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Assessment of Changes in Paraclinical Indexes Due to Intermaxillary Fixation: A Prospective Clinical Study.

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ABSTRACT

Background: One of the treatment modalities of mandibular and midface fracture is closed reduction with the use of intermaxillary fixation (IMF), in which the fractured segments are immobilized adjacent to each other and this procedure results in the reunion of the separated segments. It has been shown that there is a direct relation between nutrition and the healing process of the body therefore treatment with IMF could possibly affect the healing process. In this study, we evaluated the effects of IMF on paraclinical factors like protein profile and lipid profile which are markers for malnutrition condition, so further thoughts can be given to prevent malnutrition by using different supplements. **Methods**: 30 Patients having mandibular fracture which needed closed treatment was selected for this study. All patients were treated with a 4 weeks period of IMF. Lipid profile factors [total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglyceride (TG)] and protein profile factors [hemoglobin (Hb), albumin (Alb)] were measured before the start of IMF and after the 4 weeks period of IMF. **Results**: there occur decrease in the level of Alb and the reduction was statistically significant. There occur slight increase in Hb level at the end of treatment however the result was statistically insignificant. also there occur decrease in the level of TC, HDL, LDL and TG after the treatment but the result was statistically insignificant. **Conclusion**: it was concluded that treatment with IMF can result in malnutrition conditions although not severe. so when close reduction techniques are used as the treatment plan in maxillofacial region, a supplemental nutrition planning is very thoughtful thing to do.

Keywords: Fracture, Intermaxillary fixation.

INTRODUCTION

Trauma is a major cause of admission to hospitals by oral and maxillofacial surgeons. Maxillofacial operations generally compromise the ability to eat or drink in the early postoperative period. Patients with compound or comminuted fractured jaws or who have undergone Orthognathic surgery are usually unable to take a normal diet for a period of 6-8 weeks. If healing is to proceed normally in these patients, it is important that all nutritional requirements be met throughout this period, otherwise, these patients may become nutritionally deficient, dehydrated and may develop unwanted complications.[1]

Mandible and midface fractures have high incidence in maxillofacial injuries and can be treated in two ways. The first treatment option includes open reduction techniques, which is carried out by surgical incisions and the fractured segments are fixed with different instruments like screws, plates and wires. The second option is closed reduction with the use of intermaxillary fixation (IMF), in which the fractured segments are immobilized adjacent to each other and this procedure results in the reunion of the separated segments The jaws are usually immobilized by eyelet wiring or arch bars aided by rubber bands or stainless steel wires for a period ranging between 4-6 weeks.[2]

Many studies have shown a direct relation between nutrition and the healing process of the body therefore, treatment with IMF could possibly affect the healing process.[3,4] Also some studies have demonstrated how IMF reduces body weight and other indexes like BMI.[5,6] IMF is even used as a technique to treat extreme obesity.[7]

Intermaxillary fixation compromises the nutritional status in the early postoperative period leading to loss of water, fat and protein. Individualized nutritional therapy which defines the optimal kilocalories and essential nutrients (carbohydrates, proteins, vitamins, minerals and water) need of the patient is necessary for warding off infection, enhancing healing, and promoting good health [8].

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Ideally, the weight of these patients's should be maintained by providing food in a form of liquid and semi-liquid nature and beverages that are calorically sound. Without adequate nutritional support the energy requirements of these patients are principally met by the breakdown of body protein with a consequent loss of lean body mass and an electrolyte imbalance.[9]

In this study, we evaluated the effects of IMF on paraclinical factors like protein profile and lipid profile which are markers for malnutrition condition, so further thoughts can be given to prevent malnutrition by using different supplements. Because nutrition habits are different in every region and society, it is mandatory to evaluate the effects of close reduction on people in each region to find the best way to face it

MATERIALS AND METHODS

After obtaining the ethical clearance from institutional ethical committee a randomized prospective study was done on 30 patients who reported to the post graduate department of oral and maxillofacial surgery, government dental college and hospital Srinagar with mandibular fractures. All patients were treated and observed by the same surgeon. The patients selected for the study were requested to sign consent form if conscious and adult or by his/her attendant/guardian if minor.

