

ORIGINAL RESEARCH

Comparison of 2D miniplates vs 3D miniplates in mandibular fractures

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ABSTRACT

Background: Mandibular fractures are typically caused by direct trauma to the lower jaw. The present study was conducted to compare 2D miniplates vs 3D miniplates in mandibular fractures. **Materials & Methods:** 58 cases of mandibular fracture of both genders were divided into 2 groups. Group I patients were treated with 2.0-mm titanium 3D-miniplate and group II patients were treated with 2.0-mm titanium standard miniplates. Parameters such as sensory deficit /paresthesia and mouth opening at 1 month, 3 months and 6 months was recorded. **Results:** Group I had 19 males and 10 females and group II had 16 males and 13 females. Sensory deficit /paresthesia was seen in 2 in group I and 3 in group II at 1 month, 1 in group I and 2 in group II at 3 months and 0 in group I and 1 in group II at 6 months. The difference was significant ($P < 0.05$). The mean mouth opening at 1 month was 25.2 mm and 25.1 mm in group I and II, at 3 months was 34.6 mm and 32.4 mm and at 6 months was 36.2 mm and 35.1 mm respectively. The difference was significant ($P < 0.05$). **Conclusion:** 3D titanium miniplates can be used in place of traditional titanium miniplates. When compared to standard miniplates, the method provides a more dependable and effective treatment approach for mandibular fractures.

Key words: mandibular fractures, mouth opening, titanium miniplates

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INTRODUCTION

Facial trauma refers to any injury sustained to the face, which can involve the skin, bones, soft tissues, and other structures in the facial region. Facial trauma can result from various causes, such as accidents, falls, assaults, sports injuries, and motor vehicle accidents. The severity of facial trauma can range from minor injuries like cuts and bruises to more severe and life-threatening conditions.¹

Mandibular fractures are typically caused by direct trauma to the lower jaw. High-impact collisions can result in facial injuries, including mandibular fractures. Physical altercations and assaults can lead to facial trauma, including fractures of the lower jaw. High-impact sports, such as football or hockey, can also cause facial fractures, including those involving the mandibular symphysis. Accidental falls, especially from heights, can result in facial injuries.²

The signs and symptoms of a mandibular fracture (including symphysis, parasymphysis, angle, body and condyle) can vary depending on the severity of the injury.³ Common symptoms include pain and

tenderness along the midline of the lower jaw, swelling and bruising around the jawline, difficulty opening and closing the mouth, malocclusion (misalignment of the upper and lower teeth when biting down), numbness or tingling sensation in the lower lip or chin region, loose or mobile teeth, especially in the area of the fracture, inability to chew properly and bleeding from the mouth.⁴

Among the numerous treatment approaches, the three-dimensional plating system is regarded as one of the most effective methods for managing mandibular fractures.⁵ It is built on the notion of a quadrangle as a geometrically stable support configuration. Its configuration, rather than its thickness or length, contributes to its increased stability.⁶ The shape of a 3D micro plate provides for an increased number of screws, three-dimensional stability, and resistance to torque forces while preserving a low profile and malleability.⁷ The present study was conducted to compare 2D miniplates vs 3D miniplates in mandibular fractures.

MATERIALS & METHODS

The present study consisted of 58 cases of mandibular fractures of both genders. All gave their written consent to participate in the study. The study subjects were included from patients reporting to MGM super speciality hospital-Katni between January 2022 to March 2022. Age limit for inclusion in the study was 55 years old. Patients with malunited fractures were excluded from the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I patients were treated with 2.0-mm titanium 3D-miniplate and group II patients were treated with 2.0-mm titanium standard miniplates in mandibular fractures. Parameters such as sensory deficit /paresthesia and mouth opening at 1 month, 3 months and 6 months was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	3D titanium miniplate	Standard titanium miniplate
M:F	19:10	16:13

Table I shows that group I had 19 males and 10 females and group II had 16 males and 13 females.

Table II Comparison of sensory deficit /paresthesia

Period	Group I	Group II	P value
1 month	2	3	0.05
3 months	1	2	
6 months	0	1	

Table II, graph I shows that sensory deficit /paresthesia was seen in 2 in group I and 3 in group III at 1 month, 1 in group I and 2 in group II at 3 months and 0 in group I and 1 in group II at 6 months. The difference was significant (P< 0.05).

