Osteoporosis and exercise

Osteoporosis is a systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fracture. It affects approximately 30% of women over the age of 50 and is a major health problem worldwide. It is increasing due to prolonged life expectancy and altered lifestyle. Fractures of the hip are associated with the highest mortality and morbidity. Twenty five per cent of those who have a hip fracture die within six months and 50% are incapacitated. The risk of developing a fragility fracture depends on the amount and strength of bone, and the rate at which bone is lost, and on falls. In women the major cause of bone loss and osteoporosis is oestrogen withdrawal. Hypogonadism is also a factor in male osteoporosis. Oestrogen increases trabecular bone, while testosterone affects cortical bone. Osteoporosis is a preventable disease. A large bone mass early in life protects against osteoporosis.

Bone is a living tissue that is continuously being turned over or remodelled during a cycle of resorption and bone formation which takes approximately 13 weeks. The rate of turnover is determined by hormonal and local factors. The turnover of trabecular bone is much greater and osteoporosis is more marked in trabecular bone, which is affected earlier than cortical bone.

Peak bone mass is generally achieved in early adulthood, being determined by sex, heredity, race, diet, exercise, and hormones. In females 50% of the bone mass is due to prepubertal growth, but only 10% in males. Physical activity is an important factor in determining peak bone mass but one must distinguish between the different forms of physical activity—weight bearing and non-weight-bearing.

The effect of exercise on bone mass is site specific. If the exercise involves mainly the lower limb, it may improve femoral neck bone density, but have no effect on the radius. It is essential to examine the specific region of interest, for example the neck of the femur and the lumbar spine, if you wish to determine the level of bone mineral density.

Physically active people have higher bone mineral densities than age matched controls. A meta-analysis of six trials showed that exercise reduced the incidence of hip fractures by 50%. Skeletal fragility in the elderly can be traced to low peak bone mass attained during childhood and one of the factors is the level of physical activity undertaken during the developing years.

There is a relation between bone mass and activity. Women with osteoporotic fractures have a lower muscle mass and strength than age matched controls. Extremes of exercise, too little or excessive, both result in bone loss. Long periods of oestrogen deficiency during the early decades affect peak bone mass. Eating disorders such as anorexia nervosa, bulimia, excessive exercise induced amenorrhea, or excessive psychological stress and high levels of prolactin may all result in low oestrogen concentrations, resulting in an increased incidence of stress fractures and even osteoporosis in young females.

There has been an increase in eating disorders, particularly in the so called feminine sports such as gymnastics, synchronised swimming, ballet dancing, and weight category sports (light weight rowers). The combination of amenorrhea, eating disorder, and osteoporosis is now known as the athletic triad. Unless patients are treated when they are young they will have major problems in later life.

Lack of physical activity is a risk factor for osteoporotic fractures. Immobilisation and prolonged bed rest produce a rapid bone loss, while exercise involving weight bearing has been shown to reduce bone loss and to increase bone mass. The optimal type and amount of physical activity that will prevent osteoporosis have not been established.

To increase bone mass and strength, exercise should involve loads of high magnitude and rate and should be dynamic in nature, with varied and diverse patterns of stress. Relatively few cycles of loading would be required so you do not have to exercise for long periods. It is very important to cross train and not rely on one exercise for both cardiovascular and osteoporosis prevention. The exercise must be enjoyable, as it will only be of benefit if it is continued and is a programme for life. Poor compliance is a major problem. Strategies to prevent falls are important. Exercise in elderly people may enhance mobility, muscle strength, and co-ordination.

The combination of exercise, calcium supplements, and hormone replacement therapy is the optimum treatment to prevent bone loss.

DOMHNALL MACAULEY

Medicolegal aspects of deliberate foul play in rugby union

Medico-legal principles, which have a common denominator, are applicable to all contact body sports, and particularly soccer, cricket, and rugby union. These principles are all interrelated, with a common thread protecting the doctor’s patient, the lawyer’s client, and the particular sport itself. These principles uphold the following. (1) The rule of law on the field of play should reflect the wider law, which never stops at the boundary or touchline. (2) The spirit of the game, identified as a Corinthian ethic of fair play, runs throughout. (3) The
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M O'Brien

doi: 10.1136/bjsm.30.3.191

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