Original Article

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Dentistry Section

Comparative Efficacy of Lag Screw and 3D Plate in Fixation of Symphysis and Parasymphysis Fractures of Mandible- A Prospective Interventional Study

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ABSTRACT

Introduction: Mandible is well known for its unique anatomy and is the second most prevalent facial bone to fracture followed by fracture of nasal bone. Fracture of the mandible causes deranged occlusion, trismus, mobility of fractured fragments, pain, oedema and results in functional as well as aesthetic deformity. Therefore, the fixation of mandibular fracture plays a major role in rehabilitation of the jaw. The goal of management is to restore the premorbid occlusion and function.

Aim: To compare the efficacy of osteosynthesis of mandibular anterior fracture by two different methods of open reduction, i.e, titanium lag screw and titanium 3 Dimensional miniplate.

Materials and Methods: This prospective interventional study was conducted in the Department of Oral and Maxillofacial Surgery at Navodaya Dental College and Hospital, Raichur, Karanataka, India from January 2019 to February 2021. A total of 10 patients with symphysis and parasymphysis fracture were included in this study and were divided into two groups, five patients for group A (osteosynthesis by titanium lag screw fixation) and five patients for group B (osteosynthesis by titanium 3D plate fixation) and were treated accordingly. Parameters such as occlusion, mobility of fracture segments, interincisal mouth opening, facial oedema, pain, approximation of the lower border and lingual cortex and hardware failure were assessed clinically and radiographically, and the patients were followed-up for three months. Recorded data was compared and analysed using Statistical Package for Social Sciences (SPSS) version 26.0. Independent sample t-test was used for comparison between the groups. Chi-square test and Fisher's-exact test was used for qualitative data and p-value was set at 0.05.

Results: There was no significant difference noted between two groups when assessed radiographically on 1st day, one and a half month later and after three months. There was no significant difference noted in occlusion as well as in pain when measured postoperatively between the groups, but lag screw fixation provided normal immediate postoperative occlusion in all the cases. A significant improvement in the postoperative mouth opening was noted with lag screw group when compared to 3 D plates with a p-value of 0.015 when measured after a week postoperatively. When oedema was measured in transverse direction, it was statistically significantly less in 3D plates group postoperatively first day with a p-value of 0.028 and after a week with a p-value of 0.044. Oedema when measured in vertical direction revealed no statistically significant difference between two groups.

Conclusion: In the present study, a significant improvement in the mouth opening as well as in terms of reduction in pain and oedema was noted with lag screw osteosynthesis group. Immediate postoperative occlusion was better with titanium lag screw osteosynthesis when compared to titanium 3D plates. Based on our study, authors conclude that both the osteosynthesis materials provide good interfragmentary stability in the management of anterior mandibular fractures and can be used satisfactorily for the fixation of mandibular fractures.

Keywords: Anterior mandibular fractures, Lingual cortex, Mandibular lower border approximation, Occlusion, Osteosynthesis

INTRODUCTION

Mandible is a mobile bone of the facial skeleton which occupies an unprotected position that renders it liable to injury [1,2]. It is the second most prevalent facial bone to fracture followed by fracture of nasal bone [1,3]. The major aetiology for fracture was found to be road traffic accidents, assaults, fall and sport-related injuries [2]. Anterior mandibular fractures can be linear, oblique, comminuted or incomplete. Here, the fracture line traverses from lingual to the buccal aspect as the compressive strain develops along buccal and tensile strain along the lingual aspect [4]. Methods of fixation of fractured mandible varies from the usage of intraosseous wires to plates and screws [5]. Brons and Boering in 1970 [1] introduced lag screw which is a rigid fixation material that relies on compression principle [6].

Although lag screws provided satisfactory results, eventually miniplate application was introduced by Mitchel et al in 1973 and was modified by Champy et al in 1975 [1]. Farmand modified these miniplates into 3 Dimensional miniplates which works on the principle that when a geometrically closed quadrangular plate is secured with screws, it creates stability in three dimensions [7]. The 3D plate does not allow any movement at the superior as well as inferior border of the mandible providing maximal torsional and bending forces, facilitating reduction and stabilisation of fractured segments [8].

Literature depicts the comparison of lag screws with miniplates [9] meanwhile there is only a limited literature which compares lag screws with 3 Dimensional plates [10]. Hence, this study contributes to the gap in the knowledge. Therefore, the aim of this study was to compare the efficacy of titanium lag screws versus titanium 3D plates in the osteosynthesis of symphysis and parasymphysis fractures of the mandible following open reduction and internal fixation.

