Editorial

Sarcopenia is a potential factor for optimized treatment selection for elderly patients with early stage non-small cell lung cancer

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Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass (SMM) and strength with a risk of adverse outcomes such as physical disability, poor quality of life, and death by the European Working Group on Sarcopenia in Older People (EWGSOP) (1). Iannuzzi-Sucich *et al.* measured the prevalence of sarcopenia in 337 healthy elderly people aged 64–93 years (2). In the overall cohort, 23% of women and 27% of men were diagnosed with sarcopenia. In subgroups comprising women and men aged ≥80 years, the prevalence rates increased to 31% and 53%, respectively. Sarcopenia is primarily associated with aging, but there are other causative factors, including low physical activity, malnutrition, advanced organ failure, and malignancy. As high as 47% of patients with locally advanced or recurrent non-small cell lung cancer (NSCLC) have been reported to have sarcopenia (3).

In the field of oncology, several researchers have evaluated the negative impact of sarcopenia on posttreatment survival. Shachar *et al.* reported the association of low skeletal muscle with worse survival in their meta-analysis of 38 studies that included various cancers (4). Patients with sarcopenia have a worse prognosis compared with those without sarcopenia after surgical resection of lung cancer. Deng *et al.* recently conducted a systematic review that evaluated the impact of sarcopenia on long-term survival of patients with surgically treated NSCLC (5). Their meta-analysis of 6 relevant studies showed a significant difference in 5-year overall survival between patients with and without sarcopenia. The difference was more prominent in patients with early stage NSCLC. The 6 studies included various types of surgical procedures including wedge resection, segmentectomy, lobectomy, bi-lobectomy, and pneumonectomy. Lobectomy is the standard treatment for early stage NSCLC. However, data specific to lobectomy patients and sarcopenia have not been available. Fintelmann *et al.* have recently evaluated sarcopenia in patients who were treated with lobectomy (6), which this editorial introduces.

Fintelmann *et al.* performed a retrospective study of 135 patients who underwent lobectomy for NSCLC. They measured cross-sectional area (CSA) of skeletal muscle at the level of the fifth thoracic vertebra (T5) on computed tomography (CT). Patients were divided into low and high SMM groups according to the sex-specific median of the CSA. Patients with low SMM were significantly older than those with high SMM. No perioperative or 30-day deaths were observed in either group. The low SMM group showed significantly higher incidence of postoperative complications, longer length of hospital stay, and a higher rate of re-admission. The skeletal muscle CSA at T5 was the most dominant factor for the development of postoperative complications among the known predictive factors including age, sex, pulmonary function, body mass index, and surgical approach. The authors concluded that low thoracic SMM is an independent factor associated with increased postoperative complications and health care utilization in patients treated with lobectomy for lung cancer. They suggested that SMM can be utilized as a predictor of postoperative complications complementary to the existing predictive factors.

The strong points of Fintelmann's paper are that they revealed an impact of sarcopenia specifically in patients who underwent lobectomy, as described above, and that measurement of SMM was performed via thoracic CT, which is routinely performed in patients with lung cancer. Most published papers on sarcopenia measured CSA of the psoas muscle or whole skeletal muscle at the level of the third lumber vertebra (L3), which may need an additional CT scan of the abdomen. Regarding weakness of the paper, I have a concern about their measurement method for the CSA of the skeletal muscle at T5. The CSA of SMM around the scapula may vary depending on position of the arms. Other concerns about the statistical analysis were raised in the accompanying commentary (7). However, despite these issues, the paper by Fintelmann *et al.* is valuable in revealing that sarcopenia measured on thoracic CT helps predict postoperative events.

Non-cancer mortality is among the issues in elderly patients who undergo surgery for NSCLC. Eguchi *et al.* reported that non-cancer mortality was the leading cause of death within 1.5 years after surgical resection of stage I NSCLC in patients aged 65 years or older (8). The impact of noncancer-specific, early phase mortality was expressed as a function of age. As indicated in Fintelmann's paper, sarcopenia is associated with postoperative complications. Future studies are warranted to investigate which is the dominant factor for non-cancer early phase mortality: sarcopenia or age.

Stereotactic body radiotherapy (SBRT) is a less-invasive treatment alternative to surgery in patients with early stage NSCLC. Choosing between SBRT and surgery for patients at high risk of surgery-related complications is still controversial. Due to difficulties in conducting a randomized controlled study, several authors compared SBRT and surgery using propensity-score-matched cohorts. According to a meta-analysis of 16 studies with propensity score matched by Chen *et al.* (9), better overall survival was seen after surgery compared with SBRT for patients with early stage NSCLC. However, lung cancer-specific survival was similar for both SBRT and surgery. A study based on the National Cancer Database in the US revealed that the mortality rate during the early phase after treatment is lower in patients who underwent SBRT than those who underwent surgery (10). Stokes *et al.* compared the 30- and 90-day posttreatment mortality rates between patients who underwent surgery and those who received SBRT for NSCLC. Differences in the posttreatment mortality rates increased as patient age increased. The largest difference in favor of SBRT was observed in patients aged 70 years or older. As in surgery, sarcopenia is associated with non-cancer mortality at long-term after SBRT. However, according to our previous study, non-cancer mortality during the early phase did not increase in sarcopenia patients (11). When considering early mortality, SBRT might be a more favorable treatment for elderly sarcopenia patients with early stage NSCLC.