- Patients gender, age, etiology, location of fracture site was recorded on case proforma sheets

Inclusion criteria

- Age 15-60
- BMI 18-30
- Patients needing closed reduction for mandibular fracture treatment.

Exclusion criteria

- Patients needing surgery.
- Medically compromised
- Edentulous patients were IMF cannot be done

Methodology

- 30 Patients having mandibular fracture which needed closed treatment was selected for this study.
- All patients was treated with a 4 weeks period of IMF
- Blood sample was obtained from all patients before treatment and lipid profile factors [total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglyceride (TG)] and protein profile factors [hemoglobin (Hb), albumin (Alb)] was measured.
- Then all patients were treated with a 4 weeks period of IMF.
- None of the patients receive any supplements during the treatment period.
- After 4 weeks, a blood sample was obtained again, and all the measurements were redone at same laboratory using same standardization which was used for measurement before IMF.

Statistical Methods

Statistical software SPSS (version 20.0) and Microsoft Excel (version 5.00) were used to carry out the statistical analysis of data. Data was analyzed by means of descriptive statistics viz, means and standard deviations. Paired t-test was employed to compare differences in various parameters before and after Intermaxillary fixation (IMF). Graphically the data was presented by bar diagram. A P-value of less than 0.05 was considered statistically significant

RESULTS

A total of 30 patients were included in the study. Of these patients 18 (60%) were male and 12 (40%) were female with an average age of 30 years.

For evaluating the protein profile, two indices were measured, albumin and hemoglobin. The average albumin level among the patients before the treatment was 4.36 ± .40 g/dl, however after the IMF for a period of 4 weeks the average albumin level reduces to 3.93 ± 0.32 g/dl, the result was statistically significant ($p < 0.001$) [Table 1 and Graph 1]

The mean hemoglobin level before the treatment was 14.37 ± 1.61 mg/dl which increased up to 14.40 ± 1.69 mg/dl at the end of IMF. However the difference was statistically insignificant ($P > 0.852$) [Table 1 and Graph 1]

The mean total cholesterol level before the treatment was 157.53 ± 27.76 mg/dl which reduces upto 154.53 ± 28.27 mg/dl at the end of treatment. The difference was however statistically insignificant ($P > 0.112$) [table 1 and graph 1].

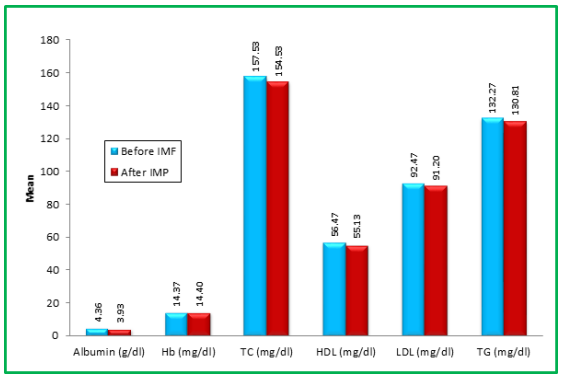
The mean HDL of the serum of the patients before treatment was 56.47 ± 8.46 mg/dl, however after the period of 4 weeks of IMF it decreases to the mean level of 55.13 ± 7.58 mg/dl, the result was however statistically insignificant ($P > 0.071$). [Table 1 and Graph 1]

The mean LDL level of patients before the treatment was 92.47 ± 12.63 mg/dl. After the IMF period of 4 weeks it reaches to the mean level of 91.20 ± 12.02 mg/dl. However the decrease in the level of LDL before and after the treatment was statistically insignificant ($P > 0.101$). [Table 1 and Graph 1]

The triglycerides (TG) mean level before the treatment was 132.27 ± 13.60 mg/dl. The TG mean level decreases up to 130.81 ± 12.75 mg/dl after the treatment of IMF for 4 weeks, however the result was statistically insignificant ($P > 0.058$) [Table 1 and Graph 1]

Table 1: The mean of this study's measurment.

