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Original Research Article

Comparative evaluation of biting force in 2mm locking plates with 2mm miniplates in the treatment of mandible fractures: A clinical study

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ABSTRACT

Aims and Objectives: 1. To compare efficacy of 2mm locking plates with 2mm miniplates in the fixation of mandible fractures and 2. To evaluate and compare the biomechanical function by measuring the bite force at 1st week, 3rd week, 6th week and 3rd month postoperatively in 20 patients divided equally into two study groups.

Materials and Methods: A prospective randomized study was carried out at Department of Oral and Maxillofacial Surgery, Meghna Institute of Dental Sciences, Nizamabad from 2019 to 2021 to treat consecutive mandibular fractures where patients were randomly divided into two groups each composed of 10 patients where Group A were treated with single 4 holed stainless-steel locking miniplates and Group B with two 4 holed stainless steel conventional mini plates both maintaining a gap of 2.0 mm system. Later assessment was done using bite force recording postoperatively at 1st week, 3rd week, 6th week and 3rd month and with the associated complications like Swelling, Infection, Paresthesia, Mobility between fracture fragments and Hardware failure.

Results: When the mean bite force values in right molar region of group A and group B were compared at 1st week, 3rd week, 6th week and 3rd month, there was statistically significant increase in bite force noted in group A when compared to group B at 1st week and 3rd week (P<0.05). But no statistically significant differences were observed at 6th week and 3rd month (P>0.05).

When the mean bite force values in the central incisor region of group A and group B were compared at 1st week, 3rd week, 6th week and 3rd month, there was statistically significant increase in bite force noted in group A compared to group B at 1st week and 3rd week (P<0.05). But no statistically significant differences were observed at 6th week and 3rd month (P>0.05).

When the mean bite force values in left molar region of group A and group B were compared at 1st week, 3rd week, 6th week and 3rd month, there was statistically significant increase in bite force noted in group A when compared group B at 3rd week (P<0.05). But no statistically significant differences were observed at 1st week, 6th week and 3rd month (P>0.05).

Conclusion: The study signifies that both the fixation systems were able to provide stability to fracture segments, but locking plate system has provided better stability when compared to miniplates system, hence recommending for more elaborative studies to arrive at definitive conclusion.

1. Introduction

In this era of increasing automobilization, industrialization and technology, the treatment of maxillofacial injuries has

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attained a prominent position, especially 0f mandibular fracturs which is considered as the second most common because of its eminence on the face.[1,2] Thus, the therapeutic goals in the management of mandibular fractures are to re-establish the anatomy, fracture stabilization and to restore the function with the least morbidity.[1] Subsequently, the advent of open Reduction and Internal Fixation (ORIF) has grown with the development of osteosynthesis plate by the British surgeon Sir William Lane over 100 years ago.

But then the idea was in advance of its times, because the technology for plates to be biocompatible and the problem of sepsis had first to be overcome which got unraveled with the invention and implementation of "Champy's principle otherwise "tension band principle" by Champy and Lodde in the early 1970s to the mandible in their mathematical, biomechanical and clinical studies.[3,4] Based on the observations he outlined the ideal lines of osteosynthesis, which are able to withstand a force of up to 600 to 1000 N/mm2 with the elastic limit of flexibility 700-800 N/mm2 and the rupture point of 950-1100N/mm2, which was substantially higher than the maximal masticatory force.[5]

However, the longstanding problem with miniplate osteosynthesis was loosening of one or more screws[6] and the plate must be adapted meticulously to the contours of the bone as any errors in fixation may result in permanent malocclusion.[5] To overcome this problem and at the same time to retain the advantages of Champy's conventional miniplates, the locking screw and locking plate system was introduced in maxillofacial region by Ralf Gultwald in 2003. This new design of Mini-locking plate provided locking of the screws on both the plate and bone interface, on either side of the fracture.[6] These plates function as internal fixators, achieving stability by locking the screw to the plate.[7] The locking mechanism is such that the hole in the bone plate is engineered to accept screws that locks to it by the thread under the head of the screw i.e., one thread will engage the bone and another will engage a threaded area of the bone plate.[8]

