



Nutritional management in patients with gastrointestinal tumors in the surgical department

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Abstract:

The last quarter of 25 years is undoubtedly a milestone in clinical nutrition in Poland. The current years have shown the growing importance of this medical area, which is now a component of many therapies. A better nourished patient means more effective pharmacotherapy, faster wound healing, less fewer complications - especially in the postoperative time, a shorter period of hospitalization, and, consequently, lower costs of treatment. Nutritional treatment is particularly important in surgical departments and for many years has been one of the basic procedures for care of the patient. In the present time, this is the basic skill of a doctor. The choice of treatment method should justify the patient's clinical condition, type and degree of malnutrition and the duration of therapy. The duty of each doctor treating oncological patients (surgical, chemotherapeutic or radiotherapeutic) is a particularly thorough assessment of the nutritional status of the patients and, if appropriate, the implementation of the nutritional intervention as quick as possible. The earlier the metabolic actions are taken, the more comfortable the patient lives becomes and the better the results of the treatment are observed.

Introduction:

Malnutrition is an increasingly topic in the context of cancer. The last quarter of 25 years is undoubtedly a milestone in clinical nutrition in Poland. The current years have shown the growing importance of this medical area, which is now a component of many therapies. In the case of malignant neoplasm of the gastrointestinal tract, patient undernutrition is of particular importance during surgical treatment and convalescence period.

Objectives:

The aim of the article was to present the problem of malnutrition in neoplastic diseases of the gastrointestinal tract qualified for surgical treatment. The authors wanted to raise awareness and pay attention to the purposefulness of taking nutritional intervention, as well as to point the importance of proper nutritional assessment of the patient, especially in the case of neoplastic diseases of the gastrointestinal tract.

Methods:

The work attempts to collect information on malnutrition, ways of its diagnosis and presentation of general

principles of nutritional intervention, which is particularly important in cancer of the gastrointestinal tract treated surgically. The work is a systematic review of current literature. The information was found in the Pubmed database, the following keywords were used: clinical nutrition, malnutrition, emaciation, gastrointestinal cancer.

Starving in health and illness, malnutrition

The formation of malnutrition is the result of a lack of coverage of the nutrient needs of the body. How fast the symptoms of malnutrition appear depends primarily on the patient's state of health.

In the case of cessation of nutrient supply in a healthy person, adaptive mechanisms will work, as a result basic metabolism will be reduced, protein and fat reserves will be gradually consumed and the energy expenditure of the organism will be reduced. This is called a simple starvation. In this case, the man voluntarily decides to stop eating. Most often, there are no health complications, if it continues for 5 - 7 days. If patient continue fasting with 40-50% of initial body weight loss, death occurs. This condition can occur after about 2 months of starvation.^[1]

Table 1. Internal organs and the effects of malnutrition^[8]

Heart	Myocardial atrophy, impaired contractility, decreased stroke volume, hypotension
Liver	Decrease in protein synthesis, edema
Pancreas	Disorders of intra- and exocrine pancreatic function, absorption disorder
Kidneys	Decrease in glomerular filtration, renal tubular atrophy, metabolic acidosis, acute renal failure
Marrow	Inhibition of cell line production, leukopenia, decrease of immunity condition, wound healing difficulties.

Malnutrition in oncological disease

The cancer process is one of the diseases that results in protein-caloric malnutrition. It should be emphasized that in the case of gastrointestinal tumors, protein-caloric malnutrition is the more frequent if higher the tumor is localized in the gastrointestinal tract. The same dependence applies to the rate of cachexia: the higher digestive tract is involved, the more rapidly the cachexia process progresses.

During admission to the hospital, malnutrition is found in^[7]:

- 70 - 90% of patients with esophageal cancer
- 50-70% of patients with stomach cancer
- 30-40% of patients with pancreatic cancer
- about 10% of patients with colon cancer.

This results are correlated to the quality and life expectancy of the patient, the effectiveness of oncological treatment and the costs of therapy, that's why the diagnosis of malnutrition and correct nutritional management are currently the main aim for supporting cancer treatment.^[7] Nutritional treatment is particularly important in the case of tumors of the upper gastrointestinal tract. In this case, the most common complication of the disease is cancer cachexia. The word "cachexia" derives from the Greek language and literally means "bad condition"^[12] and is a syndrome of dysfunctions resulting from the body's response for the form of a generalized inflammatory reaction. The syndrome of dysfunctions involved in the pathogenesis of cachexia is illustrated in [Table 2](#). Cancer cachexia is characterized by intensification of catabolic processes.

