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Editorial

Sarcopenia and Hip Fractures

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The global prevalence of sarcopenia is estimated to be between 7.5% and 77.6%. The prevalence largely varies according to the study characteristics ranging between 14 -33% in care facilities, 26% in spinal cord injuries and up to 78% in hospitalized patients with disability[1].

Approaches to defining sarcopenia remain controversial. The definition most cited today is that proposed by the European Working Group on Sarcopenia in Older People (EWGSOP), that has been updated in EWGSOP II in 2019. The EWGSOP II uses criteria to categorize each identified case as possible sarcopenia, established sarcopenia and severe sarcopenia based on: the presence of low muscle strength (criterion 1), low muscle mass (quality and quantity) (criterion 2), and low physical performance (criterion 3). The presence of criterion 1 identifies possible sarcopenia, criteria 1 and 2 confirm the diagnosis and if all 3 criteria are met sarcopenia is considered severe. This categorization is endorsed by several international scientific societies for clinical practice and research[2].

Many studies in the current literature present associations between revised definitions of sarcopenia and health complications such as functional decline, frailty, impaired quality of life, increased health care costs and mortality. Especially older adults suffering from sarcopenia are more than three times more likely to fall, regardless of age, sex, or comorbidities. Therefore, patients with hip fracture (especially older adults) are more likely to be sarcopenic[3,4]. Hip fracture is considered the most devastating among the fragility fractures, due to its unfavourable outcomes: reduced life expectancy with 8-36% increased mortality rate and reduced ability to function with approximately 10-20% of hip fracture survivors requiring long-term nursing home care, and only 40-70% fully regaining their preinjury level of independence[5].

When the decline of muscle mass and function following a hip fracture is not regained during recovery, the risk for recurrence of fall-related fractures will rise. Recent studies have shown an increased risk of a hip fracture of 40–60% with decrease in either muscle mass quantity (muscle cross-sectional area) or muscle quality (X-ray attenuation, echo intensity)[8,9].

Based on the current guidelines' sarcopenia diagnosis requires measurement of muscle strength, muscle mass, and physical performance[10], which may not be always feasible in hip fracture patients as mobility problems and pain limit this kind of assessment.

Within the EWGSOP II algorithm, the assessment of sarcopenia starts with a simple questionnaire for screening: SARC-F. In this questionnaire scoring ≥ 4 (to 10) can suggest sarcopenia[11]. However, this is not the case in hip fractured patients because these subjects are unable to perform some of the mobility tests, at least in the early rehabilitation phase of the hip fracture. Tests such as walking and climbing stairs are not possible due to difficulties in walking and balance. Diagnosis needs techniques such as handgrip strength, i.e. using a dynamometer, which is a validated and widely used method for measuring grip strength. Alternatively, without a measuring device strength could be assessed simply by measuring hand's fist, which is a subjective measurement because using this approach we are facing the problem of threshold, and the dependency of the test from motivation and possibility of pain for example due to osteoarthritis in hand. We also may face certain difficulties if the patient has cognitive impairment and may not be able to comply. However, measuring muscle strength is important because it defines possible sarcopenia (criterion 1 according to EWGSOP II). Other tests frequently used to assess muscle strength or physical performance (power) are Chair stands test (for criterion 1 in EWGSOP II), Walk test and Time up and Go test (for criterion 3,); again, these tests are not useful during the acute phase of hip fracture in the hospital.

The measurement of appendicular muscle mass through whole body composition analysis with dual energy x-ray

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absorptiometry (DXA) is the clinical gold standard to define sarcopenia The skeletal muscle index (SMI), a ratio from appendicular skeletal muscle mass (ASM) divided by height^2 is a valuable number to establish the thresholds of the disease[11]. The problem lies here in the lack of whole body DXA software in many hospitals, making a body composition assessment in a hip fractured subject almost impossible, at least in the early stages. Although new techniques are emerging for measuring muscle quality and quantity, such as musculoskeletal ultrasound, there is a lack of cut-off points for different populations, which means these methods are still under constant investigation, but are not yet ready for use in a clinical context.

One study using DXA body composition after hip fracture found a 9% decrease in lower extremity lean mass and 5% in total body, from 10 days to 4 months, and another one a 6% decrease in total body from 10 days to 2 months, respectively[12-14]. A follow-up study found no significant change between 3 and 10 days in total body lean mass[15]. These results may create a timeline of intervention no later than 10 days for at least 2 months during rehabilitation phase[16].

Notably, reduced measures of muscle mass may worsen the prognosis following hip fracture. The prognosis in men compared to women after a hip fracture is poorer. In men, lean mass declines at a higher rate before and after a hip fracture and this may partially explain higher post-fracture mortality rate in men[6,7]. The prognostic value of malnutrition in rehabilitation settings is also established, and is associated with functional decline, especially protein-energy malnutrition, worse functional status and poor recovery[17]. Absence of malnutrition and high muscle strength were significantly associated with higher odds of functional recovery after hip fracture. On the other side there was no association between high skeletal lean mass and function[18].

A report from the International Sarcopenia Initiative (EWGSOP and IWGS) concluded that essential amino acids, including 2,5gr of leucine, β-hydroxy β-methylbutyrate (HMB) and the increase of protein intake to 1,2 gr/kg/day, could improve the muscle parameters[19]. Furthermore, older people not only need more protein than young adults, but also these nutrition interventions – need a suitable timetable and could be more beneficial with the inclusion of personalized exercise programs[20].

Currently, the diagnosis and management of sarcopenia in hip -fracture patients are extremely challenging, as there are no standardized diagnostic guidelines and treatment protocols. Despite this, possibilities are being explored. As research in hip-fracture patients keeps growing, heterogeneity in studies may diminish and this will lead to a better understanding regarding sarcopenia in this population. In addition, it will allow us to design targeted intervention strategies, starting from prevention.

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