Nutrition of Patients with Jaw Fracture and After Orthognatik Surgery, Review of the Literature

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Abstract

Nutritional deficiencies occurring during treatment process in patients with jaw fractures will have a negative impact as: reducing of immune indicators in the body, weakening of protective reactions, tendency to complications, and traumatic effects.

This article summarizes the content of scientific studies related to the nutritional status or nutrition of patients with fractures.

METHODS: Was conducted a systematic review of randomized controlled trials evaluating the nutritional status of patients with jaw fractures and post-orthodontic surgery during immobilization.

Results: Were identified twenty-seven studies. It is established that during the immobilization period the patient has changes of the trophic status, nutritional insufficiency (malnutrition), explained by weight loss and changes in anthropometric parameters, blood changes (hypoalbuminemia, decrease of hemoglobin of blood).

Oral nutritional supplements or alternative feeding methods improve nutritional status, as many studies have observed (weight and other anthropometric parameters, normalization of biochemical blood parameters,). In addition, according to some authors, decreased the number of complications and reduced the duration of hospitalization and expenditure. It is recommended that nutritional supplements be offered to malnourished patients during this period.

Keywords: Maxillofacial trauma; Mandibular fracture; Jaw fracture; Nutrition; Feeding; Diet; Nutritional assessment; Nutritional status; Intermaxillar fixation; Orthognatik surgery;

Introduction

According to domestic and foreign authors, with maxillofacial injuries, fractures of the lower jaw occur in 70-85% of cases [17,24,38,39]. A nutritional disorder, which inevitably occurs in patients with trauma of the maxillofacial region, has a negative impact on the outcome of treatment.

In surgical patients, the operative insult is followed by a period of catabolism, characterized by release of stress hormones and inflammatory mediators. It is thought that if these physiological processes are unchecked or exaggerated, they will exacerbate the acute inflammatory response and contribute to morbidity. The following operation, surgical patients are vulnerable to the development and consequences of malnutrition, because of the mechanical restrictions imposed by their operations, pain, nausea, and periods.

Intermaxillary Fixation (IMF) is one of the modalities used in the fixation of the mandible to the maxilla after fracture reduction of these bones or any surgery to correct their position as in orthognathic surgery. The Intermaxillary Fixation (IMF) compromises the normal oral intake which leads to a situation similar to starvation or fasting state. This method is a constant stress for the patient, as it complicates speech and chewing. The diet of patients with IMF is restricted on a semisolid and fluid diet which is often inadequate in energy content and in the range of nutrients and this type of diet will not compensate the proteolysis process which occurs in response to trauma. Reducing energy consumption causes weight loss in subsequent changes in the composition of the body and muscles [16,25,31]. In many countries, despite the limitations, intermaxillary fixation is considered an absolute method of immobilization [7]. Conversely, IMF has also been used in obese patients for treatment obesity and diet control, and in these cases, body weight loss ranged 5-6 kg/6 weeks [16,41].

However, patients who underwent orthognathic surgery also get bone trauma and IMF, as a rule, cannot eat properly for 6-8 weeks. It should be noted that during this period it is important to comply with all requirements for nutrition, otherwise, due to deficit of macro- and micronutrients, dehydration can develop unwanted complications [6,7].

Options to support oral nutrition or diet should meet the needs of patients, considering post-traumatic catabolism,
blocking the chewing function and lack of function of the gastrointestinal tract [5,17,21,24]. As observations show, on trauma of the face and jaws, especially penetrating to the oral cavity, the appetite decreases markedly, the taste is perversed, and the painfulness of the food intake procedure is quite natural. All this in the aggregate often causes the patients to refuse to eat or sharply limit themselves in eating [24]. With a prolonged lack of nutrition (with parenteral nutrition), it develops hypoxic damage to the mucosa of the gastrointestinal tract. These patients have intestinal insufficiency, as a rule, malabsorption develops due to a decrease in food intake, although it is during this period that the need for nutrients increases. Therefore, it can be said with certainty that patients with fractures in the maxillofacial area, undoubtedly, need temporary support of nutrition [2,9,14,21,24].

