Frailty and sarcopenia—from theory to practice

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ABSTRACT

Frailty and sarcopenia have emerged as important syndromes in geriatrics. Their impact is far reaching and are associated with many poor outcomes in older adults. Assessment of frailty and sarcopenia should form part of the assessment in older adults at all encounters between healthcare staff and older adults, coupled with comprehensive geriatric assessment. Early interventions are warranted based on existing consensus guideline recommendations. Recently, strict lockdown measures to protect at-risk groups during the coronavirus disease 2019 pandemic may have led to worsening of frailty and sarcopenia among older adults, owing to social isolation, reduced access to care, and physical inactivity. Assessment and prevention of frailty and sarcopenia are of particular importance during pandemics. Further study is warranted to find the best strategies for managing frailty and sarcopenia.

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Introduction

In recent years, frailty and sarcopenia have emerged as important syndromes in geriatrics. The aim of this article is to give a concise overview of these two syndromes and their evolving applications in clinical practice. Frailty and sarcopenia are closely connected, and there is a recent conceptualisation of merging the two conditions into a single clinical entity—physical frailty and sarcopenia syndrome.[1] For clarity, frailty and sarcopenia will be discussed separately in the present article.

Frailty

Definition

Frailty is "a biological syndrome of decreased reserve and resistance to stressors, resulting from cumulative decline across multiple physiologic systems, and causing vulnerability to adverse outcomes".[2] The prevalence of frailty varies depending on the definitions. In Hong Kong, in patients aged ≥65 years, the prevalence is reported as 7.9% for frailty and 50.6% for pre-frailty.[3] Frailty is more prevalent among women, poor socio-economic groups, and ethnic minorities.[4] Frailty-related adverse outcomes include falls, decreased mobility, decreased functioning, increased dependency, hospitalisation, institutionalisation, increased healthcare expenses, and even death.[5] Frailty is a poor prognostic factor for older patients with coronavirus disease 2019 (COVID-19).[6]

Ageing, sarcopenia, falls, polypharmacy, cognitive impairment, co-morbidities, endocrine disorders, poor oral health, malnutrition, cognitive frailty, social isolation, and poverty have been described as risk factors for frailty.[7] Since 2020, COVID-19 has been implicated as a new risk factor for frailty. Strict lockdown measures to protect older adults from COVID-19 often worsen frailty as they lead to social isolation, depression, malnutrition, reduced access to care, and physical inactivity.[8]

Frailty assessment

Detection of frailty helps to predict individual outcomes of interventions and facilitates better judgement for appropriate management and resource allocation.[9] At present, there is no robust evidence to support routine screening in the community.[10] Nevertheless, many professional bodies, including The British Geriatrics Society[11] and the Asia-Pacific Clinical Practice Guidelines for the management of frailty,[12] recommend assessment for frailty in all encounters between healthcare staff and older adults.[11]

Among the many frailty assessment instruments, no single tool can suit all situations. The Timed Up and Go test is an example of a single-item assessment tool.[13] Commonly used non–single-item tools include the Fried frailty phenotype, the frailty index, the FRAIL (Fatigue, Resistance, Ambulation, Illness, and Loss of weight) scale, and the Clinical Frailty Scale.[14] The choice of tool should be based on the population characteristics and the purpose of the assessment. For example, in primary care and specialist out-patient settings, the Timed Up and Go test or the Clinical Frailty Scale are suitable tools for assessing frailty as they are quick and simple to perform.[15] More robust tools, such as the frailty index, may be necessary for assessment before surgery. Because the risk factors are multifactorial, a comprehensive geriatric assessment should be coupled with frailty assessment to identify stressors

and drivers. In the United Kingdom, an electronic version of the frailty index has been developed, based on primary care data, including disease state, symptoms and signs, disabilities, and abnormal laboratory values.[16]

Clinical application of frailty assessment

Frailty assessment has been used in many clinical settings. In acute settings including acute and emergency, frailty assessment can facilitate treatment plan formulation, triage for hospitalisation or community support services.[17] In Hong Kong, the Geriatrics at Front Door programme was initiated by the Hospital Authority in October 2020. In this programme, geriatric evaluation and management nurses provide comprehensive geriatric assessment, including frailty assessment, for older patients in acute and emergency departments.[18] If the patients are deemed suitable to be discharged directly after being seen by doctors, the geriatric evaluation and management nurses also arrange subsequent community support and provide telephone follow-up appointments for the patients.

