

## Assessment Of Mouth Opening After Release Of Maxillomandibular Fixation In Fracture Patients And The Effect Of Exercises Over Mouth Opening - A Prospective Study

Research Article

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### Abstract

**Introduction:** Maxillomandibular fixation is a fundamental component for managing facial trauma, reconstruction and orthognathic surgery. Open Reduction and Internal Fixation has overcome the disadvantages of prolonged intermaxillary fixation (IMF). On the contrary, shortening the period of IMF compromises the fracture union. However, severe masticatory pull, loosening of IMF while placement of screws and TMJ positioning can pave way for malocclusion post internal fixation. This poses a need for postoperative IMF.

**Aim:** This study aims to evaluate the mouth opening in patients who had undergone a maxillomandibular fixation post internal fixation treated in an institution in Kelambakkam.

**Materials And Methods:** An observational study was designed to evaluate the reduction of mouth opening after the release of IMF for patients treated at Chettinad Dental College and Research Institute. Patients treated at chettinad dental college and research institute from January 2014 - August 2021 based on their medical records which will include the general demographic details, type of fracture, method of fixation, period of immobilization and their maximal mouth opening at varying periods.

**Results:** This study reveals a reduction in the mouth opening after immobilization by maxillomandibular fixation following a facial trauma. There was increase in mouth opening after the patients were subjected to mouth opening exercises on a regular basis. Factors such as weight loss, oral hygiene, malocclusion after treatment and infection of the fracture site was also assessed.

**Discussion:** The amount of reduction in mouth opening seen in patients with fracture following maxillomandibular fixation varies depending on the severity of malocclusion and the period of immobilisation. An open reduction shows a better mouth opening than a closed reduction. Since immobilization is required even after ORIF, there can be reduction in mouth opening which can be rectified with mouth opening exercises.

**Conclusion:** In this study, we conclude that there is evidence of reduced mouth opening even after a shortened period of IMF and also the reduced interincisal mouth opening had drastically rectified to the pre-morbid state after administration of mouth opening exercises.

### Introduction

Fracture of the mandibular bone is the most common among facial bone fractures followed by midface fractures. The treatment objective is to reestablish the dental occlusion and masticatory function to pre-morbid state. Maxillomandibular fixation is a fundamental component and the mainstay in fracture management to ensure the interrelationship of dental occlusion. This can be brought about by various methods such as Arch bars, Ernst ligatures, bone supported devices including intermaxillary fixation

screws, hanger plates and inter-arch miniplates, and interdental wires in case of dentulous arch and gunning splint in cases of edentulism. Open Reduction and Internal Fixation has overcome the disadvantages of prolonged intermaxillary fixation (IMF) such as pain, poor oral hygiene, phonetic disturbance, loss of effective work time, weight loss, reduced masticatory efficiency, and reduced mouth opening [1-3]. On the contrary, shortening the period of IMF compromises the fracture union. However, severe masticatory pull, loosening of IMF while placement of screws and TMJ positioning can pave way for malocclusion post internal

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fixation. This poses a need for postoperative IMF. This study aims to evaluate the mouth opening in patients who had undergone a maxillomandibular fixation post internal fixation treated in an institution in Kelambakkam.

### Materials And Methods

Patients who reported to the Department of Oral and Maxillofacial Surgery, Chettinad Dental college and Research Institute during the period June 2017 - December 2021 after an alleged history of trauma were screened. Patients with head injuries and facial injuries other than the mandibular fractures or midface trauma were excluded from the study. Patient of either gender, aged 20 years or more, who are nonsmoker, nonalcoholic, and nonsubstance or intravenous drug abuser diagnosed with fracture with no infection at the fracture site and no systemic comorbidities were included in the study. Patients having fracture with no occlusal derangement and normal mouth opening or with previous history of limited mouth opening were excluded from the study.

Patients were treated with 1-3 weeks of maxillomandibular fixation after open reduction and internal fixation depending on the severity of malocclusion. They were also advised to refrain from strenuous physical activity during this period. Teeth in the fracture line were removed when indicated, and an antibiotic regimen was given preoperatively and for 3 days postoperatively. Weekly monitoring of the patients were done during the treatment period. On removal of the IMF, mouth opening was assessed on the day of removal of IMF, 1 week, 3 months and 6 months after removal. The values were recorded. Mouth opening exercises were done periodically and the rate of recovery was recorded.

