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Case Report

A Case Report of Probable Secondary Sarcopenia After Intensive Care Hospitalization

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Abstract

Malnutrition, inflammation, comorbid diseases, and inactivity are known causes of sarcopenia. It results in clinical consequences like fractures, falls, low quality of life, cognitive dysfunction, and mortality. Especially in the treatment of patients with prolonged immobilization syndrome, management should not only focus on functional limitations but patients should also be evaluated and followed up for sarcopenia. In this case report, we present the management of probable secondary sarcopenia in the intensive care unit as a result of urosepsis and discuss it in the light of the literature.

Keywords: Geriatrics, Immobilization syndrome, Intensive care unit, Malnutrition, Sarcopenia

Introduction

Sarcopenia was introduced to describe low muscle mass due to aging a few decades ago[1]. Over the years, the idea that muscle function is a better determinant has developed and physical performance and muscle strength have been added to the definition of sarcopenia[2,3]. In sarcopenia, also to low muscle strength, there is low muscle quantity and quality; poor physical performance is an indicator of severe sarcopenia. The disease is directly related to functional independency, hospitalization, prolonged hospital stay, and increased number of falls; and it causes depression, cognitive impairment, decreased quality of life, higher mortality, and excess medical payments[4]. This condition can be classified as primary or age-related sarcopenia and secondary sarcopenia. Sarcopenia is diagnosed as primary when there aren't other particular causes except aging. Secondary sarcopenia can be analyzed under 3 main headings; Activity-related sarcopenia (due to bed rest, sedentary lifestyle, loss of fitness), Disease-related sarcopenia (related to chronic illness, inflammation, malignancy), Nutrition-related sarcopenia (due to inadequate energy and/or protein intake, such as malabsorption, gastrointestinal disorders).

According to modern definitions, muscle strength, muscle quantity or quality and physical performance should be assessed to diagnose sarcopenia. Testing for sarcopenia is recommended both in elderly patients and in patients with markedly reduced physical performance. The European Working Group on Sarcopenia in the Elderly (EWGSOP2) uses low muscle strength as the main parameter of sarcopenia; muscle strength is currently the most reliable measure of muscle function. In particular, sarcopenia is probable when low muscle strength is detected. The diagnosis of sarcopenia is confirmed by the presence of reduced muscle quality or quantity. Sarcopenia is considered severe when low muscle quantity/quality, low muscle strength and low physical performance are found[5]. Diagnostic criteria for sarcopenia according to different guidelines are shown in Table 1. There are some problems in the diagnostic evaluation of ICU patients. If patients with sarcopenia are sufficiently orientated and co-operated in relation to age and disease status, muscle strength and physical performance can be assessed.

In this case report, we described a patient who underwent extracorporeal high-wave lithotripsy (ESWL) due to urolithiasis and was subsequently followed up in the

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	Low Muscle Mass	Low Muscle Strength	Low Physical Performance
EWGSOP2	ASM: M <20 kg, F <15 kg OR ASM/Height^2 M <7.0 kg/m^2, F <5.5 kg/m^2	Handgrip strenght: M <27 kg, F <16 OR Chair stand: >15 s	Gait speed: ≤0.8 m/s (4-m) OR SPPB score: ≤8 points OR TUG: ≥20 s OR 400 m walk: ≥6 min
SDOC		Handgrip strenght (absolute): M <35,5 kg, F <20 OR standardized to body weight/BMI	Gait speed ≤0.8 m/s (4-6-m)
AWGS	ASM/Height^2: M <7.0 kg/m^2, F <5.4 kg/m^2 OR BIA M <7.0 kg/m^2, F <5.4 kg/m^2	Handgrip strenght: M <28 kg, F <18	Gait speed: <1.0 m/s (6-m) OR 5-time chair stand ≥12 s OR SPPB ≤9

Table 1. Sarcopenia Diagnostic Criteria (EWGSOP2: European Working Group on Sarcopenia in Older People, SDOC: Sarcopenia Definitions and Outcomes Consortium AWGS: The Asian Working Group for Sarcopenia ASM: Appendicular Skeletal Muscle Mass, M: Male, F: Female, SPPB: The Short Physical Performance Battery, TUG: The Timed Up and Go Test, BMI: Body Mass Index, BIA: Bioelectrical Impedance Analysis).

Component	Question	Scoring	Pre-Rehabilitation	Post-Rehabilitation
Strength	How much difficulty do you have in lifting and carrying 5 kg?	None=0 Some=1 A lot or unable=2	2	1
Assistance in walking	How much difficulty do you have walking across a room?	None=0 Some=1 A lot, use aids, or unable= 2	1	0
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None=0 Some=1 A lot or unable without help=2	1	0
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None=0 Some=1 A lot or unable=2	1	1
Falls	How many times have you fallen in the past year?	None=0 1-3 falls=1 4 falls=2	1	1

Table 2. Pre and Post-Rehabilitation Scores in SARC-F Questionnaire.

intensive care unit (ICU) due to urosepsis. We present the diagnosis and treatment of missed diagnosis of probable secondary sarcopenia while focusing on internal and functional problems due to malnutrition and immobilization in the ICU, and discuss it in the light of the literature.

Case Presentation

A 65-year-old female patient with known hypertension and heart rhythm disorder applied to the urology clinic of our hospital with the complaint of right kidney pain. During the examination, a 12 mm kidney stone was detected in the right kidney's upper calyx, and a decision was made to apply ESWL. After ESWL, a urethral stent was placed to dilate the ureter, prevent stone obstruction, and facilitate its passage. After the procedure, the patient was admitted to the urology service for follow-up. On the 4th hour of the procedure, she developed general deterioration, nausea, and bloody vomiting. Due to simultaneous hypotension, tachycardia, and fever, she was admitted to the ICU for close monitoring with a preliminary diagnosis of urosepsis.

