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ORIGINAL ARTICLE

Effect of treating Mid-Face fracture on nutritional status.

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ABSTRACT… Objective: To determine the effect of treating the midface fracture on nutrition status, assessed via serum albumin and weight loss. **Study Design:** Prospective Observational Cohort Research. **Setting:** Department of Oral and Maxillofacial Surgery, Allama Iqbal Medical College/Jinnah Hospital Lahore. **Period:** September 2022 to Feb 2023. **Methods:** The research comprised patients receiving open reduction and internal fixation for mid-face fractures. Preliminary weight and subsequent weight measurement taken were recorded three weeks later, and two months afterward for each subject throughout treatment. Initial weight and subsequent weight measurement taken were recorded during treatment for each study subject. Serum albumin was sampled during their first appointment and 1 month later. A final evaluation was conducted six weeks following the surgery. **Results:** A total of 60 patients undergoing open treatment for mid-face fractures aged over 12 years. The mean age of 28.47±9.520 years. There were 56(93.33%) males and 4(6.67%) female. Diagnosis of patients showed that there was a maximum of 30(50%) patients with fractures of both maxilla and zygomatic bone. The results of the study showed that the mean weight of the patients was 64.05±14.21 preoperatively. At 3 weeks mean weight was 61.44±13.76 while at 2 months mean weight was 62.31±13.99 kg. These results are following other studies. The results of the study showed that the mean albumin of the patients was 3.81±0.710 preoperatively with a minimum albumin level of 2.50 and a maximum of 5.50. At 1-month albumin level was 3.76±0.70, with a minimum level of 2.60 and a maximum of 5.50. **Conclusion:** Mid face fracture caused mild to moderate malnutrition in some cases so a protein diet was recommended to such patients post-treatment. Weight loss in the treatment of mandibular fractures is anticipated to be higher than in the treatment of midface fractures.

Key words: Albumin Level, Mid-Face Fracture, Nutritional Status, Weight Loss.

INTRODUCTION

A number of health indices' trajectories are influenced by nutrition, which is a primary predictor of health.[1] Nutritional status has a significant impact on the rehabilitation mechanisms of the body. Compared to individuals who are well-nourished, undernourished patients are more susceptible to infections and surgical problems. Therefore, a good nutritional state is linked to a speedy post-traumatic and post-operative recovery. Nutritional impairment results in the body losing fat and protein. Therefore, understanding the projected decline in nutritional status during the illness and its treatment is critical. This enables the practitioners to balance the body's calorie expenditure with proper nutritional assistance. There are various methods of nutritional status assessment, among these methods, weight loss and serum albumin tiers are also included.

When it comes to morbidity and mortality in the young population, trauma is the main reason for hospital admission.[2,3] Maxillofacial trauma increases the body's requirement for nutrients and energy, for optimal recovery. Depending on degree of trauma severity, and pre-trauma health, nutritional supplementation may be required.[4] The majority of patients with maxillofacial injuries require maxillo-mandibular fixation for treatment, which compromises nutritional intake.[5] Recent evidence-based recommendations, however, favour treating midface fractures with rigid and open treatment options, such as miniplate fixation. The length of maxillo-mandibular fixation

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is significantly shortened as a result. Therefore, it is anticipated that modern treatments for midface fractures would result in less weight loss and protein insufficiency than closed reduction.

Due to discomfort, edema, and maxilla-mandibular stabilization, it has been shown in prior research that mandibular fractures, are linked to a 5% loss in body weight during treatment.[6] The link between midface fractures and nutritional status was not described in any well-designed prospective study, according to a thorough literature search. Furthermore, no link between treating midface fractures and its effects on weight loss and serum albumin status was discovered. It is hypothesised that the findings of this study will aid medical professionals in treating and preventing nutritional deficits caused by trauma, hence enhancing patients' general health. This study's goals are to determine the relationship between weight loss during midface fracture rehabilitation and to spot patterns in laboratory result values over the course of midface fracture treatment.

Methods

The sample size was calculated by the WHO sample size calculator at a 95% confidence level, 0.04% assumed proportion=0.04 (assuming expected weight loss in midface fractures from the study of Brian J. Christensen et al), and the required sample size was 60. Where n=N*X/(X+N-1), X=Zα/22*p*(1-p)/MOE2, and Zα/2 is the critical value of Normal distribution at α/2 (e.g for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. Note that a finite population correction has been applied to the sample size formula.