### Results & Discussion

Demographic details, year of the injury, type of fracture, amount of mouth opening at the time of diagnosis, fixation method, surgical procedure, period of immobilization, mouth opening exercise and amount the mouth opening after one week, one month and three months after release of IMF were assessed in 75 maxillofacial trauma patients who were treated by ORIF followed by IMF. They were statistically analysed using SPSS software version

2.0 and conclusions were drawn.

75 patients who reported to the Department and diagnosed with maxillofacial trauma were assessed and their mean age was  $32 \pm 2$  years with 45% of the trauma reported during the year 2019. 56% of the patients were diagnosed with mandibular trauma, 29.33% with maxillary trauma and 28% with combined fractures. Open Reduction and Internal Fixation was done for all the patients followed by 1-2 weeks of immobilisation based on the severity of malocclusion post internal fixation.

Patients were found to have restricted interincisal mouth opening with a mean and standard deviation of  $24.1 \pm 2.1$  mm immediately after release of IMF. The patients were started with mouth opening exercises and the interincisal mouth opening was measured after 1 week, 1 month, 3 months and 6 months. The mean and standard deviation for the interincisal mouth opening in the periodic intervals were found to be  $36.8 \pm 2.91$ ,  $39.4 \pm 1.64$ ,  $42.7 \pm 1.67$  &  $45.67 \pm 4.3$  respectively (Tab 1, 2). The increase in mouth opening is contributed to the mouth opening exercises carried out on a regular basis. A comparison of the mouth opening after release of IMF among maxillary fractures, mandibular fractures and combined fractures was done using One-way ANOVA. There is no significant difference in mouth opening at any stage between the fracture types (Tab 3).

In closed reduction, the fracture heals in a process termed secondary bone union with callus formation [4]. Owing to the nature of the soft callus formed initially, protection is rendered in the form of bracing or internal fixation. Proper healing and ossification of callus is determined by adequate immobilization or else this leads to fibrous union [5]. In this study, early release and early mandibular movement was started which had an added advantage of enhanced vascular and lymphatic circulation in the tissues around the fracturesite, with this slight functional stress imposed upon the fracture site possibly accelerating consolidation. Other methods of shortening the IMF period is splinting of the lower jaw with an arch bar or acrylic splint or a period of soft diet [6].

According to Adeyemi Et Al [7] there might be betterment in restriction of mouth opening if the IMF could be shortened to a period of 2 weeks because there will be micromovement along

**Table 1: Correlation of Period of immobilization and Mouth opening.**

Variables correlated	Pearson's correlation coefficient (r)	Strength of correlation	P value	Significance
Period of immobilisation Vs Mouth opening at IMF release	-0.053	*	0.04	significant
Period of immobilization vs Mouth opening at 1 week	-0.095	*	0.03	significant

**Table 2: Correlation of Interincisal Mouth opening after a period of mouth opening exercise.**

Variables correlated	Pearson's correlation coefficient (r)	Strength of correlation	P value	Significance
Mouth opening exercise vs Mouth opening at 1 week	-0.213	*	0.03	significant
mouth opening exercise vs Mouth opening at 1 month	-0.154	*	0.02	significant
Mouth opening exercise Vs mouth opening at 3 months	-3.946	*	0.001	significant
Mouth opening exercise Vs mouth opening at 6 months	-2.01	*	0.054	significant

**Table 3: One-way ANOVA test to Correlate fracture type with mouth opening.**

Variable	Fracture type	Mean	SD	95% CI for Mean		F	P value
				Lower	Upper		
MouthOpening at time of diagnosis	Maxillary	23.38	3.75	21.12	25.65	1.19	0.31
	Mandibular	21.79	6.19	19.18	24.4		
	Combined	19.8	5.69	15.73	23.87		
Mouth opening at 1 week	Maxillary	28	3.79	25.71	30.29	1.34	0.27
	Mandibular	27.21	5.96	24.69	29.73		
	Combined	24.5	5.25	20.74	28.26		
Mouth opening at 1 month	Maxillary	35.92	3.75	33.66	38.19	2.37	0.1
	Mandibular	34.5	5.26	32.28	36.72		
	Combined	31.5	5.23	27.76	35.24		

the fracture line. This is justified because the most critical period of fracture healing is during first 2 weeks during which inflammation and revascularization occurs [8]. So there are studies which could justify that conventional method of 4-6 weeks [10] can be modified and it can be added with mouth exercises after a certain period of fixation.

