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To study the Efficacy of 2.0 mm Locking Plate / Screw System in the Management of Mandibular Fractures

[1]Dr.Vikas Sarowa, MDS, Department of Oral and Maxillofacial Surgery, Government Dental College & Hospital Jaipur, Rajasthan

[2]Dr. Vasu Dev, MDS, Department of Oral and Maxillofacial Surgery, Government Dental College & Hospital Jaipur, Rajasthan

[3]Dr. Pooja Arya, Assistant Professor (ENT), Sikar Medical College, Sikar.

Dr. D.K. Gupta, MDS, Department of Oral and Maxillofacial Surgery, Government Dental College & Hospital Jaipur, Rajasthan

[5]Dr. Anjali Dave Tiwari, MDS, Department of Oral and Maxillofacial Surgery, Government Dental College & Hospital Jaipur, Rajasthan

Corresponding Author: Dr. Pooja Arya, Assistant Professor (ENT), Sikar Medical College, Sikar.

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Abstract

Background: The current study to evaluate the efficacy of the locking miniplates as a viable treatment modality in the osteosynthesis of mandibular fractures.

Methods: The study comprised of 15 patients having mandibular fractures, attending the outpatients department and emergency of Department of Oral & Maxillofacial Surgery, Govt. Dental College & Hospital, Jaipur.

Results: We found 0% infection rate in our study . Swelling was seen in ***7*** out of ***15*** (i.e. 47%)at Ist follow up. At follow up IInd swelling was present in only 3(i.e. 20%) & at the IIIrd & last follow up swelling was absent in all of the patients. Mental nerve paresthesia of fractured site was found in two (14%) patients on the first follow-up (wihin 72 hrs) & second followup(2 week), but the paresthesia disappeared in one patient at the third follow-up (6 week). At the last follow up(3 mths) paresthesia was not present in any of the patient.

Conclusion- We concludes that the use of locking miniplates plate in mandibular fracture was efficacious enough to bear masticatory loads during the osteosynthesis of fracture. It gives the advantage of greater stability, less precision required in plate adaptation because of the "internal/external fixator", and less alteration in periosteal blood supply.

Keywords: Mandibular, Maxilla, Miniplates.

Introduction

In the era of increasing automobilization, industrialization and technology, the treatment of maxillofacial injuries has attained a prominent position. Traffic accidents, which are becoming more and more frequent, particularly have brought about an increase in maxillofacial injuries. The head being the exposed part

of the body is involved in highest percentage of injuries of all body region. The other causes of maxillofacial injuries are interpersonnel violence, falls, sporting injury and industrial trauma. Fracture though a complex term to define can be simply defined as "A disruption in the continuity of bone stressed beyond its elastic modulus, with the formation of two or more fragments".[1]

Precise surgical technique with little margin of error are required during management of these fractures. The main goal in the treatment of fracture is to predictably restore preinjury anatomical form, with associated aesthetics and function. The goal must be accomplished by means that will produce the least disability, smallest risk, and shortest recovery period for the patient. Traditionally this has been achieved by immobilising the jaws using teeth. [2]

In the past four decades there has been an increasing interest in obtaining more immediate return to normal function by using different methods of direct fixation with an open approach and allowing anatomical reduction of the fragments. Direct fixation using different methods of plate and screw osteosynthesis has gained in-popularity.[3]

Through the decades various plate and screw osteosynthesis have been introduced like AO bicortical plating system; two-dimensional miniplating system, resorbable plates and screws, 3-dimensional miniplating system and locking miniplate system. Miniplate osteosynthesis, first introduced by Michelet in 1973, and further developed by Champy in 1975, is today's standard for the treatment of mandibular fracture. Champy determined the ideal lines of osteosynthesis on which plates have to be applied to resist torsional forces.[4]

