A 14th-17th Century Osteoporotic Hip Fracture from the Santa Clara-a-Velha Convent in Coimbra (Portugal)

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**Introduction**

Osteoporosis is a metabolic disease characterized by abnormalities in the amount and architectural arrangement of bone tissue, which lead to impaired skeletal strength and an increased susceptibility to fracture. The clinical significance of osteoporosis lies in the problems associated to it, namely the archetypal hip, Colles and vertebral fractures.

Hip fractures (HF) represent one of the most significant causes of morbidity and mortality amongst the elderly. According to the epidemiologic projections, the worldwide annual HF numbers will rise to 6.26 million by 2050.

Although fractures are ubiquitous in paleopathology, the majority of them is the outcome of a traumatic event and do not reflect the weakness inherent to the bone itself. HF are an outcome of osteoporosis, which is a condition characterized by abnormalities in the amount and quality of bone tissue.

**The affected individual**

This study refers to an adult (>50yrs) female individual exhumed from grave 6. The skeleton was almost complete but poorly preserved. All teeth were lost *ante mortem*. Generalized vertebral and appendicular arthrosis was noted. Both tibiae were affected by a mild, non-specific, infectious process. Radiographic analysis suggests considerable osteopenia (generalized bone loss). This individual sustained an extracapsular fracture in the left proximal femur (Figs. 4, 5).

Although the femur is broken and incomplete, it’s possible to observe the extensive fracture repair in the intertrochanteric region. The bony callus coincides with the intertrochanteric crest and the intertrochanteric line as they pass between the great and lesser trochanters. The radiograph shows reactive bone formation ( sclerosis) in the affected area (Fig. 6). The tibial proximal epiphysis also presents major morphological modifications. It’s not possible to distinguish if they’re the result of another fracture or severe secondary arthrosis.

**Discussion**

The competence of bone to resist stress depends on maintaining bone quantity, quality and regular architecture of bone. There are pathological conditions, such as osteoporosis and osteopenia, which can negatively affect these factors. The described HF is probably a pathological fracture secondary to osteoporosis. The affected individual was an elderly nun. Osteoporosis and osteoporotic fractures mainly affect old aged women. The Clarissas sisters in Coimbra were recruited in rich families and were obliged to use a dark habit. The risk for osteoporosis in Catholic nuns may be even higher than that of the general female population given their longer life expectancy and the use of a traditional habit as a young adult, resulting in limited sun exposure.

Mortality among HF patients is high, both during admission and after discharge, and long-term survival in this kind of fracture in older individuals is uncommon. Intertrochanteric fractures promote the absolute incapacity of the affected limb. As such, a solid community support network is suggested by the extensive remodeling associated with the fracture and the long time survival of this individual.