



Importance of Nutritional Evaluation in Transplant Patients Awaiting Lung Transplantation

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Abstract

Nutritional status of lung transplant candidates is important both before and after transplant. Early assessment of nutritional status is necessary to identify individuals with malnutrition/at risk of malnutrition and to prevent complications, manage the catabolic process and provide optimal nutrition. In this article, it is aimed to draw attention to the importance of nutritional evaluation before lung transplantation. By reason of today, there is still a need to increase malnutrition awareness, prevent malnutrition and spread interdisciplinary work all over the world. Malnutrition and obesity, considered, a malnutrition, have negative consequences for the patient, health professionals and the economy. These are encountered with deterioration of organ systems, increase in hospital stay-cost-re-admission, in morbidity and mortality. For this reason, determining the nutritional problems of the patients from the first admission to the hospital is the key point in predicting the problem from the beginning and producing a solution accordingly. In particular, the nutritional status of lung transplant candidates affects short and long-term factors such as post-transplant complications, length of hospital stay and mortality, post-discharge care and re-admission to the hospital.

Keywords: Lung Transplantation; Nutritional Status; Evaluation of Nutritional Status

Abbreviations

BMI: Body Mass Index; PNI: Prognostic Risk Index

Introduction

The respiratory system in the human body consists of the nose, oropharynx, larynx, trachea, bronchi, bronchioles and lungs. The lungs are anatomically connected to the trachea through the right and left bronchi; taking oxygen into the body and removing carbon dioxide; It is an organ responsible for gas exchange [1]. The lungs are anatomically located in the thoracic cavity and have 3 lobes on the right and two lobes on the left [2]. The openness of the lungs to environmental exposures is in parallel with the exposure to da-

mage. Death rates from lung diseases in the world are approximately 3 million people with chronic obstructive pulmonary disease, 250,000 to 500,000 people with respiratory tract infections, 1.4 million people with tuberculosis and 1.6 million people with lung cancer [3]. Lung transplantation has become increasingly common in recent years and all over the world [4]. At the same time the last stage is a treatment model that increases the survival and quality of life for lung patients [4,5]. According to the reports of lung transplant centers, the data of June 2018 indicate that 69,200 lung transplants have been performed until this date and the number of centers performing more than 50 transplants per year has increased from 18 to 20 [6]. A total of 34024 transplants were performed in Europe in 2017, including heart, kidney and liver transplants, of

which 2013 were lung transplants [7]. In our country, the first lung transplantation was performed in 2004 and the number of licensed centers performing lung transplantation has increased gradually since then. The number of lung transplants performed in these centers until 2017 is 168, and it is stated that an average of 30 lung transplants are performed annually in our country [8].

The multidisciplinary 'Transplant Teams' consisting of a transplant surgeon and doctor, transplant coordinator, dietitian, psychiatrist/psychologist, social worker and pharmacist, have a long and difficult journey with the patient [9]. The task of this team is to evaluate the suitability of the transplant candidate, to prepare the patient for the transplant process, to ensure and maintain the quality of life, and to work towards increasing survival after the transplant [10].

In the technical report published by the experts of the World Health Organization and the Food and Agriculture Organization in 2002, the importance of nutrition in the fight against non-communicable diseases were emphasized [11]. On the other hand, maintaining nutrition and medical nutrition therapy are an integral part of the transplantation process, which is a long journey for healthcare professionals and patients [12].

The International Heart and Lung Transplantation Society has specified the general criteria required to perform transplantation in end-stage lung patients. Among these criteria, progressive or severe malnutrition and class I obesity (Body Mass Index-BMI 30.0 - 34.9 kg/m²: especially central obesity) are considered relative contraindications, and class II and III obesity (BMI ≥ 35 kg/m²) are considered absolute contraindications [16].

This article emphasizes the importance of evaluating nutritional status in lung transplant candidates.

Lung transplantation and malnutrition

Malnutrition is a common condition at admission to hospital, during hospitalization and after surgery [17]. The majority of lung transplant candidates suffering from malnutrition [10,18].

While the European Society for Clinical Nutrition and Metabolism Association defines malnutrition as "decreased physical and mental functions and worsening of the clinical outcome of the disease as a result of deterioration in body composition (decrease

in lean mass) and body cell mass, caused by inadequate intake or irregular nutrition" [19], the American Society The Association for Parenteral and Enteral Nutrition and the Academy of Nutrition and Dietetics recommend 2 or more of the characteristics of low energy consumption, weight loss, subcutaneous fat loss, loss of muscle mass, fluid accumulation (leucalized or general), and functional capacity (determined by measurements) in adult malnutrition accepted the presence of excess as adult malnutrition [20].

The negative effects of malnutrition are multi-faceted. It can affect all organ systems and quality of life in the patient, such as deterioration in bowel integrity and immunity, increase in infection rates, delay in wound healing, hypothermia, deterioration in renal functions, decrease in cardiac output, increase in psychological problems such as apathy/depression, loss of muscle mass, deterioration in liver functions [21].

On the other hand, it also has economic and political repercussions with the increase in the length of hospital stay and re-admissions, mortality and health expenditures [20,21]. Identification of patients with malnutrition and/or malnutrition risk is the basis of the solution step in preventing the risk before malnutrition occurs or in early intervention in malnutrition. For nutritional physiology is complex, complicate and reveals individual results depending on the nutritional status of the person [22].

