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Original article

Sarcopenia and malnutrition in acutely ill hospitalized elderly: Prevalence and outcomes

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SUMMARY

Background & aims: Data about the prevalence of sarcopenia among hospitalized patients is lacking and it is unclear whether the diagnostic criteria commonly used in community-dwellers is applicable in acutely ill subjects.
The aims of this report are: (i) to assess the prevalence of sarcopenia among hospitalized patients; (ii) to assess whether the European Working Group on Sarcopenia in Older People (EWGSOP) criteria are applicable in an acute care setting; and (iii) to assess the mortality rate at 3 months.
Methods: 103 patients admitted to the Acute Geriatric Clinic were enrolled. Inclusion criteria were: age ≥65 years and malnutrition or risk of malnutrition, according to the Mini Nutritional Assessment Short Form. Sarcopenia was diagnosed using the EWGSOP criteria by means of bioimpedance analysis, handgrip strength and gait speed, within 72 h of admission. Information on deaths was obtained by telephone interview at 3 months following discharge.
Results: Sarcopenia was diagnosed in 22 patients (21.4%). Twenty-three patients (22.3%) were not able to perform the gait speed and/or the handgrip strength because bedridden or requiring intensive treatments. In this group, a definite diagnosis of sarcopenia was not possible, lacking at least one EWGSOP criteria. Eleven (10.7%) patients died within the 3 months post-discharge period. Kaplan–Meier survival curves showed that sarcopenic patients died significantly more frequently than others (log-rank $p \leq 0.001$).
Conclusions: In a population of hospitalized elderly malnourished or at risk of malnutrition, sarcopenia is highly prevalent and associated with an increased risk to die in the short-term. Furthermore, the EWGSOP criteria cannot be satisfactorily applied in a relevant proportion of patients.

1. Introduction

Sarcopenia is a loss of muscle mass and strength and/or reduced physical performance which is associated with an increased risk of incident disability, falls, all-cause mortality and increased healthcare costs [1–4]. Estimates of the prevalence of sarcopenia in older subjects worldwide vary from 3% to 30% according to the operational definition implemented and to the settings considered in the studies [5–7].

In 2010, the European Working Group on Sarcopenia in Older People (EWGSOP) has published a consensus definition based on the measurement of lean mass, grip strength and gait speed, stating that low lean mass and either low grip strength or slow gait speed are required to make the diagnosis [1]. One year later, the International Working Group on Sarcopenia (IWGS) suggested that a diagnosis of sarcopenia could be obtained on the basis of low gait speed and an objectively measured low muscle mass [8]. In the same year, another consensus conference [9] reinforced the same

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concept. It is therefore evident, from these definitions, that low gait speed is a key point for the diagnosis.

However, gait speed can be assessed only in specific patient populations; in fact, most studies investigated the prevalence of sarcopenia and its outcomes in community-dwelling subjects [3,10] or in patients with mild physical disability, but there are few data regarding the applicability of the international criteria in populations with major disability or with acute clinical illnesses. In literature, only two studies were conducted among hospitalized patients. Gariballa et al., [11] diagnosed sarcopenia on the basis of detection of low muscle mass (measured by mid-arm muscle circumference) and low muscle strength (using a handgrip dynamometer), but no tests of physical performance (such as gait speed) were included in the assessment. Rossi et al., [12] in a study on 119 acutely ill patients admitted to a geriatric unit, assessed sarcopenia using the EWGSOP criteria but gait speed test was possible only in little more than the half population.

Malnutrition is a common [13] geriatric syndrome which has been recognized as a risk factor for sarcopenia and frequently co-exists with it [14]. Like sarcopenia, malnutrition is associated with substantial adverse outcomes, affecting both the patient and the healthcare system, and including increased morbidity, mortality, rehospitalization rates and healthcare costs [15,16]. Nonetheless, there is no published data assessing the prevalence and the impact of the two associated conditions in patients in an acute hospital setting.

Therefore, we designed this study to investigate: a) the prevalence of sarcopenia; b) the applicability of EWGSOP criteria; and c) the impact of sarcopenia on 3-month survival in a population of elderly patients admitted to an Acute Geriatric Unit (AGU) with malnutrition or at risk of malnutrition.

