

Original Research Article

Evaluation of 2 mm locking plates for treating mandibular fractures

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Received: 30 November 2019

Revised: 25 December 2019

Accepted: 31 December 2019

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ABSTRACT

Background: The progressive development in the trauma management has now paved way to the use of miniplates for the treatment of mandibular fractures. We present a case series of twenty-five patients treated with miniplates for the mandibular fractures.

Methods: The study was done on twenty-five patients diagnosed clinically and radiographically with mandibular fractures and attending the outpatient department of Oral and Maxillofacial surgery of a tertiary care hospital in Jaipur city. The selected cases were treated by open reduction and internal fixation under general anesthesia. 2.0-mm titanium locking mini plates were used as a method of internal fixation. The patients were evaluated for the location, type and number of fractures, time required for adaptation and fixation of single four hole 2.0-mm locking plate, complications during surgery, pre and post-surgical occlusal relationship, adequacy of reduction on postoperative radiograph and any post-surgical complications requiring a secondary surgical intervention.

Results: Majority were in the age group of 21-30 years (72%) with a mean age of 26.6 years. Among these, there were 23(92%) male and 2(8%) female patient. Maximum (28%) patients were of symphysis and angle fracture followed by symphysis and condylar (25%), while only 2% cases were of Para symphysis and condylar. The mean time taken for single plate adaptation and fixation was 11.34 minutes for symphysis fracture, 14.12 minutes for parasymphysis fracture, and 11.56 minutes for body fracture and 18.90 minutes for angle fractures.

Conclusions: The locking miniplates in mandibular fractures is efficacious enough to appreciate early recovery of normal jaw function, uneventful healing and good union at the fracture site with minimal weight loss due to early reinstatement of masticatory function.

Keywords: 2-mm Locking plates, Mandibular fractures, Plate adaptation time

INTRODUCTION

There have been a tremendous advancement in the management of trauma in the recent years.¹ The progressive improvement in the techniques from supportive bandages to splints, semi-rigid fixation with trans osseous wiring to rigid fixation with compression plates and more lately back to semi-rigid fixation with miniplates are few important advances in the field of trauma management.^{2,3} The aim of fracture management is

restoration of proper function, strength and contour defects which would have occurred at the time of trauma, and controlling infection at the fracture site.⁴ The locking plates have now replaced the conventional wiring system for mandibular fractures as they allow patient mobilization earlier.⁵ Michelet in 1973 first proposed the approach of miniplate osteosynthesis.⁶ Some of the advantages of the locking plate/screw system over other plating system for mandibular fracture management includes internal fixator property of these plates, stability, easier adaptation of the plate.⁷

METHODS

The study was done on twenty-five patients diagnosed clinically and radiographically with mandibular fractures and attending the outpatient department of Oral and Maxillofacial surgery at a tertiary care teaching dental college in Jaipur from 2016 to April 2018. Prior to commencement the permission to conduct the study was taken from the institutional ethics committee. Preoperatively detailed medical history of the patients was recorded. Routine blood and urine investigations were done for all the patients. A standard case history proforma was used to collect necessary information regarding each case and photographic records were maintained of the operative procedure and placement of plates in all cases. Preoperative panoramic view was done to evaluate the site and type of fractures. Immediate post-operative view was taken to evaluate the fracture reduction and placement of plates. Follow up panoramic views were taken at regular interval: first and third month of post-operative period to evaluate healing process.

Inclusion criteria

- Patients with fractures of mandibular symphysis, parasymphysis, and body and angle region irrespective of their age, sex and etiological factors, cases where fracture fragments were badly displaced and closed reduction was not sufficient enough to reduce the fractures, patients available for periodic review, fractures showing early signs of infection.

Exclusion criteria

- Condylar fracture of mandible, medically compromised patients, patients presenting with comminuted fractures, children with erupting teeth, patients not ready to turn up for follow up.

The selected cases were treated by open reduction and internal fixation under general anesthesia. 2.0-mm titanium locking mini plates were used as a method of internal fixation. After the routine clinical and radiological examination protocol, the fracture site was exposed by using intraoral approach or existing laceration except in some inaccessible angle fractures, where trans buccal trocar was used with osteosynthesis using locking miniplates. The patients were evaluated for the location, type and number of fractures, time required for adaptation and fixation of single four hole 2.0-mm locking plate, complications during surgery, pre and post-surgical occlusal relationship, adequacy of reduction on postoperative radiograph and any post-surgical complications requiring a secondary surgical intervention. Antibiotics and analgesics were administered for 7 days following surgery.

The patients were followed up for a period of 6 weeks, initially for every week and a period of 6 months later to assess radiographic evidence of healing.

RESULTS

Majority were in the age group of 21-30 years (72%) with a mean age of 26.6 years. Among these, there were 23(92%) male and 2(8%) female patient, with Road Traffic Accident (RTA) being the most common etiological cause 14.5(58%). Maximum (28%) patients were of symphysis and angle fracture followed by symphysis and condylar (25%), while only 2% cases were of Para symphysis and condylar as depicted by (Figure 1). Figure 2 and 3 depicts the pre- and post-operative profile of one of the recruited patients. The mean time taken for single plate (4-hole plate with 4 screws) adaptation and fixation was 11.34 minutes for symphysis fracture, 14.12 minutes for Para symphysis fracture, and 11.56 minutes for body fracture and 18.90 minutes for angle fractures as depicted in Table 1.