There was Staphylococcus hominis and Klebsiella pneumoniae growth in the patient's blood culture. Antibiotherapy (Meropenem 3x1gr, Teicoplanin 3x400 mg loading dose, followed by 1x400 mg maintenance dose) was started in consultation with the Infectious Diseases clinic. She was intubated on the 3rd day of ICU because of insufficient respiratory rate and depth. On the 5th day of ICU, the patient's need for inotropic medication developed, and ecchymotic areas were observed in the distal lower extremities. With the suspicion of circulatory disorder, the lower extremities were evaluated with Doppler USG, and vascular pathologies were excluded. Teicoplanin was stopped considering the known thrombocytopenic side effects. On the 10th day of ICU, the patient was extubated. She was transferred from the ICU to the urology service. Her antibiotic therapy was completed on the 14th day. She lost 8 kg during his stay in the intensive care unit. Her weight dropped from 65 to 57 kg. The Physical Medicine and Rehabilitation Department (PRM) was consulted by the urology service due to limitation of movement and functional disability.

During her clinical evaluation at the PMR Department; the patient was ambulated with a wheelchair, had difficulty in sitting and standing, and had weakness in handgrip strength. There were no any limitations in upper and lower extremities range of motion (ROM). In the manual muscle strength test, hip extension was 3/5, hip abduction was 3/5, and finger flexion and finger abduction were 3/5. The SARC-F questionnaire for suspicion of sarcopenia was administered, with a score of 6/10. She couldn't lift the 4,5 kg weight. SARC-F strength criterion score was 2. Assistance, Rise, Climb and Falls criterion scores were 1. She was able to do the 30-second sit and stand test 5 times. Jamar dynamometry handgrip strength was found to be 10kg. We considered the patient as probable sarcopenia. The patient underwent a 4-week intensive physical therapy program including ROM, strengthening, balance, coordination, and gait training exercises. A resistance exercise programme recommended for elderly adults with sarcopenia has been implemented. Exercise frequency was two sessions per week. Exercise intensity was 40–60% 1RM progressing to 70–85% 1RM (1RM, 1 Repetition Maximum: the maximal amount of weight that can be lifted for one complete repetition). Exercise volume was 3 sets of 10 repetitions. Rest period was 120 seconds between sets; 4 minutes between exercises. Occupational therapy methods were also used to improve hand functions. Nutritional arrangements were done under a dietitian's supervision. Adequate nutrient intake is important for muscle function. Protein and vitamin D are important for maintaining muscle function. 1.2 g/kg/day protein and 1000 IU/day vitamin D were given. Daily protein was distributed into all day meals.

It was observed that ecchymotic discoloration continued in the distal parts of bilateral lower extremities and d3-type necrosis developed in the 3rd toe of the right foot. A dermatology opinion was obtained for the necrotic area and hyperbaric oxygen therapy was recommended. After hyperbaric 02 treatment complete recovery was observed except for necrosis of the 3rd toe of the right foot.

At the pre-discharge examination, her lower extremity muscle strength was full and she could walk unassisted. The patient's SARC-F score was 3 and pre and post rehabilitation SARC-F scores are shown in Table 2. Her 30-second sit and stand test result was 10. Her hand grip strength was 12 and she continues to exercise. The patient was discharged with a home exercise program.

Discussion

In this article, we present the missed diagnosis of secondary sarcopenia and its importance in a patient who was intubated due to urosepsis and followed up in the ICU. Sarcopenia was ignored while focusing on the patient's other systems and functional problems. Therefore, to raise awareness, we discussed the diagnosis and importance of sarcopenia in the light of the literature.

Several studies have documented an association between sarcopenia and ICU. According to the study published by Kanova M et al. in 2022, similar to our study, nutrition and early rehabilitation were found to be effective in treatment and prevention[6]. In this prospective study by Mueller N et al. on critical surgical patients, sarcopenia and frailty were found to predict length of hospital stay as well as unfavourable discharge disposition[7]. In 2018, Toptaş M et al. showed that reduced skeletal muscle mass was a significant predictor of in-hospital mortality in a sample of patients admitted to the intensive care unit of a tertiary medical centre[8].

A meta-analysis published in 2022 analysed the impact of resistance exercise on elderly patients with sarcopenia. This study found, similar to our study, that resistance exercise can markedly improve muscle quality and muscle strength in older patients with sarcopenia.

Our case was characterised by prolonged hospitalisation, inflammation and insufficient energy and/or protein intake. We thought it was probably secondary sarcopenia and started treatment. Based on the literature, we predominantly performed resistance exercises under the supervision of a physiotherapist[9]. Studies have shown that if kidney function is normal and If there are no other contraindications, protein intake of 1.0 g/kg/day to 1.2 g/kg/day is recommended[10]. Vitamin D deficiency is related to sarcopenia and atrophy, especially in type 2 muscle fibres. Vitamin D replacement has been found to increase muscle strength, reduce falls and prevent fractures. This effect is evident with vitamin D replacement at a dose of 700-1000 IU/day[11].

Sarcopenia is likely to attract more attention as problems of the population ageing intensify. We aimed to ensure that secondary sarcopenia is taken into consideration and to emphasise the importance of resistance exercises, adequated nutrition. Further researches are needed to diagnose sarcopenia earlier in order to start treatment as soon as possible, especially in ICU patients.

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