Asymptomatic vertebral fracture: a wolf in sheep's clothing?

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Various methods are available for the detection of the so-called morphometric vertebral fracture in patients who have low bone density but do not present with the classical symptoms of severe back pain due to vertebral collapse. The semiquantitative (SQ) method was developed for the purpose of correcting the subjective evaluation of radiographs and is widely used in epidemiological studies and clinical trials (1). It consists of an assessment of the height of vertebral bodies at the anterior, middle and posterior portions and the evaluation of the percentage of apparent reduction between them, grading the severity of the fracture as follows: Grade 0, when there is no fracture; Grade I, when there is a 20-25% reduction in vertebral body height; Grade II, when the reduction is between 25 and 40%; and Grade III when the reduction is > 40%. The assessment of vertebral fractures can also be made by the algorithm-based qualitative *ABQ Jiang* method, which is a modified approach for the visual diagnosis of vertebral fractures (2). Vertebral fracture is identified when there is evidence of central terminal plate depression and not only by the reduction in the vertebral height itself. As criteria for the presence of fractures the *ABQ Jiang* method uses evidence of osteoporotic endplate depression, with or without apophysis or cortical fracture.

The semiquantitative approach can be applied during bone mineral density (BMD) evaluation by the dual-energy x-ray absorptiometry technique, also known as vertebral fracture assessment (VFA). Although conventional radiography of the spine is considered the standard method for the detection of vertebral fractures, VFA exposes the patient to lower radiation, has a lower cost and may be less operator-dependent (3). One potential disadvantage of conventional radiographic vertebral morphometry is related to the geometric distortions of the vertebral bodies inherent in the use of cone-beam geometry technique, in which each point on the radiograph is magnified and distorted in different ways. Compared with the center of the radiograph, which is less magnified and viewed at a more perpendicular angle, the periphery (edge) is more magnified and viewed at a more oblique angle. This issue of obliquity is minimized with VFA, particularly when performed with the patient in the supine position (3). Conventional visual radiographs are useful in identifying degenerative vertebral disease, which may resemble fractures when seen on VFA with automatic contour delineation of the vertebral bodies.

In this issue of the *Archives* Muszkat and cols. (4) report data on the prevalence of vertebral fractures by VFA/DXA in 188 postmenopausal women, of whom 75% were receiving treatment with bisphosphonates. They found that 17% had moderate to severe fractures. Fifty-six percent of the fractures occurred in the thoracic spine and 28% were considered severe. BMD values were not significantly different between those with and without fractures, but the latter were older and had significantly less fat mass, suggesting that general health and frailty may be an important factor related to the risk of vertebral fractures, as found in a recent study in old men (5).

The incidence of morphometric vertebral fractures ranges from 570/100,000 person-years in men to 1070/100,000 person-years in women (6). As such fractures may

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be detected in patients with BMD in the osteopenia range, evaluation of the vertebral morphometry is a valuable tool in identifying the high-risk patient for future fractures irrespective of BMD values (7). Moreover, the decision on a more prolonged use of bisphosphonates in the long-term treatment of low BMD in postmenopausal women may also depend on whether the patient has a vertebral fracture or not (8).

The prevalence of vertebral fractures by VFA in postmenopausal women aged 59-70 years has been reported to be 4.3% using vertebral heights less than 3 SD from reference values (McCloskey criteria) and confirmed by the Genant method (9), with 17% of them having mild vertebral deformities (vertebral heights between -2 and -2.99 SD from reference values). Likewise, an increased prevalence of vertebral fractures has been reported in several conditions associated with bone fragility, including endocrine (10-13), inflammatory (14,15) and cardio-pulmonary diseases (16,17).

Several studies have demonstrated that the presence of an asymptomatic vertebral fracture may predispose the patient to a worse health outcome. It may be associated with a decrease in quality of life, reflecting the frailty of the elderly (5,18). It may result in an increased risk of future fractures, especially at the hip, with all its devastating consequences (19), and also in an increase in total mortality (20).

The paper by Muszkat and cols. highlights the importance of detecting asymptomatic vertebral fractures in patients with low bone mass who are at increased risk for future fracture. It is therefore to be hoped that the availability of VFA will result in a more widespread use of this approach.

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