Data Collection Procedure

All subjects fulfilling the inclusion criteria presented during the duration of the study period were enrolled in the study. After approval from the ethical committee (283/21/07/2022/SIERB) informed consent was taken. Fractures of the middle portion of the face were labeled as midface fractures. They include maxillary lefort as well as zygomatic bone fractures. Weight loss and values of serum albumin levels were measured to assess nutritional status. Patient enrolled in the study was weighed at their initial consultation, after 3 weeks, and after 2 months. Initial weight and each subsequent weight measurement taken were recorded for each subject during treatment for each study subject. Sampling for serum albumin was done at their initial consultation, after 1 a month. All data was collected on structured performances and analyzed on SPSS.

RESULTS

Total of 60 patients undergoing open treatment for mid-face fractures aged over 12 years. The mean age of 28.47±9.520 years. There were 56(93.33%) male and 4(6.67%) female patients as shown in Figure-1.

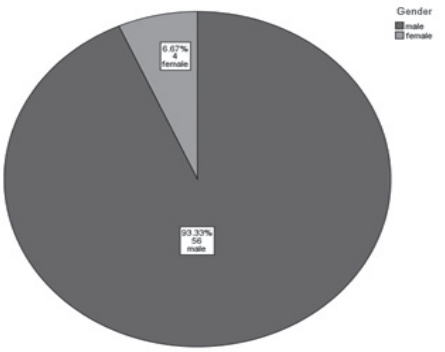

Figure-1. Gender of the patient

Diagnosis of patients showed that there were a maximum of 30(50%) patients with fracture of both maxilla and zygomatic bone, 14(23.33%) patients with maxillary bone fracture, and 8(13.33%) patients with zygomatic and fracture of both midface + mandible bones respectively as shown in Figure-2.

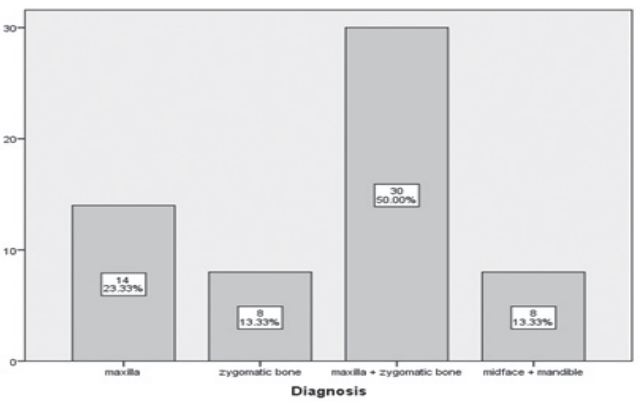

Figure-2. Diagnosis of midface fractures

The results of the study showed that the mean weight of the patients was 64.05±14.21 preoperatively with a minimum weight of 38 and a maximum weight of 106 kg. At 3 weeks mean weight was 61.44±13.76, the minimum weight was 34 and the maximum was 100. While 2 months mean weight was 62.31±13.99 kg with a minimum weight of 32 and a maximum weight of 99 kg.

The results of the study showed that the mean albumin of the patients was 3.81±0.710 preoperatively with a minimum albumin level of 2.50 and a maximum of 5.50. At 1-month albumin level was 3.76±0.70, with a minimum level of 2.60 and a maximum of 5.50.

Paired sample t-test was applied to calculate the mean weight in the study population preoperatively and at the end of 2 months. Preoperative weight was compared with weight at 2 months. The mean weight was 64.05 + 14.20 paired t-test was used to assess the mean difference and was statistically significant. (p=.000). Paired sample t-test was applied to calculate the mean serum albumin value. Preoperative albumin was compared with albumin at 1 month. The mean albumin level was 3.810 + .710 paired t-test was used to assess the mean difference and was statistically non-significant (p=.096) as shown in Table-I.

		Mean	SD	P Value
Pair 1	preoperative weight	64.05	14.21	.000
	weight at 2 months	62.31	13.99	
Pair 2	preoperative albumin	3.810	0.710	.096
	Albumin levels at 1 month	3.77	0.70	

Table-I. Mean Weight and albumin level of patient's pre and post-operatively

Data was stratified concerning gender, age, and type of fracture. The data showed that was a significant effect of age on the mean weight of patients pre-operatively at 3 weeks and 2 months, while age does not affect albumin level as shown in Table-II.

		Age (years)	Mean	S.D	P-Value
Weight	Pre-operative	< 35	61.32	14.09	.004
		35 - 55	73.92	9.83	
	at 3 week	< 35	58.74	13.58	.003
		35 - 55	71.19	9.65	
	at 2 months	< 35	58.38	15.86	.004
		35 - 55	72.19	9.85	
Albumin	Pre-operative	< 35	3.80	0.74	.838
		35 - 55	3.85	0.64	
	at 1 Month	< 35	3.77	0.73	.948
		35 - 55	3.76	0.59	

Table-II. Stratification of mean and albumin level with respect to Age

The data showed that was no effect of gender on the mean weight and albumin level of patients pre-operatively at 3 weeks and 2 months.