MATERIALS AND METHODS

This prospective interventional study was conducted in the Department of Oral and Maxillofacial Surgery, Navodaya Dental College and Hospital, Raichur, Karanataka, India from January 2019 to February 2021. Institutional Review Board (IRB) approval (NDC/RCR/2018-2019) was obtained for the study protocol. Informed consent was obtained from all patients prior to open reduction and internal fixation under general anesthesia.

A total of 10 patients with symphysis and parasymphysis fractures were assigned to one of two groups: group A (n=5) were treated by open reduction and internal fixation using 2 mm titanium lag screws, and group B (n=5) were treated by open reduction and internal fixation using 2 mm titanium 3D plate.

Inclusion criteria: Patients with symphysis and parasymphysis fractures of the mandible classified based on "Comprehensive AOCMF Classification System: Mandible Fractures- Level 2 Tutorial" [11] associated/not associated with other maxillofacial fractures and who were fit for surgery under General Anesthesia (GA) were included.

Exclusion criteria: Any comminuted, infected fractures and patient with GA contraindication were excluded from the study.

A 3-month follow-up was done based on clinical and radiographical parameters.

Study Procedure

Fracture was approached either through the existing chin laceration or through mandibular paravestibular degloving incision [12]. Blunt dissection was carried out to expose the fracture line upto the lower border of the mandible. The mental neurovascular bundle was identified and skeletanised to prevent traction on the nerve. Maxillomandibular Fixation (MMF) was released following which a complete reduction of fracture fragments was done in all the cases. Titanium lag screw (S.K Surgicals, Pune) fixation was performed in group A and titanium 3D plate (S.K Surgicals, Pune) fixation in group B followed by closure of the incised wound.

Occlusion was assessed visually based on Angle's molar relationship [13] and mobility of fractured segments were evaluated clinically by bi-digital palpation so as to assess any movement in the fracture fragment. Interincisal mouth opening was measured from the incisal edge of lower right central incisor to upper right central incisor using metal scale. Oedema was evaluated using a 3-0 silk thread and the measurements were then transferred into a metal scale. The distance from mucocutaneous junction of the lower lip to the upper border of the thyroid cartilage was measured using a 3-0 silk thread and was labelled as vertical measurement representing the oedema present in a vertical direction. The distance between two gonial angles across the chin was measured and was labelled as transverse measurement representing the oedema present in a transverse direction) [1]. Patient was asked to rate the pain based on Visual Analogue Scale (VAS) [9]. All these values were recorded one day before surgery and postoperatively on the 1st day, one week, one and a half month and three months later.

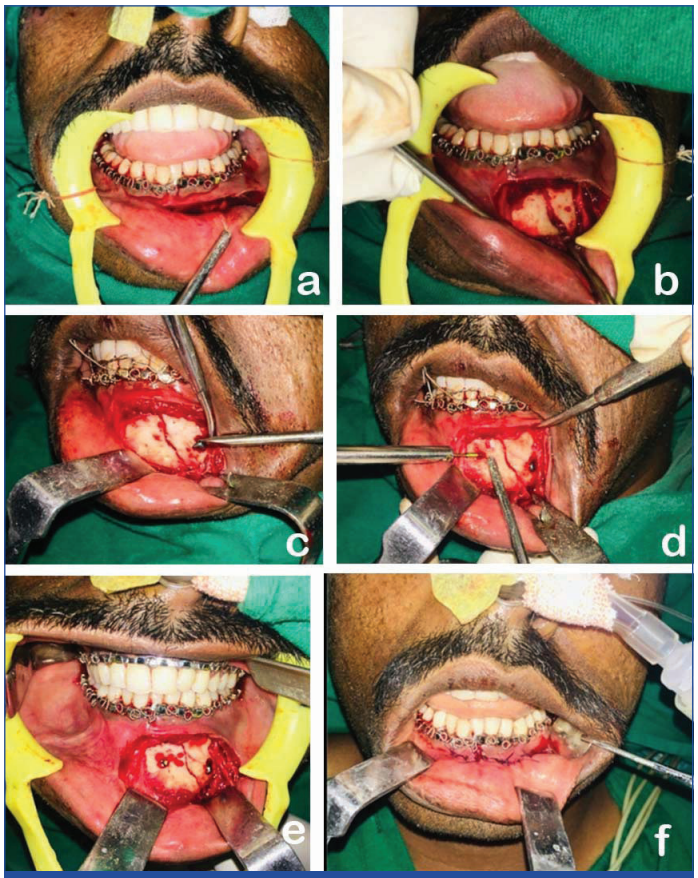
Orthopantomogram (OPG) and mandibular occlusal radiographs were taken one day before surgery and postoperatively on the 1st day. OPG was taken preoperatively to assess the difference in the height of fracture fragments at the lower border and to compare the approximation achieved postoperatively with both lag screw and 3D plate osteosynthesis. Mandibular occlusal radiographs were taken to assess the difference in approximation of the lingual cortex of the fractured segments preoperatively and postoperatively and to compare with both the groups. The same radiographs (OPG and occlusal radiograph) were repeated after three months to assess any hardware failure.

