Frailty

Pei Jun Zhao (Meds 2017), Stefan Rodic (Meds 2018)

Faculty Reviewer: Dr Laura Diachun, MD, FRCPC (Division of Geriatric Medicine)

INTRODUCTION

Frailty is a term often used by both medical experts and laymen, yet defining the concept proves to be more difficult. Frailty is not just aging, though its prevalence increases with age.¹ A person who is frail may show no symptoms of disease, no co-morbidity, nor disability, but is more susceptible to rapid decline in the event of illness. Then how do physicians track this condition and communicate accurately with colleagues? And what are the implications of frailty and its clinical significance?

In broad terms, frailty is a constellational phenomenon consisting of weakness, aging, declining physiologic reserve, and impaired cognitive capacity. This increased vulnerability from age-associated functional decline results in a reduced ability to cope with everyday or acute stressors.² Although loosely defined, frailty has been found to be a prognostic indicator of recovery after illness, hospitalization, and surgery.

DEFINITIONS

Currently, there are at least 27 different measurements of frailty described in literature, each with its own focus and advantages.³ Depending on the definition, the prevalence of frailty in people age 65 or greater is estimated to be around 10.7%.⁴ It increases with age and with chronic comorbid conditions. However, there is currently no consensus on a preferred definition. Here we introduce a few common ways that physicians characterize frailty.

The Frailty Phenotype (FP) is defined as having 3 or more of unintentional weight loss (≥ 10 lbs or 5% body weight per year), grip weakness (≤ 20 th percentile), exhaustion (self-reported), slow gait velocity (≤ 20 th percentile), and low physical activity (based on a questionnaire).⁵ It is shown to be an independent prognostic factor for falls, worsening activities of daily living, hospitalization, and death. While FP provides a concrete definition, some of its components such as grip strength measurement are more technical. Also, the physical activity questionnaire is time consuming, making FP less practical for routine clinical use.⁶ Since then, a variety of more clinically friendly tools have been developed.

One of these tools is the Clinical Frailty Scale (CFS). CFS evaluates the presentation of frailty on a scale of 1 to 7, taking into account mobility, assistive devices, energy level, comorbidities, physical activity, and functionality.⁷ A series of pictographs is even available to facilitate the diagnosis. A recent study assessed a group of seniors using both the CFS and the Frailty Phenotype, and concluded that the 2 tools have a high concordance.⁶

In general, a frailty assessment involves functional evaluation along with other indicators to form a comprehensive picture. The “timed up and go” test is a classic motor assessment that involves a patient rising from a seated position in a chair, walking 3 meters forward, turning around, then walking back to the chair and sitting

down.⁸ This test requires both static and dynamic balance and is closely related to mobility in everyday life. Moreover it is quick and can be easily included in the comprehensive geriatric exam.

Combining motor function and other indicators, a variety of frailty indexes have been proposed, including one outlined in the Survey of Health, Aging and Retirement in Europe (SHARE), a population-based longitudinal study. The criteria include reported fatigue, low appetite, weakness, observed gait (walking without help, with help, chair-bound, bed-bound, unobserved), and low physical activity. The SHARE frailty instrument also correlates with overall mortality.⁹

PATHOPHYSIOLOGY

One of the hallmarks of frailty is a decline in physiologic reserve. A number of systems are affected, such as the musculoskeletal, endocrine, immune systems, and the brain.¹⁰ Sarcopenia, for instance, directly contributes to the decline in functional ability.¹¹ In the endocrine system, changes in insulin-like growth factor (IGF), sex hormone, and cortisol secretion are also associated with frailty.¹² Cognitively, frailty is associated with a higher incidence of mild cognitive impairment in the elderly.¹³

Moreover, frailty is an inflammatory state.¹⁴ The frail elder has chronically elevated levels of inflammatory markers compared to robust older adults. Interleukin 6 and C-reactive protein are present in low grade inflammation, and are associated with morbidity in the geriatric population. But it is uncertain whether frailty leads to inflammation or vice versa. This inflammation leads to a catabolic state contributing to weight and muscle loss.¹⁵ Furthermore, antibody responses to vaccinations are reduced, leaving frail patients at an increased risk of contracting infections such as influenza.¹⁶

The causes of these physiological changes are complex. Frailty upsets the delicate balance of homeostasis, leading to loss of physiologic reserve. With more research into the pathophysiology of frailty, biological markers may potentially be combined with functional assessment to evaluate frailty in the clinic.¹⁷

IMPLICATIONS

Slow gait speed, low physical activity, weight loss, and cognitive impairment are associated with chronic disability, long-term nursing home stays, and mortality.¹⁸ Hospitalized patients who are frail have increased risk of developing delirium.¹⁹ Preoperative frailty is associated with higher postoperative complications, length of stay, and discharge to assisted-living facilities.²⁰ Kidney transplant recipients who are frail have delayed graft function.²¹ Thus, assessing frailty is important in planning elective procedures and during the course of hospital stay. It can also serve as a prognostic factor for expected patient recovery.

