

Original Research

2D mini-plates versus 3D mini-plates in Treatment of Mandibular Symphysis Fracture

¹Dr. Sumit Bhatt, ²Dr. Priyanka Shanker, ³Dr. Avior B. Awaskar, ⁴Jahnavi Vanteru, ⁵Dr. Dhanashree D. Kamble, ⁶Dr. S.Narendra Prassath

¹Senior Lecturer, Department of Oral and Maxillofacial Surgery, Rajasthan Dental College and Hospital, Jaipur Rajasthan, India;

²Junior Resident, Department of Oral & Maxillofacial Surgery, Subharti Dental College and Hospital, Meerut, Uttar Pradesh, India;

³Postgraduate 3rd year, Department of Oral and Maxillofacial Surgery, Sinhgad Dental College and Hospital, Pune, Maharashtra, India;

⁴Intern, Sri Balaji Dental College, Hyderabad, Telangana, India;

⁵Senior Lecturer, Department of Oral Medicine, Diagnosis and Radiology, Nanded Rural Dental College, Nanded, Maharashtra, India;

⁶Senior Lecturer, Department of Pedodontics, Karpaga Vinayaga Institute of Dental Sciences, Chengalpattu, Chennai, India

ABSTRACT:

Background: Any injury to the face that affects the soft tissues, bones, skin, and other facial components is referred to as facial trauma. The present study was conducted to compare 2D miniplates and 3D miniplates in mandibular symphysis fracture. **Materials & Methods:** 60 cases of mandibular symphysis fracture of both genders were divided into 2 groups. Each group had 30 patients. In the mandibular symphysis, group I patients received treatment with a 2.0-mm titanium 3D-miniplate, while group II patients received treatment with 2.0-mm titanium conventional miniplates. At one, three, and six months, parameters like mouth opening and sensory deficit/paresthesia were noted. **Results:** Group I had 19 males and 11 females and group II had 18 males and 12 females. Sensory deficit/paresthesia was seen in 3 in group I and 2 in group II at 1 month, 2 in group I and 1 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 24.2 mm and 24.4 mm in group I and II, at 3 months was 36.6 mm and 34.8 mm and at 6 months was 38.4 mm and 36.4 mm respectively. The difference was significant ($P < 0.05$). **Conclusion:** Traditional titanium miniplates can be substituted with 3D titanium miniplates. The technique offers a more reliable and efficient treatment option for mandibular symphyseal fractures than conventional miniplates.

Keywords: facial trauma, titanium miniplates, mandibular symphyseal fractures

Received Date: 13 December, 2024

Acceptance Date: 19 January, 2025

Corresponding author: Dr. Sumit Bhatt, Senior Lecturer, Department of Oral and Maxillofacial Surgery, Rajasthan Dental College and Hospital, Jaipur Rajasthan, India

This article may be cited as: Bhatt S, Shanker P, Awaskar AB, Vanteru J, Kamble DD, Prassath SN. 2D miniplates versus 3D miniplates in treatment of mandibular symphysis fracture. *Int J Res Health Allied Sci* 2025; 11(1):31-34.

INTRODUCTION

Any injury to the face that affects the soft tissues, bones, skin, and other facial components is referred to as facial trauma. Numerous incidents, including car crashes, falls, assaults, sports injuries, and accidents, can produce facial trauma. From simple wounds like cuts and bruises to more serious and potentially fatal disorders, facial trauma can vary in severity. Usually, direct damage to the lower jaw is the source of

them.¹ Mandibular fractures and other face injuries are possible outcomes of high-impact crashes. Lower jaw fractures and other face damage can result from physical altercations and assaults. Mandibular symphysis fractures are among the facial fractures that can result from high-impact sports like football or hockey. Facial injuries can arise from unintentional falls, particularly those that occur from heights.²

Depending on the extent of the injury, a mandibular symphysis fracture might have a variety of indications and symptoms.³ Malocclusion (the misalignment of the upper and lower teeth when biting down), numbness or tingling in the lower lip or chin region, loose or mobile teeth, especially in the area of the fracture, difficulty opening and closing the mouth, pain and tenderness along the midline of the lower jaw, swelling and bruising around the jawline, difficulty chewing, and bleeding from the mouth are common symptoms.⁴

The three-dimensional plating technique is thought to be one of the best ways to treat mandibular angle fractures out of all the other treatment options. It is based on the idea that a quadrangle is a support arrangement that is geometrically stable. Its enhanced stability is a result of its configuration rather than its thickness or length. A 3D micro plate's design maintains its low profile and malleability while allowing for more screws, three-dimensional stability,

and resistance to twisting forces.⁵The present study was conducted to compare 2D miniplates and 3D miniplates in mandibular symphysis fracture.