STATISTICAL ANALYSIS

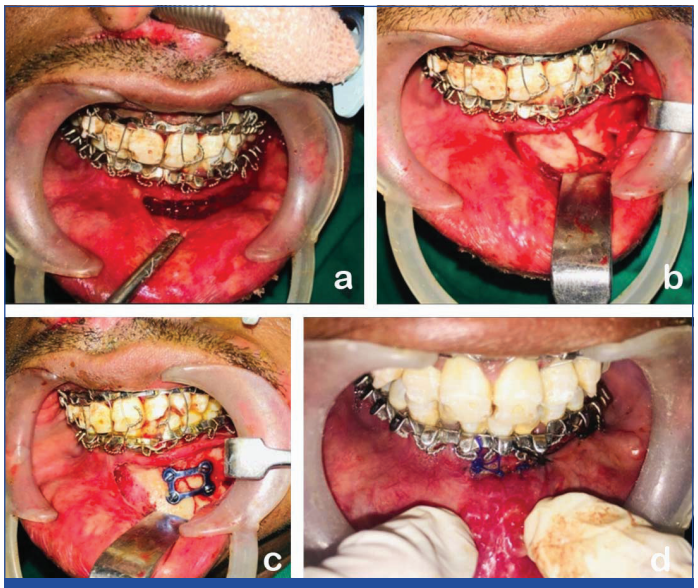
Recorded data was entered in Microsoft spreadsheet followed by calculation of frequency and percentage of the qualitative data. It was then analysed using Statistical Package for Social Sciences (SPSS) version 26.0. Independent sample t-test was used for comparison between the groups. Chi-square test/Fisher's exact test was used to evaluate the association between any variables or qualitative characteristics and p-value was set at 0.05.

RESULTS

In the present study, group A (n=5) treated by open reduction and internal fixation using 2.0 mm titanium lag screws [Table/Fig-1a-f], and group B (n=5) were treated by open reduction and internal fixation using 2 mm titanium 3D plate [Table/Fig-2a-d].



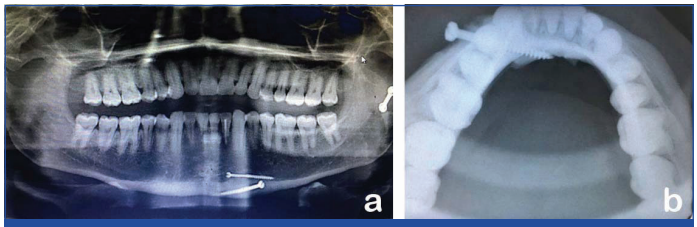
[Table/Fig-1]: Lag screw osteosynthesis (Group A). a) Incision placed (clinical image reveals a paravestibular incision placed from distal of 32 to mesial of 45 region); b) Exposure of fracture site (clinical image shows a fracture line running in an oblique direction from distal side of 31 at the superior border to inferior border of the mandible); c) Placement of 1st lag screw (clinical image represents application of 2 mm diameter×22 mm length lag screw from the near cortex to the far cortex after the reduction of fracture site to the anatomical position); d) Placement of 2nd Lag screw (clinical image represents application of second lag screw of 2 mm diameter×20 mm length from the far cortex to near cortex); e) Placement of both the lag screws (2×22 mm length lag screw and 2×20 mm length lag screws were placed); f) Sutures placed (simple interrupted sutures were placed in layers to close the vestibular incision using vicryl 3-0 suture material).