Parameter	Before IMF		After IMP		P-Value
	Mean	SD	Mean	SD	
Albumin (g/dl)	4.36	0.40	3.93	0.32	<0.001*
Hb (mg/dl)	14.37	1.61	14.40	1.69	0.852
TC (mg/dl)	157.53	27.76	154.53	28.27	0.112
HDL (mg/dl)	56.47	8.46	55.13	7.58	0.071
LDL (mg/dl)	92.47	12.63	91.20	12.02	0.101
TG (mg/dl)	132.27	13.60	130.81	12.75	0.058



DISCUSSION

Maxillofacial injuries commonly occur due to motor vehicle accidents, falls; insults and sport accidents.[12,13] Mandible and midface fractures have high incidence in maxillofacial injuries and can be treated in two ways. The first treatment option includes open reduction techniques, which is carried out by surgical incisions and the fractured segments are fixed with different instruments like screws, plates and wires. The second option is closed reduction with the use of intermaxillary fixation (IMF), in which the fractured segments are immobilized adjacent to each other and this procedure results in the reunion of the separated segments.[14] The use of miniplates and rigid fixation in the management of fractured mandibles had negated or obviated the use of intermaxillary fixation as an absolute method of immobilization in many countries. However, despite the wide use of miniplates, intermaxillary fixation is still used as the sole and only method of immobilization in many parts of the world.[1]

In this study we have investigated the serum levels of cholesterol, triglycerides, HDL, LDL, albumin and hemoglobin before and after the IMF for a period of 4 weeks.

Our study was comprised of 30 patients between the age group of 15 to 60 years. Mean age of subjects were 30 years, which corresponds with the study of Yazdani et al,[10] and Elamin Nimir Elamin,[1] in which the mean age of subjects were 30 years.

In our study it was seen that the mean level of Alb, faced a reduction of 0.43 mg/dl during the IMF period and the reduction was statistically significant. Alb is a long term index for malnutrition, it has a half-life of 20 days, and so short term changes don't affect it. The IMF period in our study was 28 days, so Alb was a suitable index to show the patient's nutrition condition. There was a significant decrease in patients Alb level due to IMF although this reduction was not severe, but it showed the insufficient nourishment condition, which was not a surprise due to the occluded jaws and the inability to intake normal diet of the patients. This was in accordance with the study of Yazdani J, et al,[11] which also shows the same result. However our study was in contrast to Elamin Nimir which shows that there doesn't occur significant change in albumin level before and after IMF.[1]

Hb was the other protein index that was evaluated in this study, it was seen that there occurs increase in Hb level after the end of treatment; however the result was statistically insignificant. Yazdani J, et al,[11] in a similar study shows that there occurs increase in Hb level after the IMF. According to this study the increase in Hb level occurs because during the IMF period, the patient's mouth is occluded tightly so breathing through the mouth is greatly affected. Also according to studies of de Menezes VA et al,[15] and Souki BQ et al,[16] it was seen that 8-53% of population has mouth breathing, and it supplies up to 70% of the oxygenation in some cases. Because all of our patients have encountered trauma to their faces, their nasal breathing may be affected due to it. Hence, the affected mouth and nasal breathing would create some deal of hypoxia which the body increases by increase in the Hb level, like when it's seen in heavy smokers and mountain climbers.[17] Thus we can conclude that the increase in Hb is a physiologic reaction due to its role in oxygenation and not the nutrition condition.

Also in our study the lipid profile was evaluated in terms of total cholesterol (TC) level TG level, HDL, and LDL level. It was seen that there occurs decrease in the level of all four parameters of lipid profile however the result was statistically insignificant. This was in accordance with the study of Yazdani J, et al,[11] and Elamin Nimir which also shows the similar results.[1]

CONCLUSION

By evaluating patients' protein and lipid indexes it was concluded that treatment with IMF can result in malnutrition conditions although not severe. As we know, good nutrition is the key for better and faster recovery, so when close reduction techniques are used as the treatment plan in maxillofacial region, a supplemental nutrition planning is very thoughtful thing to do.

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