Weight loss of 26.3% is observed in 93.7% of patients since they all consume only liquid or semisolid food till the release of IMF. Oral hygiene maintenance for patients were difficult and therefore periodic irrigation was done in order to maintain oral hygiene. There was no reported case of significant malocclusion after treatment of fractures however in contrast Al-belasy [9] reported a 13.3% of malocclusion in his study. The presence of postsurgical malocclusion depends on the number of fractures, degree of displacement, the time of mobilization and the reduction that can be achieved. The reason that there is no significant malocclusion in this study might be due to factors such as age, patients who are nonsmoker, nonalcoholic, and nonsubstance or intravenous drug abuser, patients with no systemic comorbidities or infection. Also, there was no reported case of infection after commencement of treatment. This could be due to the administration of intravenous antibiotics post surgery followed by oral antibiotics for 1 week. Tab. Augmentin 625mg and Tab. Flagyl 400mg are the antibiotics that are given. This is similar to the study of Adeymi Et Al but this is in contrast to a report from a similar study by Al-belasy, who reported 2 patients with infection.

## Conclusion

In this study, we conclude that there is evidence of reduced mouth opening even after a shortened period of IMF and also

the reduced interincisal mouth opening had drastically rectified to the preorbital state after administration of mouth opening exercises. This signifies that these exercises play a significant role in the recovery to preorbital state which in turn improves the quality of life.

## References

- [1]. Wood GD. Assessment of function following fracture of the mandible. *Br Dent J.* 1980 Sep 2;149(5):137-41. PubMed PMID: 6932890.
- [2]. Kahnberg KE. Conservative treatment of uncomplicated mandibular fractures. *Swed Dent J.* 1981;5(1):15-20. PubMed PMID: 6943731.
- [3]. Cawood JI. Small plate osteosynthesis of mandibular fractures. *Br J Oral Maxillofac Surg.* 1985 Apr;23(2):77-91. PubMed PMID: 3158338.
- [4]. Luyk NH: Principles of management of fractures of the mandible, in Peterson IJ, Indresano AT, Marciani RD, Roser SM (eds): Principles of Oral and Maxillofacial Surgery (2nd ed). Philadelphia, PA, Lippincott-Raven, 1997, pp 424
- [5]. Haug RH, Schwimmer A. Fibrous union of the mandible: a review of 27 patients. *J Oral Maxillofac Surg.* 1994 Aug;52(8):832-9. PubMed PMID: 8040737.
- [6]. deAmaratunga NA. Mouth opening after release of maxillomandibular fixation in fracture patients. *J Oral Maxillofac Surg.* 1987 May;45(5):383-5. PubMed PMID: 3471923.
- [7]. Adeymi MF, Adeymo WL, Ogunlewe MO, Ladeinde AL. Is healing outcome of 2 weeks intermaxillary fixation different from that of 4 to 6 weeks intermaxillary fixation in the treatment of mandibular fractures? *J Oral Maxillofac Surg.* 2012 Aug;70(8):1896-902. PubMed PMID: 22793957.
- [8]. Kalfas IH. Principles of bone healing. *Neurosurg Focus.* 2001 Apr 15;10(4):E1. PubMed PMID: 16732625.
- [9]. Al-Belasy FA. A short period of maxillomandibular fixation for treatment of fractures of the mandibular tooth-bearing area. *J Oral Maxillofac Surg.* 2005 Jul;63(7):953-6. PubMed PMID: 16003621.
- [10]. Ueki K, Marukawa K, Hashiba Y, Nakagawa K, Degerliyurt K, Yamamoto E. Assessment of the relationship between the recovery of maximum mandibular opening and the maxillomandibular fixation period after orthognathic surgery. *J Oral Maxillofac Surg.* 2008 Mar;66(3):486-91. PubMed PMID: 18280381.