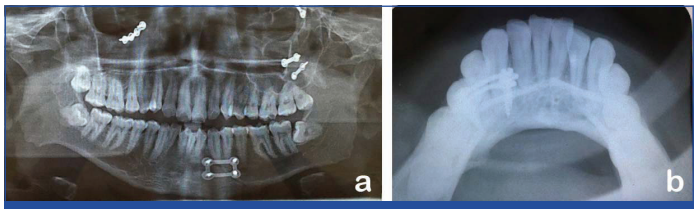
[Table/Fig-2]: 3D plate osteosynthesis (Group B). a) Incision placed (clinical image reveals a paravestibular incision placed from distal of 31 to mesial of 45 region); b) Fracture site exposed (clinical image reveals a fracture line running downwards from 32 at the superior border and diverges halfway on the way to inferior border of the mandible resulting in a third fragment in between the two fracture segments); c) 3 Dimensional plate placed (clinical Image represents application of a 2 mm diameter 3 Dimensional plate with four 2×8 mm length monocortical screws with the superior border of plate along the tension zone and inferior border of the plate along the compression zone); d) Sutures placed (simple interrupted sutures were placed in layers to close the vestibular incision using vicryl 3-0 suture material).

[Table/Fig-3a,b] and [Table/Fig-4a,b] show postoperative radiographs for groups A and B, respectively.

Occlusion was assessed clinically and was categorised as deranged occlusion or normal occlusion. Two patients in lag screw group and four patients in 3D plate group had deranged occlusion preoperatively. All patients had normal occlusion postoperatively in lag screw group while two patients still presented with deranged occlusion postoperatively on 1st day, after one week and one patient till one and a half month in 3D plate group. After three months no patient had deranged occlusion in both the groups. There was no statistically significant difference noted between the two groups [Table/Fig-5].



[Table/Fig-3]: Postoperative OPG and Occlusal Radiograph of lag screw osteosynthesis. a) Orthopantomogram-OPG depicts the positioning of lag screws placed in the left parasymphysis region postoperatively; b) Mandibular Occlusal radiograph depicts the positioning of lag screws placed in the left parasymphysis region as well as the approximation of lingual cortex achieved postoperatively.



[Table/Fig-4]: Postoperative OPG and Occlusal Radiograph of 3D plate osteosynthesis. a) Orthopantomogram - OPG depicts the placement of 3 Dimensional plate placed in the left parasymphysis region postoperatively; b) Mandibular Occlusal radiograph depicts the placement of 3 Dimensional plate placed in the left parasymphysis region as well as the approximation of lingual cortex achieved postoperatively.

Occlusion		Lag screws Group A (n=5)		3D plates Group B (n=5)		p-value
		No.	%	No.	%	
Preoperative	Deranged	2	40	4	80	0.262
	Normal	3	60	1	20	
1st Day Postoperative	Deranged	0	0	2	40	0.222
	Normal	5	100	3	60	
7 Days Postoperative	Deranged	0	0	2	40	0.222
	Normal	5	100	3	60	
45 Days Postoperative	Deranged	0	0	1	20	0.5
	Normal	5	100	4	80	
90 Days Postoperative	Deranged	0	0	0	0	-
	Normal	5	100	5	100	

[Table/Fig-5]: Comparison of occlusion between group A and group B.
*Fisher's-exact test for significance

Preoperatively the mean mouth opening was 25.8 mm and Standard Deviation (SD) was 4.08 for group A and a mean of 21.4 mm and SD of 3.04 for group B. Postoperatively on the 1st day, mouth opening remained almost the same for both the groups. Postoperatively after a week, significant improvement with a p-value of 0.015 was noted in group A when compared to group B [Table/Fig-6]. Mobility of fractured fragments was noted in all 5 patients in group B and 4 patients in group A preoperatively. There was no mobility of fractured fragments noted postoperatively in any of the patients.