	Age	Mean	S.D	P-Value
Preoperative weight	male	64.34	14.16	.560
	female	60.00	16.47	
Weight at 3 week	male	61.74	13.64	.533
	female	57.250	17.02	
Weight at 2 months	male	61.58	15.80	.709
	female	58.50	17.41	
Preoperative albumin	male	3.85	0.71	.120
	female	3.28	0.62	
Albumin levels at 1 month	male	3.80	0.69	.109
	female	3.23	0.51	

Table-III. Stratification of mean weight and albumin level with respect to gender

The data showed that was no effect of type fracture on the mean weight and albumin level of patients pre-operatively at 3 weeks and 2 months.

DISCUSSION

Modern health models founded on scientific data that is supported by evidence-based research favour accurate preoperative health and nutritional status assessments of patients having surgery. The harmful consequences of uncontrollable weight loss and protein deficiency on wound healing have long been recognised.[7]

		Mean	S.D	P- Value
pre-operative weight	Maxilla	66.50	16.53	0.813
	zygomatic bone	60.75	12.96	
	maxilla + zygomatic bone	64.27	14.09	
	midface + mandible	62.25	13.22	
weight at 3 week	maxilla	64.00	16.17	0.829
	zygomatic bone	59.81	12.96	
	maxilla + zygomatic bone	61.42	13.68	
	midface + mandible	58.69	11.98	
weight at 2 months	maxilla	64.54	16.50	0.867
	zygomatic bone	60.63	12.98	
	maxilla + zygomatic bone	60.55	17.19	
	midface + mandible	59.69	13.09	
pre-operative albumin	maxilla	3.68	0.67	0.125
	zygomatic bone	4.35	0.72	
	maxilla + zygomatic bone	3.71	0.69	
	midface + mandible	3.86	0.68	
	Total	3.81	0.71	
Albumin levels at 1 month	maxilla	3.72	0.59	.070
	zygomatic bone	4.36	0.70	
	maxilla + zygomatic bone	3.64	0.67	
	midface + mandible	3.70	0.81	
	Total	3.77	0.70	

Table-IV. Stratification of mean weight and albumin level with respect to diagnosis

To ascertain if a specific person has nutritional imbalance linked to an underlying ailment or whether a person is likely to develop a harmful condition as a result of nutritional imbalance, nutritional status assessment is essential.[8] Protein scarcity can impede biological processes, that are involved in molecular and chemical processes of healing and bone production.[9] An adequate intake of both energy and protein is required to prevent malnutrition. Early control of nutrition may speed up the healing process since malnutrition can hinder and delay recovery.[10] Additionally, it was shown that if patients are unable to meet their nutritional needs, the costs of inadequate healing of wounds in undernourished patients far exceed the prices of oral nutritional supplements.[11,12]

The study comprised patients aged over 12 years who were receiving open treatment for mid-face fractures and whose nutrition status was assessed within the first week of hospital stay. However, participants who were unable to provide consent, had pathological fractures or gunshot wounds, were pregnant, had chronic illnesses that affected their nutritional condition, or were receiving closed treatment alternatives were not included in the study. Additionally, those who skipped a follow-up appointment or didn't have their weight recorded at the first visit were also not included.

A thorough preoperative and postoperative nutritional status assessment is therefore required. The pre-structured history, physical examination and laboratory results are only a few of the methods available to determine nutritional status. Information should be methodically acquired. A thorough nutritional evaluation based on all of the aforementioned elements is advised.[8] Because damage to the dental and osseous components of the jaws prevents proper oral intake, patients who experience facial injuries and seek treatment are thought to be at a higher risk of malnutrition. Additionally, the body's requirement for nutrients is increased by anaesthesia and surgical stress. The incidence of stress is also higher in patients with intermaxillary fixation. Patients may endure postoperative sequelae such as pain at the incision site, nausea, and discomfort, all of which cause them to eat less

frequently than usual. For six to eight weeks, it might be challenging for patients with broken mandibles to consume regular meals. The steady state of metabolism is disrupted by surgery and anaesthesia, starting a catabolic process that is accelerated by periods of low nutrient intake. The daily caloric needs of the average adult are 1800–2000. Several research have shown how MMF lowers body weight and other indices like BMI. In the early stages of this phase, muscle is broken down, with extra protein breakdown occurring from the surgically injured actively metabolising tissues.

There are two different perspectives on how to manage a patient's nutrition with facial trauma. One theory asserts that excessive levels of each nutrient are necessary to encourage healthy healing and stop weight loss. The other claims that a diet that is sufficient in all nutrients is acceptable. There are no clear recommendations available, and the opinions of each school's supporters range greatly.