The main advantage of the locking plate over the conventional plate is that the locking plate does not require any precise adaptation of the plate to the underlying bone as the screws are tightened by the "lock" to the plate, thus stabilizing the segments without the need to compress the plate to the bone even under full functioning of the masticatory system.[2] But in the conventional plating system, without this intimate contact tightening of the screws will cause drawing of the bone segments towards the plate[6] resulting in alterations in the position of osseous segments and the occlusal relationship. The second advantage of locking plate/ screws system is that the screws are unlikely to loosen from the bone plate even if the screw is inserted into the fracture gap or a comminuted segment. Hence there is decreased incidence of inflammatory complications from loosening of the plate and screws.[8]

2. Materials and Methods

A prospective randomized study was carried out at Department of Oral and Maxillofacial Surgery, Meghna Institute of Dental Sciences, Nizamabad dated from 2019 – 2021 to treat consecutive mandibular fractures after a detailed case history, where it includes 20 patients meeting with the necessary criteria, divided equally into two groups. The Group A was treated with locking miniplates and Group B with conventional miniplates both composed of 4 holed 2mm stainless steel system. The written and verbal consent were taken from the patients approved by the institutional ethical committee.

2.1. Inclusion criteria

1. Isolated non-comminuted mandibular fractures excluding condyle and coronoid process.
2. No sex predilection.
3. Healthy individuals with no debilitating systemic diseases.
4. Patients who can be treated either intraorally or extra orally.
5. Under follow up at regular intervals for a period of 3 months.

2.2. Exclusion criteria

1. Infected fractures.
2. Completely or partially edentulous patients.
3. Medically compromised patients.
4. Patients with compromised periodontal health.

2.3. Materials used for plating

1. Mini stainless steel plating surgical kit (Figure 1)
2. 2.0mm stainless steel 4 holed with gap internal locking miniplates (Figure 2) & 2.0mm stainless steel 4 holed with gap conventional mini plates (Figure 3).