MATERIALS & METHODS

The present study consisted of 60 cases of mandibular symphysis fracture of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Each group had 30 patients. In the mandibular symphysis, group I patients received treatment with a 2.0-mm titanium 3D-miniplate, while group II patients received treatment with 2.0-mm titanium conventional miniplates. At one, three, and six months, parameters like mouth opening and sensory deficit/paresthesia were noted. 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	19:11	18:12

Table I shows that group I had 19 males and 11 females and group II had 18 males and 12 females.

Table II Sensory deficit /paresthesia

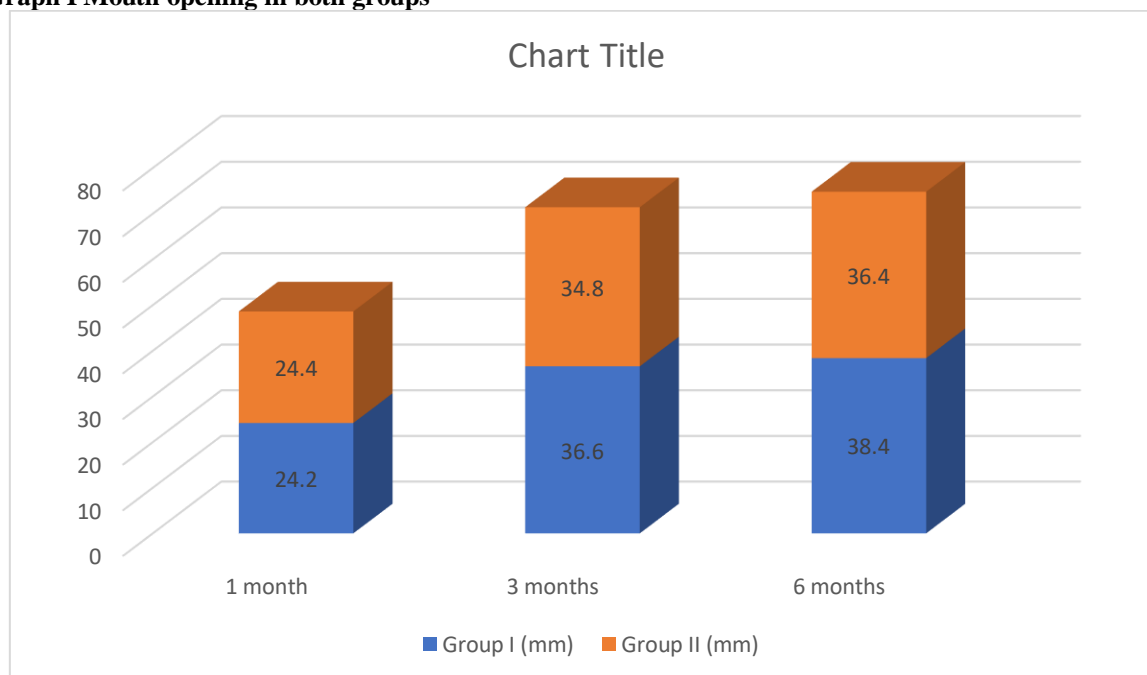
Period	Group I	Group II	P value
1 month	3	2	0.05
3 months	2	1	
6 months	0	1	

Table II shows that sensory deficit /paresthesia was seen in 3 in group I and 2 in group III at 1 month, 2 in group I and 1 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).

Table III Mouth opening in both groups

Period	Group I (mm)	Group II (mm)	P value
1 month	24.2	24.4	0.05
3 months	36.6	34.8	
6 months	38.4	36.4	

Table III, graph I shows that mean mouth opening at 1 month was 24.2 mm and 24.4 mm in group I and II, at 3 months was 36.6 mm and 34.8 mm and at 6 months was 38.4 mm and 36.4 mm respectively. The difference was significant (P< 0.05).