Various types of miniplating systems has been developed to provide stable fixation for mandibular fractures and osteotomies. A disadvantage of conventional miniplate systems is that the plate must be perfectly adapted to the underlying bone to prevent alterations in alignment of the segments and changes in occlusal relationship.The introduction of locking systems for the treatment of mandibular fractures has offered certain advantages over other plating systems. In locking system the hole in the bone plate was engineered to accept screws that lock to it by a second thread under the head of screw. These plates function as internal fixators, achieving stability by locking the screw to the plate. A unique advantage of to locking systems is that it become unnecessary for the plate to have intimate contact with the underlying bone, making plate adaptation easier. Theorectical advantages proposed include:1)less screw loosening;2)greater stability across the fracture site;3)less precision required in plate adaptation because of the internal/external fixator ; and 4) less alteration in osseous or occlusal relationship upon screw tightening.[5]

The biomechanical and technical advantages of locking miniplate systems over conventional miniplate system promoted the current study to evaluate the efficacy of the locking miniplates as a viable treatment modality in the osteosynthesis of mandibular fractures.

Methods

The study comprised of 15 patients having mandibular fractures, attending the outpatients department and emergency of Department of Oral & Maxillofacial Surgery, Govt. Dental College & Hospital, Jaipur.. The selected cases were treated by open reduction and internal fixation with 2.0 mm titanium locking miniplates. Inclusion criteria were undisplaced or minimally displaced fractures of the mandible requiring

open reduction and internal fixation in any one of the following regions: symphysis, parasymphysis and body or angle region. Exclusion criteria were fractures infected prior to treatment, comminuted fractures or mandibular fractures with associated condylar and coronoid fractures and patients with compromised medical conditions.

Results

Table 1: Demographic variable

Mean age	31.2±8.32 Yrs
Male : Female	12:3
RTA	11(73.33%)
Assault	3(20.00%)
Self -fall	1(6.67%)
Undisplaced : Minimally displaced	12:3

Among the study population, the majority of cases were in the age group of 21-30 years (66.67%) with a mean age of 31.2 years. There were 12 male and 3 female patient, with road traffic accident (RTA) being the most common etiological cause 11 (73.33%), followed by assault 3 (20.00%), and work-related or self-fall 1 (6.67%). There were 12 undisplaced and 3 minimally displaced fractures observed.

Post-operative intermaxillary fixation was done for 7 to 10 days in all patients.

We found 0% infection rate in our study . Swelling was seen in ***7*** out of ***15*** (i.e. 47%)at Ist follow up. At follow up IInd swelling was present in only 3(i.e. 20%) & at the IIIrd & last follow up swelling was absent in all of the patients. Mental nerve paresthesia of fractured site was found in two (14%) patients on the first follow-up (wihin 72 hrs) & second followup(2 week), but the paresthesia disappeared in one patient at the third follow-up (6 week). At the last follow up(3 mths) paresthesia was not present in any of the patient. Paresthesia may have been due to fracture line passing through the mental foramen region or may be due to the manipulation of nerve during the surgical procedure.

Discussion

We found 0% infection rate in our study, this is in correlation with the infection rate reported in the studies of **Champy[6](1978)**-3.8%, **Cawood[7](1985)**-6%, **Smith[8](1991)**-2.5%, **Ellis et al.[9](2002)**- 10%**,** and **Collins et al.[10](2004)**- 4%.

Swelling was seen in ***7*** out of ***15*** (i.e. 47%)at Ist follow up. At follow up IInd swelling was present in only 3(i.e. 20%) & at the IIIrd & last follow up swelling was absent in all of the patients.

Mental nerve paresthesia of fractured site was found in two (14%) patients on the first follow-up (wihin 72 hrs) & second followup(2 week), but the paresthesia disappeared in one patient at the third follow-up (6 week). At the last follow up(3 mths) paresthesia was not present in any of the patient. Paresthesia may have been due to fracture line passing through the mental foramen region or may be due to the manipulation of nerve during the surgical procedure. Paresthesia seen in our study (14%) is in correlation with the paresthesia reported in the study of **Cawood [7](1985)** 8%.

Conclusion

We conclude that the use of locking miniplates plate in mandibular fracture was efficacious enough to bear masticatory loads during the osteosynthesis of fracture . It gives the advantage of greater stability, less precision required in plate adaptation because of the “internal/external fixator”, and less alteration in periosteal blood supply.

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