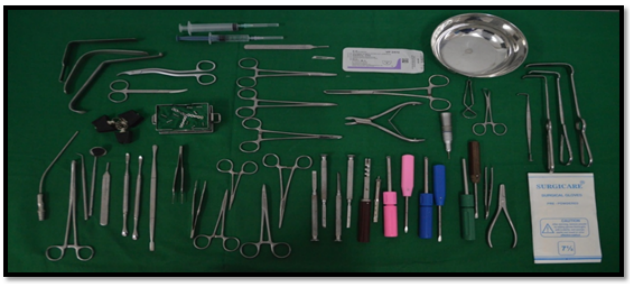

Fig. 1: Armamentarium

Fig. 2: Locking plate and screws

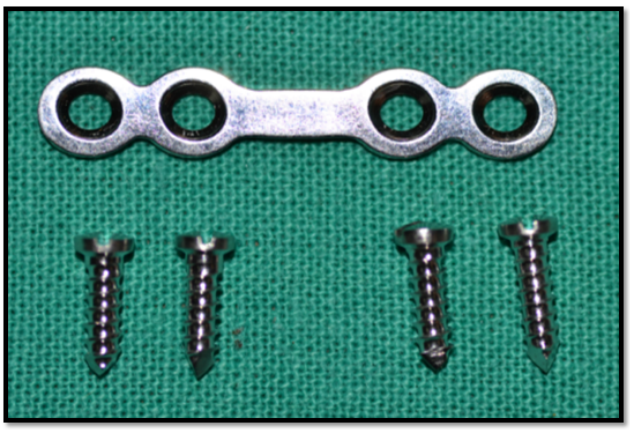

Fig. 3: Mini plate and screws

2.4. *Operating technique*

Patients were operated under strict asepsis using anesthesia (general / local) where the intraoral approach was used in majority of cases with sublabial or degloving incision, reflection of mucoperiosteal flap to expose the fractured segments. For the extraoral, either submental incision or submandibular incision was given, blunt dissection was performed and periosteum was incised to expose fractured segments and in very few patients fractured fragments were exposed dissecting through the existed extraoral lacerations. Then the anatomical reduction of fracture fragments was done followed by intermaxillary fixation with help of tie wires and bone plates were placed along the lines of osteosynthesis as described by Champy. Thereafter, bone plate intermaxillary fixation was done, occlusion was checked and soft tissue were closed in layers where intermaxillary fixation was placed for three weeks. (Figures 4, 5, 6 and 7).

2.5. *Bite Force Recording (Figures 8, 9, 10 and 11)*

An indigenous Bite Force Recorder calibrated to measure in bite force in Newtons was used, it consists of a state-of-the-art apparatus which was carefully selected

Fig. 4: Pre-operative OPG

Fig. 5: Post -operative OPG

Fig. 6: Exposure of the fracture site

Fig. 7: Rigid fixation with the locking plate

and individually crafted using technical expertise when required. The actual device was developed in conjunction with the superior technical knowledge at Techniq Design Group – Secunderabad.

Fig. 8: Bite force recorder

It consisted of following components:

1. Metallic fork and sensor
2. Microcontroller based electronic instrument
3. Batteries for amplifier and wheat stone bridge
4. Instant standardization device

While recording the subject was instructed to sit with the head upright, looking forward and in an unsupported natural head position throughout the trial, to refrain from extraneous movements and to bite on the pads of bite force gauge to the maximum level as forcefully as possible and bite force values was recorded postoperatively at right molar, central incisor and left molar region.

The post-operative assessment of the patients was done under following parameters:

1. Bite force recording at 1st week, 3rd week, 6th week and 3rd month follow-up

Fig. 9: Bite force reording in central incisor region

Fig. 10: Biteforce reording in right molar region

2. Swelling - Present/Absent
3. Infection - Present/Absent
4. Paresthesia - Present/Absent.
5. Mobility between fracture fragments - Present/Absent
6. Hardware failure - Present/Absent.

3. Results

3.1. Age and sex distribution

Out of the 20 patients treated 19 were males and 01 was female) with a mean age of 31.90±8.21years in group A and 34.80±8.00 years in group B and the youngest was 22 years old and the eldest was 50 years old. (Table 1).

Fig. 11: Bite force reording in left molar region

Table 1: Comparison of mean age of group A and group B

Groups	n	Mean	SD	t-value	P-value
Group A	10	31.90	8.21	-0.8001	0.4341
Group B	10	34.80	8.00		

Table 2: Sex distribution in group A and group B

Sex	Group A	%	Group B	%	Total
Male	10	100.00	9	90.00	19
Female	0	0.00	1	10.00	1
Total	10	100.00	10	100.00	20

3.2. Location of the fracture

Out of 20 fractures, 03 patients had symphysis fracture, 10 patients had parasymphysis fracture in out of which again 06 were on the left side and 04 were on the right side, 02 patients had body fractures one on right and one on left side and 05 patients had angle fractures out of which 03 were on left side and 02 were on right side. (Table 3)

3.3. Postoperative complications

3.3.1. Patients treated using locking plates (Group-A)

All fractures appeared to be well reduced and stable with no major and much of minor complications except for the infection in 01(10%) patient developed at the site of wound which got resolved with drainage and on administration of antibiotics. (Table 4)

3.3.2. Patients treated using conventional miniplates (Group-B)

All fractures appeared to be well reduced and stable with no major and much of minor complications except for the infection in 02(20%) patient developed at the site of wound which got resolved with drainage and on administration of antibiotics. (Table 5)