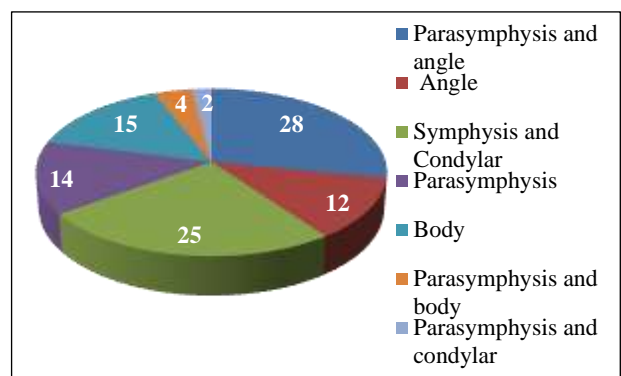


Figure 1: Distribution of mandibular fracture according to location.

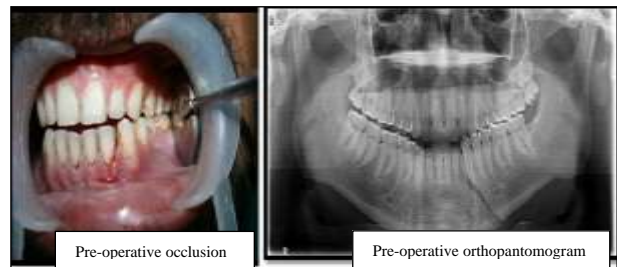


Figure 2: Preoperative profile of patients showing occlusion and orthopantomogram.

Table 1: Distribution according to location and mean time taken for adaptation and fixation.

Location	Mean time (min)
Symphysis	11.34
ParasympHysis	14.12
Body	11.56
Angle	18.90

Postoperative complications were noted in 3(12%) patients. One patient developed an intraoral wound dehiscence (exposure of plate) which was treated by

irrigation and primary closure while two developed infection at fracture site which was treated with incision and drainage with adequate antibiotic coverage. However, the infection resolved after 7 days.

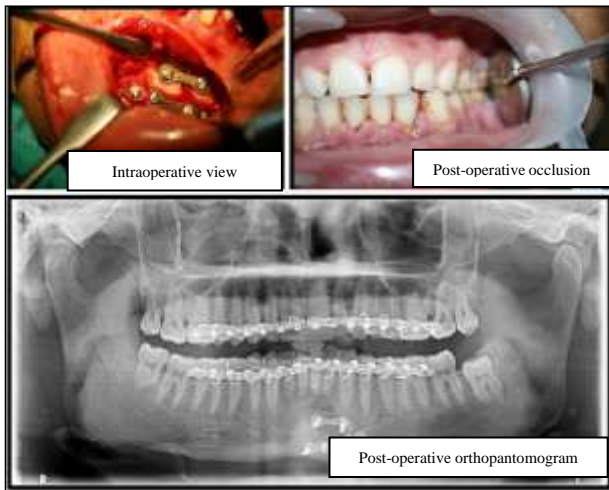


Figure 3: Intraoperative, Postoperative Occlusion and immediate one-month post-operative orthopantomogram of the patient.

DISCUSSION

In the recent years many studies have been conducted evaluating the role of locking plate system in various other mandibular fractures. In one such study which was evaluating the role of 2.4 mm locking plate system in treating comminuted mandibular fracture caused by firearm, it was found that the locking plate system presents several advantages and the most important is the great stability of the fractured segments due to its higher load transmission. Additionally, it provided absence of pressure on the plate/bone interface and did not affect the vascular supply and bone healing on the fractured area.⁸

This study reviews the efficacy of 2.0 mm locking plate/screw system in 25 patients requiring open reduction and internal fixation without maxillomandibular fixation. The results of this study were in concordance to many previous studies.⁸⁻¹⁰ However in a study which compared conventional 2.0 mm miniplates and 3-D plates in fractures of symphysis, displaced Para symphysis and angle and bilateral mandible in 28 patients, it was found that 3-D plates was a better option due to their simplicity, ease of application and reduced infection control.¹¹ Commonest site for fracture as revealed in this study was Para symphysis and angle (28%) while the least common site was Para symphysis and condylar (2%). Mean time taken for single 4-hole plate adaptation and fixation was least in symphysis region (11.34 min). For the fractures of the body, Para symphysis and angle region the mean time were 11.56, 14.12 and 18.90 minutes respectively. Commonest site for fracture was Para symphysis and angle, followed by angle alone and symphysis fracture

associated with condylar injury. This study revealed that locking miniplates had advantage of greater stability, better plate adaptation because of the “internal/external fixator”, and less alteration in periosteal blood supply still the results are not conclusive as it was done for twenty-five patients only. More of such studies involving comparative evaluation of two different systems of management of fracture and involving larger sample size, patients from different regions of India are warranted.

CONCLUSION

The locking miniplates in mandibular fractures is efficacious enough to appreciate early recovery of normal jaw function, uneventful healing and good union at the fracture site with minimal weight loss due to early reinstatement of masticatory function. Locking plate/screw system proved to be more rigid than conventional plate/screw system, thereby reducing the need and duration of inter maxillary fixation. 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. Studies with larger sample size are necessary to corroborate the findings of the present study for their wider use in clinical practice.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sharma A, Sharma K, Panwar VR, Kamal N, Gurjar M. Evaluation of 2 mm locking plates for treating mandibular fractures. *Int J Res Med Sci* 2020;8:566-9.