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Malnutrition of the oncological patient - diagnosis and prevention

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Abstract

Introduction: Malnutrition is an important medical problem which affects more than half of patients at the time of diagnosis of cancer, before any treatment begins. Deficits of nutrients in this group of patients have enormous impact on the course of the disease, tolerance of anti-cancer treatment, quality of life and mortality. Weight loss is observed in 30% to over 80% of patients and depends on the type of cancer, location and its severity.

Abnormal nutritional status is also one of the causes of a weaker response to the applied anti-cancer treatment (both local and systemic) and, consequently, probably worse prognosis and shorter survival time, and more frequent occurrence of adverse effects and severe complications of anti-cancer therapy that force premature its completion. Patients with malnutrition occurs increased incidence of infectious complications, which worsens their prognosis. Worse healing of wounds after surgical procedures is observed, patient stays longer in the hospital, and the date of commencement of adjuvant treatment goes away. Cancer cachexia may result in feelings of weakness, fatigue, and increase the risk of depression and aggravate the general condition.

The aim of the work is to present the essence of the problem which is malnutrition, especially in oncological patients.

Summary: Proper nutrition, adapted to the current clinical situation and covering demand, is still an underestimated element of treatment of patients. Properly conducted nutritional therapy in oncological patients is an important element of treatment, because it creates optimal conditions for recovery and reduces the risk of relapse.

Key words: nutritional treatment, cancer, nutritional status

Introduction

There are many different definitions of malnutrition in the literature. The simplest definition of malnutrition says that it is a disorder of nutritional status [1]. The World Health Organization defines malnutrition as "an imbalance between the need for nutrients and energy and supply, the satisfaction of which allows for growth, maintenance of vital functions and performance of specific functions" [2]. For many years, it was thought that malnutrition mainly affected the population in the underdeveloped countries of Asia and Africa. In the first

studies of 1955, researchers pointed out that a significant proportion of patients hospitalized in the United States had malnutrition that was getting worse during hospital treatment. It was not until the 1970's, with the introduction to clinical practice of nutritional treatment and the determination of the state of nutrition, it has been shown that malnutrition of various degrees is observed in almost half of surgical and internal patients [3]**.** Subsequent studies have shown that up to 30% of properly nourished patients develop malnutrition after admission to the hospital, and in over 70% of those who are undernourished, this condition is further aggravated during hospitalization. Subsequent studies from 2005 confirm the fact that malnutrition is a significant medical problem. Symptoms of malnutrition in varying severity related to 50-80% of oncological patients at the time of the diagnosis of cancer, before any therapeutic action is started [4].

Cancer cachexia can be defined as a clinical syndrome characterized by weight loss, weakness and lack of appetite. In depletion, there is a reduction in the body fluid compartments, metabolic disorders and progressive impairment of vital functions.

The frequency of malnutrition and cachexia depends on many factors. Impact may be affected by the severity of the disease, the location of the cancer and even the patient's age. The worst statistics of cancer cachexia affect patients with gastrointestinal cancer - about 90% in case of esophageal cancer and about 70% in case of stomach, pancreas and liver cancer [5].

Causes of malnutrition

The presence of cancer in the body releases a number of pathophysiological mechanisms that affect the development of cancer cachexia. The body's metabolic balance is disturbed by a chronic inflammatory reaction. Cytokines - TNF, interleukin-1, interleukin 6, interferon-α, interferon-γ are released. It is the physiological response of the body to the growth of the tumor. Constant production of cytokines leads to dysregulation of hormones responsible for maintaining the metabolic balance of the body. It reduces insulin secretion, increases production and release of glucagon, noradrenaline, epinephrine and serotonin, increases muscle protein breakdown for glucose resynthesis, changes the proportion of

proteins produced in the liver, reduces albumin and increases the amount of acute phase proteins - C reactive protein and fibrinogen [6].

The most common causes of malnutrition include inadequate oral nutrition, increased nutrient loss following digestive disorders, absorption or fistula and increased hyperkatabolism requirements [3]. The main eating disorder in the course of cancer is anorexia. During the treatment, symptoms resulting from toxic effects of drugs may occur, such as nausea, vomiting, disturbances in taste sensation, dryness and burning of the mouth, inflammation of the gastrointestinal mucosa (causing odynophagia), abdominal pain, constipation and diarrhea [2,7].

Malnutrition may be the result of local tumor growth, for example, causing swallowing disorders, reduced appetite, premature feeling of satiety, and pain. Diagnostic tests related to the treatment that should be performed on an empty stomach can cause hospital malnutrition, which affects about half of the patients, and worsens in about 2/3 of patients hospitalized due to cancer. Surgical procedures and other therapeutic activities (chemotherapy and radiotherapy) may also reduce food intake. The cause of malnutrition can also be impaired absorption of nutrients, especially in patients with gastrointestinal cancers - after stomach resection, intestinal fragments and increased body requirements resulting from the underlying and co-morbidities disease [5,6].