Approximation of the lower border of mandible indicates the reduction of fracture. Preoperatively a mean difference of 2.01 mm was noted between the two fractured fragments at the inferior border of the mandible in group A while a mean difference of 2.54 mm in group B. Postoperatively the day after surgery, mean difference reduced to 1.27 mm in group A whereas 1.10 mm in group B. Complete

Variables	Group	N	Mean	Std. Deviation	t-test	p-value
Interincisal mouth opening (mm)						
Preoperative	Lag screws	5	25.8	4.08	1.930	0.090
	3D plates	5	21.4	3.04		
1st Day Postoperative	Lag screws	5	25.4	6.54	1.213	0.260
	3D plates	5	21	4.79		
7 Days Postoperative	Lag screws	5	31.2	3.89	3.076	0.015*
	3D plates	5	24.2	3.27		
45 Days Postoperative	Lag screws	5	42	3.46	1.826	0.105
	3D plates	5	35.4	7.30		
90 Days Postoperative	Lag screws	5	43.6	4.82	0.772	0.462
	3D plates	5	41.4	4.15		
Approximation of lower border (milimeters)						
Preoperative	Lag screws	5	2.01	0.76	0.887	0.401
	3D plates	5	2.54	1.10		
1st Day Postoperative	Lag screws	5	1.27	1.21	0.227	0.826
	3D plates	5	1.10	1.06		
90 Days Postoperative	Lag screws	5	0.96	1.03	0.132	0.898
	3D plates	5	0.87	0.92		
Approximation of lingual cortex						
Preoperative	Lag screws	5	4.50	2.34	1.514	0.168
	3D plates	5	2.56	1.64		
1st Day Postoperative	Lag screws	5	2.32	1.77	1.107	0.301
	3D plates	5	1.28	1.11		
90 Days Postoperative	Lag screws	5	1.60	1.81	0.767	0.465
	3D plates	5	0.90	0.93		
Pain (Visual analogue scale)						
Preoperative	Lag screws	5	7.00	1.87	1.633	0.141
	3D plates	5	8.60	1.14		
1st Day Postoperative	Lag screws	5	3.60	3.43	0.876	0.406
	3D plates	5	5.40	3.05		
7 Days Postoperative	Lag screws	5	2.00	1.225	0.707	0.500
	3D plates	5	3.00	2.91		
45 Days Postoperative	Lag screws	5	0.00	0.00	-	-
	3D plates	5	0.00	0.00	-	-
90 Days Postoperative	3D plates	5	0.00	0.00	-	-

[Table/Fig-6]: Comparison of interincisal mouth opening, approximation of lower border, lingual cortex and pain between group A and group B.
p-value <0.05 statistically significant

approximation of lower border was noted in both the groups after three months. There was no statistically significant difference noted between the two groups [Table/Fig-6].

Approximation of lingual cortex play a major role in defining the efficacy of fixation material and was assessed with an occlusal radiograph. A mean difference of 4.5 mm was noted in the lingual cortex between the two fracture fragments in group A and a mean of 2.56 mm in group B preoperatively. There was a substantial reduction noted in group A when compared to group B a day after surgery. Postoperatively after three months, a mean difference of 1.6 mm was noted in group A while there was almost a complete approximation of lingual cortex noted in group B. On comparison there was no statistically significant difference noted between two groups [Table/Fig-6].

Patient was asked to rate the pain based on VAS (scale of 1-10). Preoperatively patients rated pain with a mean score of 7.0 for group A and 8.6 for group B. Postoperatively on 1st day, a significant reduction in pain was noted in both the groups. Patients in group A experienced less pain when compared to patients in group B

postoperatively after a week. None of the patients had pain postoperatively one and a half month and three months later. On comparison between two groups there was no statistically significant difference noted [Table/Fig-6].

Oedema was evaluated using a 3-0 silk thread in a transverse as well as vertical direction. When measured in transverse direction, preoperatively, swelling measuring a mean of 25.1 mm was noted in group A and a mean of 23.3 mm was noted in group B. Postoperatively a day after surgery, oedema almost remained the same in both the groups. Reduction in the oedema was noted postoperatively after a week to a mean value of 24.1 mm in group A and 22.6 mm in group B. When measured vertically a swelling measuring of 13.2 mm was noted in group A and 11.2 mm in group B preoperatively. Postoperatively after a day, oedema decreased to 12.5 mm in group A while it increased to 12.0 mm in group B. Reduction in the oedema was noted postoperatively after a week to a mean value of 10.8 mm in group A while it remained the same in group B. Postoperatively when measured in a transverse as well as vertical direction on one and a half month as well as three months later, oedema subsided completely in both the groups. Comparison of facial oedema in transverse as well as in vertical direction between two groups, were shown in [Table/Fig-7]. In lag screw group and 3D plate group, oedema measured in transverse direction on 45th day and 90th day postoperatively remained the same with the mean values of (22.7- lag screw group and 21.9 mm- 3D plate group) which signifies the reduction in oedema when compared to preoperative mean values. Same applies for oedema measured in vertical direction on 45th day and 90th day postoperatively as it remained the same with the mean values of (10.42- lag screw group and 11.7 mm- 3D plate group). There was a statistically significant difference noted between two groups when measured in transverse direction with a p-value of 0.012 a day before surgery, 0.028 postoperatively on 1st day and 0.044 after a week [Table/Fig-7].

