not just to evaluate mandible alone, but this photo can describe many parts of facial bones. More sophisticated examination such as CT (computed tomography) scan and MRI (magnetic resonance imaging) have become more popular. CT Scan can construct facial bone in three-dimension reconstruction, where we can observe in detail the type of fracture. In a developed country, MRI has more role as radiological examination in maxillofacial fracture, and in our centre, it is start done routinely. MRI primarily is used to evaluating the damage of soft tissue especially in complex fracture [8].

There are several choices of treatment in maxillofacial fractures, but the proper treatment is depending on many factors such as treatment cost, availability of tools at the hospital, doctor's skills, patient's willingness to obey post-surgical treatment. The choice of treatment can be different in each country or region [3], [4], [5]. In our hospital, most of the patients underwent closed reduction treatment with arch bar fixation and some patients were done with ORIF miniplate. ORIF miniplate has been reported to be the gold standard of the treatment [3], [4]. However, this form of treatment become quite famous at Sanglah General Hospital due to the effectiveness of diagnosing and readily available of tools and local insurance assist. It makes the cost of treatment affordable. There are some of the surgical approaches in maxillofacial, such as intraoral sublabial approach, coronal approach, transcutaneous approaches, and transconjunctival approach [9], [10]. The transconjunctival approach does not familiar with Sanglah General Hospital. The main goal of reduction is to restore proper functions of maxillofacial. We need to correct function of chewing and speaking, to stabilise and correct occlusion, to obtain a pain-free mandibular range of motion, to restore the contour of the maxillofacial, and to offer enough stability to ensure the union of bones, and to reduce the risk of infection [11].

In early 2001, the insurance does not cover ORIF miniplate and arch bar fixation as well as any medical devices for open and closed reduction. This makes the delay in the management of maxillofacial fracture. But today, since the new agreement between hospital and insurance provider was made, the choices of a method in maxillofacial fracture management is more flexible [9], [10]. The high rates

of infection could be described as the use of closed reduction with MMF. Not only oral hygiene is a major concern for patients after surgery, but also adequate nutrition needs to be considered and plays an important role in wound healing [6].

Orbital fractures often occur periorbital oedema, ecchymosis, conjunctival bleeding, limited movement of the eye, and diplopia. The orbital fracture can be associated with zygomaticomaxillary fractures, nasal fracture, and it can cause tripod fracture. Tripod fracture includes zygomatic arch, lateral orbital rim, and inferior orbital rim. Immobilisation techniques use ORIF miniplate. Subciliary incision approach is often used in our department to correct the inferior orbital fracture. The zygomaticomaxillary fracture can use a combination approach of subciliary and intraoral.

Mandibular fractures are often characterised by a malocclusion. Dentoalveolar trauma is often observed with mandibular fractures, include trismus, pain with mastication, the floor of the mouth hematoma, facial asymmetry, and paresthesia of the third trigeminal division [11]. Immobilisation technique of mandibular fracture uses ORIF miniplate. If mandibular or maxilla fracture associated with dentoalveolar trauma, we can use an arch bar or IDW to secure loose teeth and alveolar bone. IDW can be used for simple alveolar process fracture. MMF is used as an aid for the appropriate anatomical reduction of bony segments. We can use rubber or wire MMF to immobilise mandible.

Early fracture immobilisation can reduce the risk of infection. Because of the high risk of bacterial contamination in maxillofacial fractures, the antibiotic drug should be given to all maxillofacial fractures. Teeth adjacent to the fracture site must be evaluated and should be preserved to increase stabilisation of the fracture area.

Proper maintenance of oral hygiene, both before and after surgery, is an important treatment in the management of maxillofacial fractures. Loss of tissue barriers due to bacterial invasion due to maxillofacial fractures, loose or missing teeth, gingival tears, hematoma, oedema, and disorders with natural cleansing mechanisms will increase the risk of infection. Appropriate oral hygiene uses saline, peroxide, or drugs (chlorhexidine gluconate) should be encouraged. Increasing the frequency of brushing teeth must be educated to patients and families, and the use of pulsatile irrigation devices is very helpful for patients.

Eating right and maintaining important nutritional status for postoperative care. Mandibular immobilisation with MMF for 4-6 weeks will make nutrition intake more difficult, and weight loss cannot be avoided [10]. Our experience, MMF can be maintained for 3-4 weeks to get good occlusion. While patients with MMF, they need to keep oral hygiene with antiseptic gargle and get a liquid meal.