Development of malnutrition can not be attributed solely to the disease itself. It can be caused by anti-cancer treatment. Surgical treatment, radiotherapy and chemotherapy cause various disorders that affect the state of nutrition. Table No. 1 shows the nutritional consequences caused by radical excision of the organ [5].

Tab. No. 1. Effect of radical excision of organs of the digestive system on the nutritional status [5].

Reseated organ	*Nutritional consequences*
Tongue and throat	Dysphagia
Thoracic segment of the esophagus	Impaired absorption of fat in the results of vagotomy Gastric fluid due to vagotomy
Stomach	Anemia, impaired absorption of fat, iron, calcium and vitamins, Dumping syndrome
Duodenum	Biliary - pancreatic insufficiency
Jejunum	Reduction in the absorption of glucose, fats, proteins, folic acid, vitamin B12
The ileum or ileocecal valve	Impaired absorption of vitamin B12, salts of fatty and bile acids
Small intestine (75%)	Impaired absorption of fats, glucose, proteins, folic acid, vitamin B12 Diarrhea
Jejunum and ileum	Unavailable complete absorption
Large intestine (complete or almost total resection)	Loss of water and electrolytes
Pancreas	Impaired absorption and diabetes
Liver	Transient hypoalbuminemia

Diagnostics of malnutrition

The first step in assessing the status of nutrition is to perform screening tests to identify patients at risk of malnutrition or malnourishment. In search of the best method to assess nutritional status, experts developed a questionnaire to the risk assessment related to malnutrition - Nutritional Risk Screening (NRS 2002). The risk of malnutrition is assessed on the basis of the current state of nutrition and the expect risk of deterioration of the current nutritional status due to increased demand during illness or surgery. The literature has published many articles confirming the high effectiveness of NRS 2002 in the diagnosis of complications related to malnutrition in the course of the disease.

In nutrition screening tests, an important place has also the Subjective Global Assessment of nutritional status (SGA), which according to many clinicians is very effective both in diagnosing malnutrition and in predicting postoperative complications associated with malnutrition [8].

To assess the risk of development of malnutrition, ESPEN (European Society for Clinical Nutrition and Metabolism) introduced an additional concept that is a high nutritional risk - SNR (Severe nutritional risk), which determines the probability of a worse outcome of treatment of the disease or surgery depending on the current or predictable state of nutrition and metabolic status of the patient [9].

A high nutritional risk can be found when one of the following criteria is present:

- ✓ weight loss> 10-15% within 6 months
- ✓ body mass index (BMI) <18.5 kg / m²
- ✓ grade C on the SGA scale or result> 3 on the NRS 2002 scale
- ✓ albumin plasma concentration <, 3 g / dl (excluding the impairment of liver or kidney function) [2,4,9]

In addition to nutritional screening tests, anthropometric studies may be used to assess body weight, including BMI (Body Mass Index), calculated using the formula:

$$BMI = \frac{kg}{m^2}$$

During interpretation of the results of an oncological patient, it is assumed that BMI [10]:

- ✓ over 30 kg / m² means a large overweight
- ✓ 25-29,5 kg / m² means overweight
- ✓ 24-24.5 kg / m² range means good nutrition
- ✓ 17-23.5 kg / m² means the risk of malnutrition
- ✓ less than 17 kg / m² means malnutrition

It should be remembered that in patients over 65 years of age malnutrition requiring intervention is already determined at BMI below 24 kg / m² and weight loss equal to or greater than 5% in the last 1-6 months [4,10].

Another group of tests used to assess nutritional status are biochemical studies. The concentration of albumin, prealbumin and transferrin levels are useful in diagnosing protein-caloric malnutrition. Interpretation of the results of biochemical tests is presented in the table No. 2.

Tab. No. 2. Interpretation of albumin, transferrin and prealbumin [4,10]

Nutritional status	*Albumin (g/dl)*	*Transferrin (mg/ dl)*	*Prealbumin (mg/dl)*
Normal	3,5-5,0	176-315	18-45
Light malnutrition	3,0-3,4	134-175	10-17
Average malnutrition	2,1-2,9	117-133	5-9
Heavy malnutrition	<2,1	<117	<5
Period half-term	21 days	8 days	2 days

Summary

Malnutrition during neoplastic disease is a significant clinical problem. The introduction of an early, routine assessment of the patient's nutritional status and assessment of the risk of developing malnutrition or cachexia in cancer patients seems necessary. Evaluation of the nutritional status and assistance of the dietitian should be available to all patients with diagnosed cancer treated both in the outpatient clinic and in the hospital. During the deepening assessment of nutritional status, various methods should be used to optimize the result individually for each patient. Frequently repeated assessment and early implementation of individual nutritional support become an inseparable element of care for a cancer patient. It should be remembered that preventive and curative treatment in the field of malnutrition among cancer patients improves the effects of anti-cancer therapy, prevents extended hospital stays, reduces hospitalization costs, reduces the incidence of infections and complications of oncological, surgical treatment, radiotherapy, chemotherapy and reduces convalescence time and improves quality of life of the patient [2,4,10].

Numerous studies confirm the fact that malnutrition is a significant clinical problem and indicate the need for multidirectional interventions in this group of patients.

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