In critical care, for patients aged ≥65 years, frailty is a strong prognostic factor for death among patients with COVID-19.[19] In emergency settings, frailty assessment can help to predict the clinical risk of in-hospital death for patients with COVID-19 aged ≥80 years.[20]

Frailty assessment can facilitate personalised treatment for patients with chronic diseases. For example, treatment targets of diabetes can be based on the degree of frailty in older patients.[21] Assessment of frailty also allows identification of older patients in need of end-of-life care.[22] Frailty predicts poorer surgical outcomes including surgical complications, length of hospitalisation and mortality. Frailty assessment before surgery improves risk stratification and prediction of surgical outcomes. Frailty assessment enhances early interventions, including medication review, nutritional augmentation, and rehabilitation.[23] Frailty assessment also ensures that, after surgery, frail patients can be given targeted care to reduce the occurrence of pressure sore, delirium, dehydration, and immobility.

Management of frailty

Current evidence of the efficacy of the various interventions available is limited. Without firm evidence-based interventions, strategies to manage frailty are based on existing consensus guideline recommendations. For example, the Asia-Pacific Clinical Practice Guidelines for the management of frailty[12] recommends identification of frailty, an individualised physical programme with resistance training. Polypharmacy should also be addressed, as much research has linked frailty development with polypharmacy. This includes reviewing medications regularly and deprescribing those drugs which are no longer needed under the supervision of a healthcare professional.[24] The guideline also suggests screening patients for causes of fatigue, reviewing patients' nutritional status, and prescribing vitamin D for patients who are deficient.[12]

In addition to hospital-based assessment and interventions, prevention or reversal of frailty is also shifted to the community setting.[25] Individual home-based exercise and nutrition intervention are advocated to help pre-frail or frail older adults to improve frailty score and physical performance.[26]

At every stage, it is crucial to encourage the patient to participate in the care plan (if they are able to). Patients may perceive "frailty" as a negative term and many feel that once they become frail there is no potential to improve. Educating patients is essential, so they understand that frailty is often remediable, especially in its early stages. In mild to moderate stages, community rehabilitation can be helpful. In severe stages, once the comprehensive geriatric assessment clearly indicates that there are no remediable factors, the focus may shift to best supportive care and end-of-life care.[27]

Sarcopenia

Definition

Sarcopenia is defined as a syndrome characterised by progressive and generalised loss of skeletal muscle mass, strength, and function, with a risk of adverse outcomes such as physical disability, poor quality of life, and high mortality.[28] Sarcopenia can be categorised as acute (ie, appearing within 6 months in the setting of an acute disease or immobility such as hospitalisation) or chronic (ie, a chronic sarcopenic state lasting ≥6 months).[28] In Hong Kong, the prevalence of sarcopenia is reported to be 9% among those aged ≥65 years.[29]

Sarcopenia is caused by an imbalance between muscle protein anabolism and catabolism, leading

虚弱症和肌肉減少症：從理論到實踐

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虛弱症和肌肉減少症已成為老年病學中的重要綜合症。它們的影響是深遠的，並且與老年人的許多不良結果有關。當醫護人員與老人接觸，虛弱症和肌肉減少症應成為對老年人評估的一部分，並進行全面老年病學評估。根據現有的共識指南建議，早期干預是必要的。近年，2019冠狀病毒病大流行期間為保護高危人群而採取的嚴格封鎖措施，可能導致老年人因社會孤立、獲得護理的機會減少和缺乏身體活動使虛弱症和肌肉減少症惡化。在2019冠狀病毒病大流行期間對虛弱症和肌肉減少症的評估和預防尤為重要。有必要進一步研究以找到管理虛弱症和肌肉減少症的最佳策略。

to an overall loss of skeletal muscle.[30] Sarcopenia is associated with transition of type II muscle fibres to type I muscle fibres, and increased myosteatosis (intramuscular and intermuscular fat infiltration). Risk factors for sarcopenia include older age, lack of exercise, malnutrition, hormonal imbalance, cytokine disturbances coupled with inflammation, and genetic predisposition.[31]

