Journal of
Gynecology and Women's Health
ISSN 2474-7602

Juniper Publishers
key to the Researchers

Case Report
Volume 3 Issue 4 -March 2017
DOI: 10.19080/JGWH.2017.03.555616

J Gynecol Women's Health

Frailty Assesment and Risk of Osteoporotic Fracture in Women from a Case

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Submission: March 07, 2017 ; **Published:** March 23, 2017

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Abstract

Around 50 percent of the elderly women will present an osteoporotic fracture. These fractures are related to the presence of frailty syndrome, which appears linked to age with a prevalence of 10-25% in the same age group. The association between these two entities shows the importance of a different method for evaluating of the risk of fracture in the elderly women, incorporating the syndrome as a risk factor that must be taken into account. Frailty, on the other hand, is a good indicator to evaluate the effectiveness of the different interventions related to osteoporosis.

Keywords: Frailty; Osteoporosis; Women; Risk of fracture

Abbreviations: SPPB: Short Physical Performance Battery Test; BMI: Body Mass Index

Introduction

Frailty is a geriatric syndrome related to a decrease in the functional reserve of the different physiologic systems. When an aggression occurs, the patient loses her capacity to balance the damage, resulting in an alteration of the homeostasis and secondary negative health events [1].

The appearance of a hip fracture or other (osteoporotic ones) in older women is a health event that is associated with increased mortality and morbidity, as well as dependency. For frail women it also implies acceleration in the evolution of frailty syndrome due to its consequences: immobility, increase of infections, sedentarism [2]. Osteoporotic fractures are more common in women, what makes it especially important to apply preventive strategies and identify indicators that allow a correct evaluation of treatments and interventions on them, as functional capacity and frailty have become more important than health events as a measure of quality of life and prognosis in the elderly [3].

It is therefore important to be able to identify frail women who have greater risk of hip fracture and other osteoporotic fractures, as they clearly worsen their prognosis [4]. Through the presentation of a case, principal applications of frailty identification related to risk of fracture will be described, as well as the controversy and problems found in research in this field.

Case Report

The case of a 78-year-old patient, who in the last three years unintentionally lost 8kg is presented. In her personal history, she has arterial hypertension, obesity, diabetes mellitus, grade IIIb renal insufficiency and intermittent asthma. She is not able to climb 20 steps without stopping.

In the physical examination, an abdominal perimeter of 120cm, with a BMI of 33, is highlighted. She has never received corticosteroid therapy for long periods of time, has not had previous fractures, does not smoke and has no other risk factor for osteoporosis.

The patient, in addition to the described comorbidities, has frailty syndrome according to the FRAIL scale and phenotype. An interdisciplinary handling of the case is established, involving medical, nursing and physiotherapy professionals. In spite of the efforts, the patient does not perform the prescribed exercises and maintains an irregular feeding, so that her BMI increases to 36.

Two years after, the patient presents lower strength, aerobic endurance and flexibility, worsening the score obtained in the Short SPPB from 15 to 9 points.

At the age of 80, without any special trauma or fall, she has a spiral left hip fracture, which is surgically treated. Due to the characteristics of the fracture, bone densitometry is performed with a T Score of -2.9 in the right hip and -3.8 in the lumbar vertebrae. Antiresorptive treatment is started as she is diagnosed of osteoporosis.

Taking advantage of the disposition of the patient in coping with the rehabilitation of the fracture, it is possible to establish life changes in terms of food and exercise, with weight loss and increase of muscle mass against fat tissue, observed through impedanciometry and by the SPPB scale.

Discussion

Frailty is a dynamic condition that refers to a greater vulnerability secondary to the physiological changes typical of aging and influenced by the patient's life conditions and diseases. It is directly related to age, and appears in more than 10% of people over 65 years, and in more than 25% of those over 85 [5]. Frailty syndrome affects women preferentially, not only in terms of relative prevalence but also with a longer duration of the disease. African-American women have higher rates of frailty [6].

Osteoporosis, defined as a reduction of bone mass with altered bone microarchitecture, is usually diagnosed with the aid of a densitometry (when bone density is less than 2.5 standard deviations from that of a young, healthy woman), or after the appearance of a frailty fracture. Due to population aging, it is estimated that between 40 and 50% of women will present at the time of their life an osteoporotic fracture [7].

It has been shown that the more frail a patient is, the greater the risk of an osteoporosis-related fracture has, so detection of frailty syndrome can help in the management of osteoporosis in older women [8].

There is a relationship between the presence of osteoporosis and sarcopenia, and between the last and frailty syndrome. Locquet et al report that muscular mass and strength are lower in women with osteoporosis. They analysed grip strength measurements, Dual-Energy X-Ray Absorptiometry and physical performance by the SPPB [9]. Sarcopenia is related to body composition, with higher proportion of fat, as in the patient showed.

Table 1: Components of phenotype definition of frailty [7].

Exhaustion
Decreased walking speed
Low physical activity
Weakness
Unintentional weight loss

The large number of tools proposed to measure frailty in the elderly makes it difficult to establish a protocol that identifies the syndrome as a risk factor for osteoporotic fracture [10,11]. The phenotypic definition of frailty and the frailty index have been shown to be independent risk factors for this type of fractures, independent of chronological age. No literature has been found that clarifies which of the two approaches to frailty syndrome allows greater risk discrimination, since the existing studies are contradictory in this matter [12,13]. Tables 1 & 2 shows the principal characteristics of these frailty models.

Table 2: Components of frailty index and other accumulation of deficits scales for frailty identification [1,7,8].

Comorbidities	Functional Deficits	Cognitive and Psichological Déficits	Social Support	Others
Cardiovascular risk factors	Basic activities of daily living	Ansiety or depression	Loneliness	Nutritional factors
Cancer	Isntrumental activities of daily living	Dementia	Economic resources	Drugs
COPD			Family and social relations	
Others				

One of the tools most used in the calculation of osteoporotic fracture risk is the fracture risk assessment tool (FRAX). There is evidence that frailty index has the same predictive value for osteoporotic fracture and hip fracture as this tool. Therefore, it can be used as an aid to identify the risk of this type of fracture in the elderly [14].

There is little scientific evidence about the evolution of the frailty syndrome before and after an osteoporotic fracture, as follow-up studies should be performed. It has been demonstrated that frailty index and other accumulation definitions of frailty shows greater frailty after a fracture, but this may be not applicable as functional deficit is a logical consequence of a fracture [15]. Further research must be made in order to identify the evolution of frailty in relation to a fracture, as frailty can be used as an indicator for the effect of a treatment or intervention [8].

Conclusion

Detection of frailty in elderly women has been shown to be useful for the assessment of the risk of osteoporotic fracture. Due to the high prevalence of osteoporosis, as well as of frailty syndrome, it is necessary to develop research on the influence of one in the other over time, being frailty a good indicator of the

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effectiveness of treatments and interventions for osteoporosis [7].

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