3.4. Biting force

3.4.1. Central incisors

Group A: The mean bite force values at central incisor postoperatively at 1st week, 3rd week, 6th week and 3rd month are 86±5.44N, 123.80±5.98N, 147.10±5.93N and 282.60±13.87N respectively which showed that the central incisor bite force had increased significantly at the follow up visits. (Table 6)

Group B: The mean bite force values at central incisor postoperatively at 1st week, 3rd week, 6th week and 3rd month are 77.70±6.91N, 112.90±5.67N, 141.3±10.20N and 273.60±14.18N respectively which show that the incisor bite force had increased significantly at the follow up visits. (Table 7)

3.4.2. Comparison between group A and group B

An increased bite force was noted in group A when compared to group B, however it is statically significant at 1st week and 3rd week ($P<0.05$) but not at 6th week and 3rd month ($P>0.05$). (Table 8)

3.5. Right molar

Group A: The mean bite force values at right molar postoperatively at 1st week, 3rd week, 6th week and 3rd month are 195.90±19.05N, 286.30±16.21N, 363.40±12.25N and 658.50±5.64N respectively which showed that the right molar bite force had increased significantly at the follow up visits. (Table 9)

Group B: The mean bite force values at right molar postoperatively at 1st week, 3rd week, 6th week and 3rd month are 179.80±12.64N, 270.00±13.42N, 354.20±6.84N and 655.80±4.80N respectively which showed that the right molar bite force had increased significantly at the follow up visits. (Table 10)

3.5.1. Comparison between group A and group B

An increased bite force was noted in group A when compared to group B, however it is statically significant at 1st week and 3rd week ($P<0.05$) but not at 6th week and 3rd month ($P>0.05$). (Table 11)

3.6. Left molar

Group A: The mean bite force values at left molar region postoperatively at 1st week, 3rd week, 6th week and 3rd

Table 3: Distribution of location of fractures in group A and group B

Location of fracture	Group A	%	Group B	%	Total
Left angle	1	10.00	2	20.00	3
Left body	1	10.00	0	0.00	1
Left parasymphysis	4	40.00	2	20.00	6
Right angle	1	10.00	1	10.00	2
Right body	0	0.00	1	10.00	1
Right parasymphysis	2	20.00	2	20.00	4
Symphysis	1	10.00	2	20.00	3
Total	10	100.00	10	100.00	20

Table 4: Post- operative evaluation of patients treated with locking plates (Group A)

S.No	Type of fracture	Minor Complications			Major Complication
		Occlusion Achieved	Mobility of fragments	Infection/ oedema	Non-Union / Malunion and plate removal due to infection
1.	Left parasymphysis	Normal	A	A	A
2.	Left parasymphysis	Normal	A	A	A
3.	Right parasymphysis	Normal	A	A	A
4.	Right parasymphysis	Normal	A		A
5.	Left parasymphysis	Normal	A	A	A
6.	Symphysis	Normal	A	A	A
7.	Left body	Normal	A	A	A
8.	Left parasymphysis	Normal	A	A	A
9.	Left angle	Normal	A	A	A
10	Right angle	Normal	A	A	A

Table 5: Post-operative evaluation of patients treated with Miniplates (Group B)

S.No	Type of fracture	Minor Complications			Major Complication
		Occlusion Achieved	Mobility of fragments	Infection/ oedema	Non-Union / Malunion and plate removal due to infection
1.	Right angle	Normal	A	A	A
2.	Left angle	Normal	A	A	A
3.	Right body	Normal	A		A
4.	Left parasymphysis	Normal	A	A	A
5.	Right parasymphysis	Normal	A		A
6.	Right parasymphysis	Normal	A	A	A
7.	Symphysis	Normal	A		A
8.	Left angle	Normal	A	A	A
9.	Symphysis	Normal	A	A	A
10	Left parasymphysis	Normal	A		A

Table 6: Comparison of central incisor bite force (Newtons)at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd}month time intervals in group A by paired t test