In the present study none of the patients encountered paresthesia of the lower lip/chin region postoperatively. Wound Dehiscence was noted in one case of group B on postoperative 5th day which was managed by resuturing and healing was uneventful. Hardware failure like loosening of the screw, plate fracture, infection was not seen in any of the cases.

DISCUSSION

According to Barde DH et al., [14] and Jung HW et al., [15] symphysis and parasymphysis region of the mandible were the most frequently fractured sites. In this study, authors have compared the efficacy of rigid (titanium lag screws) and semi rigid (titanium 3D plates) fixation in the management of symphysis and parasymphysis fractures.

When occlusion was compared postoperatively on 1st day, all patients in group A were in occlusion while two patients still presented with deranged occlusion in group B. This is in accordance with the study conducted by Rao E et al., to assess the effectiveness of lag screw fixation in mandibular fractures where lag screws proved to provide a better occlusion [16]. This could probably be due to the compression technique of the lag screw. Lag screws are bicortical screws which engage both the cortices and on tightening the screw compresses both the fracture fragments towards each other resulting in good anatomical reduction and fixation which brings the teeth in occlusion intraoperatively [17]. 3D plates use monocortical screws for fixation of the fracture fragments and the causative reason for occlusal discrepancy probably could be due to the imbalance between activities of muscles of mastication [18]. When assessed after three months postoperatively malocclusion was not seen in any of the patients in both the groups.

On comparison of interincisal mouth opening between two groups there was a statistically significant difference noted postoperatively after a week. A significant improvement in the mouth opening was noted in group A after a week. This result coincides with the comparative study conducted by Mittal G et al., [4] on lag screws and miniplates where improvement was significant in lag screw group when compared to the miniplate group. All patients had a mouth opening of >40 mm after three months in both the groups.

Mobility of fractured fragments were noted in all five patients in group B and four patients in group A preoperatively. There was no mobility of fractured fragments noted postoperatively in any of the patients. This could probably be due to the resultant primary bony union between the fractured fragments in lag screw group as it does not allow interfragmentary mobility [4,19]. These results are comparable with the study conducted by Carricondo AR et al., [20] who concludes that the interfragmentary distance is smaller when the lag screw technique is used, providing greater compression of the fragments to achieve primary bone healing. 3D plates although semi rigid in nature and results in an indirect/secondary bony union has demonstrated sufficient amount of rigidity for effective osteosynthesis of fracture [18]. In contrast to this Barde DH et al., [14] noted immediate postoperative mobility in the 3D plate group in his study, efficacy of 3D plates over champy's miniplates in mandibular fractures.

In our study there was no significant difference noted when approximation of the lower border and lingual cortex was compared between two groups. Lag screw being a rigid fixation device is based on compression technique. When placed perpendicularly to the fracture fragments it compresses the fragments towards each other [19]. 3D plate is a geometrically configured plate with two horizontal bars and two interconnected vertical bars. A single 3D plate with two horizontal bars one at the superior and the other at the inferior border stabilises the fracture fragments firmly by resisting the shearing, bending and torsional forces in all three dimensions [21].

Facial oedema: Transverse (T) and Vertical (V) Measurement										
			T	V	T	V	T	V	T	V
		n	Mean (mm)	Mean (mm)	Std. Deviation	Std. Deviation	t-value	t-value	t-value	p-value
Preoperative	Lag screws	5	25.1	13.20	2.966	2.752	1.257	1.430	0.012*	0.190
	3D plates	5	23.3	11.20	1.204	1.483				
1st Day Postoperative	Lag screws	5	25.6	12.50	1.517	1.581	2.687	0.535	0.028*	0.608
	3D plates	5	23.7	12.00	0.447	1.369				
7 Days Postoperative	Lag screws	5	24.1	10.80	1.245	1.351	2.387	1.863	0.044*	0.100
	3D plates	5	22.6	12.00	0.652	0.500				
45 Days Postoperative	Lag screws	5	22.7	10.42	1.789	1.354	0.894	1.845	0.397	0.102
	3D plates	5	21.9	11.70	0.894	0.758				
90 Days Postoperative	Lag screws	5	22.7	10.42	1.789	1.354	0.894	1.666	0.397	0.134
	3D plates	5	21.9	11.60	0.894	0.822				

