THE RELATIONSHIP BETWEEN QUALITY OF LIFE IN SARCOPENIA AND SKELETAL MUSCLE INDEX IN PATIENTS WITH ADVANCED LUNG CANCER

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Abstract

Introduction. Today the relevance of sarcopenia is increasing in various types of malignant neoplasms.This syndrome is most common in patients with advanced forms of cancer and can adversely affect survival, treatment outcomes, and functional status. The prevalence of sarcopenia in patients with lung cancer is higher than in other types of malignant tumors. To understand the relationship between sarcopenia and quality of life is especially important for patients with advanced cancer. **Aim**. To assess the relationship between skeletal muscle index (SMI) and quality of life in sarcopenia in patients with advanced lung cancer. **Materials and methods.** A prospective analysis was carried out of 28 patients with advanced lung cancer who have applied to the "ONCOLIFE" Medical Center since the beginning of 2021. All patients had sarcopenia on CT scan. Skeletal muscle cross-sectional area analyzed using software ImageJ (National Institutes of Health, Bethesda, MD, USA). To determine the quality of life in sarcopenia a questionnaire SarQoL was used. Pearson's correlation analysis was used to assess the correlation between quality of life and SMI. **Results.** Pearson's correlation analysis showed a statistically significant positive correlation between quality of life and SMI ($r = 0,451$, $p = 0,016$, N=28). Body mass index

(BMI) positively correlated with quality of life (r = 0,398, p = 0,036, N=28), and age negatively correlated with SMI (r = -0,391, p = 0,040, N=28). There was no statistically significant correlation between indicators such as BMI and SMI, as well as age and quality of life. **Conclusions.** Quality of life in sarcopenia statistically significantly correlates with SMI in patients with metastatic lung cancer. Early diagnosis of sarcopenia is essential for timely prescription of treatment aimed at maintaining and better muscle mass, which can improve cancer patients quality of life.

Key words: **lung cancer patient; quality of life; skeletal muscle index.**

Introduction

Today the relevance on sarcopenia is increasing on various types on malignant neoplasms [1]. Sarcopenia is characterized by progressive degeneration of skeletal muscle [4]. Sarcopenia is now known as a geriatric syndrome with decreased muscle mass, strength, and physical performance [4]. This syndrome is most common in patients with advanced forms of cancer and can adversely affect survival, treatment outcomes and functional status [2]. Globally, lung cancer remains the leading cause of morbidity and mortality from malignant tumors [6]. The prevalence of sarcopenia in patients with lung cancer is higher than in other types of malignant neoplasms [7]. According to the international consensus on the definition and classification of cancer cachexia, computed tomography (CT) is an important diagnostic method for assessing sarcopenia due to the quantification of muscle mass [3]. Skeletal muscle index (SMI)thresholds are <55 cm^2/m^2 for males and <39 cm^2/m^2 for females [3].

However, the relationship between the indicators of sarcopenia determined by CT and the subjective data of patients with malignant neoplasms remains poorly understood [2]. The development of sarcopenia contributes to the loss of regulation of inflammatory and metabolic pathways, which results in the development of systemic cytokine-mediated inflammation [5]. As a result, this leads to a poor quality of life for patients [5]. This emphasizes the importance of diagnosis and timely treatment of this syndrome. It should be noted that the gradual development of sarcopenia and erased symptoms can lead to late detection of severe muscle loss, when interventions aimed at support and improvement will not bring positive results. Thus, understanding the relationship between sarcopenia and quality of life is especially important for patients with advanced cancer.

Aim. To assess the relationship between skeletal muscle index and quality of life in sarcopenia in patients with advanced lung cancer.

Materials and methods. A prospective analysis was carried out of 28 patients with advanced lung cancer who have applied to the "ONCOLIFE" Medical Center in 2021. All patients had sarcopenia on CT scan. Patients gave written informed consent to participate in the study. All patients are indicated for palliative polychemotherapy (PCT).