Time intervals	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	86.00	5.44					
3rd week	123.80	5.98	-37.80	2.70	-43.95	-44.2753	0.00001*
1st week	86.00	5.44					
6th week	147.10	5.93	-61.10	4.46	-71.05	-43.3368	0.00001*
1st week	86.00	5.44					
3rd month	282.60	13.87	-196.60	11.81	-228.60	-52.6607	0.00001*
3rd week	123.80	5.98					
6th week	147.10	5.93	-23.30	3.83	-18.82	-19.2321	0.00001*
3rd week	123.80	5.98					
3rd month	282.60	13.87	-158.80	10.85	-128.27	-46.2808	0.00001*
6th week	147.10	5.93					
3rd month	282.60	13.87	-135.50	10.44	-92.11	-41.0522	0.00001*

Table 7: Comparison of central incisor bite force at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month time intervals in group B by paired t test.

Time intervals	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	77.7	6.91					
3rd week	112.90	5.67	-35.20	4.10	-45.30	-27.1215	0.00001*
1st week	77.70	6.91					
6th week	141.3	10.20	-63.60	4.38	-81.85	-45.9526	0.00001*
1st week	77.70	6.91					
3rd month	273.60	14.18	-195.90	9.23	-252.12	-67.1099	0.00001*
3rd week	112.90	5.67					
6th week	141.30	10.20	-28.40	5.80	-25.16	-15.4935	0.00001*
3rd week	112.90	5.67					
3rd month	273.60	14.18	-160.70	9.09	-142.34	-55.8884	0.00001*
6th week	141.30	10.20					
3rd month	273.60	14.18	-132.30	6.41	-93.63	-65.2411	0.00001*

Table 8: Comparison between group A and group B with central incisor bite force at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month time intervals by t test

Variable	Groups	n	Mean	SD	t-value	P-value
1st week	Group A	10	86.00	5.44	2.9844	0.0079*
	Group B	10	77.70	6.91		
3rd week	Group A	10	123.80	5.98	4.1851	0.0006*
	Group B	10	112.90	5.67		
6th week	Group A	10	147.10	5.93	1.5544	0.1375
	Group B	10	141.30	10.20		
3rd month	Group A	10	282.60	13.87	1.4353	0.1684
	Group B	10	273.60	14.18		

Table 9: Comparison of right molar bite force (Newtons) at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month in group A by paired t test

Time intervals	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	195.90	19.05					
3rd week	286.30	16.21	-90.40	7.04	-46.15	-40.5908	0.00001*
1st week	195.90	19.05					
6th week	363.40	12.25	-167.50	12.45	-85.50	-42.5527	0.00001*
1st week	195.90	19.05					
3rd month	658.50	5.64	-462.60	15.36	-236.14	-95.2606	0.00001*
3rd week	286.30	16.21					
6th week	363.40	12.25	-77.10	12.39	-26.93	-19.6831	0.00001*
3rd week	286.30	16.21					
3rd month	658.50	5.64	-372.20	14.04	-130.00	-83.8436	0.00001*
6th week	363.40	12.25					
3rd month	658.50	5.64	-295.10	8.49	-81.21	109.9010	0.00001*

month are 174±20.70N, 281.50±11.82N, 360.10±8.03N and 658±5.38N respectively which showed that the left molar bite force had increased significantly at the follow up visits. (Table 12)

Group B: The mean bite force values at left molar region postoperatively at 1st week, 3rd week, 6th week and 3^{rd} month are 174.20±.20.70N 268.80±13.85N, 352.30±11.94N and 654.30±5.31N respectively which showed that the left molar bite force had increased significantly at the follow up visits. (Table 13)

3.6.1. Comparison between group A and group B

An increased bite force was noted in group A when compared to group B, however it is statically significant at 3rd week (P<0.05) but not at 1^{st} week, 6th week and 3rd month (P>0.05). (Table 14)