[Table/Fig-7]: Comparison of facial oedema in transverse as well as in vertical direction between 2 groups.
*p-value <0.05 statistically significant

In this study, intensity of pain was significantly decreased in all patients of both the groups across the follow-up period and this is consistent with the literatures of Agarwal M et al., [22] and EL Nakeeb NA et al., [23] who reported that a statistical significant difference was not found in relation to pain. On the 1st postoperative day, severe pain was noted in both the groups and this could be probably due to increased swelling at the operated site. Reduction in the pain was noted postoperatively after a week in both the groups. Similarly, Bhatnagar A et al., [9] also noted reduction in pain in lag screw group in his study where he compared the efficacy of lag screws and miniplates in mandibular fractures.

When facial oedema was compared in transverse and vertical direction there was a statistically significant difference noted between the two groups, a day before surgery, postoperatively 1st day and after a week. The transverse and vertical measurements differ based on patient's facial form (width and length of the face). This could probably be the reason for the difference noted between the two groups preoperatively. When oedema was measured transversely the day after surgery, slight increase was noted in lag screw group where as 3D plate group showed a significant increase in oedema when measured vertically. Oedema subsided after a week in both the groups when measured in a transverse direction with more reduction being noted in lag screw group while oedema increased when measured vertically in 3D plate group. Agnihotri A et al., [1] in his study of comparative analysis of the efficacy of lag screws and miniplates noted a significant amount of reduction in duration of facial oedema in lag screw group. Authors also highlighted that the greater amount of bone drilling required for placement of more number of screws and the greater quantity of hardware used contributed to more persistent postsurgical oedema in the application of semirigid fixation [1].

Hardware failure like loosening of the screw, plate fracture, infection was not seen in any of the cases. In contrast to our study Goyal M et al., [24] have encountered plate fractures which lead to the removal of plate and screws in his study of comparision of lag screws and miniplates in management of mandibular fracture.

In a study conducted by Goyal M et al., in 2012 [24], 33.3% of postoperative paresthesia was noted in miniplate group and 13.3% in lag screw group. In contrast, none of the patients encountered paresthesia of the lower lip/ chin region postoperatively in our study. Breakage of the drillbit was encountered intraoperatively in one case of group A. This complication has already been reported earlier by many authors [25]. Tiwana PS et al., in 2007 [25] has proposed the reason being the inappropriate drilling angle and improper reduction of the opposing cortex. He suggested to engage the opposing cortex as perpendicularly as possible and also to avoid forcing the drill as the drill gets deflected by the inner cortex of the mandible in a "U" shape resulting in breakage when forced.

Wound dehiscence was noted in one case of group B. According to Ziccardi VB et al., in 1997 [26] wound dehiscence contributed to 21% of the complication rate that is associated with mandibular fracture. Authors mentioned the reason as the tension developed on wound margin lead to breakdown of the wound because of inadequate blood supply as the plate was close to the superior border as well as under the incision site. According to Agnihotri A et al., [1], Goyal M et al., [24] and several other authors, lag screw fixation technique has been proved to be better than other techniques as it provides more stability, resistance to torsion and greater compression between the fragments. While several other studies conducted by Balakrishnan R and Ebenezer V [8] and Mittal Y et al., [7] stated 3D plate as a stable fixation material as it prevents maximum torsional and bending forces and was found to be strong yet malleable, facilitating reduction and stabilisation of fractured segments.

Limitation(s)

Sample size was limited in the present study and a longer follow-up period would have beneficial. More clinical and radiographic parameters such as bite force and density of the bone could have been included.

CONCLUSION(S)

In the present study, a significant improvement in the mouth opening at one week postoperatively as well as in terms of reduction in pain and oedema was noted with lag screw osteosynthesis group. Immediate postoperative occlusion was better with titanium lag screw osteosynthesis when compared to titanium 3D plates. Based on our study, authors conclude that both the osteosynthesis materials provide good interfragmentary stability in the management of anterior mandibular fractures and can be used satisfactorily for the fixation of mandibular fractures.

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