Weight Changes (in kg) in Mandible Fracture Patients After IMF: A Prospective Study

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Abstract

Background: This prospective study is done to assess weight loss due to maxillomandibular fixation (MMF) in patients who have undergone treatment for maxillofacial fractures. This fixation method is a closed reduction technique that can interfere with normal nutrition intake of solid and semisolid foods and thus can result in weight loss and malnutrition. Therefore, in this study we explain the degree and pattern of weight loss in patients treated with MMF.

Materials and Methods: We treated 300 patients for 4 to 6 weeks of MMF. We measured and compared the weight before and after MMF.

Results: The loss of weight was statistically significant (P < .001) with MMF treatment.

Conclusion: MMF caused mild to moderate malnutrition in some cases so protein diet was recommended to such patients post treatment.

Keywords

Weight loss, maxillomandibular fixation, mandibular fractures

Introduction

Maxillofacial fractures are caused by road traffic accidents, fall from height, interpersonal fights, and injuries during games.1-3 Mandible fractures can be treated by two methods. An incision is given to expose the fracture site in open reduction techniques and fractured segments are immobilized using screws and plates. The maxillomandibular fixation (MMF) is done in the closed method of reduction4-5. Although MMF can lead to malunion, non-union, and periodontitis, still it is a common method of treatment.5 The period of MMF is 3 to 6 weeks.6,7 During the period of MMF, the intake of food is decreased affecting the healing process of the body.8 Advantages of MMF are that it is inexpensive and not technique-sensitive. But MMF is not risk-free as patients may vomit during MMF period. Patients with MMF may lose weight.5,6,14 Those with respiratory disorders such as asthma have been shown to have deterioration in their respiratory function. Patients also dislike MMF. They have difficulty in maintaining normal diet and oral hygiene.4,7 There are possible temporomandibular joint sequelae, muscular atrophy and stiffness, denervation of muscles due to alterations in fiber types, irreversible loss of bite force, weight loss, and risk of inflicting injuries to operators manipulating wires.8-11

Methods and Materials

This prospective study was performed in Oral and Maxillofacial Surgery (OMFS) Department, Indira Gandhi Government Dental College (IGGDC), Jammu. We treated

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300 patients of mandibular fractures. Among these patients, 270 patients were males and 30 females, age ranging from 15 to 50 years. The pre-operative weight ranged from 45 to 89 kilogram (kg). All patients were treated with MMF for 5 to 6 weeks. Weight of the patients was noted pre-operatively, first week post-operatively, and fifth week post-operatively. The net weight loss observed was 5.5 kg at the end of the first week post-operatively and 5 kg in the fifth week post-operatively when compared with their weights before MMF. Within the limitations of this study, significant weight loss was observed at the first week post-operatively among all patients. At the release of MMF, the weight measurements were done again.

Results

Among 300 patients with only mandibular fracture included in the study, 6 patients reported mild malnutrition. Comparison of pre-operative, first week post-operative, and fifth week post-operative weights is shown in Table 1 and Figure 1. The net loss of weight observed was 5.5 kg at first week post-operatively and 5.0 kg at fourth week post-operatively when compared with their weights before surgery. Table 1 shows comparison of weights in terms of {Mean (SD)} at different time intervals using repeated measures ANOVA test. The pre-operative mean weight was 68.87 kg, post-operative 1 week mean weight was 64.29 kg, and post-operative 5 week mean weight was 65.25 kg.

| Time Intervals     | N   | Mean   | Std Deviation | Wilk's Lambda Value | P Value |
|--------------------|-----|--------|---------------|---------------------|---------|
| Pre-operative      | 300 | 68.87  | 11.250        |                     |         |
| Post-operative 1 week | 300 | 64.29  | 11.294        | 11537.487           | <.01**  |
| Post-operative 5 week | 300 | 65.25  | 11.286        |                     |         |

Note: **p < .01, highly significant.

Table 2. Bonferroni’s Post Hoc Analysis

|          | Pre-Operative | Post-Operative 1 Week | Post-Operative 5 Week |
|----------|---------------|-----------------------|-----------------------|
| Pre-Operative | --           | <.01**                | <.01**                |
| Post-Operative 1 Week | <.01**         | --                    | <.01**                |
| Post-Operative 5 Week | <.01**         | <.01**                | --                    |

Discussion

Treatment like MMF decrease patients’ ability to eat during the early days or first 24 to 48 hours but after that they are able to resume a normal liquid diet. Patients with fractured mandible find it difficult to take normal diet for 6 to 8 weeks. Surgery and anesthesia disrupt the metabolic steady state initiating a catabolic process which is intensified by periods of limited nutritional intake. A normal adult requires 1800 to 2000 calories per day. Some studies have demonstrated how MMF reduces body weight and other indexes like BMI. Muscle is catabolized for glucose production (gluconeogenesis) early in this phase, with additional protein breakdown from the metabolically active tissues that have been wounded surgically.

In this study, the net loss of weight was 5.5 kg at first week post-operatively due to decrease in carbohydrate and protein intake. All patients in this study had mandibular fractures and were treated with MMF alone. Patients had difficulty in maintaining nutrition intake during the first week post-operatively but soon adjusted to liquid diet after one week.

In this study, only weight of the patient was noted irrespective of their nutritional diet, socioeconomic status, healing, and post-operative complications. The overall weight loss in this study is 5 kg which is in comparison with the study done by Worrall in which total weight loss was 4.6 kg. Further, more patient started to gain weight by the fourth post-operative week. In other similar studies, no significant weight loss was observed after 4 to 6 weeks of intermaxillary fixation (IMF). Another study in which IMF was used to control obesity also showed that prolonged use of IMF had no significant effect on the weight of the patient.