After a patient is recognized to have frailty, there are ways to slow its progression. Currently, medications and hormone supplementations are not recommended,²² but avoiding polypharmacy is frequently beneficial.²³ Interventions mainly involve lifestyle changes and supportive care.²⁴ For example, nutritional counselling and micronutrient supplementation can help maintain weight.²⁵ Resistance exercises can be prescribed to strengthen hips and knees.²⁴ Finally, home visits, social support, and outpatient care together construct a holistic patient centered environment for frail patients.²⁶

CONCLUSION

Frailty is an important condition affecting seniors, and contributes to morbidity and mortality during the course of medical care. There are many definitions of frailty. However, there is not yet a consensus for any single set of diagnostic criteria.²⁷ We must recognize that frailty is a complex medical condition. The various criteria assess this condition from different angles, such as muscle strength, cardiovascular status, and activities of daily living. Physicians need to weigh and balance these perspectives and keep in mind the larger picture when making clinical decisions for their patients, such as whether or not to perform elective surgery. In an aging population, physicians will be taking care of an increasing number of elderly patients. The recent increase in literature on frailty reflects its growing recognition and importance. Thus, an understanding and appreciation of the evaluation, impact, and management of frailty is critical to future health care in Canada and around the world.

REFERENCES

1. Ahmed N, Mandel R, Fain MJ. Frailty: an emerging geriatric syndrome. *Am J Med.* 2007;120:748.
2. Clegg A, Young J, Iliffe S, et al. Frailty in elderly people. *Lancet.* 2013;381:752.
3. Lee L, Heckman G, Molnar FJ. Frailty: Identifying elderly patients at high risk of poor outcomes. *Can Fam Physician.* 2015;61:227-31.
4. Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. *J Am Geriatr Soc.* 2012;60:1487.
5. Fried LP, Tangen CM, Walston J et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci.* 2001;56:M146-56.
6. Islam A, Muir-Hunter SW, Speechley M, Montero-Odasso M. Facilitating frailty identification: comparison of two methods among community-dwelling older adults. *J Frailty Ageing.* 2014;3:216-21.
7. Rockwood K, Song X, MacKnight C et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ.* 2005;173:489-95.
8. Podsiadlo D, Richardson S. The timed 'Up & Go': a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc.* 1991;39:142-8.
9. Romero-Ortuno R, Walsh CD, Lawlor BA, Kenny RA. A frailty instrument for primary care: findings from the Survey of Health, Ageing and Retirement in Europe (SHARE). *BMC Geriatr.* 2010;10:57.
10. Walston J, Hadley EC, Ferrucci L, et al. Research agenda for frailty in older adults: toward a better understanding of physiology and etiology: summary from the American Geriatrics Society/National Institute on Aging Research Conference on Frailty in Older Adults. *J Am Geriatr Soc.* 2006;54:991-1001.
11. Cruz-Jentoft AJ, Baeyens JP, Bauer JM, et al. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. *Age Ageing.* 2010;39:412-23.
12. Lamberts SW, van den Beld AW, van der Lely AJ. The endocrinology of aging. *Science* 1997;278:419.
13. Boyle PA, Buchman AS, Wilson RS, Leurgans SE, Bennett DA. Physical frailty is associated with incident mild cognitive impairment in community-based older persons. *J Am Geriatr Soc.* 2010;58:248-55.
14. Li H, Manwani B, Leng SX. Frailty, Inflammation, and Immunity. *Aging and Disease.* 2011;2:466-73.
15. Schaap LA, Pluijm SM, Deeg DJ, Visser M. Inflammatory markers and loss of muscle mass (sarcopenia) and strength. *Am J Med.* 2006;119:526.e9-17.
16. Yao X, Hamilton RG, Weng NP, et al. Frailty is associated with impairment of vaccine-induced antibody response and increase in post-vaccination influenza infection in community-dwelling older adults. *Vaccine.* 2011;29:5015.
17. De Martinis M, Franceschi C, Monti D, Ginaldi L. Inflammation markers predicting frailty and mortality in the elderly. *Exp Mol Pathol.* 2006 Jun;80(3):219-27.
18. Rothman MD, Leo-Summers L, Gill TM. Prognostic significance of potential frailty criteria. *J Am Geriatr Soc.* 2008;56:2211.
19. Eeles EM, White SV, O'Mahony SM, Bayer AJ, Hubbard RE. The impact of frailty and delirium on mortality in older inpatients. *Age Ageing.* 2012;41:412-6.
20. Makary MA, Segev DL, Pronovost PJ, et al. Frailty as a predictor of surgical outcomes in older patients. *J Am Coll Surg.* 2010;210:901.
21. Garonzik-Wang JM, Govindan P, Grinnan JW, et al. Frailty and delayed graft function in kidney transplant recipients. *Arch Surg.* 2012;147:190.
22. Walston JD. Frailty [Internet]. Up to Date; 2013 [cited 2015 Apr 8]. Available from: <http://www.uptodate.com/contents/frailty>.
23. Farrell B, Szeto W, Shamji S. Drug-related problems in the frail elderly. *Can Fam Physician.* 2011;57:168-9.
24. Cameron ID, Fairhall N, Langron C, et al. A multifactorial interdisciplinary intervention reduces frailty in older people: randomized trial. *BMC Medicine.* 2013;11:65.
25. Fiatarone MA, O'Neill EF, Ryan ND, et al. Exercise training and nutritional supplementation for physical frailty in very elderly people. *N Engl J Med.* 1994;330:1769-75.
26. Mukamel DB, Peterson DR, Temkin-Greener H, et al. Program characteristics and enrollees' outcomes in the Program of All-Inclusive Care for the Elderly (PACE). *Milbank Q.* 2007;85:499-531.
27. Sternberg SA, Wershof Schwartz A, Karunanathan S, et al. The identification of frailty: a systematic literature review. *J Am Geriatr Soc.* 2011;59:2129.