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Review

Usefulness of bone density measurement in fallers

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ABSTRACT

The objective of this systematic literature review is to discuss the latest French recommendation issued in 2012 that a fall within the past year should lead to bone mineral density (BMD) measurement using dual-energy X-ray absorptiometry (DXA). This recommendation rests on four facts. First, osteoporosis and fall risk are the two leading risk factors for nonvertebral fractures in postmenopausal women. Second, BMD measurement using DXA supplies significant information on the fracture risk independently from the fall risk. Thus, when a fall occurs, the fracture risk increases as BMD decreases. Third, osteoporosis drugs have been proven effective in preventing fractures only in populations with osteoporosis defined based on BMD criteria. Finally, the prevalence of osteoporosis is high in patients who fall and increases in the presence of markers for frailty (e.g., recurrent falls, sarcopenia [low muscle mass and strength], limited mobility, and weight loss), which are risk factors for both osteoporosis and falls. Nevertheless, life expectancy should be taken into account when assessing the appropriateness of DXA in fallers, as osteoporosis treatments require at least 12 months to decrease the fracture risk. Another relevant factor is the availability of DXA, which may be limited due to geographic factors, patient dependency, or severe cognitive impairments, for instance. Studies are needed to better determine how the fall risk and frailty should be incorporated into the fracture risk evaluation based on BMD and the FRAX® tool.

Osteoporosis is a generalized bone disease in which a decrease in bone strength translates into an increased risk of fractures [1]. Postmenopausal women are predominantly affected. Dual-energy X-ray absorptiometry (DXA) measurement of bone mineral density (BMD) is currently the best tool for identifying patients at high fall risk because of a low bone mass. Despite reimbursement of DXA by the French statutory health insurance system since 2006 in patients with one or more clinical risk factors (*Journal Officiel*, June 30, 2006; Appendix 1) [2], the use of DXA is declining in France [3], although the incidence of nonvertebral fractures has not diminished [4,5]. These facts raise concern that the management of patients at high fracture risk warranting osteoporosis drug therapy may be suboptimal.

To incorporate recent evidence on fracture risk and prevention into recommendations for postmenopausal osteoporosis management, in 2012 the French Society for Rheumatology (SFR), Osteoporosis Research and Information Group (GRIO), National Organization of French Obstetricians/Gynecologists (CNGOF), Menopause and Hormonal Aging Study Group (GEMVI), French Society for Orthopedic Surgery (SOFCOT), French Society for Endocrinology (SFE), and French Society for Geriatrics and Gerontology (SFGG) issued new recommendations about the indications of DXA and osteoporosis therapy [6]. According to these 2012 recommendations, patients without contraindications or other causes of bone fragility should receive osteoporosis therapy if they experience a severe fracture associated with a high risk of mortality, such as a vertebral, femoral, pelvic, or humeral fracture [7]. In this situation, DXA is not needed to determine that treatment is in order, although it remains valuable as a monitoring tool.

In contrast, DXA plays a key role in determining whether osteoporosis therapy is appropriate in patients who have clinical risk factors other than a severe fracture (Table 1). The 2012 recommendations indicate that DXA should be performed in postmenopausal women at substantial risk for falls, most notably those with a fall within the past year, which is the leading risk factor for incident falls [8,9].

Here, we discuss the 2012 recommendation that DXA be performed in patients with a history of one or more falls. In this situation, DXA is not currently reimbursed by the French statutory health insurance system.

1. Association between osteoporosis and falls in postmenopausal women

A history of falling within the past year is twice as common among osteoporotic women aged 60 years or over than among non-osteoporotic women [10]. This association between osteoporosis and falls is largely ascribable to shared risk factors such as older age, several genetic and anthropometric characteristics (e.g., weight loss and small muscle mass), low muscle strength, low physical exercise levels, limited mobility, and deficiencies in several hormones (e.g., the GH/IGF1 axis, vitamin D, and sex hormones) [11–20]. In addition, osteoporotic vertebral fractures with thoracic kyphosis can impair balance and muscle strength, (grip

Table 1
Indications in which the French statutory health insurance system reimburses dual-energy X-ray absorptiometry (DXA) for bone mineral density measurement (Agence française de sécurité sanitaire des produits de santé, 2006, http://www.grio.org/documents/rcd-3-1263309626.pdf).

1. DXA is reimbursed in members of the general population with any of the following criteria
   - Signs of osteoporosis
     - Radiological discovery or confirmation of a vertebral fracture (vertebral body deformity) in the absence of detectable trauma or tumor
     - History in the patient of a peripheral fracture in the absence of major trauma (except at the skull, toes, fingers, and cervical spine)
   - Disease or treatment known to induce osteoporosis
     - Systemic glucocorticoid therapy (preferably at treatment initiation) prescribed for at least 3 consecutive months in a dosage > 7.5 mg/day prednisone equivalent
     - Documented history of a disease or treatment known to induce osteoporosis: active untreated hyperthyroidism, hypercorticism, primary hyperparathyroidism, prolonged primary hypogonadism (including androgen deprivation therapy by surgery [orchidectomy] or pharmacotherapy [long-term Gn-RH analog therapy]), and osteogenesis imperfecta
2. Situations added and allowing DXA reimbursement in postmenopausal women
   - History of femoral neck fracture without major trauma in a first-degree relative
   - Body mass index < 19 kg/m^2
   - Menopause before 40 years of age for any reason
   - History of long-term glucocorticoid therapy (> 3 months) in a dose ≥ 7.5 mg/day prednisone equivalent