Osteoporosis and HIV infection: what is the connection?

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Abstract

Osteoporosis is the most common bone disease in adults, characterised by the loss of bone mass. Secondary causes are predominant in the male gender. We studied a case of osteoporosis in a 32-year-old male, former drug addict (heroin), with positive serology for HIV1 and HCV. The diagnosis of osteoporosis was confirmed by radiology, densitometry, scintigraphy and histological exams. Secondary causes were excluded. Bone biopsy showed osteopenia with reduction in the number and diameter of trabeculae, and reduction of the osteoid deposit compatible with the diagnosis of adynamic osteopathy.

This case allows us to speculate about the possible correlation between the immunological alterations verified in HIV infection and the alterations of bone

Key words: osteoporosis, human immunodeficiency virus.

Introduction

Adynamic bone disease, or "dead bone syndrome" covers a group of diseases that have in common the existence of a low number of active remodeling units in histological observation. It may be associated with secondary or primary osteoporosis and infection by the human immunodeficiency virus.[1,2]

Osteopenia and osteoporosis mainly affect women, since men are protected by higher levels of bone mass at all ages, and lower reabsorption rates.[3,4] Excessive bone loss by unit of volume, with increased fragility of the bone tissue, leads to a changes in the microstructure, leading to lower bone resistance and the appearance of fractures.[5,6]

We present the clinical case of a young man diagnosed with osteoporosis and infection by HIV.

Case report

Male patient, thirty-two years of age, Caucasian, born in Luanda, resident in Setubal. Admitted to the Medicine Service II in September 1993, for clarification of a febrile syndrome. During hospitalization, a history of pathological fracture of the costal arch, approximately one year previously, was highlighted. A history of smoking and drug dependence since the start of adolescence were noted, and seropositivity for HIV 1 and HCV, known for approximately 6 months. Personal history included hepatitis B and tuberculosis.

Objective examination showed an individual in good general health, with adequate height/weight and sexual development for his gender and age. Generalized, painless enlarged lymph nodes, liver and spleen were detected, with signs of hyperthyroidism. Use of corticoids, anticonvulsants or alcohol was ruled out. Complementary tests showed normal calcium and phosphorus levels, sedimentation rate, serum alkaline phosphatase, renal function and hemogram. Serologically, he had current infection by HIV 1 and HCV, and serological scar of hepatitis B infection. Study of the lymphocyte populations revealed a marked depletion in CD4 lymphocytes (50 lymph/mm^3).

Radiological study of the spine, hands and spleen was suggestive of osteoporosis, with bone densitometry revealing severe osteopenia with bone mass reduction of more than 60%. Parathormone, thyroid hormones, glycaemia and growth hormone levels were normal. Study of intestinal absorption did not reveal any changes. Despite dietary advice and indication to suspend the use of tobacco, there was

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a worsening of the complaints in the neck region, therefore the radiological examination of the spine was repeated. This showed partial collapse of two dorsal vertebrae. The analytical tests remained normal. Bone scintigraphy showed a generalized decrease in intensity of the radiodrug, compatible with the diagnostic of osteoporosis, with an increase in fixation at the level of the seventh rib, compatible with fracture of the rib. Bone turnover markers were requested, showing a slight increase in bone reabsorption marker ICTP (type I collagen telopeptide).

Bone biopsy was performed, without prior decalcification, and with tetracycline marking. Based on the existence of fine trabeculae, decreased osteoid thickness, and decreased number and activity of the osteoblasts, a diagnosis of adynamic bone disease was made. The patient was discharged with a diagnosis of ARC (AIDS-related complex) and osteoporosis by adynamic bone disease. From this point on, antiretroviral therapy with AZT was maintained, with subsequent DDI, calcitonin and calcium, resulting in a rapid improvement in the symptoms and lymphocyte populations (340 CD4/mm). After six months of treatment, bone densitometry was performed, showing a 3.8% increase in bone mass.

Discussion

In developed countries, osteoporosis is a major public health problem.[5] Excessive loss of bone mass per unit of volume, together with alterations in the microarchitecture of the bone tissue, exacerbate this fragility.[5] The increased risk of fracture among patients with this disease creates a major social and economic burden. Post-fracture mortality of the colon can be as high as 20% and around half of individuals become dependent on others.

Osteoporosis affects mainly women, as men have a higher level of bone mass at all ages, and do not suffer sudden hormonal changes.[3] In the clinical case presented, it was necessary to think of secondary causes that might be preventing the adequate formation of bone mass, or causing rapid bone loss.

The diagnosis hypothesis, in our case, was made through the history of pathological fracture of the costal arch, and by radiological imaging suggestive of marked osteopenia, which indicated bone loss of more than 30%.[5] Bone densitometry confirmed the diagnosis, showing loss of bone mass of 60%.

Study of this change in bone metabolism began with the clinical history, enabling drug-related causes to be ruled out. However, it was seen that the patient was a heavy smoker. Objective examination showed normal height/weight and sexual development for the gender and age, making a diagnosis of hypogonadism, intestinal absorption pathology, homocystinuria or growth hormone deficit unlikely.[3,4,7,8]

The complementary diagnostic exams performed ruled out secondary causes of osteoporosis, such as hyperparathyroidism, hyperthyroidism, diabetes, or acromegaly.

The bone biopsy carried out at that time showed histological changes compatible with a diagnosis of adynamic bone disease.

… requiring tetracycline marker and processing of the biopsy without decalcification. It is characterized by a normal or decreased osteoid thickening, or by low speed of bone formation, caused by a low number of active remodelling units and/or a decrease in matrix deposition speed by the activated units.[1,2]

Adynamic bone disease occurs in 98% of patients with fracture of the femoral neck due to primary or secondary osteoporosis. This metabolic change is also associated with other diseases, such as hypoparathyroidism, diabetes, and infection by the AIDS virus. In a study involving twenty-two patients infected by HIV, 100% presented histological criteria of adynamic osteopathy.[1,2] In this dysfunction, the deposit of mineralized bone decreases as the process worsens, and there is a positive significant direct correlation between the levels of CD4, the speed of bone deposition, and osteocalcin levels.[1]

The therapy indicated for this condition overlaps osteoporosis, and in this case, the choice was made for the association of calcium and calcitonin.[8]

Adynamic osteopathy reflects a pattern of response of the skeleton to various metabolic factors. Besides the factors already known, such as aging, use of drugs, and hormonal alterations, there appears to be an underlying immunological component. The appearance of complaints affecting lymphocyte populations reinforces this idea, and a decrease in bone activity was observed, accompanying the depletion in CD4 lymphocytes. Faced with a young man with marked osteoporosis, but without any other associated pathologies, it is important to rule out infection by HIV and to determine the lymphocyte populations, since it could be an early sign of infection by the human immunodeficiency virus. ■

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