

Commentary: Risk of Osteoporotic Fracture and Re-Fracture: Dangerous Liaisons

Rafael Izquierdo-Avino

Fracture Liaison Service, Department of Trauma and Orthopaedic Surgery, Hospital Nuestra Señora de Gracia, Zaragoza, Spain

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*Correspondence:

*Dr. Rafael Izquierdo-Avino, Fracture Liaison Service,
Department of Trauma and Orthopaedic Surgery, Hospital
Nuestra Señora de Gracia, Zaragoza, Spain;
Email: drizquierdo@gmail.com

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Fragility fractures (FF) have increasingly become a major concern for all health professionals but, in particular for Orthopaedic surgeons. Increase of life expectancy in the population worldwide has produced a significant increment of FF in patients aged 50 years or over. FF result from mechanical forces that would not ordinarily result in fracture, known as low-level (or 'low energy') trauma. The World Health Organization (WHO) has quantified this as forces equivalent to a fall from a standing height or less, or when no fall is involved¹.

However, the consequences of FF go beyond those related to the initial treatment, being surgical or conservative. We know that a patient who sustained an osteoporotic fracture will suffer a decrease in life quality and independence. This, in turn, produces functional impairment and increased morbidity and mortality. The consequences are also reflected on the social sphere of our patients, limiting their ability to complete daily activities and, therefore, increasing the need for informal (family and friends) or professional help. A major social and economic burden is emerging from health-related costs, in particular those arising from the most frequent major osteoporotic fractures (hip, vertebra, proximal humerus and wrist), which include incident fracture costs (usually during the first year after fracture), long term disability and institutionalization, pharmacological intervention cost and productivity loss of patients and informal caregivers^{2,3}.

It has been previously shown that individuals aged 50 or above who sustained a previous fracture are at a higher risk of subsequent fracture in the future^{4,5,6}, particularly within the first two years following initial fracture, a fact known as imminent fracture risk⁷ which may trigger a fracture cascade. Despite this fact and the availability of effective antiosteoporotic drugs, a wide treatment gap is seen in these patients, and only a 20-30% of them receive treatment after fracture², with a low adherence to it at 12 months post fracture⁸. Antiosteoporotic drugs have shown to be effective and safe with a positive benefit/risk balance⁹.

Previous studies have shown that incidence of subsequent FF is much higher than that of index FF^{4,5,6,10}, which enhances the importance of avoiding a first FF and, if already sustained, must raise alarm to both the patient and clinician. New fractures are a source of increased morbidity and future functional impairment as well as major social and economic burden. This is more evident for the hip FF, which carries elevated morbidity, mortality and economic costs.

When relating fracture risk with anatomic site of FF, a study

conducted by the author¹⁰ revealed an increased risk mainly when anatomic site of index and subsequent FF are the same (hip-hip, vertebra-vertebra, wrist-wrist...). Furthermore, the risk of sustaining a subsequent hip FF was higher when index FF site was at the hip, the vertebra or the global group of 'other sites', which reinforces the relevance of having a previous FF in several other sites as a risk factor for sustaining a future hip FF. Having had a hip index FF increased the risk of having a further hip FF. Several other studies^{5,6} have shown higher subsequent fracture risk regardless of anatomic site of index and subsequent FF. Patients with a hip or a vertebral fracture are, therefore, at high or very high risk of suffering a subsequent fracture and should be treated as soon as possible after the first FF.

In line with recent clinical evidence about the close relationship between index and subsequent osteoporotic fractures, clinical approach to osteoporotic fractures has evolved. Clinical decision to initiate osteoporosis treatment in patients with FF should not be based on bone mineral density (BMD) figures alone. As previously shown¹¹, most postmenopausal women with osteoporotic fractures had non-osteoporotic bone mineral density values. This finding highlights the importance of considering clinical risk factors that operate independently of bone mineral density (such as age or previous fracture) when assessing fracture risk. It is important to evaluate risk of subsequent fracture, either by clinical evaluation of predisposing factors or fracture risk scales (FRAX, Garvan, Qfracture), or preferably both together and treat accordingly. There are many guidelines for treating patients according to their low, high or very high risk of fracture. BMD data still remains an important factor but it is not essential in many patients in order to initiate secondary prevention treatment.

As mentioned above, in line with the concept of imminent fracture risk, there is a higher risk of re-fracture within the first 2 years after the index fracture. In our own study¹⁰ data obtained showed that more than one third of new FF were sustained within the first 6 months after index FF, with stabilization of incidence throughout the rest of the period up to the 2 years end point. As stated in our analysis¹⁰, patients included on the group of subsequent FF were those patients with an index FF who sustained at least one subsequent fracture during the following 2 years after index fracture in any of the described anatomic sites. Only when fracture occurred at the same anatomic site and laterality within 6 months after index FF, this event was excluded. The idea behind this was to avoid counting the same index fracture more than once, in cases of re-fracture during consolidation period, delayed/non-union or other related issues, and refers to those fractures occurring at the same anatomic site and laterality within 6 months after index FF, as this period of time was considered to be adequate and sufficient for fracture consolidation.

Excluding these fractures within 6 months may certainly underestimate the number of re-fractures but we opted to restrict inclusion in order to avoid overestimation. We consider that the high percentage of subsequent fractures (36,99%) occurring within the first 6 months after an index fracture may be related to the concept of imminent risk and several factors such as the delay in initiating pharmacological treatment and the time to achieve fracture reduction efficacy. Furthermore, our analysis shows that not only the maximum risk period falls into the first 6 months but the risk is higher in the first year of follow up as compared to the second year. These data confirm the importance of initiating anti-osteoporotic treatment in fractured patients as soon as possible after the FF, as a window of opportunity to prevent future FF.

Recently, a new concept of very high-risk^{12,13} patients has been established to define those patients who have sustained a recent fracture, or multiple fractures (vertebral and non-vertebral), older age, with high risk of falls, those with fracture while on drugs causing skeletal harm or antiosteoporotic drugs, very low BMD and with high values of FRAX. Initial therapy with bone forming agents (anabolic) followed by antiresorptive drugs is recommended for this group of patients^{12,13}.

Finally, our data¹⁰ showed that more than half of index and subsequent fractures were sustained by patients with no detected predisposing factors, and only 14% of fractured patients were on treatment, revealing a low perception of risk among patients and professionals. There is still a need for public health campaigns to raise awareness among the population and encourage professionals to treat patients.

Orthopaedic surgeons are usually the first specialists to see these fractured patients and they have the opportunity to play the important role of initiating secondary prevention with pharmacological antiosteoporotic treatment. As Orthopaedic surgeons we ought to consider comprehensive treatment for FF: primary (initial conservative, surgical and rehabilitation of the fracture) and secondary (pharmacological, diet and exercise and healthy lifestyle of the patient) which should continue for years after the fracture. Secondary prevention becomes a major part of treatment by reducing patient's suffering from future fractures, decreasing loss of independence and mobility, improving social life. It also has a direct impact on already stressed healthcare resources, by reducing hospital emergency attendance, out-patients follow-up clinics, saving operating theatre time and in-patient beds.

Two main complementary models of care have been established to improved post-fracture care, having proved to be cost-effective^{14,15}. Orthogeriatric Services (OGS) which focus on hip fractures, and Fracture Liaison Services (FLS), a coordinated model of care for secondary fracture

prevention to ensure that patients with all types of FF undergo fracture risk assessment and receive treatment in accordance with national clinical guidelines for osteoporosis.

Conflicts of Interest

The author declares to have no conflict of interest for this publication.

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