The presence of malnutrition is a relative contraindication for lung transplant candidates [23] and cachexia may be observed in advanced-stage patients (chronic obstructive pulmonary disease, idiopathic cystic fibrosis) due to the presence of inflammation [24]. However, while the threshold value for obese individuals was determined as BMI > 35 kg/m². The threshold value in body mass index for lung transplant candidates with malnutrition is not clear [25]. In end-stage lung disease, malnutrition occurs due to decreased food intake, changes in metabolism, inflammation, malabsorption, and infections [10]. The presence of malnutrition in a patient who will have a lung transplant may also affect post-transplant morbidity and mortality [10,18].

In a retrospective study conducted at the University of Strasbourg, they stood out to nutritional deficiencies among lung transplant candidates. In the study in which the BMIs (1 month, 3 months, 6 months and 1 year) and nutritional status of the patients were followed up, a decrease was found in BMI during the

lung transplantation (pre-transplant hospitalization, ICU process); It has been stated that it takes about 1 year to replace the lost weight and reach the pre-transplant BMI level. In addition, it was stated that keeping the BMI at the level of 22.8 kg/m² before the transplant can prevent the risk of BMI falling below 21 kg/m² after the transplant [25]. In the study examining the nutritional profile of lung transplant candidates, it was found that the groups with low BMI, triceps skinfold thickness and upper-middle arm muscle circumference, respectively, were in cystic fibrosis (40%-64.7%-76.5%) and bronchiectasis (32%-52.6%-73.7%) patients stated [26].

Evaluation of nutritional status is a part of the nutritional care process and is a comprehensive method used to identify nutritional problems (anthropometric methods, nutritional history, laboratory findings, medical history, physical nutrition examination) in patients. At the same time, the evaluation of nutritional status lays the foundations for the clinical decision regarding the next nutrition to be applied to the patient and establishes the future procedure [27].

In a study evaluating the prognostic risk index (PNI) score and nutritional status of lung transplant candidates in the preoperative period, it was shown that individuals with a low PNI score (PNI < 41.5) have high mortality and complication rates. The investigators also evaluated the incidence of post-operative complications with the preoperative PNI score. According to the Clavien Dindo surgical complication classification, there were significantly higher complications in the PNI-low group than in the PNI-high group (71.4% vs. 23.2%; P < 0.001) [15].

In a research based on the hypothesis that nutritional status deteriorates before and after transplantation and decrease in body mass is a risk factor for mortality, it was shown that nutritional status was impaired in 72% of cases, and reductions in lean body mass occurred in 17% of cases without weight loss [28]. In a retrospective study examining the effect of nutritional status on mortality in single and bilateral lung transplant patients, it was stated that a BMI > 27.5 kg/m² in the pretransplant period was a predictor for mortality in the post-transplant period. On the other hand, in the study in which prealbumin, which is an indicator of nutritional status, was evaluated, the risk of death was 3 times higher in patients with prealbumin level ≤ 18 g/dL compared to patients with > 18 g/dL (HR 3.01, 95% CI: 1.21 to 7.51; P = 0.018) has been shown [29].

Obesity is a factor that affects surgery and overall health due to its comorbidities and complications worldwide [30]. On the other hand, today it is accepted in the malnutrition class due to the negative results it creates in the organism [31].

While obesity is associated with results such as changes in the pharmacokinetics of drugs, adaptation to drug doses, and limitation of movement, especially in maintaining the airway in intensive care patients [32,33], it is also associated with negative outcomes that may occur with comorbidities such as Type 2 Diabetes Mellitus, hypertension and asthma [32]. Obesity has a negative effect on the lungs with increased amount of adipose tissue in the thorax, abdomen and internal organs (visceral). Therefore, this makes breathing difficult and reduces functional residual capacity [34]. The American Society of Transplant Physicians, the American Thoracic Society, the European Respiratory Society, and the International Society for Heart and Lung Transplantation, in the guidelines published in 1998, stated that for transplantation, weight gain or loss in individuals with < 70% and > 130% of their ideal body weight. suggested that they take action in this direction [35].

In a study examining the relationship between preoperative nutritional status and mortality in the first 3 months (90 days) after lung transplantation, low BMI < 17 kg/m² or > 25 kg/m² was shown as a factor increasing the mortality risk. It has been reported that patients with a pre-BMI > 27 kg/m² have a higher BMI than the reference group (BMI 20 - 25 kg/m²) [36]. In a study examining the effect of body mass index in lung transplantation in 546 patients, it was shown that the mortality rate is high in overweight and obese individuals [37].

Conclusion

Nutritional assessment is essential for transplant patients. However, it is even more important to create an individual nutrition care plan according to the weight loss/gain of the patients during the transplantation process. Evaluation of nutritional status in predicting nutrition-related problems is a method that facilitates risk and crisis management in the transplant process. Increasing the number of 'Transplant Teams' aiming the maximum benefit to the patient, such as 'Nutrition Teams' where multidisciplinary work is adopted; in this regard, it will provide a great advantage to both patients and healthcare professionals.

Conflict of Interest

The authors declare that there is no conflict of interest.

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