



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2022; 8(2): 294-296
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www.oraljournal.com
Received: 04-02-2022
Accepted: 07-03-2022

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Efficacy of locking miniplate in the treatment of mandibular fractures without intermaxillary fixation

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DOI: <https://doi.org/10.22271/oral.2022.v8.i2e.1521>

Abstract

Background: The introduction of locking plate/screw miniplate and reconstruction plating systems for the treatment of mandibular fractures and continuity defects has offered advantages over other plating systems. The present study was conducted to assess the efficacy of locking miniplate in the treatment of mandibular fractures without intermaxillary fixation.

Materials & Methods: 56 patients with undisplaced or minimally displaced mandibular fractures of both genders were treated by open reduction and internal fixation using the 2.0 mm locking plates. Parameters such as cause of injury, site of fracture, complications etc. was recorded.

Results: Out of 56 patients, males were 30 and females were 26. Causes of injury was RTA in 34, sports injury in 10, fall in 8 and miscellaneous in 4 cases. The site was right body in 12, left body in 15, right angle in 10, left angle in 8 and parasymphysis in 11 cases. Common complications was non-union seen in 2, infection in 5 and delayed union in 1 case.

Conclusion: The locking miniplate system was found to be effective in management of mandibular fractures.

Keywords: Locking mini plate system, mandibular fractures, trauma

Introduction

Intermaxillary fixation (IMF) is an age-old procedure which is used for the treatment of fractures involving maxillomandibular complex. Conventionally, various types of tooth-mounted devices such as arch bars, dental and interdental wiring, and metallic and non-metallic splints are used to achieve IMF [1]. Monocortical miniplate osteosynthesis for mandibular angle fracture is an extending over technique. The general rule for treating fractures of the mandibular angle does not differ from that for fractures anywhere in the body, which works primarily on the fundamental norm of repositioning and immobilization of the bony fragment [2].

Transoral placement of non-compressive miniplate fixation has gained popularity using the principles of Champy and colleagues. Various types of bone-plating systems have been developed to provide stable fixation for mandibular fractures and osteotomies [3]. Currently, modifications in miniplates, like locking plate/screw system, have been developed. The introduction of locking plate/screw miniplate and reconstruction plating systems for the treatment of mandibular fractures and continuity defects has offered certain advantages over other plating systems [4].

The advantage of the locking plate/screw system is that the screws are unlikely to loosen from the bone plate. This means that even if the screw is inserted into the fracture line, loosening of the screw will not occur. The possible advantage to this property of a locking plate/screw system is decreased incidence of inflammatory complications from loosening of hardware [5]. The present study was conducted to assess the efficacy of locking miniplate in the treatment of mandibular fractures without intermaxillary fixation.

Materials & Methods

The present study comprised of 56 patients with undisplaced or minimally displaced mandibular fractures of both genders. The consent was obtained from all enrolled patients. Data such as name, age, gender etc. was recorded. Patients were treated by open reduction and internal fixation using the 2.0 mm locking plates. Parameters such as cause of injury, site of fracture, complications etc. was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table 1: Distribution of patients

Total- 56		
Gender	Males	Females
Number	30	26

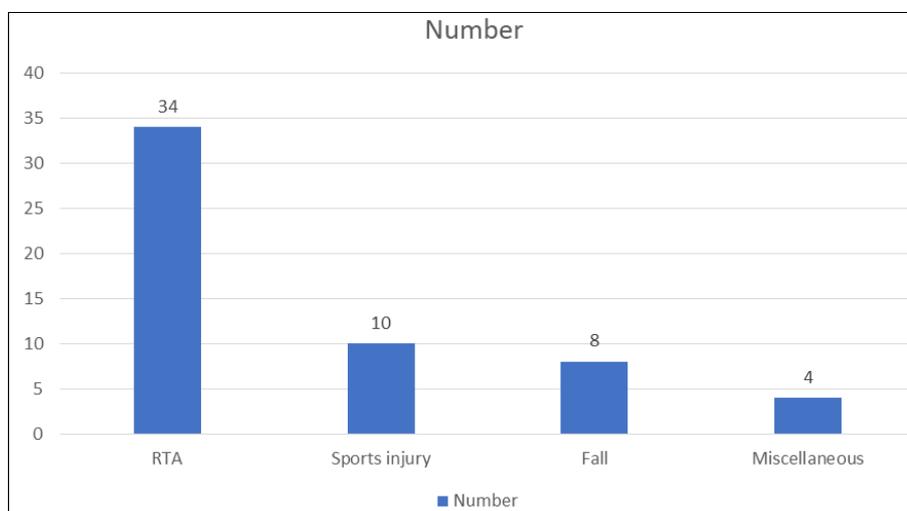
Table 1 shows that out of 56 patients, males were 30 and females were 26.