The weight of patients were calculated and analyzed for results using Bonferronis Post Hoc Analysis (Table 2). Similar studies confirmed our results of average loss of 5.4 Kg., but Ellis observed 4.5 kg loss in weight of patient during 6 weeks of treatment, and Luhr et al confirmed weight loss of 4.1 kg after 3.5 weeks. In another study of 2004, MMF
done in obesity showed an average weight of 7.4 kg. The loss of weight in this study was less compared to other such studies. A weight loss of more than 10% of the body weight is a sign of malnutrition. Because weight loss did not reach 10% in this study, like most of the studies, we can assume that treatment with MMF for 5 to 6 weeks did not result in malnutrition as patients adapted to liquid diet after a brief period of a few days.

Conclusion

In conclusion, this study shows that the decrease in nutritional intake after MMF will result in mild malnutrition. So protein supplement should be added in liquid form as MMF restricts solid and semisolid diet.

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Declaration of Conflicting Interests

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References

1. Shahim F, Cameron P, McNeil J. Maxillofacial trauma in major trauma patients. Aust Dent J. 2006;51:225-230. doi:10.1111/j.1834-7819.2006.tb00433.x.
2. Van den Bergh B, Karagozoglu KH, Heymans MW, Forouzanfar T. Aetiology and incidence of maxillofacial trauma in Amsterdam: a retrospective analysis of 579 patients. J Craniofac Surg. 2012;40:e165-e9. doi:10.1016/j.jcsm.2011.08.006.
3. Yazdani J, Taleshi KT, Motamedi MHK, Khorshidi R, Fekri S, Hajmohammadi S. Mandibular angle fractures: comparison of one miniplate vs. two miniplates. Trauma Mon. 2013;18(1):17. doi:10.5812/traumamon.9865.
4. Adeyemi MF, Adeyemo 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): 896-1902.
5. Marciani RD, Haley JV, Kohn MW. Patient compliance—a factor in facial trauma repair. Oral Surg Oral Med Oral Pathol. 1990;70:428-430. doi:10.1016/0030-4220(90)90203-5.
6. Cohen SR, Leonard DK, Markowitz BL, Manson PN. Acrylic splints for dental alignment in complex facial injuries. Ann Plast Surg. 1993;31:406-412. doi:10.1097/00000637-199311000-00004.
7. Eckelt U, Schneider M, Erasmus F, et al. Open versus closed treatment of fractures of the mandibular condylar process: a prospective randomized multi-centre study. J Craniofac Surg. 2006;17:309-314. doi:10.1016/j.joms.2006.03.003.
8. Marsh DR, Li G. The biology of fracture healing: optimising outcome. Br Med Bull. 1999;55:856-869. doi:10.1258/0071429991902673.
9. Kanno T, Sukegawa S, Tatsumi H, et al. The retromandibular transartotic approach for reduction and rigid internal fixation using two locking miniplates in mandibular condylar neck fractures. Int J Oral Maxillofac Surg. 2014 Feb;43(2):177-184.
10. Thor A, Andersson L. Interdental wiring in jaw fractures: effects on teeth and surrounding tissues after a one year follow up. Br J Oral Maxillofac Surg. 2001;39(5):398-401.
11. Choi KY, Yang JD, Chung HY, Cho BC. Current concepts in the mandibular condyle fracture management: part I. Overview of condylar fracture. Arch Plast Surg. 2012 Jul;39(4):291-300.
12. Champy M, Lodde JP, Schmitt R, Jaeger JH, Muster D. Mandibular osteosynthesis by miniature screwed plates via a buccal approach. J Maxillofac Surg. 1978;6(1):14-21.
13. Shephard BC, Townsend GC, Goss AN. The oral effects of prolonged intermaxillary fixation by interdental eyelet wiring. Int J Oral Surg. 1982;11(5):292-298.
14. Worrall S. Changes in weight and body composition after orthognathic surgery and jaw fractures: a comparison of miniplates and intermaxillary fixation. Br J Oral Maxillofac Surg. 1994;32:289-292. doi:10.1016/0266-4356(94)90048-5.
15. Blackburn GL. Effect of degree of weight loss on health benefits. Obes Res. 1995;3:211-216.
16. Garro JS, Gardiner GT. Maintenance of weight loss in obese patients after jaw wiring. Br Med J. 1981;282(6267):858-860.
17. Cannell H. Enforced intermaxillary fixation (IMF) as a treatment of obesity. Obes Surg. 1992 Aug;2(3):225-230.
18. Vaiati R, Ibrahim D, Abreu M, et al. The treatment of condylar fractures: to open or not to open? A critical review of this controversy. Int J Med Sci. 2008;5(6):313. doi:10.7150/ijms.5.313.
19. Ellis E III, Price C. Treatment protocol for fractures of the atrophic mandible. J Oral Maxillofac Surg. 2000;58(3):421-435. doi:10.1016/j.joms.2007.08.042.
20. Luhr H-G, Reidick T, Merten H-A. Results of treatment of fractures of the atrophic edentulous mandible by compression plating: a retrospective evaluation of 84 consecutive cases. J Oral Maxillofac Surg. 1996;54:230-254. doi:10.1016/S0278-2391(96)90733-8.
21. Ellis E III, Muniz O, Anand K. Treatment considerations for comminuted mandibular fractures. J Oral Maxillofac Surg. 2003;61:861-870. doi:10.1016/S0278-2391(03)00249-0.
22. Alpers DH. Manual of nutritional therapeutics. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008:274-75.