However, many choices of nutritional supplements are available for patients in liquid form, which will reduce weight loss and malnutrition. Patients can be asked to pay attention to weight gain and calories as needed. The position of the patient and bedside suction device can simplify the patient's ability to manage oral secretions and bleeding after surgery. Elevating the head of a 45-degree angle bed allows the patient to cleanse secretions effectively. Postoperative steroids and the use of ice packs can be effective in reducing oedema [10].

After the MMF was removed, the patients can eat soft food and liquid meal. In maxillofacial fracture which immobilised with an arch bar in maxilla and mandible, the maxillary arch bar can be removed after 6-8 weeks and after 12 weeks for the mandibular arch bar. They need to avoid hard food for approximately 12 weeks.

In conclusion, maxillofacial trauma has become often reported in Sanglah General Hospital, despite rapid diagnoses and proper treatment, maxillofacial trauma becomes challenges to manage due to demanding skill and high level of expertise. Based on this study, we must be more vigilant to comply with traffic signs and use of personal protective equipment when driving. Rapid and proper management of maxillofacial fractures can reduce patient morbidity.

Diagnosing the right injury to the facial bone is a key step in determining a treatment plan. Surgeons must have sufficient knowledge of facial anatomy and physiology to be able to reconstruct broken segments. Deformities after facial trauma are difficult to repair in the second operation. So, the importance of dealing with almost all maxillofacial fracture problems in the first surgery is pretty clear to all traumatologists.

## References

1. Burlew CC, Moore EE. Trauma. In: Brunicaardi FC, Andersen DK, Billiar TR, et al., editors. Schwartz Principles of Surgery. 10th ed. New York: McGraw Hill Education, 2015:197.
2. Chalya PL, Mchembe M, Mabula JB, Kanumba ES, Gilyoma JM. Etiological spectrum, injury characteristics and treatment outcome of maxillofacial injuries in a Tanzanian teaching hospital. *J Trauma Manag Outcomes*. 2011; 5:7. <https://doi.org/10.1186/1752-2897-5-7> PMID:21635724 PMCID:PMC3118339
3. Hussain S, Mohammad S, Khan R. Effectiveness of ORIF by Using one Titanium Plate and Archbar for Management of Mandibular Fractures in Parasymphyseal Region. *Pak J Med Health Sci*. 2010; 4:61-4.
4. Germar GG, Cruz MAY. A Four-Year Study of the Demographic Distribution and Treatment of Maxillofacial Fractures Admitted at the Philippine General Hospital; *Acta Med Philipp*. 2009; 43:16-25.
5. Koshy JC, Feldman EM, Chike-Obi CJ, Bullocks JM. Pearls of mandibular trauma management. *Semin Plast Surg*. 2010; 24:357-74. <https://doi.org/10.1055/s-0030-1269765> PMID:22550460 PMCID:PMC3324216
6. Bisson JI, Psychotherapy, Shepherd JP, Dhutia M. Psychological Sequelae of Facial Trauma. *J Trauma*. 1997; 43:496-500. <https://doi.org/10.1097/00005373-199709000-00018> PMID:9314314
7. Perry M, Holmes S. Principles of Fracture Management. In: Perry M, Holmes S, editors. *Atlas of Operative Maxillofacial Trauma Surgery: Primary Repair of Facial Injuries*. London: Springer, 2014:113-145. [https://doi.org/10.1007/978-1-4471-2855-7\\_4](https://doi.org/10.1007/978-1-4471-2855-7_4) PMID:25453344 PMCID:PMC4258517
8. Henderson R, Bonsall A. Maxillofacial Injuries. (online), 2014. [cited 2015 Jun. 1]. Available from: <https://patient.info/doctor/maxillofacial-injuries>.
9. Greenberg AM, Prein J, editors. *Craniomaxillofacial Reconstructive and Corrective Bone Surgery: Principles of Internal Fixation Using the AO/ASIF Technique*. New York: Springer, 2002. <https://doi.org/10.1007/b97845>
10. Dolan RW. *Facial Plastic Reconstructive, and Trauma Surgery*. New York: CRC Press; 2003.
11. Chouinard A-F, Troulis MJ, Lahey ET. The Acute Management of Facial Fractures. *Curr Trauma Rep*. 2016; 2:55-65. <https://doi.org/10.1007/s40719-016-0040-4>