Poor nutrition, often unrecognized and untreated, causes muscular weakness, impaired immunity, and poor wound healing, and are associated with increasing in morbidity, and duration of hospitalization. In malnourished surgical patients, nutrition support improves nutrition status and clinical outcome.

The object of our review is to analyze the studies devoted to the nutritional features of patients with jaw fractures.

Study Materials

As a result of studying the literature, were selected patients with intermaxillary fixation. This also applies to patients after orthognathic surgery, because general and local features are similar to those in patients with jaw fractures in which immobilization lasts for a month. The articles were identified using the computerized search engine PubMed, Elsevier, Cochrane Central, Google scholar, Google search, Research Gate, Ebsco Host, dissercat.com, medical-diss.com and other possible sites with keywords: maxillofacial trauma, mandibular fracture, jaw fracture, intermaxillary fixation, orthognathic surgery and nutrition, feeding, diet, nutritional assessment, nutritional status, and in various combinations of these words in Russian and English. The relevant bibliographic lists were also taken into account. Were selected randomized controlled trials, meta-analyses, and prospective clinical trials, on the basis of their significance.

Results and Discussion

Has been analyzed the work on the evaluation of malnutrition in the treatment of MFR trauma. The review identified 31 studies that highlight either nutritional status or the effectiveness of oral nutrient use in patients with jaw injuries. In the studies analyzed in this review, the nutritional status or effect of oral nutrients was assessed in patients with jaw fractures and in patients after orthognathic surgery (Table). In studies used the same or similar definitions to assess the nutritional status and risk for nutrition, but the inclusion criteria were different. 17 studies in this review, the nutritional status or effect of oral nutrients were measured: body weight, serum markers (albumin Alb, hemoglobin Hb, C-reactive protein CRP), grip strength and body composition parameters (triceps skin fold thickness, mid-arm muscle circumference, body fat, subcutaneous fat, skeletal muscle) in the aggregate often causes the patients to refuse to eat or sharply limit themselves in eating [24].

