

TREATMENT OF MALOCCLUSION AFTER OPEN REDUCTION OF MAXILLOFACIAL FRACTURE: A CASE REPORT

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Abstract

The post traumatic complications of jaw fractures related to jaw function and facial deformity include nonunion, malunion, malocclusion, temporomandibular joint dysfunction and facial asymmetry. This report presents cases referred to our department for revision of malunion and malocclusion following inadequate reduction of jaw fractures by IMF later treated by ORIF. Accurate preoperative diagnosis and proper anatomical reduction of the fracture segments are essential to preventing post-surgical malunion and malocclusion.

Keywords: Fractures, Malunion, Malocclusion.

Introduction

The mandibular bone sustains fracture most frequently because it is located in the center of the face at a location prone to external injury. The goals of treatment are to ensure rapid healing through accurate reduction and fixation and to minimize disability and complications. Many techniques have been introduced over the years, including (IMF) Maxillomandibular fixation, which uses intraosseous wire, lag screw fixation, external rigid fixation and, recently, internal rigid fixation, such as stable internal fixation using a metal plate

These methods may cause such complications as infection, malunion, delayed union, nonunion, hypoesthesia, malocclusion and facial deformity. Inappropriate union is attributable to the mechanical environment, which entails wide gap between segments and movement of segments, and a poor biological environment.

The former condition is caused by a bone defect or displacement and overlap of the bone segment, whereas the latter condition is caused by decreased vascular supply, a nutritional disorder, inflammation and inhibiting factors of bone healing.

It is necessary to consider the location and complexity of the fracture, the existence of teeth on the fracture line and infection presenting in an open fracture. Due to deranged occlusion in most of the cases patient has a difficulty in mastication and facial asymmetry. In treating mandibular fractures, it is necessary to make the utmost effort to minimize complications.

The purpose of this study was to introduce a case in which revision surgery was necessitated due to malunion occurring after reduction of a mandibular fracture by closed reduction (IMF) and to discuss relevant complications.

Case Report

A 20-year-old patient was admitted to the emergency room of this hospital with the history of RTA and sustained an injury to the maxillofacial area. Based on the clinical and radiological examination results, the patient

was diagnosed with right parasymphysis fracture and left angle fracture associated with dearranged occlusion (Figure 1&2).



Figure 1: Mouth deviation on right side



Figure 2: Dearranged occlusion

The patient had under gone closed reduction with Erich Arch bar secured with 26 guage wire for a period of 40 days. Two months later, the patient visited the hospital with the primary complaint of malocclusion and deviation of mouth on the left side and was transferred to our department. During examination, spacing caused by malunion was found between the molars. We plan to do an ORIF to adjust the occlusion was performed under general anesthesia instead of orthognathic treatment.

Procedure

A chin degloving incision is given and fracture segment is exposed and refracture is done using oscillating saw (Figure 3&4).

After the occlusion was adjusted to the original position a prefabricated occlusion splint (Figure 5&6) secured with the maxillary and Mandibular arch and then 4 hole stainless steel plate fixed with 8 mm screws at inferior border and 2 hole stainless steel miniplate at superior border, was used for the re-fixation, and an Eyelet wiring done for maxilla- mandibular fixation 1 week period. After the surgery was completed, the patient reported good occlusion on both sides with no post-operative complication (Figure 7,8 & 9).

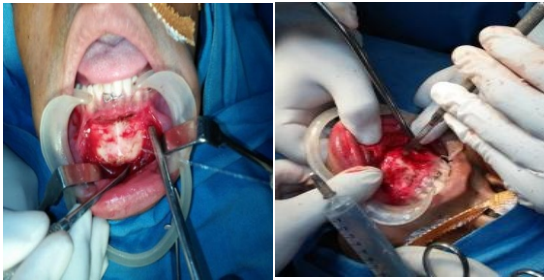


Figure 3&4: *Surgical exposure & refracture*



Figure 5&6: *Face bow transfer & Splint fabrication Articulation*



Figure 7&8: *Fixation by SS plates & post op Occlusion*



Figure 9: *Post op OPG*

Discussion

The goal of treatment for mandibular fracture is accurate reduction of the bone segments to recover the pre-traumatic occlusion and to restore normal masticatory function, pronunciation, shape and sensation. It is necessary to perform rigid fixation for the formation of the callus because integration occurs only under mechanically stable conditions, and mechanical stability is also indispensable to vascularization of the primary callus. Mechanical stability causes internal growth of the capillary process and removes fibrocartilage, which lead to osteon formation. Distortion and stress prevent such processes.

Many techniques have been studied and developed to treat mandibular fracture, and it is necessary to consider potential complications for all techniques. Alpert et al.⁹ introduced four types of complications that were classified as follows: 1) complications that appear after proper treatment is conducted; 2) complications that are attributable to inappropriate treatment; 3) complications that are due to failure of surgical treatment; and 4) complications that occur because no treatment is conducted.

Mathog and Boies¹⁰ reported that the most significant factors causing malunion in mandibular fracture included inappropriate movement, incomplete reduction, infection, poor blood circulation, and metabolic change. The integration of normal bone typically occurs in 4-8 weeks, depending on the age of the patient, and malunion occurs if bone integration does not take place in that time.

Malunion occurs due to inappropriate reduction, agitation of the bone segment, noncompliance on the part of patient or improper internal fixation.

The mandible is prone to complications that occur after jaw fracture reduction due to the following reasons. The mandible is the only bone in the facial region that moves and it has less bone support than the facial bones; therefore, a fracture of the mandible generally results in greater degrees of instability. Because of the muscle attached to the mandible, mandible displacement may occur even after reduction and fixation.

The mandible is located in the lower part of the oral cavity, which increases the possibility of infection. The mandible has lower blood circulation than the maxilla,

which contributes to the occurrence of inappropriate integration.

Physician misdiagnosis is another factor that can cause complications after mandible surgery and is attributable to inexperience or inadequate radiological examination equipment. Mandibular fracture is accompanied by edema and hemorrhage, which cause difficulty in precise diagnosis. The occurrence of multiple fractures could result in a physician erroneously overlooking some bone fracture sites.

For surgical management of such complications, a thorough and corrective examination prior to surgery is necessary. The pre-traumatic occlusion must be verified, and an osteotomy to perform internal fixation is required. It might be necessary to perform a new osteotomy on sites other than the malunion site for the recovery of occlusion.

Conclusion

In this study, malunion after mandibular reduction led to malocclusion, and ORIF provided satisfactory results. A precise pre-operative examination and appropriate surgical procedure followed by proper post-operative management are necessary to prevent post-surgical complications of jaw fracture fixation. Additional studies are warranted to investigate the surgical and non-surgical management of such complications.

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