Graph I Comparison of sensory deficit /paresthesia

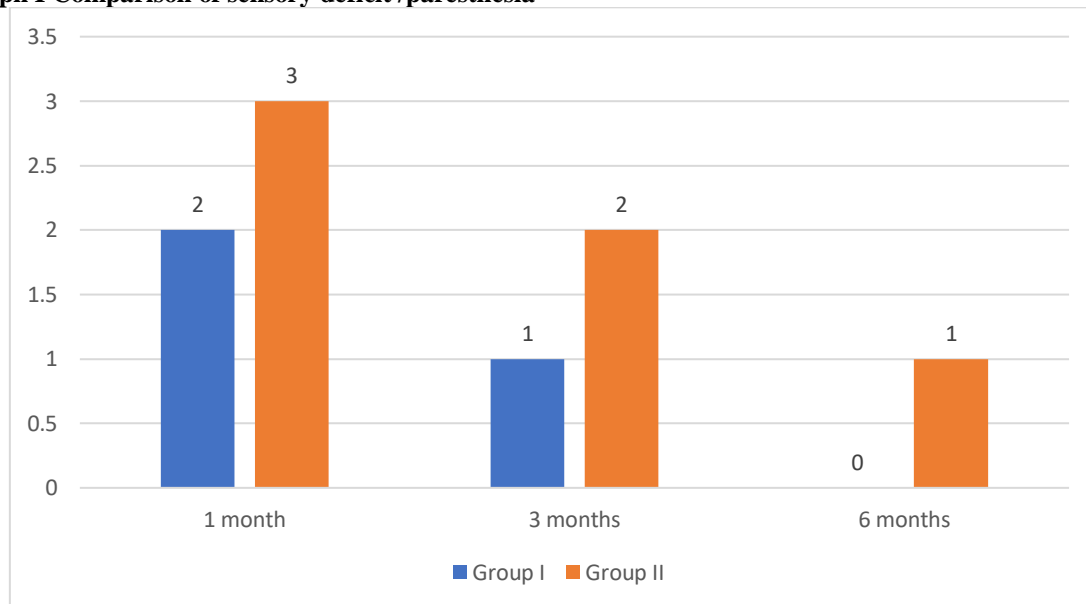


Table III Comparison of mouth opening

Period	Group I (mm)	Group II (mm)	P value
1 month	25.2	25.1	0.05
3 months	34.6	32.4	
6 months	36.2	35.1	

Table III shows that mean mouth opening at 1 month was 25.2 mm and 25.1 mm in group I and II, at 3 months was 34.6 mm and 32.4 mm and at 6 months was 36.2 mm and 35.1 mm respectively. The difference was significant (P< 0.05).

DISCUSSION

The therapy of patients who have sustained facial injuries is one of the most rewarding and challenging

areas of oral and maxillofacial practice.⁸ Even when only modest injuries are evident, the abruptness of the injury can induce considerable mental discomfort. As

a result, the clinician must effectively address both the patient's physical injuries and the patient's mental state.⁹Trauma, such as car accidents and attacks, are unquestionably the leading causes of mandibular fractures worldwide. Interpersonal aggression, falls, sporting injuries, and industrial trauma are some of the other causes of maxillofacial injuries.^{10,11}The present study was conducted to compare 2D miniplates vs 3D miniplates in mandibular fractures.

We found that group I had 19 males and 10 females and group II had 16 males and 13 females. Singh et al¹² in their study 120 patients with mandibular angle fracture were divided into 2 groups of 60 each. In group I, patients were treated with 3D, 2.0-mm titanium plates, and in group II, patients were treated with 2D, 2.0-mm titanium miniplate in mandibular angle fracture. In group I, males were 22 and females were 38. In group II, males were 40 and females were 20. Right angle fracture was seen in 32 patients in group I and 26 in group II. Left angle fracture was seen in 24 in group I and 28 in group II. Right angle and left parasymphysis fracture was seen in 3 in group I and 4 in group II. Left angle and right parasymphysis fracture was seen in 1 in group I and 2 in group II. In group I, after 1 month sensory deficit was present in 5 patients and in group II in 12 patients. After 3 months, there were no patients with sensory deficit in group I and 2 in group II. Preoperatively in group I, mouth opening was 24 mm and in group II patients was 25.80 mm, which increased to 31.20 mm in group I and 28.20 mm in group II at 1 month, 32 mm in group I and 30 mm in group II at 3 months, and 37.20 and 32.12 mm in groups I and II, respectively, at 6 months.

We found that sensory deficit /paresthesia was seen in 2 in group I and 3 in group III at 1 month, 1 in group I and 2 in group II at 3 months and 0 in group I and 1 in group II at 6 months. Mittal et al¹³evaluated and compared the clinical effectiveness of three dimensional and two- dimensional titanium miniplates for open reduction and fixation of mandibular parasymphysis fracture. Thirty patients with non-comminuted mandibular parasymphysis fractures were divided randomly into two equal groups and were treated with 2 mm 3D and 2D miniplate system respectively. All patients were systematically monitored at 1st, 2nd, 3rd, 6th week, 3rd and 6th month postoperatively. The outcome parameters recorded were severity of pain, infection, mobility, occlusion derangement, paresthesia and implant failure. The results showed that one patient in each group had post-operative infection, occlusion derangement and mobility ($p > 0.05$). In Group A, one patient had paresthesia while in Group B, two patients had paresthesia ($p > 0.05$). None of the patients in both the groups had implant failure. There was no statistically significant difference between 3D and 2D miniplate system in all the recorded parameters at all the follow-ups ($p > 0.05$).

We found that mean mouth opening at 1 month was 25.2 mm and 25.1 mm in group I and II, at 3 months was 34.6 mm and 32.4 mm and at 6 months was 36.2 mm and 35.1 mm respectively. Mujtaba et al¹⁴in their study patients in group A received 3-D miniplate treatment, while patients in group B received 2-D standard miniplate treatment. Regular evaluations were performed on the first and seventh post-operative days, the first month, and then the third month after surgery. The assessment of Post Open Reduction and Internal Fixation (ORIF) occlusion was carried out using measurement equipment. On the first post-operative day, 41 (78.8%) of group A patients and 31 (59.6%) of group B patients had acceptable occlusion. At the seventh post-operative day, 43 (82.7%) of patients in group A and 41 (78.8%) of patients in group B had acceptable occlusion ($p > 0.05$). The first and third months follow-up evaluations in both treatment groups demonstrated optimal occlusion. When compared to traditional 2-D plates, 3 dimensional plates performed better in terms of mouth opening and post op sensory deficits.

The limitation the study is small sample size.

CONCLUSION

Authors found that 3D titanium miniplates can be used in place of traditional titanium miniplates. When compared to standard miniplates, the method provides a more dependable and effective treatment approach for mandibular fractures.

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