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Patients</th>
<th>Food</th>
<th>Method of research</th>
<th>Type of received Information</th>
<th>Country where the study was carried out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keisuke Kondo, Norio Horie, et al.</td>
<td>2017</td>
<td>Total 50 patients with mandibular fracture: 25 study groups, 25 patients who were treated by IMF with nutrition support teams (NSTs) intervention (Liquid nutrition), who were used as the primary study group, and 25 patients treated without NST intervention</td>
<td>were measured: body weight, serum markers (albumin Alb, hemoglobin Hb, C-reactive protein CRP), grip strength and body composition parameters (triceps skin fold thickness, mid-arm muscle circumference, body fat, subcutaneous fat, skeletal muscle)</td>
<td>Article</td>
<td>Japan</td>
<td></td>
</tr>
<tr>
<td>Christiansen B.</td>
<td>2016</td>
<td>446 patients with jaw fracture</td>
<td>change in BMI</td>
<td>loss of body weight,</td>
<td>Article</td>
<td>USA, Louisiana</td>
</tr>
<tr>
<td>Ono S, Kihimaru M, et al.</td>
<td>2016</td>
<td>309 patients with an open fracture of the lower jaw</td>
<td>-</td>
<td>Effect of BMI on the incidence of complications, the duration of anesthesia, the duration of hospitalization, costs</td>
<td>abstract</td>
<td>Japan</td>
</tr>
<tr>
<td>Bobamuratova DT, Boymuradov ShA.</td>
<td>2016</td>
<td>46 patients with a jaw fracture</td>
<td>-</td>
<td>Was noted body weight loss, depending on the time of year</td>
<td>Article</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td>Yazdani J, Hajizadeh S, et al.</td>
<td>2015</td>
<td>60 patients with intermaxillary fixation</td>
<td>-</td>
<td>Anthropometric parameters: weight, BMI, skin - fat fold of the biceps, triceps, submental. region were determined with the help of caliperometer</td>
<td>Article</td>
<td>Iran</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Participants:</th>
<th>Intervention</th>
<th>Findings</th>
<th>Type</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malichly LA, Ivchenko AP, et al.</td>
<td>2015</td>
<td>48 patients of main gr. with a fracture of the lower jaw, 44 patients of control gr.</td>
<td>In the main gr. nutritional support with Nutri Drink</td>
<td>The loss of body weight; changes in anthropometric parameters: the circumference of shoulders and the thickness of skin fold on and triceps, the level of hemoglobin, total protein, albumin in the blood</td>
<td>Abstract</td>
<td>Russia</td>
</tr>
<tr>
<td>Sheet W, Hassouni MK</td>
<td>2012</td>
<td>25 traumatized patients and 7 obese patients</td>
<td>Comparison between the traumatized and obese patients</td>
<td>Body weight, 4 sites of skin fold thickness. Laboratory investigations included serum electrolytes Na+, K+, and serum albumin in levels</td>
<td>Article</td>
<td>Iraq</td>
</tr>
<tr>
<td>Kuvat SV, G ü ven E, et al.</td>
<td>2010</td>
<td>30 orthodontic patients</td>
<td>liquid + semi-liquid diet</td>
<td>using a body composition analyzer determined the change in body weight, fat mass, lean body mass, were determined signs of nutritional deficiency</td>
<td>Article</td>
<td>Turkey</td>
</tr>
<tr>
<td>Mekkawy MM, et al.</td>
<td>2010</td>
<td>60 patients with a jaw fracture</td>
<td>dietary recommendations, ration change in hemoglobin level; trends of complications, complaints, the intensity of pain</td>
<td>assessment of nutritional status using the questionnaire «Mini Nutritional assessment / BMI, »</td>
<td>Article</td>
<td>Egypt</td>
</tr>
<tr>
<td>Gaschbo J, et al.</td>
<td>2009</td>
<td>3 cases after orthognathic surgery</td>
<td>high-calorie, high-protein liquid</td>
<td>body weight, anthropometric parameters (BMI, shoulders circumference, skin-fat fold of triceps)</td>
<td>Article</td>
<td>Brazil</td>
</tr>
<tr>
<td>Tegza NV.</td>
<td>2008</td>
<td>69 patients with jaw fracture + 69 patients with inflammatory diseases of MFR</td>
<td>Soft nonchewy diet + patients with injuries - Nutrien OSteo, patients with inflammatory diseases of MFR - Nutrien Standard</td>
<td>anthropometric (BMI, PSZH0, OMP), biochemical (protein: general, albumen; nitrogen; lipids: cholesterol, carbohydrates: glucose, urine Na, Ca), leucocytes, erythrocytes; Economic effectiveness of treatment</td>
<td>dissertation Candidate of Medical sciences</td>
<td>Russia</td>
</tr>
<tr>
<td>Telnikh RY.</td>
<td>2008</td>
<td>100 patients with open traumatic fractures of the lower jaw: 40 patients with traditional scheme of managing; 60 patients + dietary supplements and immunostimulatory drug</td>
<td>Biologically active supplement: «Camosten» (micronutrients and essential amino acids), &quot;FluGone&quot; anti - inflammatory biochem. study. (Ca ++, alkaline phosphatase) in the blood; periods of incapacity for work</td>
<td>clinical (local complications), microbiological (dysbacteriosus), x-ray studies, timing of consolidation of fragments</td>
<td>dissertation Cand. Of Medical Sciences</td>
<td>Russia</td>
</tr>
<tr>
<td>Elamin N.</td>
<td>2006</td>
<td>30 patients with splints</td>
<td>- bioch. parameters (triglycerides, cholesterol, protein), K +, trends of complications and complaints of patients</td>
<td>loss of body weight;</td>
<td>dissertation of master degree</td>
<td>Sudan</td>
</tr>
<tr>
<td>El Khatib K, Gradell.</td>
<td>2005</td>
<td>111 patients with fracture of the lower jaw nutrition with a nasogastric tube, 81 patients - 30 patients - oral nutrition</td>