Graph I Mouth opening in both groups

DISCUSSION

One of the most fulfilling and difficult aspects of oral and maxillofacial practice is treating patients who have suffered face injuries.⁶ The suddenness of the injury can cause significant mental distress, even in cases where only minor damage are visible. The clinician must therefore successfully treat the patient's emotional health as well as their physical injuries.⁷ Trauma, including assaults and auto accidents, is without a doubt the primary cause of mandibular fractures globally.⁸ Other causes of maxillofacial injuries include falls, sports injuries, interpersonal violence, and occupational trauma.⁹ The present study was conducted to compare 2D miniplates and 3D miniplates in mandibular symphysis fracture.

We found that group I had 19 males and 11 females and group II had 18 males and 12 females. Group A patients in Mujtaba's study¹⁰ underwent 3-D miniplate treatment, whereas group B patients received regular 2-D miniplate treatment. On the first and seventh post-operative days, as well as the first month and third months following surgery, routine examinations were conducted. Measurement tools were used to evaluate Post Open Reduction and Internal Fixation (ORIF) occlusion. Thirty-one (59.6%) of group B patients and forty-one (78.8%) of group A patients had satisfactory occlusion on the first post-operative day. Forty-three (82.7%) of the patients in group A and forty-one (78.8%) of the patients in group B had satisfactory occlusion at the seventh post-operative day ($p > 0.05$). Both treatment groups showed optimal occlusion in the follow-up evaluations at the first and third months. In contrast to conventional 2-D.

We found that sensory deficit /paresthesia was seen in 3 in group I and 2 in group III at 1 month, 2 in group I and 1 in group II at 3 months and 0 in group I and 1 in

group II at 6 months. The clinical efficacy of two-dimensional and three-dimensional titanium miniplates for open reduction and fixation of mandibular parasymphysis fractures was assessed and contrasted by Mittal et al.¹¹ The 2 mm 3D and 2D miniplate systems were used to treat thirty patients with non-comminuted mandibular parasymphysis fractures who were split into two equal groups at random. At the first, second, third, sixth, and third weeks as well as the third and sixth months following surgery, every patient was routinely observed. The following outcome factors were noted: implant failure, mobility, occlusion derangement, infection, paresthesia, and pain intensity. According to the findings, one patient in each group experienced mobility issues, occlusion derangement, and post-operative infection ($p > 0.05$). One patient experienced paresthesia in Group A, whereas two patients experienced paresthesia in Group B ($p > 0.05$). In both groups, no patient experienced implant failure. In every parameter measured at every follow-up, there was no statistically significant difference between the 3D and 2D miniplate systems ($p > 0.05$).

We found that mean mouth opening at 1 month was 24.2 mm and 24.4 mm in group I and II, at 3 months was 36.6 mm and 34.8 mm and at 6 months was 38.4 mm and 36.4 mm respectively. In their study, Singh et al.¹² split 120 patients with mandibular angle fractures into two groups of 60. For mandibular angle fractures, patients in group I had treatment with 3D, 2.0-mm titanium plates, whereas those in group II received treatment with 2D, 2.0-mm titanium miniplates. There were 22 men and 38 women in group I. Group II consisted of 20 girls and 40 males. Thirty-two patients in group I and twenty-six in group II had right angle fractures. Twenty-four in group I and twenty-eight in

group II had left angle fractures. Three members of group I and four members of group II had fractures of the right angle and left parasymphysis. One person in group I and two in group II had fractures to their left angle and right parasymphysis. After a month, five individuals in group I and twelve in group II had sensory deficits. After three months, neither group I nor group II had any patients with sensory deficits. The mouth opening was 24 mm in group I and 25.80 mm in group II patients prior to surgery. At one month, it was 31.20 mm in group I and 28.20 mm in group II, at three months, it was 32 mm in group I and 30 mm in group II, and at six months, it was 37.20 and 32.12 mm in groups I and II, respectively. The limitation the study is small sample size.

CONCLUSION

Authors found that traditional titanium miniplates can be substituted with 3D titanium miniplates. The technique offers a more reliable and efficient treatment option for mandibular symphyseal fractures than conventional miniplates.