However, studies rarely make an attempt to measure the influence of treatment of midface trauma on the human body's caloric state. The assessment of nutritional needs may be done using a variety of techniques. However, measures of body weight and blood albumin levels were utilised in our study. Losing weight is a common occurrence for persons with jaw fractures.[15] The patient's weight can be used to evaluate if they are under or overfed.[16] By examining the amounts of serum proteins including albumin and pre-albumin nutritional health can be determined. However, none of these tests are intended especially to detect malnutrition, and the outcomes can vary based on a number of factors. Low levels of serum albumin indicate protein insufficiency brought on by malnutrition and other illnesses that impact protein metabolism, such as liver damage and nephrological problems. A higher-than-normal serum albumin content may be a sign of dehydration.[17] Therefore, all individuals with pathologies causing malnutrition, including those with hepatic, renal, and other diseases, were excluded from the rese.

The Department of Oral and Maxillofacial Surgery at Allama Iqbal Medical College/Jinnah Hospital Lahore conducted this prospective observational cohort research. This study aims to determine the relationship between weight loss during midface fracture treatment. A total of 60 patients over the age of 12 receiving surgery for mid-face fractures. The average age was 28.47 + 9.520 years. There were 4 (6.67%) females and 56 (93.33%) men. These findings support earlier research.

The study's findings demonstrated that the patients' preoperative mean weight was 64.05±14.21. The average weight was 61.44±13.76 kg at 3 weeks and 62.31±13.99 kg at 2 months. This means that after three weeks of midface fracture treatment, a weight reduction of 2.61± 0.45 kg is anticipated. After two months, there was a trend towards weight gain, which was 0.87± 0.23 kg kg more than in the third week. However, a 1.74 ± 0.21 kg average weight decrease over the course of two months was seen in comparison to the pre-operative weight measurement. Maxillomandibular fixation caused an average weight loss of 3.8 and 6.0 per 1-1.5 months in maxillofacial trauma patients, respectively.[19] When treating a mandibular fracture, Christensen noted a weight reduction of 4.8 to 6.4 kg in comparison to our research.[18] This leads to the conclusion that weight loss in the treatment of mandibular fractures is anticipated to be higher than in the treatment of midface fractures. When compared to a group of patients receiving MMF without nutritional intervention, the body weight loss in patients with maxillofacial injuries who had an intermaxillary fixation with nutrition supplements was apparently less.[20] When compared to weight loss from midface fractures, the potential weight loss from ramus osteotomy is substantially higher at 7.5 kg.[21]

The study's findings revealed that preoperatively, the patients' mean albumin level was 3.81±0.710. The mean level of albumin was 3.76 ±0.70 after one month. Consequently, there is a 0.05–0.01 g/dl average drop in blood albumin levels. It is not statistically significant, though (p=.096).

Comparable results have been observed in other

studies. Based on earlier studies, the maximum weight reduction was between 4 and 5 percent of the baseline weight.[22] Another study showed that within 2 months, weight loss had peaked at 4.9% of the starting weight.[18] During the patient's six weeks of treatment, Ellis noted a weight decrease of 4.5 kg.[23] "Weight change" is a frequent and helpful sign to assess the patient's nutritional state.[24] Weight reduction of 3 to 7 kg has been seen in studies.[25] This is clinically relevant since it accounts for more than 5% of the body's total weight in a single month.[26] In comparison to standard MMF, rigid bone fixation dramatically improved the post-operative nutritional wellness of face trauma patients and lowered body weight loss.[28]

CONCLUSION

This study confirmed weight loss following midface fracture, however, there were no significant changes in serum albumin levels. Weight loss in the treatment of mandibular fractures is anticipated to be higher than in the treatment of midface fractures Treating midface fracture caused mild to moderate malnutrition in some cases so a protein diet and early rehabilitation of oral intake was recommended to such patients postoperatively. To fulfill this a personalized attention and diet plan of patients with midface fractures should be encouraged. A preoperative nutritional status assessment by the nutritionist should be done to prevent likely malnutrition.

LIMITATION

A detailed study with an increased sample size should be performed. Furthermore, the assessments used in this study offer an incomplete picture of nutrition at best. Hence, strong indicators of nutrition status should be used to assess the extent of the proposed resulting malnutrition.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Bisma Iftikhar	Conception and design of work, Acquisition, analysis or interpretation of data for work.	
2	Gulraiz Zulfiqar	Drafting of work, Revising it critically for intellectual content.	
3	Maham Azam	Drafting of work or revising ot critically for important intellectual content.	
4	Moiz Ahmad	Final approval of the version to be published.