Several issues remain to be solved in the research of sarcopenia and lung cancer. Consensus on the appropriate measurement method of SMM or on the threshold for low SMM is yet to be achieved. Rier *et al.* pointed this issue in their review paper on the prognostic value of low SMM in cancer patients (12). Although the total psoas CSA or the total abdominal muscle CSA at L3 is the most common index for the SMM measurement, the muscle site for measurement varied among studies. There are several thresholds used: the median, lowest tertile, or lowest quartile of the study population; optimal values determined for the study; or thresholds proposed by the International Consensus for Cancer Cachexia (13). Measuring skeletal muscle on CT is quite time-consuming; thus, sarcopenia is not routinely assessed before treatment of NSCLC. Most studies on sarcopenia evaluated only SMM, but not muscle function, although the EWGSOP recommends that the diagnosis of sarcopenia should meet both two criteria: low SMM and low muscle function. These issues should be cleared to accumulate evidence on the impact of sarcopenia in cancer patients.

In conclusion, sarcopenia is associated with postoperative complications in patients undergoing lobectomy for NSCLC. Less-invasive treatment such as SBRT can be an alternative to surgery in elderly NSCLC patients with sarcopenia.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

References

1. Cruz-Jentoft AJ, Baeyens JP, Bauer JM, et al. Sarcopenia: European consensus on definition and diagnosis: Report

of the European Working Group on Sarcopenia in Older People. Age Ageing 2010;39:412-23.
2. Iannuzzi-Sucich M, Prestwood KM, Kenny AM. Prevalence of sarcopenia and predictors of skeletal muscle mass in healthy, older men and women. J Gerontol A Biol Sci Med Sci 2002;57:M772-7.
3. Baracos VE, Reiman T, Mourtzakis M, et al. Body composition in patients with non-small cell lung cancer: a contemporary view of cancer cachexia with the use of computed tomography image analysis. Am J Clin Nutr 2010;91:1133S-7S.
4. Shachar SS, Williams GR, Muss HB, et al. Prognostic value of sarcopenia in adults with solid tumours: A meta-analysis and systematic review. Eur J Cancer 2016;57:58-67.
5. Deng HY, Hou L, Zha P, et al. Sarcopenia is an independent unfavorable prognostic factor of non-small cell lung cancer after surgical resection: A comprehensive systematic review and meta-analysis. Eur J Surg Oncol 2018. [Epub ahead of print].
6. Fintelmann FJ, Troschel FM, Mario J, et al. Thoracic Skeletal Muscle Is Associated With Adverse Outcomes After Lobectomy for Lung Cancer. Ann Thorac Surg 2018;105:1507-15.
7. Lu E, Colditz GA. Statistical Commentary. Ann Thorac Surg 2018;105:1515.
8. Eguchi T, Bains S, Lee MC, et al. Impact of Increasing Age on Cause-Specific Mortality and Morbidity in Patients With Stage I Non-Small-Cell Lung Cancer: A Competing Risks Analysis. J Clin Oncol 2017;35:281-90.
9. Chen H, Laba JM, Boldt RG, et al. Stereotactic Ablative Radiation Therapy Versus Surgery in Early Lung Cancer: A Meta-analysis of Propensity Score Studies. Int J Radiat Oncol Biol Phys 2018;101:186-94.
10. Stokes WA, Bronsert MR, Meguid RA, et al. Post-Treatment Mortality After Surgery and Stereotactic Body Radiotherapy for Early-Stage Non-Small-Cell Lung Cancer. J Clin Oncol 2018;36:642-51.
11. Matsuo Y, Mitsuyoshi T, Shintani T, et al. Impact of low skeletal muscle mass on non-lung cancer mortality after stereotactic body radiotherapy for patients with stage I non-small cell lung cancer. J Geriatr Oncol 2018;9:589-93.
12. Rier HN, Jager A, Sleijfer S, et al. The Prevalence and Prognostic Value of Low Muscle Mass in Cancer Patients: A Review of the Literature. Oncologist 2016;21:1396-409.
13. Fearon K, Strasser F, Anker SD, et al. Definition and classification of cancer cachexia: an international consensus. Lancet Oncol 2011;12:489-95.

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