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Original Article

Associations of vitamin D deficiency with postoperative gait and mortality among patients with fractures of the proximal femur☆

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ABSTRACT

Objective: To assess whether serum vitamin D concentration is associated with gait status and mortality among patients with fractures of the proximal femur, six months after suffering the fracture.

Methods: Consecutive patients aged ≥65 years with fractures of the proximal femur, who were admitted to the orthopedics and traumatology ward of our service between January and December 2011, were prospectively evaluated. Clinical, radiological, epidemiological and laboratory analyses were performed, including vitamin D. The patients underwent surgery and were followed up as outpatients, with return visits 15, 30, 60 and 180 days after discharge, at which the outcomes of gait and mortality were evaluated.

Results: Eighty-eight patients were evaluated. Two of them were excluded because they presented oncological fractures. Thus, 86 patients of mean age 80.2 ± 7.3 years were studied. In relation to serum vitamin D, the mean was 27.8 ± 14.5 ng/mL, and 33.7% of the patients presented deficiency of this vitamin. In relation to gait, univariate and multivariate logistic regression showed that vitamin D deficiency was not associated with gait recovery, even after adjustment for gender, age and type of fracture (OR: 1.463; 95% CI: 0.524–4.088; $p = 0.469$). Regarding mortality, Cox regression analysis showed that vitamin D deficiency was not related to its occurrence within six months, even in multivariate analysis (HR: 0.627; 95% CI: 0.180–2.191; $p = 0.465$).

Conclusion: Serum vitamin D concentration was not related to gait status and/or mortality among patients with fractures of the proximal femur, six months after suffering the fracture.

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Associação da deficiência de vitamina D com mortalidade e marcha pós-operatória em paciente com fratura de fêmur proximal

Palavras chave:
Vitamina D
Mortalidade
Marcha
Fraturas do fêmur

RESUMO

Objetivo: Avaliar se a concentração sérica de vitamina D está associada ao status de marcha e à mortalidade em pacientes com fratura de fêmur proximal seis meses após a fratura.
Métodos: Avaliados prospectivamente pacientes consecutivos com fratura de fêmur proximal, com idade ≥ 65 anos, internados na enfermaria de ortopedia e traumatologia do serviço, entre janeiro a dezembro de 2011. Foram feitas análises clínica, radiológica, epidemiológica e laboratorial, incluindo vitamina D. Foram submetidos à cirurgia e acompanhados ambulatorialmente em retornos 15, 30, 60 e 180 dias após a alta, quando foram avaliados os desfechos de marcha e mortalidade.
Resultados: Avaliados 88 pacientes. Dois foram excluídos por causa de fratura patológica. Oitenta e seis pacientes com idade média de 80,2 ± 7,3 anos foram estudados. Em relação à vitamina D sérica a média foi de 27,8 ± 14,5 ng/mL e 33,7% dos pacientes apresentavam deficiência dessa vitamina. Em relação à marcha, a análise de regressão logística uni e multivariada mostrou que a deficiência de vitamina D não esteve associada a sua recuperação, mesmo após ajuste por gênero, idade e tipo de fratura (OR 1,463; 95% IC 0,524-4,088; p = 0,469). Considerando a mortalidade, a análise de regressão de Cox mostrou que a deficiência de vitamina D também não esteve relacionada à sua ocorrência em seis meses, mesmo na análise multivariada (HR 0,627; 95% IC 0,180-2,191; p = 0,465).
Conclusão: A concentração de vitamina D sérica não esteve relacionada ao status de marcha e/ou à mortalidade em paciente com fratura de fêmur proximal seis meses depois dela.

Introduction

The incidence of fractures of the proximal femur has increased over recent decades and there is an expectation that it will continue to increase because of the aging of the population.[1,2] It is expected that by 2020, 16.3% of the American population and 25% of the Canadian population will be over the age of 65 years.[2] This increase in the numbers of elderly individuals will probably give rise to higher incidence and prevalence of diseases of the musculoskeletal system, such as fractures secondary to osteoporosis and osteoarthrosis. According to Thorngren, the number of cases of hip fractures among patients over the age of 80 years has doubled over the last 20 years.[3] According to Hu et al.,[4] 1.5 million cases of hip fractures occur around the world and this number may reach 2.6 million in 2025 and 4.5 million in 2050.

Fractures secondary to bone fragility, especially those occurring in the proximal femur, have been correlated with significant reductions in independence and increased morbidity and mortality.[5] According to Holt et al.,[6] only 22% of the patients who, before the fracture occurred, were able to walk without support and unaccompanied recover this level of independence within the first 120 days after the event. This loss of independence is even more serious among patients over the age of 95 years: in this group, only 2% recover their preoperative ability to walk within the same period. Furthermore, the mortality rates relating to fractures of the proximal femur are very high and may range from 14% to 47% over the first year after their occurrence. All of these points emphasize the importance of and interest in recovering the ability to walk and improving the prognosis, for patients with this type of fracture.[6]

Among the micronutrients relating to the risk of falls and fractures among elderly people, vitamin D can be highlighted. This is a liposoluble micronutrient with a function classically related to increased intestinal absorption of calcium, which participates in active transportation of this ion in enterocytes. It also participates in mobilizing calcium in bones, in the presence of PTH, and in increasing the renal reabsorption of calcium in the distal tubule.[7] However, new functions have now been attributed to vitamin D. Studies have shown that it has an important role in modulating inflammatory and immunological processes, and that it may have a relationship with wound healing and with alterations to muscle mass and strength.[8,9] Higher vitamin D concentrations have been correlated with lower fall rates among elderly patients. Consequently, this diminishes the risk of new fractures.[10]

The objectives of this study were to evaluate the demographic, clinical and biochemical characteristics of patients with and without vitamin D insufficiency and to ascertain whether the serum concentration of this nutrient is associated with walking status and with mortality among patients with fractures of the proximal femur, six months after the occurrence.

Sample and methods

The present study was approved by our institution's ethics committee and all the patients or the persons legally responsible for them signed a free and informed consent statement.