<td></td>
<td>the duration of hospitalization, costs, postoperative complications</td>
<td>Abstract</td>
<td></td>
</tr>
<tr>
<td>Reychter TE.</td>
<td>2002</td>
<td>134 patients with a jaw fracture (66 + 68)</td>
<td>optimization of the soft, nonchewy diet + calcium alginate bioch. indicators (protein, creatinine lipids, urea, Ca); timing of consolidation of fragments</td>
<td>evaluation of rations;</td>
<td>Article</td>
<td>Russia</td>
</tr>
</tbody>
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## Nutrition of Patients with Jaw Fracture and After Orthognatik Surgery, Review of the Literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
<th>Patients</th>
<th>Nutritional Status</th>
<th>Complications</th>
<th>Method</th>
<th>Parameters</th>
<th>Abstract Location</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manus R. et al.</td>
<td>2000</td>
<td>93 patients with a jaw fracture</td>
<td>Assessment of the nutritional status of alcoholics and those who consume illegal substances</td>
<td>correlation between alcohol and plasma aspartate aminotransferase, lactate dehydrogenase, ferritin level</td>
<td></td>
<td></td>
<td>Abstract</td>
<td>-</td>
</tr>
<tr>
<td>Worrall SF.</td>
<td>1994</td>
<td>22 patients: 18 - with a fracture of jaw, 4 - orthognatik surgery</td>
<td>-</td>
<td>Body weight, lean mass, total body water with the help of the determination of skin-fat fold; comparison of a group parameters of patients with intermaxillar fixation and fixation with mini-screws</td>
<td></td>
<td>abstract</td>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>Antila</td>
<td>1993</td>
<td>17 oral surgical patients with intermaxillary fixation</td>
<td>9 patients received nutritional counseling, 8 + oral supplementation</td>
<td>Body weight and anthropometric parameters, serum copper, iron, selenium and bromide concentrations</td>
<td></td>
<td>Abstract</td>
<td>Finland</td>
<td></td>
</tr>
<tr>
<td>Califano I, et al.</td>
<td>1992</td>
<td>12 patients with a trauma of MFR, 12 patients with a neoplasm of MFR</td>
<td>adequate enteral nutrition</td>
<td>anamnesis; nitrogen balance; water-electrolyte balance; immune parameters</td>
<td></td>
<td>Abstract</td>
<td>Italy</td>
<td></td>
</tr>
<tr>
<td>Saber SK.</td>
<td>1991</td>
<td>-</td>
<td>individualized nutrition healing of wounds; general condition</td>
<td>infection;</td>
<td></td>
<td>Abstract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cawood</td>
<td>1985</td>
<td>100 patients with a jaw fracture</td>
<td>-</td>
<td>change in body weight, depending on the method of treatment; comparison of group parameters with intermaxillar fixation and fixation with mini-screws</td>
<td></td>
<td>Abstract</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Califano I, Fonseca RJ.</td>
<td>1984</td>
<td>Orthognatik surgery</td>
<td>high-calorie liquid - pre-operative food</td>
<td>Changes in body weight</td>
<td></td>
<td>Abstract</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Harju E, Pernu H.</td>
<td>1984</td>
<td>13 patients with orthognathic surgery</td>
<td>-</td>
<td>loss of body weight; complications</td>
<td></td>
<td>Abstract</td>
<td>Finland</td>
<td></td>
</tr>
<tr>
<td>Kendall BD, Fonseca RJ, Lee M.</td>
<td>1982</td>
<td>24 patients (12 +12 ) with orthognatik surgery</td>
<td>high-calorie liquid + linitum; blended food</td>
<td>Body weight, protein level</td>
<td></td>
<td>Abstract</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Rudenko AT.</td>
<td>1982</td>
<td>65 patients</td>
<td>Dry protein mixture</td>
<td>nitrogen urine, vitamin metabolism (C, B1, B2), symptoms of changes in the digestive tract</td>
<td></td>
<td>Article</td>
<td>Russia</td>
<td></td>
</tr>
<tr>
<td>Lange H, Podlesch.</td>
<td>1981</td>
<td>40 patients</td>
<td>ordinary diet + Nutro Drip, probe feeding, postoperative 10 - day nutrition</td>
<td>Duration of complications; body weight protein (albumen), creatinine) K+</td>
<td></td>
<td>Abstract</td>
<td>Germany</td>
<td></td>
</tr>
<tr>
<td>Martin Ritzau</td>
<td>1975</td>
<td>33 patients</td>
<td>-</td>
<td>loss of weight; overweight patients to have a greater loss of weight</td>
<td></td>
<td>Abstract</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Byrne J.</td>
<td>1970</td>
<td>5 cases</td>
<td>diet</td>
<td>loss of body weight</td>
<td></td>
<td>Abstract</td>
<td>USA, Chicago</td>
<td></td>
</tr>
<tr>
<td>Smith J.</td>
<td>1965</td>
<td>-</td>
<td>balanced, enriched liquid</td>
<td>analysis of micronutrients; complications, diarrhea, changes in the digestive tract organs</td>
<td></td>
<td>Abstract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Califano I, et al.</td>
<td>1992</td>
<td>12 patients with a trauma of MFR, 12 patients with a neoplasm of MFR</td>
<td>Adequate enteral nutrition</td>
<td>anamnesis; nitrogen balance; water-electrolyte balance; immune parameters</td>
<td></td>
<td>Abstract</td>
<td>Italy</td>
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In 12 studies, was studied the topological status and nutritional insufficiency was revealed in patients with jaw fractures, that in the process of treatment did not receive specific nutrients. The principle of the endpoint in these studies was weight and anthropometric changes during immobilization or biochemical blood indices [1,3,7,10-12,16,25,27,29,30,33].

