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Assessment of Nutritional Status in Patients with Esophageal and Esophago-gastric Cancer

Ocena stanu odżywienia u chorych z rakiem przełyku i rakiem połączenia przełykowo-żołądkowego

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Abstract

Background. Malnutrition is associated with weight loss, and its corollaries are metabolic disturbances and impaired function of the organs and tissues of the body. The problem of malnutrition is particularly noticeable in clinical practice because it has a negative impact on treatment outcomes and the course of operations, increasing the number of postoperative complications and significantly prolonging the patient's stay in the ward.
Objectives. The aim of this study was to assess the state of nutrition of patients diagnosed with esophageal cancer treated at the Department of Gastrointestinal Surgery and General Surgery at Wroclaw Medical University from March 2009 to February 2010.
Material and Methods. The study included 60 patients with histologically confirmed cancer of the esophagus and cardia cancer in different stages before an operation. The study group consisted of 50 men and 10 women aged from 39 to 86 years. Nutritional status was evaluated on the basis of the following indicators: percentage weight loss (MC), the level of total protein and albumin serum level, total lymphocyte count in 1 mm^3 of peripheral blood, and body mass index (BMI). In this work, the authors used the following surveys: the t test for single samples and the t test for independent samples, using STATISTICA 9.0.
Results. Based on the statistical methods, it was shown that both BMI and the value of albumin are not good indicators of malnutrition in the studied group. However, the level of total protein and total number of lymphocytes (CLL) are good, early and approximate indicators of malnutrition cases.
Conclusions. The assessment of malnutrition should be carried out using as many methods as are available (**Adv Clin Exp Med 2011, 20, 2, 199–203**).

Key words: nutritional status, esophageal cancer, esophago-gastric cancer.

Streszczenie

Wprowadzenie. Niedożywienie wiąże się z utratą masy ciała, a jego konsekwencją są zaburzenia metaboliczne, osłabienie czynności narządów oraz tkanek ustroju. Problem niedożywienia jest szczególnie zauważalny w praktyce klinicznej, ponieważ wywiera niekorzystny wpływ na wyniki leczenia, przebieg operacji, zwiększa liczbę powikłań pooperacyjnych oraz znacząco wydłuża czas pobytu chorego na oddziale.
Cel pracy. Ocena stanu odżywienia chorych z rozpoznanym rakiem przełyku i wpustu leczonych w Klinice Chirurgii Przewodu Pokarmowego i Chirurgii Ogólnej AM we Wrocławiu od marca 2009 do lutego 2010 r.
Materiał i metody. Badania przeprowadzono w grupie 60 chorych z potwierdzonym histologicznie rakiem przełyku i rakiem wpustu w różnym stopniu zaawansowania klinicznego przed zabiegiem operacyjnym. Badana grupa składała się z 50 mężczyzn oraz 10 kobiet w wieku 39–86 lat. Stan odżywienia oceniano na podstawie następujących wskaźników: procentowej utraty masy ciała (MC), stężenia białka całkowitego i albumin w surowicy, całkowitej liczby limfocytów w 1 mm^3 krwi obwodowej oraz wskaźnika masy ciała (BMI). W pracy wykorzystano następujące badania statystyczne: test t dla pojedynczej próby oraz test t dla prób niezależnych z użyciem programu STATISTICA 9.0.
Wyniki. Na podstawie zastosowanych metod statystycznych wykazano, że zarówno wartość BMI, jak i wartość albumin nie jest dobrym wskaźnikiem niedożywienia w badanej grupie chorych. Stężenie białka całkowitego i całkowita liczba limfocytów (CLL) są natomiast dobrymi, wczesnymi i orientacyjnymi wskaźnikami niedożywienia chorych.
Wnioski. Ocenę niedożywienia należy przeprowadzać wykorzystując wszystkie dostępne metody (**Adv Clin Exp Med 2011, 20, 2, 199–203**).

Słowa kluczowe: stan odżywienia, rak przełyku, rak wpustu.

Healthy nutrition (nutritional health) is a balance between the amount of nutrients taken and the demand for these components in the system [1]. Malnutrition, therefore, means taking a reduction of nutrients in relation to the requirements of the system. Malnutrition is associated with weight loss, and its corollaries are metabolic disturbances and impaired function of the organs and tissues of the body. Malnutrition burdened by additional factors such as infection, illness, and injury, including operative trauma, significantly compounds the above-mentioned problems and may ultimately lead to death [2–4].

The problem of malnutrition is particularly noticeable in clinical practice. Reports in the literature about this issue indicate that from 30 to 50% of hospitalized patients show symptoms of malnutrition [4, 5]. Patients with disorders of the gastrointestinal tract, especially those suffering from gastrointestinal cancers, constitute the most important group of patients at risk of malnutrition [2]. In a Davies study among patients with cancer, the percentage of people with clinical signs of malnutrition reached 85% [6].

