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Analysis of muscle mass by computed tomography in patients with head and neck cancer: a prospective comparative study

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Introduction

Malnutrition is common in patients with head and neck cancer, and results in increased postoperative complications and length of hospital stay, decreased quality of life and higher mortality rates. Nutritional assessment is important for patients who are at nutritional risk and essential to determine a more appropriate nutritional therapy. The use of computed tomography (CT) to assess body composition has been recommended for cancer patients, as it allows the quantification of muscle mass, and this exam is already used in cancer management. The aim is to evaluate and compare the muscle mass of HNC patients during the preoperative period with CT, with an analysis of cross-sectional areas at the level of the third lumbar vertebra (L3) compared with evaluations at cervical (C3) and thorax (T4) levels.

Materials and Methods

Assessment of muscle mass by CT was performed during the pre-treatment period in coordination with exams for cancer staging. Anthropometric data such as weight, height, and body mass index (BMI) were also evaluated. 63 patients with head and neck cancer were evaluated in the preoperative period. Muscle mass was assessed through the L3-level on CT. Muscle mass area was corrected for height (muscle mass in cm^2/height in m^2) to calculate muscle mass index (MMI). For classification of muscle mass depletion, values of MMI <55 cm^2/m^2 for men, and <39 cm^2/m^2 for women, were used. For means of comparison with the muscle mass area of L3, muscle mass was evaluated at the C3 and T4 levels.

Results

Of the 63 patients included in this study, the majority were male (77.8%) and were aged between 26 years and 93 years (median, 58 y). Patients' body weights ranged from 46.2 kg to 125 kg (median, 68 kg). Half of the patients exhibited a normal BMI (50.8%). Analysis of muscle mass by CT at the L3 level showed wide variation between patients, with a median value of 130.7 cm^2. However, MMI was classified as inadequate in 73% of the patients. An analysis of the muscle mass areas of L3 and C3 showed a very strong correlation ($r = 0.831$; $p < 0.001$) (Figure 1). MMI between L3 and C3 also showed a strong correlation ($r = 0.781$; $p < 0.001$) (Figure 2). Furthermore, when the relation of muscle mass areas and MMI between L3 and T4 were analyzed, a strong correlation was observed between areas ($r = 0.763$; $p < 0.001$) and MMI ($r = 0.715$; $p < 0.001$), respectively (Figures 3 and 4)

Results

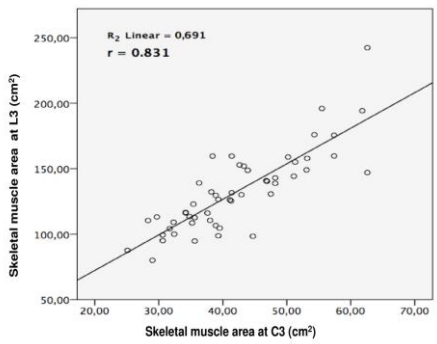

Figure 1 – The correlation between lumbar (L3) and cervical (C3) muscle mass area (cm^2). A positive relationship is presented ($r=0.831$, $p<0.001$).

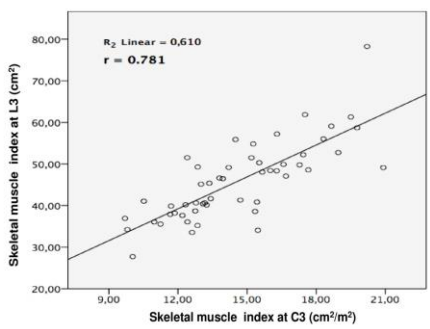

Figure 2 – The correlation between lumbar (L3) and cervical (C3) muscle mass index. A positive correlation was observed ($r=0.781$, $p<0.001$).

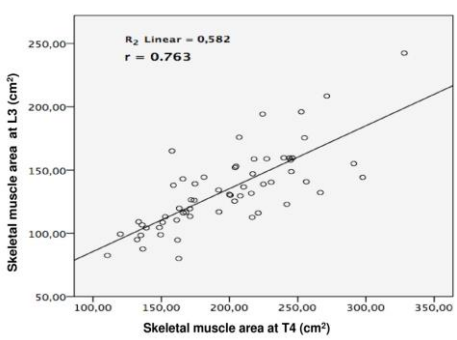

Figure 3 – The correlation between lumbar (L3) and thoracic (T4) muscle mass area (cm^2). A positive relationship is noted ($r=0.763$, $p<0.001$).

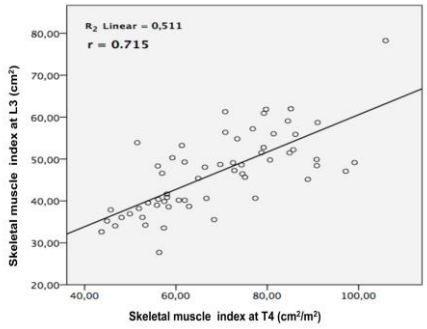

Figure 4 – Demonstrated the correlation between lumbar (L3) and thoracic (T4) muscle mass index. A positive correlation was observed ($r=0.511$, $p < 0.001$).

Conclusion

Low muscle mass is highly prevalent in patients with HNC. Analysis of C3 and T4 may represent alternatives to assess muscle mass in HNC patients.

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