Sarcopenia is categorised as primary and/or secondary based on aetiology.[32] Ageing contributes predominantly to primary sarcopenia. Secondary sarcopenia is caused by inactivity, malnutrition, and diseases such as advanced organ failure. Sarcopenia can undergo dynamic changes in which improvement or decline can occur with time.[33]

Screening for sarcopenia

The case-finding approach is the recommended screening method for sarcopenia.[34] Older patients with multiple co-morbidities (such as falls, weakness, decreased mobility and walking speed, difficulty rising from a chair, weight loss, decreased independence, and admission to a hospital or institution) should be assessed for sarcopenia and frailty. The five-times chair stand test is a simple tool that can be used for sarcopenia screening. The Asian Working Group for Sarcopenia recommends a cut-off of ≥12 s to stand up from sitting on a chair and sit down again 5 times as an indicator of sarcopenia.[34] The SARC-F (strength, assistance with walking, rising from a chair, climbing stairs, and falls) is a surrogate assessment tool, with a total score of ≥4 suggestive of sarcopenia.[35] A person may also be considered as "probable sarcopenia" if SARC-F is positive and handgrip strength is low (Asian Working Group for Sarcopenia criteria: <28 kg for men, <18 kg for women).[36] To confirm sarcopenia, further investigations such as dual-energy X-ray absorptiometry or bioelectrical impedance analysis may be needed to quantify the muscle mass and/or 6-m walk <1.0 m/s may be needed to assess performance. In clinical practice, the establishment of probable sarcopenia is usually adequate to trigger an assessment of causes and to start intervention.[33]

Sarcopenic obesity, sarcopenic dysphagia and osteosarcopenia

Sarcopenic obesity is the co-presence of sarcopenia and obesity and may produce a double metabolic burden, resulting in higher cardiovascular morbidity and mortality than either condition alone.[37] Dysphagia can be caused by sarcopenia of swallowing-related muscles.[38] The treatment of sarcopenic dysphagia requires resistance training of the swallowing muscles and nutritional intervention.[38] Patients with osteosarcopenia have a higher chance of falls and fractures than those with either osteoporosis or sarcopenia alone.[39]

Management of sarcopenia

For sarcopenia, the notion of "use it or lose it" applies. Management of sarcopenia typically involves resistance training coupled with nutrition supplementation, particularly protein. The recommended daily protein intake is 1 to 1.2 g/kg body weight, with 20 to 25 g of high-quality protein at each meal. Beta-hydroxy beta-methylbutyrate seems to be able to preserve or increase lean muscle mass and muscle strength in sarcopenic older adults.[40] Supplementation with leucine-enriched essential amino acids can improve physical function.[41] Deficiencies in vitamin D are linked with reduced physical functioning, frailty development, as well as falls and mortality.[42] Supplementation with 800 to 1000 IU vitamin D daily improves strength and balance in older adults.[43] Many new therapies for sarcopenia are in research and development. Selective androgen receptor modulators are of particular interest because of tissue selectivity.[44] It is hoped that androgen signalling with these agents can achieve gains in skeletal muscle and strength without dose-limiting adverse effects.

Summary

Frailty and sarcopenia are associated with many poor outcomes in older adults. Assessment of frailty and sarcopenia should form part of the comprehensive geriatric assessment. Early interventions are warranted and more research is needed to find the optimal management options for frailty and sarcopenia.

Author contributions

Both authors contributed to the drafting of the manuscript, and critical revision for important intellectual content.

Conflicts of interest

As an editor and an adviser of the journal, respectively, JKH Luk and DKY Chan were not involved in the peer review process.

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