2. Materials and methods

2.1. Setting

This was a prospective observational study of elderly inpatients (i.e. >65 years) consecutively admitted to the AGU of the S. Gerardo University Hospital, Northern Italy, between January and June 2013. The AGU is a 38-bed unit, staffed with specially trained nurses and geriatricians, has a nurse to patient ratio of 1:5 and a physician available 24 h a day. Patients selected for the AGU are elderly patients with reacutization of chronic critical illnesses, requiring frequent monitoring of vital signs and/or intensive interventions. The majority of AGU patients are generally admitted directly from the emergency department (90%), principal diagnoses including pulmonary diseases, cardiovascular diseases, cancer, acute cerebrovascular diseases, infections of the urinary tract, diabetes and dementia [17].

The Ethics Committee of the Milano-Bicocca University approved the study. We obtained an informed consent from all patients or their next of kin when the patients were not capable of giving informed consent due to severe cognitive impairment.

2.2. Selection of the sample

Participants were all patients consecutively recruited from inpatients admitted to the AGU between January and June 2013. Patients were eligible for inclusion if they were aged 65 years or older and had a diagnosis of malnutrition or risk of malnutrition, obtained by using the Mini Nutritional Assessment-Short Form (MNA-SF) [18]. The MNA-SF is a validated tool comprising 6 items from the full Mini Nutritional Assessment [19], which assesses: appetite loss and weight loss during the last three months, mobility problems, psychological stress or acute disease in the past three months, neuropsychological problems such as depression or dementia, anthropometric measures (body mass index in kg/m^2 or calf circumference in cm). A score ranging from 0 to 7 points means malnutrition; a score ranging from 8 to 11 points denotes risk of malnutrition, while a score ranging from 12 to 14 points denotes normal nutritional status.

Exclusion criteria were: (1) being moderately to severely drowsy or delirious on admission; (2) being bedridden for three months or more, (3) having end-stage malignancies, (4) having hyperpyrexia (temperature >38 °C) or hypothermia (temperature <36 °C) within the first 48 h following admission; and (5) having anasarca.

The flowchart of study participants is shown in Fig. 1. Of the 283 patients admitted to the AGU, 87 patients were not included because well nourished, according to MNA-SF, and 93 patients were excluded because they were delirious ($n = 50$), bedridden for at least three months ($n = 14$), or had end-stage malignancies ($n = 15$) and/or hyperpyrexia ($n = 2$); twelve patients were further excluded because of the presence of anasarca which obstructed the execution of BIA.

2.3. Comprehensive geriatric assessment

In the 48 h following hospital admission, all subjects underwent a Comprehensive Geriatric Assessment (CGA), including demographic, functional, cognitive, nutritional and global health status evaluation.

The functional status was assessed with the Katz's activities of daily living (ADL) [20], through patient and surrogate interview, referring to one month prior to admission and assigning a score of 1 for complete independence while 0 for dependence in each of the 6 basic ADLs (bathing, dressing, transfer from bed to chair, toileting, continence and feeding).

Comorbidity was assessed with the Charlson Comorbidity Index, a score that takes into account specific chronic conditions, which significantly impact on patients' survival [21].

Nutritional status was assessed using the MNA-SF, the albumin serum levels and the body mass index (BMI). BMI was defined as weight (kilograms) divided by the square of height (meters).

The modified-Richmond Agitation–Sedation Scale (m-RASS) [22] was used to assess patients' drowsiness or agitation. The m-RASS is a 10-point scale, which has been validated in medical units, assessing four levels of anxiety or agitation (restless, agitated, very agitated, combative), one level of normality, and five levels of sedation (drowsy, light, moderate, deep sedation, unarousable). Scores can range from +4 (combative, violent) to −5 (unarousable); a score = 0 denotes a patient alert and calm. A score of m-RASS <−1 was deemed to indicate drowsiness.

Delirium was diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revised (DSM-IV-TR) [23] criteria. The DSM-IV-TR criteria are widely accepted as the gold standard method when diagnosing delirium in geriatric and medical units.

2.4. Diagnosis of sarcopenia

For this study, we followed the criteria of the European Working Group on Sarcopenia in Older People (EWGSOP) [1]. According to their recommendation, diagnosis of sarcopenia in the present study sample required the documentation of low muscle mass plus the documentation of either low muscle strength or low physical performance.

Muscle mass was measured by bioelectrical impedance analysis (BIA). The BIA resistance (ohms, U) was obtained using a Quantum/S Bioelectrical Body Composition Analyzer (Akern Srl, Florence, Italy) with an operating frequency of 50 kHz at 800 mA. Whole-