The state of malnutrition is particularly marked among patients with cancer of the upper gastrointestinal tract, where malnutrition is compounded by difficulties in accepting food. Malnutrition has a negative impact on treatment outcomes and the course of operations, increasing the number of postoperative complications and significantly prolonging the patient's stay in the ward.

The research of Ryan et al. in a group of 90 patients with gastric cancer who underwent gastrectomy showed that, in patients with weight loss in excess of 10% compared to a group of patients with loss of less than 10%, both the time of diagnosis of postoperative complications and mortality were significantly higher, 51.9% vs. 26.2% and 11.1% vs. 0% [7]. Similar observations have also been presented by other authors [2, 3, 8].

Nutritional assessment can be carried out by various methods, which have different sensitivity, specificity, and costs in clinical practice. Anthropometry and Body Mass Index (BMI) do not, in the end, however, specify actual malnutrition.

Introduced by Professor Elia, MUST (Universal Screening Tool Malnutrition) allows one to not only assess the degree of malnutrition, but also the risk of malnutrition, and is a widely used scale [9]. Today, the most well-known application is the SGA scale (Subjective Global Assessment) and PG-SGA scale (Patient-Generated Global Assessment Subjective), which is adapted to the needs of the patients, are characterized as being shorter and quicker compared to MUST, and the questionnaire allows for easier detection of malnutrition and determining the prognostic value in patients with cancer [10–12]. The Nutritional Risk Index (NRI), based on an assessment of the level of the serum albumin and weight loss in the last period [13], which is preliminary, is a simple, approximate assessment of the risk of malnutrition.

The aim of this study was to assess the state of nutrition of patients diagnosed with esophageal cancer treated at the Department of Gastrointestinal and General Surgery, Wroclaw Medical University from March 2009 to February 2010.

Material and Methods

The study included 60 patients with histologically confirmed cancer of the esophagus and cardia cancer in different stages before an operation. In all patients, the main symptom was dysphagia. The study group consisted of 50 men and 10 women (Tables 1, 2) at the age of 39 to 86 years (median age 62.5).

Nutritional status was evaluated on the basis of the following indicators: percentage weight loss (MC), the level of total protein and albumin serum level, total lymphocyte count in 1 mm^3 of peripheral blood, and body mass index (BMI). The data contained in the SGA questionnaire and the recommendations of the Polish Society of Parenteral and Enteral Nutrition allowed authors to assume that weight loss exceeding 5% is an indicator of malnutrition.

Body mass index (BMI) was calculated according to the pattern of the patient BMI [kg/m^2] = = body weight (kg)/height (m^2). Clinical data, including the height and weight were obtained from an interview. The number of cells in 1 mm^3 of peripheral blood was calculated by the formula: CLL = % X number of lymphocytes/100. In this work, the following surveys were used: the t test for single samples and the t test for independent samples, using STATISTICA 9.0.

Results

In the group of 60 patients, the percentage of men with esophageal cancer was statistically significantly higher compared with women (83.3% men vs. 16.6% women, $p = 0.027$ (Tables 1, 2).

Taking into account the BMI, malnutrition was found in 22 out of 60 respondents (BMI kg/m^2 < 20, Tab. 3). The state of malnutrition based on the value of total protein in serum (< 6.2 g%) characterized a similar number of patients studied as BMI (23 vs. 22 persons). However, malnutrition based on the value of serum albumin (< 3.5 g%)

Table 1. Characteristics of the study group for age and sex

Tabela 1. Charakterystyka badanej grupy chorych pod względem wieku i płci

Age (Wiek)	20–29	30–39	40–49	50–59	60–69	70–79	> 80	Percentage (Odsetek) %
Men (Mężczyźni)	0	1	4	16	21	7	1	83.3
Women (Kobiety)	0	0	0	2	4	2	2	16.6
Median age (Mediana wieku)	–	39	44	56	64	75	84	X

Male percentage/female percentage – p = 0.027.
Odsetek mężczyzn/odsetek kobiet – p = 0,027.

Table 2. Characteristics of the study group for age, gender and underlying diseases

Tabela 2. Charakterystyka badanej grupy chorych pod względem wieku, płci oraz choroby zasadniczej

	20–29	30–39	40–49	50–59	60–69	70–79	> 80
Men – ca oesophagi + ca cardiae (Mężczyźni)	–	0 + 1 = 1	2 + 2 = 4	13 + 3 = 16	19 + 2 = 21	5 + 2 = 7	0 + 1 = 1
Women – ca oesophagi + ca cardiae (Kobiety)	–	–	–	2 + 0 = 2	2 + 2 = 4	2 + 0 = 2	2 + 0 = 2

