Osteoporosis – bone health following the menopause

Osteoporosis – the thin bone disease that may lead to fractures – affects around three million people in the UK. Postmenopausal women are by far the most common sufferers, although osteoporosis can also affect younger women, men and very occasionally children.

Introduction

Bone is living tissue that has to be constantly repaired and renewed because of microscopic damage that occurs with daily physical activity. This process of renewal is called bone turnover and it is carried out by two sets of cells: osteoclasts dig up bone whilst osteoblasts lay down new bone. The two processes are linked (coupled) together so that they balance each other. If there is a relative increase in bone resorption (removal), as happens following menopause, then bone tissue is lost and bones become thinner. The maximum amount of bone in the skeleton (peak bone mass) is achieved soon after linear growth ceases. There is gradual loss of bone with aging in adults, but major bone loss in women occurs with loss of estrogen at the menopause.

Increased resorption of bone compromises the micro-architecture and makes bones more fragile and liable to break. The full-blown disease of osteoporosis is responsible for over 300,000 fractures yearly in the UK with an annual cost to the NHS of over £2 billion. The most serious of these is a fractured neck of femur (hip) because it usually requires surgery and post-operative complications can occur. Between 20 and 35 per cent of sufferers between the ages of 75 and 90 die within 12 months of fracturing their hip, around 80 per cent of whom are women.

Diagnosis

A classical osteoporotic fracture of the wrist, spine or hip with relatively little trauma will give a diagnosis of osteoporosis, but diagnosis can be made before a fracture has occurred using a dual energy X-ray absorptiometry (DEXA) scan. DEXA presents a patient's bone mineral density in terms of standard deviations (a statistical unit) below that of a young adult reference population. The unit used is presented as a T-score and the World Health Organisation (WHO) has established the following guidelines:

- T-score of -1.0 or greater = normal
- T-score between -1.0 and -2.5 = low bone mass (osteopenia)
- T-score of -2.5 or less = osteoporosis

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X-rays are helpful for confirming fragility fractures, e.g. of the ribs or vertebrae. However, they are relatively insensitive to the identification of early disease, requiring a bone mass loss of at least 30 percent before picking up diagnostic changes.

Treatment

The treatments available to reduce risk of fracture act in different ways, either to reduce resorption or to increase formation of bone. The most common medications used are bisphosphonates, which reduce the resorption of bone as it normally occurs. Alendronate, the most commonly used bisphosphonate, is known to be very effective at preventing bone loss and fractures. It can irritate the food pipe (oesophagus) so it is given once a week on an empty stomach and patients are advised to remain upright for an hour after taking it. It still often causes heartburn however, and many patients cease to take it for this reason. Other types of oral bisphosphonates are available given weekly or monthly.

Bisphosphonates can be given as a 3-monthly injection into a vein or a yearly infusion into a vein. There is a very small risk of unwanted effects such as heart rhythm disturbances, osteonecrosis of the jaw where a bit of jawbone dies (usually following a tooth extraction), and fragility fractures of the thigh bone. To minimise these risks bisphosphonates are usually given for 3 to 5 years followed by a treatment-free 'holiday'.

Hormone Replacement Therapy (HRT) has been shown to reduce the risk of fracture and can be used to prevent or treat osteoporosis in postmenopausal women. It is a safe and effective treatment and has many additional benefits other than to the skeleton, including benefits to the heart and blood vessels, the brain and the skin. It can be given as a tablet, gel, spray or patch applied to the skin and there is no limit to duration of use.

Parathyroid hormone (Teriparatide) boosts bone formation but has to be given as daily injections under the skin. It is given as a one to two-year course. You may be offered teriparatide if you have had many spinal fractures and are at a high risk of breaking another bone. This will usually be after you've tried a more common drug treatment, or if other treatments aren't suitable for you.

Denosumab is an antibody (blocker) to a major signal that drives the osteoclasts. It is thus very effective in stopping bone breakdown. It is easily given as an injection under the skin just once every 6 months. However, it does have the same risks as bisphosphonates for osteonecrosis of the jaw and fragility fractures of the thigh bone. There are also some concerns that there may be excessive loss of bone, and potentially increased fracture risk, on stopping this treatment.

Romozosumab is an antibody that blocks a factor (sclerostin) that inhibits the main signals for stimulating bone formation, thereby boosting bone mass. It is given as a monthly injection under the skin for a course of 12 months and is expensive. It may be suitable if you've already broken a bone due to osteoporosis and are at high risk of breaking another. It is not used as a first line treatment.

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Calcium compounds such as carbonate and citrate and calcium + vitamin D combinations are also widely prescribed to help improve bones, particularly in patients who are taking oral corticosteroids (such as prednisolone). These should not be regarded as treatments by themselves but are an adjunct to other treatments such as bisphosphonates and HRT.

Better bone health

Exercise, sunshine and a balanced diet are all needed for healthy bone growth and maintenance.

Exercise improves bone and muscle strength. Weight bearing and muscle strengthening exercises are important for bone health. Weight bearing exercise includes any exercise on your feet that requires controlled movement such brisk walking, marching, dancing and running.

A healthy and balanced diet is fundamental to bone (and general) health because it supplies the protein, carbohydrate and fat, vitamins, minerals and other nutrients vital for tissue renewal and growth. This is important during childhood when new bone is being constantly laid down and also throughout adult life when old bone is broken down and destroyed and new bone is built up to replace it.

Fresh fruit and vegetables supply a vast range of essential minerals and other nutrients needed to maintain a sturdy skeleton. Dairy foods are rich in calcium and eating them need not increase one's saturated fat intake because the reduced fat versions supply just as much of this mineral (and often more, weight for weight). Other sources of calcium include green leafy vegetables such as spring greens, spinach and broccoli, baked beans, dried fruit, bottled mineral water, soya beans, sardines, salmon, nuts, dried beans and sunflower seeds. You need around 700 mg of calcium a day. Here is a calcium calculator if you are not sure how much you get now.

Vitamin D is also essential because it enables calcium and phosphorus to be used to form strong bones and teeth. It can be obtained from sunshine and as a supplement. Sunshine on the skin creates vitamin D and the advice is exposure of a reasonable body area for 20 minutes per day from May to October. Vitamin D can also be obtained from food, e.g. milk and dairy products, fish liver oils, sardines, herring, salmon and tuna. If you're at risk of osteoporosis or taking an osteoporosis medicine, you are advised to take a 20 mcg (800iu) supplement of vitamin D a day. This is to make sure you're getting enough for your bones.

Prevention of falls

This is particularly important for older people. Paying attention to loose mats, wires and other obstacles in the home is necessary, as is taking care when out walking in icy conditions.

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Useful contacts

Royal Osteoporosis Society
www.theros.org.uk
Freephone helpline: 0300 102 3030
(Monday-Friday 9am-1pm and 2pm-5pm)
Email: nurses@theros.org.uk

International Osteoporosis Foundation
www.iofbonehealth.org

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This Women's Health Concern fact sheet provides information and guidance, to be used in consultation with your own healthcare professional. It has been developed by the medical advisory council of the British Menopause Society and it will be updated when guidance changes and/or new data becomes available.

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