Archives of Gerontology and Geriatrics 59 (2014) 39–43

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Sarcopenia, physical rehabilitation and functional outcomes of patients in a subacute geriatric care unit

Dolores Sánchez-Rodríguez [a,d,*], Ester Marco [b,d,e], Ramon Miralles [a,d], Mónica Fayos [b], Sergio Mojal [c], Martha Alvarado [b], Olga Vázquez-Ibar [a,d], Ferran Escalada [b,c,d], Josep M. Muniesa [b,c,d]

[a] Geriatrics Department, Parc de Salut Mar (Hospital de ÍEsperança, Centro Fòrum de ÍHospital del Mar), Barcelona, Catalonia, Spain
[b] Physical Medicine and Rehabilitation Department, Parc de Salut Mar (Hospital de ÍEsperança), Barcelona, Catalonia, Spain
[c] Institut Hospital del Mar dÍnvestigacions Mèdiques, Barcelona, Catalonia, Spain
[d] School of Medicine, Universitat Autònoma de Barcelona, Catalonia, Spain
[e] School of Medicine, Universitat Internacional de Catalunya, Catalonia, Spain

ARTICLE INFO

Article history:
Received 12 August 2013
Received in revised form 20 February 2014
Accepted 21 February 2014
Available online 1 March 2014

Keywords:
Geriatric rehabilitation
Elderly
Sarcopenia
Intermediate care
In-patient

ABSTRACT

Sarcopenia is the loss of muscle mass and strength, which in the elderly can result in disability and affect functional outcomes after hospitalization. The aim of this study was to evaluate the functional outcomes and mortality during hospitalization and at three months post-discharge, according to the presence of sarcopenia.

Prospective study of 99 patients (38.4% men, aged 84.6) admitted in a subacute geriatric care unit who underwent a rehabilitation intervention. Main outcomes were mortality and functional improvement at discharge and at three-month follow-up. Sarcopenia was assessed by handgrip strength (hydraulic dynamometer) and by body composition bioimpedance.

Forty-six (46.5%) patients met diagnostic criteria of sarcopenia. Patients with sarcopenia had a worse prior functional status than those without the condition (Barthel Index: 64.2 ± 22.8 vs 73.3 ± 21.8; $p = 0.04$) but both groups had similar functional decline at admission (Barthel Index: 24 ± 15.1 vs 28.5 ± 15.2; $p = 0.1$) and achieved similar functional improvement at discharge (20.4 ± 18.3 vs 27.4 ± 21; $p = 0.08$). Barthel Index at discharge remained comparatively worse in patients with sarcopenia (44.2 ± 26.6 vs 55.9 ± 26.7; $p = 0.03$). After completing a 3-month at-home rehabilitation program, no changes in functional capacity were observed in patients with sarcopenia; their peers improved their Barthel Index scores (45.5 ± 24.8 vs 61.6 ± 26.6; $p = 0.007$). Mortality rates at 3-month follow-up did not differ between groups.

In conclusion, patients with sarcopenia had a worse functional status, similar functional improvement during hospitalization and a lack of recovery after returning home. Further studies are needed to establish long-terms effects on mortality.

1. Introduction

Sarcopenia is currently defined as the loss of skeletal muscle mass and strength that occurs with advancing age (Cruz-Jentoft et al., 2010). This geriatric syndrome is progressive and widespread, and can lead to disability, hospitalization (Cawthon et al., 2009), worsening quality of life, and death (Cawthon et al., 2009; Cruz-Jentoft et al., 2010; Gariballa & Alessa, 2013; Lang et al., 2010; Reid, Naumova, Carabello, Phillips, & Fielding, 2008).

Although the prevalence of sarcopenia varies among different populations and measuring methods, recent reports range from 11% to 50% in people older than 80 years (Legrand, Vaes, Matheï, Swine, & Degryse, 2013; Morley, 2012). Patients with sarcopenia have greater disability and functional dependence compared to their peers without the condition (Janssen, Baumgartner, Ross, Rosenberg, & Roubenoff, 2004; Waters, Baumgartner, Garry, & Vellas, 2010). In an 8-year follow-up study, their risk of developing disability was 27% and the likelihood of disability was almost 80% greater in subjects with severe sarcopenia (Janssen, 2006).

* Corresponding author at: Centre Fòrum Hospital del Mar Llull 410, 08019 Barcelona, Spain. Tel.: +34 932483604; fax: +34 933268500.
E-mail address: 97662@parcdesalutmar.cat (D. Sánchez-Rodríguez).

http://dx.doi.org/10.1016/j.archger.2014.02.009
0167-4943/

To our knowledge, only one study has reported the association between sarcopenia and poor outcomes in hospitalized elderly patients. In this study, the length of stay was significantly longer in patients diagnosed with sarcopenia and the risk of non-elective readmission and mortality were higher than in those without this condition (Gariballa & Alessa, 2013). These data support the impact of sarcopenia on health-care costs (Janssen, Shepard, Katzmarzyk, & Roubenoff, 2004).

Elderly patients admitted to a subacute geriatric care unit have recently suffered an acute experience, generally have high comorbidity and medical complexity (Von Sternberg et al., 1997), and are admitted to receive rehabilitation therapy during a defined period of time (usually about two weeks) before a scheduled home discharge (Applegate et al., 1990; Pla Director Sociosanitari, 2006; Sabartés, Sánchez, & Cervera, 2009). At this level of hospital care, patients have functional limitations secondary to an acute medical or surgical intervention that are potentially reversible. During admission in the subacute geriatric care unit, patients are medically monitored and receive gait and occupational therapy related to basic activities of daily living (Makowski, Maggard, & Morley, 2000). These interventions are based on the principles of comprehensive geriatric assessment (Applegate et al., 1990).