REFERENCES

1. Sankar AS., Thangavelu A. Role of indigenous 3-Dimensional Titanium Plating system in Oral and maxillofacial Surgery. *J Maxillofac Oral Surg*, 2004; 3: 24-27.
2. Jain MK, Manjunath KS, Bhagwan BK, Shah DK. Comparison of 3-dimensional and standard miniplate fixation in the management of mandibular fractures. *J Oral Maxillofac Surg*. 2010; 68(7):1568-72.
3. Goyal M, Marya K, Chawla S, Pandey R. Mandibular osteosynthesis: A comparative evaluation of two different fixation systems using 2.0 mm titanium miniplates and 3-D locking plates. *J Maxillofac Oral Surg*. 2011; 10(1):32.
4. Mittal G, Dubbudu RR, Cariappa KM. Three-dimensional titanium mini plates in oral & maxillofacial surgery: A prospective clinical trial. *J Maxillofac Oral Surg*. 2012; 11(2):152-9.
5. Giri KY, Singh AP, Dandriyal R, Indra N, Rastogi S, Mall SK, et al. Incidence and pattern of mandibular fractures in Rohilkhand region, Uttar Pradesh state, India: A retrospective study. *J Oral BiolCraniofac Res* 2015;5:140-5.
6. Bui P, Demian N, Beetar P. Infection rate in mandibular angle fractures treated with a 2.0-mm 8-hole curved strut plate. *J Oral Maxillofac Surg*. 2009; 67(4):804-8.
7. Mishra N, Thakkar N, Kar I, Baig SA, Sharma G, Kar R, et al. 3 D Miniplates versus conventional miniplates in treatment of mandible fractures. *J Oral MaxillofacSurg*2017;18:1-8.
8. Chhabaria G, Halli R. Evaluation of 2.0-mm titanium three- dimensional curved angle strut plate in the fixation of mandibular angle fractures- A prospective clinical and radiological analysis. *CranioMaxillofac Trauma Reconstr*2014;7:119-25.
9. Sehgal S, Ramanujam L, Prasad K, Krishnappa R. Three-dimensional v/s standard titanium miniplate fixation in the management of mandibular fractures—A randomized clinical study. *J CranioMaxillofacSurg*2014;42:1292-9.
10. Mujtaba A, Malik NR, Umer MF, Mujtaba H, Zofeen S, Rana ZA. A Comparison of Post-Operative Occlusion with 3-D vs. 2-D Miniplate Fixation in the Management of Isolated Mandibular Angle Fractures. *J. 2022 Feb* 2;5(1):107-13.
11. Mittal Y, Varghese KG, Mohan S, Jayakumar N, Chhag S. A comparative study of 3-dimensional titanium versus 2-dimensional titanium miniplates for open reduction and fixation of mandibular parasymphysis fracture. *Journal of maxillofacial and oral surgery*. 2016 Mar;15:93-8.
12. Singh R, Konark, Singh A, Singh D K, Nazeer J, Singh S. Comparative evaluation of 2D miniplates and 3D miniplates fixation in mandibular angle fracture - A clinical study. *Indian J Dent Res* 2020;31:134-7.
13. Singh H, Kumar P, Goel R, Kumar A. Sex hormones in head and neck cancer: Current knowledge and perspectives. *Clin Cancer Investig J*. 2012;1(1):2-5. <https://doi.org/10.4103/2278-0513.95011>.
14. Kumar A, Bindal R, Shetty DC, Singh HP. Primary oral malignant melanoma: Clinicopathological series of four cases. *Dent Res J (Isfahan)*. 2012 May;9(3):338-44. PMID: 23087742; PMCID: PMC3469903.
15. Nayar, Amit; Singh, Harkanwal Preet1,;Leekha, Swati. Pulp tissue in sex determination: A fluorescent microscopic study. *Journal of Forensic Dental Sciences* 6(2):p 77-80, May–Aug 2014. | DOI: 10.4103/0975-1475.132527
16. Sodhi, Surinder Pal Singh; Brar, Ramandeep Singh; Singh, Harkanwal Preet1,; Kaur, Tajinder1; Dhawan, Rohan. A rare occurrence of basal cell adenoma of palate: A case report with comprehensive immunohistochemical analysis. *Journal of Cancer Research and Therapeutics* 11(4):p 1023, Oct–Dec 2015. | DOI: 10.4103/0973-1482.147391