Inclusion criteria are: Stage IV lung cancer confirmed by TNM according to the 8th edition of the American Joint Committee on Cancer; age over 40; Eastern Cooperative Oncology Group (ECOG) status ≤ 1.

Exclusion criteria: presence of concomitant severe decompensated pathology; patients with other types of malignant tumors.

CT is the main method for diagnosing lung cancer and assessing response to treatment [9]. CT images of the third lumbar vertebra (L3) are linearly related to total body muscle mass [9].This diagnostic method detects low muscle mass in patients with normal body weight or obesity [9].

Before PCT all patients underwent CT scan of the chest, abdomen and small pelvis with intravenous contrast. CT scans were analyzed using software Image J (National Institutes of Health, Bethesda, MD, USA).The cross-sectional area of skeletal muscle was quantified from images on the L3 [8]. Threshold values of Hounsfield units (HU) for muscle tissue, defined in the range from -29 to +150 HU (Figure 1).
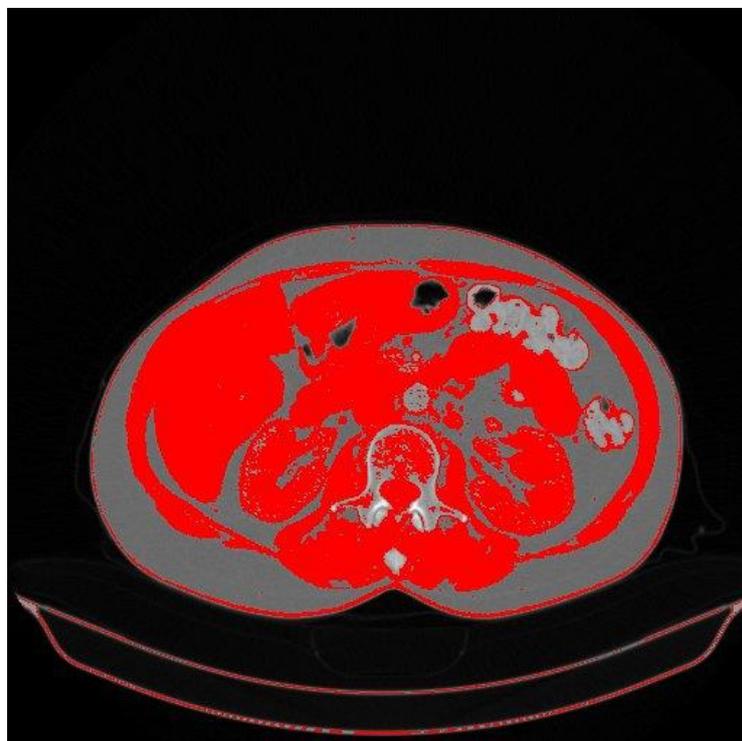

Fig. 1.CT-defined sarcopenia (skeletal muscle HU range -29, +150)

The cross-sectional area of skeletal muscle (cm^2) (the difference between the outer contour, the inner contour and the area L3) was normalized for height by dividing by the square of the height (m^2) and expressed as the SMI (sm^2/m^2) [8].

SarQoL questionnaire

The SarQoL Universal Questionnaire is a questionnaire for patients with sarcopenia syndrome [10]. The interpretation of the SarQoL questionnaire is based on an assessment of the quality of life in sarcopenia, which is on a scale from 0 to 100, where 0 is the worst quality of life, and 100 is the best quality of life. The use of the SarQoL questionnaire is recommended for clinical and scientific purposes [11]. This questionnaire can serve as a criterion for the effectiveness of the treatment.

Statistical analysis

Statistical processing of the results was performed with the program Statistica for Windows 13 (StatSoft Inc., No JPZ804I382130ARCN10-J). The normality of the distribution of indicators was checked by the Shapiro–Wilk test. Pearson's correlation analysis was used to assess the correlation between the two continuous variables. The statistically significant level was determined by the values $p < 0.05$.