4. Discussion

The most potential advantage in locking plate / screws system is that they do not disrupt the underlying cortical bone perfusion[2,9] or the vascular supply of bone and

Table 10: Comparison of right molar bite force (Newtons) at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month in group B by paired t test

Time intervals	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	179.80	12.64					
3rd week	270.00	13.42	-90.20	5.81	-50.17	-49.1108	0.00001*
1st week	179.80	12.64					
6th week	354.20	6.84	-174.40	10.33	-97.00	-53.3878	0.00001*
1st week	179.80	12.64					
3rd month	655.80	4.80	-476.00	11.49	-264.74	-131.0147	0.00001*
3rd week	270.00	13.42					
6th week	354.20	6.84	-84.20	10.06	-31.19	-26.4564	0.00001*
3rd week	270.00	13.42					
3rd month	655.80	4.80	-385.80	12.83	-142.89	-95.0863	0.00001*
6th week	354.20	6.84					
3rd month	655.80	4.80	-301.60	8.26	-85.15	-115.432	0.00001*

Table 11: Comparison of right molar bite force (Newtons) at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month in group A by paired t test

Time intervals	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	195.90	19.05					
3rd week	286.30	16.21	-90.40	7.04	-46.15	-40.5908	0.00001*
1st week	195.90	19.05					
6th week	363.40	12.25	-167.50	12.45	-85.50	-42.5527	0.00001*
1st week	195.90	19.05					
3rd month	658.50	5.64	-462.60	15.36	-236.14	-95.2606	0.00001*
3rd week	286.30	16.21					
6th week	363.40	12.25	-77.10	12.39	-26.93	-19.6831	0.00001*
3rd week	286.30	16.21					
3rd month	658.50	5.64	-372.20	14.04	-130.00	-83.8436	0.00001*
6th week	363.40	12.25					
3rd month	658.50	5.64	-295.10	8.49	-81.21	109.9010	0.00001*

Table 12: Comparison of left molar bite force at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month time intervals in group A by paired t test

Time intervals	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	174.70	20.70					
3rd week	281.50	11.82	-106.80	19.78	-61.13	-17.0783	0.00001*
1st week	174.70	20.70					
6th week	360.10	8.03	-185.40	24.05	-106.12	-24.3807	0.00001*
1st week	174.70	20.70					
3rd month	658.70	5.38	-484.00	21.56	-277.05	-71.0027	0.00001*
3rd week	281.50	11.82					
6th week	360.10	8.03	-78.60	13.87	-27.92	-17.9255	0.00001*
3rd week	281.50	11.82					
3rd month	658.70	5.38	-377.20	11.35	-134.00	-105.0845	0.00001*
6th week	360.10	8.03					
3rd month	658.70	5.38	-298.60	9.17	-82.92	-102.9995	0.00001 *

Table 13: Comparison of left molar bite force at 1^{st} week, 3^{rd} week, 6^{th} week and 3^{rd} month time intervals in group B by paired t test

Time intervals	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
1st week	174.70	20.70					
3rd week	268.80	13.85	-94.10	17.35	-53.86	-17.1520	0.00001*
1st week	174.70	20.70					
6th week	352.30	11.94	-177.60	18.00	-101.66	-31.1990	0.00001*
1st week	174.70	20.70					
3rd month	654.30	5.31	-479.60	17.21	-274.53	-88.1126	0.00001*
3rd week	268.80	13.85					
6th week	352.30	11.94	-83.50	16.07	-31.06	-16.4302	0.00001*
3rd week	268.80	13.85					
3rd month	654.30	5.31	-385.50	11.60	-143.42	-105.1146	0.00001*
6th week	352.30	11.94					
3rd month	654.30	5.31	-302.00	11.61	-85.72	-82.2278	0.00001*

Table 14: Comparison between groups A and B withleft molar bite force at 1^{st} week, 3^{rd}week, 6^{th} week and 3^{rd} month time intervals by t test.