A balanced diet containing the optimal number of kilocalories and essential nutrients is important for patients with bone damage to prevent complications, support healing and health. To correct the nutritional insufficiency of these patients, a hypercaloric and enriched diet was proposed [6,9,20-22,24,26,35,45,46]. In patients with splints, the needs were regulated by a dietitian. Dietary recommendations help to improve consumption by changing the intake of food (for example, enriching food, adapting the diet). In some studies, increased energy and/or protein intake was studied, as a result of which the effectiveness of treatment was higher than in the control group [6,9,20-22,26,35,46].

A number of authors evaluated the influence of patented supplements in the form of dry and liquid nutrient mixtures, biologically active additives, which were used as nutritional support in patients with trauma of MFR. The goal of food is to ensure the balance of energy, proteins, vitamins and microelements, resulting in a significant improvement in the clinical outcomes of patients with a trauma of MFR. The use of nutritive support or biologically active additives proved to be more effective than standard care [2,4,8,15,17,18,23,28,32].

Many researchers note that patients received support in the simplest way: they used additives for feeding or enteral tubes. El-Khatib et al. compared the result of tube-feeding and oral nutrition. After analyzing the hospitalization duration and frequency of complications, the authors found the advantages of the usual type of nutrition in 111 patients with a jaw fracture after osteosynthesis [13].

Some authors recommend the prescription of nutritional support to surgical patients either before surgery or after surgery due to the severity of existing malnutrition or for the purpose of preventing postoperative complications and reducing the timing of wound healing. Early postoperative nutrition (<24 hours) significantly affects nutritional status and promotes faster recovery [42-44]. Long-term nutritional support was suggested by Fonseca et al., who recommended pre-operative, high-calorie nutrition to orthognathic patients to prevent weight loss and complications [8].

The most common in patients with jaw injuries is a change in body weight. An assessment of anthropometric indicators trends, such as body mass index, thickness of skin-fat folds of the triceps, biceps, etc., was carried out by many authors. Biochemical parameters, duration of hospitalization, the timing of wound healing or consolidation of fragments, the nature of complications, quality of life and functional status can serve both as criteria for assessing trophological status and confirming markers for the effectiveness of nutritional support.

In 16 studies, was provided information about the change in body weight in patients with traumas of maxilla facial area [1,3,5,11,13,15,16,21,24,26,27,29,31]. Christensen noted an average of 4.8 ± 6.4 kg of body weight loss, according to Worall, this index varied by an average of 4.5 for 6 weeks; E. Harju observed 7.5 ± 3.5 kg of weight loss for the entire period wearing a bimaxillary splint [3,11,30]. Antila et al. reported that body weight loss during the IMF period in patients receiving nutritional counseling with and without oral supplementation was 3.8 ± 2.7% and 6.0 ± 3.8%/4-6 weeks, respectively [4]. In Keisuke’s study, body weight loss with nutritional support teams intervention (1.8 ± 1.5 kg and 3.1 ± 2.3%/3 weeks) was significantly lower than that without intervention (2.7 ± 1.4 kg and 4.6 ± 2.4%/3 weeks) [46].

