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Mini Review

Under Diagnosis of Vertebral Fractures

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Abstract

Vertebral fractures are the most prevalent osteoporotic fracture and often related to the decreasing in the quality of life. Despite their high prevalence, vertebral fractures are usually unrecognized by radiologists and most of the doctors that deal with osteoporosis. The lack of agreement on the method used to define fracture leads to ambiguous radiographic reports and missed opportunities of treatment. Since most of the clinical repercussions of vertebral fractures are preventable with pharmacologic therapy, efforts should be made to standardize a routine to reporting of vertebral fractures. With a clear approach to reporting theses fractures, radiologists can diminish missed diagnosis and improve clinical outcomes.

Keywords: *Vertebral fractures; Osteoporosis; Radiographic Diagnosis*

Introduction

The prevalence of osteoporotic fractures rises exponentially with age, resulting more than 8.9 million fractures annually worldwide [1]. Vertebral fractures are the most widely recognize osteoporotic fracture and often associated with increased of morbidity and mortality [2]. They are also related to increased pain, loss of physical function and subsequent risk of new, both vertebral and other sites fractures. Regardless of its high frequency, they are usually underdiagnosed [3,4,5].

Since vertebral fractures are often unsuspected clinically, because most of them are asymptomatic, diagnosis relies upon accurate radiographic detection [5]. However, there has been a significant absence of agreement on the method use to define fracture, leading to ambiguous radiographic reports [6].

The Genant semi-quantitative technique [7] can be used reliably in vertebral fracture evaluation. Genant method is the most used method worldwide. The diagnose involves a reduction in vertebral height (anterior, middle, or posterior dimensions) which exceeds 20% of a vertebral body (Figure 1). It can also be diagnosed by vertebral comparison if there is more than three standard deviation difference in vertebral heights between adjacent vertebral levels [8].

The Vertebral fracture assessment (VFA) is an efficient method for recognizing vertebral fractures during the time of bone mineral density (BMD) analysis. Several studies [8,9,10] have shown that VFA can be both sensitive and specific method. Nevertheless, visualization of the upper thoracic spine can be of lower quality compared to other radiographic techniques [11].

The Algorithm-Based Qualitative technique is focused on radiological evidence of deformity at the vertebral endplate as the first sign of fracture. Different methods of vertebral fracture definition have been proposed, but there is no consensus gold standard [12].

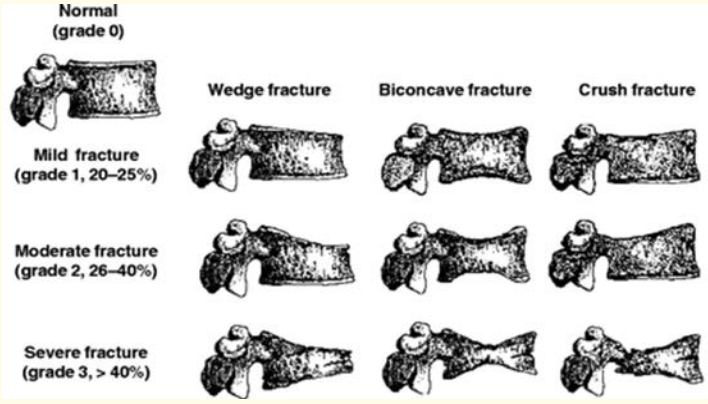

Figure1: *Semi quantitative technique visual grading of vertebral fracture (from Genant et al [7]).*

Discussion

Osteoporosis is a global public health concern. It's an osteometabolic disease characterized by bone microarchitecture deterioration, which leads to a higher risk of fractures with minimal trauma [13].

Despite vertebral fractures high prevalence in postmenopausal women and the older man, they are frequently difficult to identify [14]. The lack of acknowledgment is because of the absence of symptoms and the problem in determining the cause of symptoms. Back pain and height loss can be related to vertebral fractures, but they are very unspecific. Thereby, vertebral fractures are not frequently considered in the clinical assessment of patients resulting missed opportunities for treatment and inferior clinical outcomes [2,13].

Imaging evaluation is essential for high fracture risk patients. Plain vertebral imaging is a simple and widely available technique. Radiographic interpretation can be additional to VFA to improve vertebral fracture diagnosis. Most of the vertebral fractures occur at T10-L2 and can be easily visualized by VFA method. If vertebral fracture evaluation results are doubtful, radiographic imaging ought to be acquired [15].

Samelson., *et al.* evaluated a long-term risk of incident vertebral fracture in 704 women and men in the Framingham Study. Prevalence of vertebral fracture was similar (14%) both in women and men; however, incidence was more noteworthy in women (24%). The study shows the importance of diagnosing this prevalent fracture [6].

Both symptomatic and asymptomatic vertebral fractures demonstrate increased fracture risk in untreated patients. A longitudinal cohort study showed that women with a prevalent vertebral fracture had an estimate 3-fold higher risk of incident vertebral fracture than women without a history of vertebral fracture [2]. Moreover, there is an increased risk of any fracture not long after having a clinical vertebral fracture [15].

A retrospective study of 934 hospitalized older women between 1995 and 1997 found radiographic evidence for 132 moderate or severe vertebral fractures (14%) and demonstrated that only 50% of contemporaneous radiology reports identified these fractures [16].

Borges., *et al*. performed spine radiographs in 7 postmenopausal women participating in a study of osteoporosis at the Centro de Pesquisa Clínica do Brasil to evaluate the prevalence of vertebral fracture. The radiographic images were sent to 4 general radiologists for blinded independent interpretations. Radiology reports showed significant variability in the identification and description of vertebral fractures. Such variability could lead to misleading management of patients with osteoporosis and possible under treatment [13].

A prospective, multicenter and multinational study evaluated the accuracy of radiographic diagnosis of vertebral fracture in postmenopausal older women, newly diagnosed with osteoporosis. Of 2451 women with an evaluable radiograph, 789 (32%) had at least one

vertebral fracture. Discrepancies between local and central readings revealed undetected vertebral fracture (68%) and equivocal terminology in the local radiology report (32%) resulted in a false-negative rate of 34%. The study suggests that efforts to enhance accuracy in reporting and interpretation may increase the effectiveness of radiographic image for detecting vertebral fractures [5].

In conclusion, the failure to diagnose vertebral fracture is a worldwide problem. Even though vertebral fracture identification can be difficult due to no standardized method, it's also an overlooked situation. Radiologists should be clear and decisive on their reports, stating the presence or absence of fracture, which should lead to better communication with physicians and thereby improve treatment of patients with osteoporosis.

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