Results

The number of patients with sarcopenia and stage IV lung cancer was n = 28. Of these, there were 21 men and 7 women. The average age of patients - 62 y.o. The median quality of life and SMI scores were 72.41 and 42.27, respectively. The average body mass index (BMI) was 25.92.
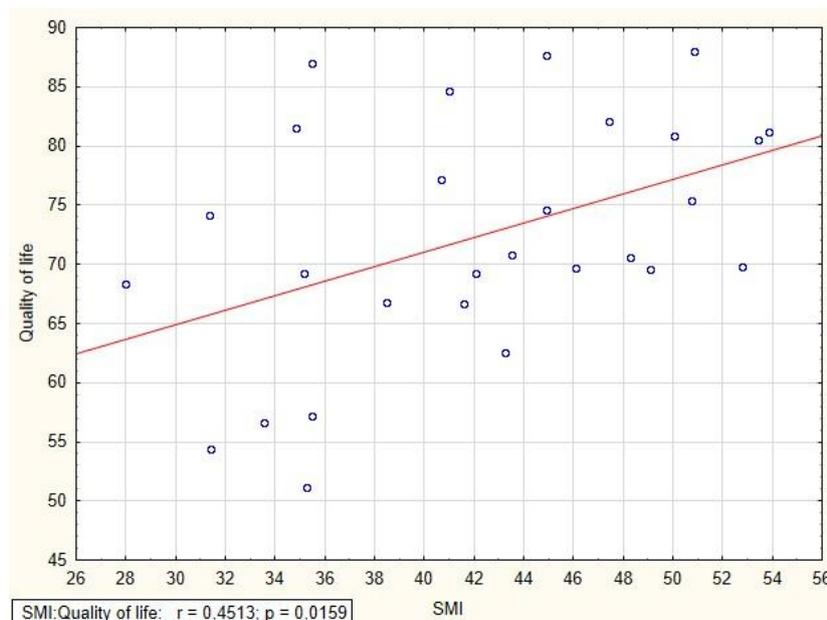

Fig. 2. Correlation between quality on life and SMI

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Pearson correlation analysis showed statistically significant positive correlation between quality of life and SMI (r = 0,451, p = 0,016, N=28, figure 2).

BMI positively correlated with quality of life (r = 0,398, p = 0,036, N=28) and age negatively correlated with SMI (r = -0,391, p = 0,040, N=28). There was no statistically significant correlation between indicators such as BMI and SMI, as well as age and quality of life (Table 1).

Table 1

Pearson correlation analysis

	SMI		Quality of life	
	r	p	r	p
Quality of life	0,451	0,016	–	–
SMI	–	–	0,451	0,016
BMI	0,105	0,595	0,398	0,036
Age	-0,391	0,040	-0,098	0,619

Abbreviations: SMI - skeletal muscle mass index; BMI - body mass index

Discussion

Recently, the influence on sarcopenia on oncology is gaining more and more interest [12]. The number on randomized controlled trials aimed at the treatment on sarcopenia is growing steadily around the world [13]. There is a negative effect on low muscle mass on overall survival among various types on malignant neoplasms [12].

Functional status has strong prognostic value and is on important predictor on acute toxicity associated with anticancer treatment [14]. However, additional factors are

Also needed to assess the possible risks on chemotherapy treatment.

The results of this prospective study show a statistically significant relationship between quality of life and SMI. Understanding this relationship may open up new opportunities for targeted treatment of sarcopenia to improve clinical outcomes in patients with malignant neoplasms.

Therefore, sarcopenia is an important predictor of treatment tolerance and survival in cancer patients, especially those with metastatic disease. Early diagnosis and multimodal treatment are on on the modern trends on minimizing the negative impact on sarcopenia on patients with malignant neoplasms [5].

Thus, further research is needed to diagnose sarcopenia in a timely manner and prescribe the correct treatment in order to maintain and improve both muscle mass and the quality of life in cancer patients.

Conclusions

1. Quality of life in sarcopenia statistically significantly correlates with skeletal muscle index in patients with metastatic stage of lung cancer.

2. Early diagnosis of sarcopenia is essential for the timely prescription of treatment aimed at maintaining and improving muscle mass, which can improve the quality of life of cancer patients.

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