Table 3. Nutritional status in the study group on the basis of BMI

Tabela 3. Stan odżywienia w badanej grupie chorych na podstawie BMI

Nutritional status (Stan odżywienia)	BMI kg/m^2	Men – ca oesophagi + ca cardiae (Mężczyźni)	Women – ca oesophagi + ca cardiae (Kobiety)
Extreme obesity (Otyłość olbrzymia)	> 40	–	–
Obesity (Otyłość)	30–39.9	–	1 + 0 = 1
Overweight (Nadwaga)	25–29.9	7 + 3 = 10	1 + 1 = 2
Normal body weight (Prawidłowa masa ciała)	20–24.9	15 + 7 = 22	3 + 0 = 3
Risk of malnutrition (Niedowaga)	18–19.9	11 + 0 = 11	1 + 0 = 1
Malnutrition – appropriate nutritional therapy (Wychudzenie – zalecane leczenie żywieniowe)	17–17.9	1 + 1 = 2	–
Severe malnutrition – needed nutritional therapy (Wygłodzenie – potrzebne leczenie żywieniowe)	< 17	5 + 0 = 5	2 + 1 = 3

was found in a group of 44 people, which is twice the size of the group based on BMI. When based on the total number of lymphocytes in the peripheral blood of < 1500, malnutrition characterized a group of 33 patients, a larger group than BMI (33 vs. 22 persons) (Table 4).

Based on the statistical methods shown, BMI is not a good indicator of malnutrition in the study group ($p < 0.05$). In relation to the value of albumin, p was < 0.05 and thus this value cannot be a good indicator of malnutrition. However, in relation to total protein concentration and for both CLL cases, the p value was above 0.05 and so it was statistically significant.

Discussion

Already in the thirties of the last century, attention was paid to the problem of malnutrition in patients in hospital wards. The authors found a significant correlation between the nutritional status of patients and an effective treatment process. Today it is widely known that it is very impor-

Table 4. Characteristics of the patients with malnutrition based on the level of lymphocytes, the level of albumin and total protein, and the percentage of weight loss

Tabela 4. Charakterystyka grupy chorych z niedożywieniem na podstawie stężenia limfocytów, albumin i białka całkowitego oraz odsetek utraty masy ciała

Indicators of malnutrition (Wskaźniki niedożywienia)	Men with esophageal cancer (Mężczyźni chorzy na raka przełyku)	Men with cardia cancer (Mężczyźni chorzy na raka wpustu)	Women with esophageal cancer (Kobiety chore na raka przełyku)	Women with cardia cancer (Kobiety chore na raka wpustu)	Total (Suma)
Albumin < 3.5 g% (g/dl)	28	9	6	1	44
CLL < 1500	20	8	4	1	33
Total protein < 6.2 g% (g/dl)	11	7	4	1	23
Percentage of weight loss > 5%	17	1	3	1	22

tant in patients operated on, in particular, because of cancer. Currently, it is assumed that weight loss reaching more than 10% is a bad prognostic factor in cancer [7, 8].

Malnutrition increases the number of postoperative complications in the form of clinically abnormal suppuration of wounds, anastomotic leakage and fistula formation and thus significantly lengthens the healing process and the patient's stay in the ward. In addition, it adversely affects the quality of life of patients and, which is also very important, significantly increases the cost of treatment [14, 15].

Given the fundamental importance of malnutrition, many scientific institutions have initiated an investigation on finding appropriate indicators for assessing nutritional status. There are many views on this subject. According to some authors, a reliable indicator is the determination of the total number of lymphocytes, the rate of creatinine and anthropometry [16–18].

According to other authors, determining BMI, an indication of the level of albumin in serum and the declaration of weight loss above 5% is just as reliable [19–22]. Careful analysis of the work presented by different authors, however, does not give a definite answer which of these indicators is most relevant for assessing nutritional status.

For the assessment of malnutrition in described patients, the authors have relied on four indicators: BMI, levels of albumin, total protein and total lymphocyte count (CLL). For the analysis of the above indicators, the t test was for single samples and t test for independent samples were used (STATISTICA 9). Statistical significance ($p > 0.05$) was shown in the value of total protein and total lymphocyte count (CLL). However, BMI and albumin levels in this study were not statistically significant ($p < 0.05$). These results appear to be consistent with the work of other authors on malnutrition [23–27].

According to them, BMI is only used for the classification of body weight and to determine the degree of obesity, and the level of albumin indicates more about the severity of the disease and the state of hydration than the state of malnutrition of the patient [28].

In authors of the current study opinion, malnutrition is a complex process that consists of many factors. Essential to this process is the severity and nature of the disease, its course, length of stay as a hospital patient, treatment and possible complications. The assessment of nutritional status should therefore be carried out very carefully based on the largest possible number of indicators. The level of total protein and total number of lymphocytes (CLL), as is clear from our study, could be an early, landmark indicator of malnutrition in the patient.

On this basis, one can quickly isolate a group of malnourished patients, first requiring a widening range of investigation on the type of malnutrition, but also to guide the proper nutritional therapy.

The authors concluded that the total protein level and the total number of lymphocytes (CLL) are good, early and indicative measures of malnutrition cases. The assessment of malnutrition should be carried out using as many methods as are available.

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