Worall and Cawood, comparing the nutritional status of patients depending on the method of treatment, found that in patients with bone fixation with miniplates and screws, nutritional insufficiency and weight loss were significantly less [27,30]. The loss of body weight affects both the composition of the body, and the ratio between lean body mass and fatty deposits. Simultaneously with the reduction in body fat, a significant loss of body proteins occurs, which leads to a decrease in muscle mass. S. Kuvat et al. And Keisuke and coauthors with the help of the body composition analyzer revealed a change between lean and fat mass in patients after correction of occlusion surgically and with mandibular fracture [31,46].

Changes in the body mass index as a result of treatment in patients are reported in 9 studies [10,11,12,17,25,31,32]. Other authors for assessing trophological status used anthropometric measurements by assessing the thickness of the skin-fat fold of the triceps, the biceps, the submental region, and the circumference of the shoulder muscles [12,17,32]. It is shown that the effectiveness of nutritional support during the treatment period directly depends on the nature of the intervention [17,32].

A number of authors carried out biochemical studies to assess the sufficiency of macro- and micronutrients [2,4,5,6,7,16,17,22-24,28,33,46]. As a result, were analyzed the concentration and composition of proteins, lipids, carbohydrates in blood and urine, the level of vitamins and microelements, electrolyte imbalance and a number of enzymes such as aspartate aminotransferase, lactate dehydrogenase, alkaline phosphatase, etc.

As is known, in the process of bone healing the main role is played by protein and minerals. It has been established that in patients with insufficient nutrition, slow down wound healing and synostosis [9,34]. Has been identified the relationship between nutrition and local status, on which depend the timing of the consolidation of fragments and healing of wounds [18,28].

The frequency and nature of complications in the injured with a jaw fracture with nutritional support was studied in 9 studies [2,3,7,9,13,18,20,26,28]. As the analysis of these studies has shown, specialists make attempts to significantly reduce the risk of complications in the treatment of patients with a fracture of the mandible, using for this purpose different types of diets or nutritional support. Less complications and relief of complaints.
at an earlier time was observed in the group of patients who received additional nutritional support [2,26].

However, the available randomized controlled trials provide too little information about the cost of such treatment. In total, we found 3 studies in which were studied the financial side and duration of hospitalization [10,13,17]. Thus, N.V. Tegza found that the use of dry nutrient mix is justified from a medical and economic point of view, since it promotes faster activation of patients in the clinic and reduces the cost of their maintenance in a hospital [17].

In another study, was considered the effect of a postoperative type of diet - hospital costs, depending on the frequency of complications [13]. Savings from shortening the duration of hospital stay were assessed by S. Ono et al., who found the relationship between the body mass index and the rate of complications, the duration of anesthesia, the duration of hospitalization, and the cost of treatment in 309 patients with an open fracture of the mandible [10].

Conclusions

i. As shown by the analysis of literature data, intermaxillary fixation and trauma itself have a significant effect on nutritional status and other metabolic indicators, such as body composition, including proteins, fats, carbohydrates, electrolytes, etc.

ii. The authors of many studies included in this review focus on the trophic status and the impact of an alternative strategy for feeding patients with jaw fractures and intermaxillary fixation.

iii. Recently, have been widely used the most modern methods for assessing trophological status, such as bioimpedanceometry, dual-energy X-ray absorptiometry, air plethysmography, MRI or magnetic resonance spectroscopy. Together, these methods make it possible to determine the structure of the body relatively accurately at the elemental, molecular, cellular, tissue levels and at the level of the organism as a whole. With the help of these methods, it is possible to determine the amount of fats, the weight without fat, the content of bone mineral substances, total body water, extracellular water, total adipose tissue and its internal depot (visceral, subcutaneous and intermuscular), skeletal muscles, ectopic fat depot giving information about the metabolic function. The use of technology to evaluate body composition is the most accurate method, but it is most effective when included as one of several important components of the study in assessing nutritional status.

Thus, the study of the nutritional status of the injured with a jaw trauma makes possible to determine the measures for correcting disorders and metabolic indices.

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Nutrition of Patients with Jaw Fracture and After Orthognatik Surgery, Review of the Literature