Table 2. A dysfunction syndrome that causes cancer cachexi [authors' own source].

Disorders of nutrition by a physiological route	Anorexia, dysphagia, impaired intestinal passage
Increased loss of nutrients	Disorders of absorption, digestion, gastrointestinal fistula, enteropathy
Increased needs for nutrients	Hypercoatabolic tumor, infection or concomitant diseases
Disruption of metabolic processes	Increased gluconeogenesis, increased protein breakdown
Increased inflammatory reactions	Intensity of proinflammatory cytokines
Side effects of oncological treatment	Loss of appetite, disturbances of taste sensation and smell, vomiting, diarrhea
The emotional state of the patient	Abandonment, lack of willingness to fight the illness, apathy, depression, fear about the future

Evaluation of nutritional status

In the surgical ward, nutritional treatment of an oncological patient is an integral part of modern treatment therapy. Already upon admission to a ward, the nutritional status of the patient is assessed using the following documents: SGA - Subjective Global Assessment and NRS 2002 (Nutritional Risk Screening 2002), which should be repeated every 2 weeks. This is a mandatory procedure in all hospital departments in Poland. In clinical practice, if a malnutrition is suspected, a detailed interview is collected with the patient ([Table 3](#)), appropriate laboratory

and anthropometric examinations are ordered. The final diagnosis of the severity of malnutrition is always based on conclusions from all diagnostic activities.

Table 3. Nutritional interview with a oncological patient^[1]

1. What was the normal weight of the patient? (ie in the period of health and normal nutrition)
2. Has unplanned weight loss occurred in the last 6 months?
3. Has there been a change in nutrition after diagnosis the disease? If yes, what? (quantitative or qualitative)
4. Are there any problems with food intake? (nausea, vomiting, diarrhea, lack of appetite / feeling of fullness, pain during eating, change of taste and the smell of meals, dysphagia)
5. What foods are you currently eating? (solid, semi-liquid, liquid diet)
6. What amount of food is currently being taken, compared to the condition before the disease? (the same amount, less by ¼, less by ½)

In addition to the interview, it is important to examine the subject, which should primarily include the condition of the skin, mucous membranes and gums, loss of subcutaneous tissue and observation of the general visual state of the patient (attention to wasting). In the late period of malnutrition pleural effusions, ascites, muscular atrophies and pain appear are observed.^[15]

In determining the state of nutrition, anthropometric verification indicators are used. The basic examination is the measurement of body weight. The most common is to determine the BMI (Body Mass Index).

The above indicator is a good instrument determining the nutritional status, provided that is determined at least twice in a specified time interval. It is not reliable in some pathological conditions, i.e. ascites, generalized edema and limb amputation. BMI as a determinant of nutritional status is illustrated in [Table 4](#).

Table 4. BMI - as an indicator of nutritional status.^[2]

<18.5 kg / m ²	Malnutrition
18.5 - 20 kg / m ²	Danger
20 - 25 kg / m ²	Standard
25 - 30 kg / m ²	Overweight
> 30 kg / m ²	Obesity

A modern anthropometric method determining the exact composition of the patient's body is bioimpedance analysis (BIA - bioelectrical impedance analysis). It is a safe method for the body, easy to use, non-invasive and repeatable. The test consists in measuring differences in impedance (electrical resistance) of tissues, through which low-voltage electric current is passed. Adipose tissue is characterized by high resistance (i.e. high impedance), while fat-free tissue is low. The size of the edema can also be determined by this test.^[16]

Nutritional status is also shown by blood biochemistry. Biochemical tests are objective and extremely helpful at every stage of nutritional treatment. The most frequent parameters used to assess patients' nutrition are the determination of albumin, prealbumin and transferrin concentrations in the blood serum and the total number of lymphocytes (CLL) reflecting the state of the immune system.^[1,17] Albumins are the most discussed parameter of nutritional status evaluation. Their half-life period is 21 days. Hypoalbuminemia should not be considered only as a consequence of malnutrition, but mainly as a determinant of the hydration status and the severity of the disease. However, undoubtedly, the decrease in albumin concentration due to the reduction of their synthesis indicates the manifestation of malnutrition, while the increased breakdown of these proteins - the process of catabolism^[17]. Prealbumins are an appropriate indicator of nutritional status, mainly due to the short half-life period. Their small pot in the body allows for proper assessment of quantitative changes in visceral proteins of the body as a result of malnutrition.^[1,17] Transferrin is a beta-globulin that binds and transports iron in plasma. It is helpful in determining the concentration of proteins in the body, but when interpreting the results it should be taken into account that many other factors influence its concentration.^[1]

