

MANAGEMENT OF SPINAL OSTEOPOROTIC FRACTURES

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Fast growing ageing population

The latest update of demographic projections are recently published by the United Nations (UN) and Organization for Economic Cooperation and Development (OECD). The UN projection expects the under fifteen of age to remain stable up to 2050 in the developed countries, whereas the over sixty will increase by 40%. For the over eighty, the OECD estimates that they will more than double, with an increase of 133% for the OECD countries, while in the 27 European Union countries the increase will be even more dramatic: +153% and the 80+ will constitute 12 % of the total population.

And with a growing number of aged people we assist at an increase of prevalence of osteoporosis and its consequences: bone fractures. We observe an increase both in number and in incidence of non-hip fractures, in over forty, men and women. The impressive aspect is that this increase is four times that of heart attack, stroke and breast cancer and so it is for the economic costs of the management of fragility fractures.

Diagnosis with T-score

The diagnosis of osteoporosis is based on the measurement of bone mineral density (BMD), expressed in T-score with the cut-off established by WHO twenty years ago. T-score tells us how the BMD measured data differ in standard deviations from the BMD mean of normal healthy people.

At the decrease in T-score of bone mass, there is an exponential increase of the relative risk of femoral fracture and there is a linear inverse relationship between the increase of BMD obtained by drugs and the risk of bone fracture: thus, the more BMD increases, the less the risk.

Non pharmaceutical treatment

The non-pharmacological treatment guidelines of osteoporosis establish to focus on risk factors before selecting specific drugs. Smoking increases peripheral catabolism of estrogen, the most important hormone for bone health. Exercising stimulates the activity of osteoblast, the new bone synthesiser. In elderly people management the prevention of falling is mandatory and so the removing of carpets, the control of visus and balance. In the southern European countries, even in presence of more sunlight, the population has a lower vitamin D level than in North Europe. Factors that may explain this are that in the south for example, there is less habit to sunbathing and more common to use high-protection sunscreens.

The prevalence of vit D deficiency is widespread in Italy, more than eighty percent of women has vitamin D levels below the threshold of deficiency and more than forty percent presents very low levels, under 7.5 ng/ml. Vitamin D is important for the optimal response to pharmacological treatment: in fact, deficient patients do not show the same increase in bone mass as those observed in vitamin D repleted patients.

Prior fractures

Prior vertebral fracture plays an important role in the risk for subsequent vertebral fractures. In the first year of alendronate trial relative risk (RR) for subsequent fracture is 2.6 if one fracture is present; 5.1 if two fractures are present and 7.3 if there are more than two previous fractures. In the fracture prevention trial on teriparatide, patients in the placebo group with severe vertebral

deformity at baseline had a 3.55- and 6.75-fold increased risk of developing new and moderate/severe vertebral fractures, respectively.

Subsequent to a vertebral fracture, an increase in age adjusted relative risk of death is observed; that factor is more relevant than the one reported after hip fracture (RR 8.6 vs. 6.7).

Pharmacological treatment

For the pharmacological treatment of osteoporotic vertebral fractures we have two classes of drugs: bone resorption inhibitors and new bone formation stimulators. In addition to the most studied estrogen and bisphosphonates, that inhibit osteoclast activity and bone matrix resorption, today we have the availability of a monoclonal antibody that blocks the differentiation and proliferation of osteoclasts, denosumab; among the inhibitors we include strontium ranelate, even if it also has an anti-resorptive action. All these considered drugs are effective in preventing secondary vertebral osteoporotic fractures, whereas not all of these are also effective in primary prevention and no effectiveness is found in the prevention of osteopenia vertebral fractures.

Effectiveness for the prevention of hip and non-vertebral osteoporotic fractures has been proven only for few drugs and among them only some of the bisphosphonates and denosumab.

We can establish which drugs are best suited for each case, on the basis of age, severity of the disease, cost of the drug, starting from estrogen and selective estrogen receptor modulators in younger patients, between fifty and sixtyfive, up to parathyroid hormone, reserved for the more severe cases and for the most elderly, passing through bisphosphonates, denosumab and strontium ranelate.