Variable	Groups	n	Mean	SD	t-value	P-value
1st week	Group A	10	174.70	20.70	0.0000	1.0000
	Group B	10	174.70	20.70		
3rd week	Group A	10	281.50	11.82	2.2063	0.0406*
	Group B	10	268.80	13.85		
6th week	Group A	10	360.10	8.03	1.7135	0.1038
	Group B	10	352.30	11.94		
3rd month	Group A	10	658.70	5.38	1.8408	0.0822
	Group B	10	654.30	5.31		

allows the periosteum to grow under the plates supporting fracture healing.[10] This avoids the cortical necrosis which is sometimes seen under the plates compressed against the bone.[2,8] After the introduction of the concept of biomechanical fixation, various studies were done to evaluate its functional efficiency by measuring the bite force regained at specific time intervals.

The most of the studies has used various regular electrical and mechanical instruments like transducers, strain gauges and spring-loaded appliances which were used in the medical field for measuring force and pressure. However, with the advancement in technologies made it possible to reduce the size of these electrical and mechanical instruments and made the measurement of force or pressure easier and more reliable without causing any harm to the patients and the bite recorder which we used in our study is one of such a kind.

The measuring of bite forces to evaluate treatment modalities became increasingly popular and it is also being applied for:

1. Measuring functional outcome after fracture reduction
2. Measuring bite forces and contact areas before and after distraction osteogenesis
3. Evaluating the functional outcome in denture wearers
4. Evaluating the functional outcome in implant retained prosthesis wearers
5. Measuring the level of comfort after periodontal surgeries.
6. As an aid to diagnose complicated orthodontic cases and thus plan further management.

However, the reasons for observed reduction in bite force may be due to pain, protective reflex mechanism known as “Muscle Splinting” that occurs following the fracture of bones, traumatic and surgical damage caused to the muscle during injury and surgery respectively and the most important contributing factor for the observed reduction in bite forces is neuromuscular adaptation.[11]

In the present study the mean age in group A is 31.90± 8.21 years and group B is 34.80±8.00 years. In group A all patients were males whereas in group B there were 19 males and 1 female. This variation could affect the mean bite force values as females have less biting force when compared to males as prop up by a study done by Jefrey et al. in 1992.[11]

In the present study when location of the fractures is considered, out of 20 fractures, 03 patients had symphysis fracture, 10 patients had parasymphysis fracture out of which 06 were on the left side and 04 were on the right side, 02 patients had body fractures one on right and one on left side and 05 patients had angle fractures out of which 03 were on left side and 02 were on right side. In group A there were single left and rightangle fractures each, 4 left parasymphysis and 2 right parasymphysis factures, one

right angle and one symphysis fractures. In group B there were 2 left angle and 1 right angle fractures, 2 left and 2 right parasymphysis fractures, 1 right body and 2 symphysis fractures.

While performing open reduction and internal fixation in group A, a 4 holed 2.0mm single locking plate with screws was used where as in group B, 2.0mm miniplate fixation was done according to Champy's lines of osteosynthesis. This is in congruence with study conducted by Tams et al (1997) which showed that one bone plate is sufficient for symphysis fractures, as well as in the treatment of mandibular body fractures.12 The present study achieved same fixation objectives by using single locking plate against two miniplates used for fixation of same type of fracture. A similar comparative study done by Gutwald et al. concluded that locking system showed a significantly higher stability in comparison to conventional miniplates. [7]

5. Conclusion

The observed gain in bite forces, when treated using locking plates do suggest a potential advantage of better stability with the locking plates over conventional plates in treating mandible fractures. But the present study comprised of only 20 patients. Hence, a more elaborate study on a greater number of patients is required to prove the biomechanical superiority of locking plates over conventional miniplates.

6. Source of Funding

None.

7. Conflict of Interest

None.

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