Table 2: Causes of injury

Causes	Number	P value
RTA	34	0.01
Sports injury	10	
Fall	8	
Miscellaneous	4	

Table 2, graph 1 shows that causes of injury was RTA in 34, sports injury in 10, fall in 8 and miscellaneous in 4 cases. The

difference was significant ($P<0.05$).



Graph 1: Causes of injury

Table 3: Site of fracture

Site	Number	P value
Right body	12	0.84
Left body	15	
Right angle	10	
Left angle	8	
Parasymphysis	11	

Table 3 shows that site was right body in 12, left body in 15, right angle in 10, left angle in 8 and parasymphysis in 11 cases. The difference was significant ($P<0.05$).

Table 4: Complications

Complications	Number	P value
Non- union	2	0.05
infection	5	
Delayed union	1	

Table 4 shows that common complications was non- union seen in 2, infection in 5 and delayed union in 1 case. The difference was significant ($P<0.05$).

Discussion

Three-dimensional (3D) mini locking plates with a change in size, shape, and number came into existence [6]. This IMF

technique is based on the principle of monocortical, juxta-alveolar, and subapical osteosynthesis without compression [7]. It uses miniaturized malleable plates that not only prevent loosening of the screws but also control rotation in the angle fracture to resist shearing, bending, and torsional forces on the fracture segments [8]. It has a unique double-lead thread that facilitates the growth of the periosteum under the plates by causing minimal interference in the vascular supply to the bone, thus supporting fracture healing leading to greater stability and less alteration in an occlusal relationship [9]. The use of an intraoral approach, small size, easy adaptability, and placement has facilitated an increased use of monocortical plates in maxillofacial surgery [10]. The present study was conducted to assess the efficacy of locking miniplate in the treatment of mandibular fractures without intermaxillary fixation.

We found that out of 56 patients, males were 30 and females were 26. The causes of injury was RTA in 34, sports injury in 10, fall in 8 and miscellaneous in 4 cases. Prabhakar C *et al* [11] evaluated the efficacy of locking miniplate/screw system in the treatment of mandibular fractures without maxillomandibular fixation. 20 patients with undisplaced or minimally displaced mandibular fractures cases were treated by open reduction and internal fixation using the 2.0 mm locking plate/screw system. Open reduction and internal

fixation with the 2.0 mm locking plate/screw system were achieved in all the 20 cases with satisfactory stability of the fracture fragments. The system was found to be reliable and effective intraoperatively.

We found that site was right body in 12, left body in 15, right angle in 10, left angle in 8 and parasymphysis in 11 cases. Subramaniyan *et al* ^[12] compared the efficacy of 2.0-mm mini locking plates and 2.0-mm 3D locking miniplates in mandibular angle fractures. This study involved 34 mandibular angle fracture patients with randomly categorization into Group 1 (managed using 2.0-mm conventional mini locking plate) and Group 2 (managed using 3D miniplates). The parameters evaluated were occlusal stability, displacement of fracture, signs of inflammation as well as any hardware failure postoperatively. The mean duration of operation was significantly less in Group 2 ($P < 0.05$). Normal healing was noted to be more in Group 2 than in Group 1, with no hardware failure observed in any of the groups. Postoperative occlusal stability was observed to be more satisfactory during the 3rd week of follow-up in Group 2 patients, which was statistically insignificant.

We found that common complications was non-union seen in 2, infection in 5 and delayed union in 1 case. Malik and Singh ^[13] in their study had concluded that treatment of fractures of the mandibular angle with the conventional miniplates is often concomitant to impediments such as infection, mobility, and malocclusion. Kumar *et al* ^[14] reported an uneventful healing with the use of 3D miniplates in the fixation of the mandibular angle fracture.

In a study done by Mittal *et al.*, one patient each (6.7%) had postoperative occlusion derangement which was noted at the 1st week of follow-up in Group A (treated with 3D miniplates) and Group B (treated with conventional locking plates). At the 2nd week of follow-up, one patient had occlusion derangement only in Group A. From the 3rd week of follow-up, all patients had intact occlusion. These findings were in slight contrast with the findings of this study that reported two patients (11.8%) in Group 1 as having mildly deranged occlusion and none in Group 2. The plausible reason for these variations could be attributed to different follow-up time periods.

Conclusion

Authors found that the locking miniplate system was found to be effective in management of mandibular fractures.

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