The present study explored two hypotheses: (1) Sarcopenia may be present among patients in a subacute geriatric care unit, given that the population is elderly and has been admitted because of an acute functional decline; and (2) in this group of patients, there is a likely relationship between sarcopenia, disability and functional decline.

The objectives of the study were:

1. To determine the prevalence of sarcopenia in elderly patients admitted to a subacute geriatric care unit.
2. To evaluate the immediate impact of sarcopenia in daily clinical practice by establishing a relationship between sarcopenia and changes in the functional status at three months after discharge, following subacute rehabilitation and home-based care.
3. To define the relationship, if any, between sarcopenia and mortality at three-month follow-up.

1.1. Patients and methods

Design: Observational, prospective, follow-up study of a cohort of elderly patients admitted consecutively during the study inclusion period, January through August 2012. Inclusion criteria were admission to the subacute geriatric care unit for functional loss secondary to a non-disabling medical disease, aged 75 years or older, being ambulatory prior to hospitalization, and willingness to participate and to provide a signed informed consent.

Population: Elderly patients admitted to a subacute geriatric care unit in a university hospital in Barcelona (Catalonia, Spain). At time of admission, the patients were not diagnosed with disabling diseases that could directly affect muscle weakness (such as neurological diseases, hip fractures or amputations). The functional impairment was attributable to a recent medical process, such as respiratory or urinary infections, heart or renal failure.

Setting: The site was a subacute geriatric care unit offering post-acute hospitalization with a special emphasis on appropriate rehabilitation and optimal recovery (Applegate et al., 1990; Miralles, Esperanza, & Vázquez, 2005); this was followed by at-home care and rehabilitation services.

Measurements: The main outcome variables were those used for defining sarcopenia according to criteria of the European Working Group on Sarcopenia in Older People (EWGSOP), in which sarcopenia is determined by both decreased handgrip strength and loss of muscle mass (Cruz-Jentoft et al., 2010). Cut-off points of normality depend upon the measurement technique chosen and on the availability of reference studies. The EWGSOP report recommends the use of cut-off points available from the sarcopenia literature, based on normative populations when available and otherwise on predictive populations.

Handgrip strength, expressed in kilograms and in percentage of normal population, was measured by a hand-held dynamometer (JAMAR®, Nottinghamshire, UK) and the observed reading was compared with reference values (Luna-Heredia, Martín-Peña, & Ruiz-Galiana, 2005). Patients had to perform a maximum voluntary isometric contraction of finger flexor muscles. The highest value of three reproducible manoeuvres (<10% variability between values) was used for analysis. For the purpose of this study, values less than 60% of the reference data, adjusted for age and sex, were considered decreased. Lean and Fat Body Mass were measured by bioimpedance (Bodystat 1500, Bodystat Ltd, Isle of Man, British Isles) in kilograms and expressed as normal, low or high values according to normal values for the population by age, sex, height and weight. The Bodystat 1500 analyzer includes among its functions a range of normality adjusted for age and sex in geriatric population: Fat-free mass (FFM) (kg) = $(0.360 \times 10^4 \times H^2/R) + 0.359\mathrm{BW} + 4.5\mathrm{S} - 20T + 7.0$ where H is height (m), R is resistance (Ω), BW is body weight (kg), S is sex (females = 0; males = 1) and T is thigh circumference (m) (Deurenberg, van der Kooij, & Evers, 1990).

Other variables collected included age and sex; comorbidity assessed with the Charlson index (Charlson, Pompei, Ales, & MacKenzie, 1987) and average length of stay (including acute and subacute care unit). The Barthel Index (Granger, Albretch, & Hamilton, 1979), was used to assess functional status before hospital admission (by anamnesis, clinical interview with patients and confirmed by caregivers, medical records, and general practitioner as appropriate), at the time of transfer to the subacute care unit and again at discharge.

Functional changes, calculated by subtracting the Barthel Index at admission from the Barthel Index at discharge (BIdis–BIadm) (Ávila, Vázquez, & Baztán, 2000; Baztán et al., 2004; Castellano-Vela, Gómez-Pajares, Rochina-Puchades, & Gil-Egea, 2010) and mortality at three-month follow-up were also recorded.

Procedure: Within 72 h of admission, all patients were assessed by an interdisciplinary geriatric team, including an intervention plan for their specific needs. The rehabilitation specialist recommended an individualized physical therapy program to improve functional capacity and independence in mobility and basic activities of daily living. The rehabilitation program consisted of therapeutic exercises to maintain joint range of movement, endurance training to progressively increase muscle strength and tolerance to sitting in bedside chair, functional mobility training (bed mobility, transfers, sitting, standing) using adaptive equipment, as appropriate; and gait training with or without assistive devices (walkers, crutches, walking sticks). Patients were discharged on the basis of their clinical course, typically with ongoing, home-based physical therapy. After hospital discharge, all participants in this study continued receiving home-based physical therapy three times per week, in forty-minute sessions, depending on tolerance and collaboration levels.

At three months after discharge, patients were contacted by telephone for a clinical assessment in which an investigator blinded to the study recorded functional changes and adherence to rehabilitation (Korner-Bitensky, Wood-Dauphinee, Siemiatycki, Shapiro, & Becker, 1994; Korner-Bitensky & Wood-Dauphinee, 1995). Mortality was collected from medical records or caregiver telephone interview.

National and international research ethics guidelines were followed, including the Deontological Code of Ethics, Declaration of