Strategies for Fracture Prevention in the Elderly

a report by
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Most fractures in the elderly, commonly called ‘fragility fractures,’ result from low-energy trauma such as a fall from standing height. The likelihood of the occurrence of these fractures increases with age, and they can contribute substantially to a patient’s morbidity and mortality. For example, vertebral compression fracture, the most common fragility fracture in the elderly, often leads to pain, decreased pulmonary function, depression, and another fracture. Hip fracture is associated with a 30% one-year mortality rate in leads to pain, decreased pulmonary function, depression, and another compression fracture, the most common fragility fracture in the elderly, often activities that could help to prevent a subsequent fracture. Reducing fracture risk in the elderly represents a challenge to practitioners. However, as many precautions exist, but have not been implemented or are not well adhered to, it also represents an opportunity to improve care and reduce the individual and societal burden of fracture in the elderly.

Primary Goals in Fracture Reduction

The main goal is to achieve one or all of the following: reduce the chance of an event occurring that may result in fracture, improve bone quality and its fracture resistance, and improve adherence to therapies that can decrease osteoporosis development or fall risk. Special attention should be paid to vulnerable populations at higher risk for fracture, including those with cognitive impairment and dementia.

Fall Prevention and Exercise

Studies have shown that fall prevention programs may reduce the risk of fracture, at least moderately. These programs, often community-based, work to modify a person’s living environment so that objects that could contribute to falls, such as throw rugs, electrical cords, and clutter, are eliminated. Although there have not been many controlled trials of this intervention type, a meta-analysis of studies examining the effect of reduction of household clutter in the homes of the elderly has demonstrated a trend toward reduced fracture risk. Additionally, fall prevention programs that focus on a review of a patient’s medications, which might contribute to decreased balance or increased somnolence, have been shown to reduce falls.

At least as importantly, fall prevention programs focus on improving an individual’s balance, strength, and conditioning, all of which can improve gait and safe ambulation. For example, practicing tai chi has been shown to reduce the risk of falls and increase bone mineral density. Despite this, no solid evidence exists that one specific exercise program will reduce the incidence of fragility fracture.

Hip protectors or other padding can decrease fracture when they are worn continuously. In especially thin individuals, those not overly concerned about appearance, and institutionalized patients who are at high risk for falls, hip protectors may decrease injuries.

Diet

Patients with hip fractures who are determined as being malnourished on admission are at increased risk for poor outcome. Additionally, a balanced diet that includes enough calcium (approximately 1,200mg daily) and vitamin D (approximately 800IU daily) may prevent fragility fractures. In particular, vitamin D may play an important role in fracture prevention. A person who is vitamin D-replete has a decreased fall risk and improved neuromuscular function compared with those who are vitamin D-deficient.

As a large proportion of elderly individuals, especially those who are institutionalized, are vitamin D-deficient, and as vitamin D deficiency is easily treated by highly tolerable oral vitamin D supplementation, this represents an excellent opportunity for improvement. In a meta-analysis of randomized controlled trials designed to determine fracture reduction in individuals taking vitamin D supplementation, a significant decrease was noted in hip and other non-vertebral hip fractures in individuals taking at least 800IU vitamin D daily.

Osteoporosis Medications

In addition to calcium and vitamin D, other medications have been shown to improve bone density and to decrease fracture risk. These include bisphosphonates, estrogen and selective estrogen receptor modulators (SERMs), calcitriol, teriparatide, and strontium ranelate. Alendronate, one of the most commonly prescribed bisphosphonates, has been shown to decrease fragility fractures in women with or without pre-existing vertebral compression fracture. Risedronate has been shown to decrease vertebral and non-vertebral fragility fractures in post-menopausal women. In particular, bisphosphonates have been demonstrated to decrease the incidence of hip fracture in post-menopausal women.

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Osteoporosis

Several meta-analyses of randomized controlled trials have confirmed a reduction in fracture risk in women taking estrogen, the Women's Health Initiative (WHI) data regarding the correlation between oral estrogen and an increased risk for cardiovascular problems—including stroke, pulmonary embolism, myocardial infarction, and breast cancer—has made estrogen a third-tier choice for improving bone strength among practitioners.34–36 Raloxifene, a SERM, has been shown to reduce the incidence of vertebral compression fractures by at least 30%.37–40 Calcitonin may decrease vertebral compression fractures in post-menopausal women with osteoporosis, but has not been shown to have an effect on non-vertebral fragility fractures.41

Other medications should be also considered in patients who have been diagnosed with osteoporosis. Teriparatide, the only medication available in the US that promotes bone formation, has been shown to decrease the risk of vertebral and non-vertebral fragility fractures and to enhance fracture healing in an animal model.42–44 Strontium ranelate has also been shown to decrease vertebral and non-vertebral fracture risk; however, it is unavailable in the US.

Cognitively Impaired Elderly and High-Risk Patients

Much interesting research has been conducted in the field of fracture prevention in the elderly and individuals with dementia. An inability to understand restrictions and/or institutionalization, which can lead, for example, to vitamin D deficiency, age, and medication—prescribed for the prevention in the elderly and individuals with dementia. An inability to understand restrictions and/or institutionalization, which can lead, for example, to vitamin D deficiency, age, and medication—prescribed for the understanding. Dementia is an independent risk factor for falling, and a fall in an individual with Alzheimer’s is more likely to result in hip fracture than a fall in an individual who is not cognitively impaired.45–47

In this generally frail population, even simple interventions such as the addition of calcium, vitamin D, and risudronate to a patient’s medication regimen have been shown to decrease the incidence of vertebral fractures.48 Unfortunately, those who are oldest, most frail, and have the greatest number of medical comorbidities—in other words, in the patients in whom fracture intervention may make the greatest difference—are often neglected in treatment interventions. Other high-risk populations include those with hypogonadism (often men who are being treated for prostate cancer), multiple medical comorbidities, and corticosteroid users.49

Concept of Responsibility for Bone Health

Many models for identifying and treating elderly patients who would benefit from fracture reduction interventions have been shown to be efficacious. For example, several orthopaedic surgeons have adopted fragility fracture liaison services that function as mechanisms for evaluating elderly fracture patients for osteoporosis and for advising osteoporosis treatment strategies.50–53

Unfortunately, neither orthopaedic surgeons nor primary care physicians meet the need for initiating or encouraging interventions that may reduce the risk of fragility fracture, especially in the most-at-risk populations. There is also evidence that, in spite of the relatively wide dissemination of this information, it has not been widely adopted by either institutions or individuals.54

There are compelling data that fall prevention strategies, exercise, and medications to improve bone quality can decrease the incidence of fragility fractures in the elderly. The most promising strategy in fracture prevention is the adoption of the concept of responsibility for the preventive measures. In other words, the more we consistently urge our patients to take responsibility for their physical conditioning and bone health, the greater the likelihood that an imminent fragility fracture may be prevented. The more we as practitioners take responsibility for prescribing pharmacological and non-pharmacological interventions and then ascertaining and understanding the compliance of patients, the greater impact we may have on fracture prevention.