In malnutrition associated with the disease, the immunological barrier is often weakened.^[15] Malnutrition patients are particularly sensitive to infections, which are very often complications of surgery. An appropriate indicator to assess the functioning of the immune system is the total number of lymphocytes (CLL). The CLL indicator should be calculated according to the formula:

$$\text{CLL} = \frac{\% \text{ lymphocytes} \times \text{number of leukocytes}}{100}$$

Feeding intervention

Nutritional treatment is indicated when: current or threatening malnutrition is present, oral diet will not be included for the period above 7 days, current food intake does not reach 60% of the daily caloric demand for more than 10 days.^[10] Delivery of nutrients through the gastrointestinal tract is the most physiological way of clinical nutrition of patients. Even if the nutrient needs of the body can not be completely covered by the enteral route, for example in the case of high grade intestinal fistulas or partial obstruction of the gastrointestinal tract, the route of supply of the substance should not be completely abandoned. In this case, combined parenteral and enteral nutrition should be considered. We begin parenteral nutrition whenever the alimentary tract is insufficient, ineffective or impossible.^[10] For parenteral nutrition to

produce the intended effect, the completeness principle must be followed. The nutritional mixture should provide protein, energy (derived from fats - approx. 40% and carbohydrates - approx. 60%), electrolytes, trace elements, vitamins and water.

The choice of the method of nutritional treatment should justify the patient's clinical condition, type and degree of malnutrition and the duration of therapy. The observation shows that oncological patients with threatening malnutrition, consuming oral food supplements for 2-3 weeks before surgery, are much better undergoing post-operative recovery, compared to patients not using ONS (Oral Nutrition Support). The consumption concerns 2-3 packages a day, that is average of 600 - 900 kcal extra.

Particularly noteworthy are patients with malignant tumors of the upper gastrointestinal tract (esophagus, stomach), which are among the most catabolic tumors of the digestive system.^[13] When the oncological disease is diagnosed, the patient already has the first symptoms of deterioration of nutritional status, most often manifested by uncontrolled weight loss. In this case, nutritional treatment is a supportive therapy, reducing progressive protein-calorie malnutrition, but nevertheless is one of the basic elements of therapeutic treatment.

In malnourished patients, nutritional treatment should be applied 10-14 days before the procedure, even if this is done at the expense of postponing the date of surgery, whereas in severely undernourished patients, which can not be properly fed orally or enterally, parenteral nutrition is indicated.^[10]

The duty of each doctor treating oncological patients (surgical, chemotherapeutic or radiotherapeutic) is a particularly thorough assessment of the nutritional status of the patients and, if appropriate, the implementation of the nutritional intervention as soon as possible. The earlier the metabolic actions are taken, the more comfortable the patients' lives and the better the results of the treatment are.

Summary

Malnutrition leads to serious metabolic disorders: it increases catabolism, disturbs the acid-alkaline and water-electrolyte balance of the body and consequently plays a key role in the dysfunction of many organs.

Malnutrition is a disease and can be found in the International Classification of Diseases and Health Problems in Chapter IV, in section E40 - E46. Like any other untreated disease it can lead to death. That is why it is very important to correctly diagnose malnutrition and to take proper nutritional intervention in order to minimize the

frequency and limit the effects of severe malnutrition.^[7] Clinical nutrition is the basic skill of a doctor at the present time, in the first place assessing the nutritional status of the subject should be done, then taking into account the patient's clinical and metabolic status. Clinician chooses the right way to supply the ingredients so that the nutrients supplied are optimally used. Subsequently ordering and providing the appropriate nutritional mixture, and for the following days monitoring the effectiveness of the therapy and the clinical condition of the patient needs to be made.

Conclusions

Malnutrition in cancer is an increasingly common topic. Proper diagnosis of malnutrition and proper nutritional intervention significantly improves the prognosis of patients. A better nourished patient means more effective pharmacotherapy, faster wound healing, less complications - especially in the postoperative time, a shorter period of hospitalization, and consequently, lower costs of treatment.

Nutritional treatment is particularly important in surgical departments and for many years has been one of the basic procedures for care of the patients.

Cooperation between the doctor, nurse, pharmacist and dietician is important in the whole nutritional procedure. Working together for the good of the patient is undoubtedly the success of nutritional therapy and invaluable help in the treatment of cancer.

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