Osteoporosis in men

Around a third of osteoporotic fractures occur in men. Generally, hip fractures are associated with high rates of morbidity, disability, and mortality. Mortality in men after hip fracture is about double that in women. Although men do not have a rapid loss of bone density as seen in women after the menopause, both sexes lose bone density after the age of 65 years. Both the National Osteoporosis Guideline Group and the NHS Clinical Knowledge Summaries give advice on treating men with osteoporosis. Doctors need greater awareness of this disease to proactively identify men at risk of osteoporotic fracture.

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About one in three osteoporotic fractures occur in men, and the consequences of these fractures are more severe in men than in women. Despite the large numbers of men affected, osteoporosis in men remains largely underdiagnosed and undertreated. With a growing ageing male population, it is important that men who are at risk of osteoporosis are diagnosed early and treated appropriately to reduce morbidity and mortality, and to maintain quality of life.

The impact of osteoporosis

Fragility fractures occur most commonly at the wrist, hip, and spine. Although any fracture can impact on quality of life, causing loss of mobility and independence as well as chronic pain, hip and spinal fractures can have a particularly devastating effect.

Hip fractures are responsible for more than 1150 premature deaths in the UK every month. A year after a hip fracture, 80% of patients are unable to resume activities such as driving, shopping, gardening, and climbing stairs. 60% will have difficulty with at least one essential activity of daily living such as dressing, using the toilet, or feeding themselves. 40% remain unable to walk independently, and 25% will enter a nursing home for the first time. Most patients diagnosed with a spinal fracture will have difficulties with activities of daily living, and 40% will suffer constant pain.

Osteoporotic fractures place a growing burden on the NHS and social services. Estimates from the National Osteoporosis Society suggest that the combined costs for patients with a hip fracture amounts to more than £1.73 billion per year in the UK. A growing ageing population means that the number of fractures will probably continue to rise.

Osteoporosis in men

Although osteoporosis is considered as primarily affecting women, one in five men older than 50 years will break a bone mainly as a result of this disease. Approximately 30% of hip fractures and 20% of vertebral fractures occur in men. Although fewer men than women are affected by osteoporosis, when they have the disease, the consequences are often more significant. Morbidity after fragility fracture is at least as high in men as it is in women, and fracture-related mortality a year after hip fracture in men is approximately double that of women.

Investigating osteoporosis in men

Men in their fifties do not experience the rapid loss of bone that women do after the menopause, and compared with women, osteoporosis usually develops later in life in men. However, from about the age of 65 years, men and women lose bone mass at a similar rate, and calcium absorption decreases in both sexes.

Primary osteoporosis

Primary osteoporosis is either idiopathic, in which the cause is unknown, or age-related. As opposed to age-related bone loss, idiopathic osteoporosis occurs in younger men. An individual’s bone-mineral density is determined by their peak bone mass and subsequent bone loss. Peak bone mass describes the bone mass and strength achieved at the end of the growth period. Peak bone mass plays a critical role in an individual’s risk of osteoporotic fracture in adulthood. The greater
peak bone mass an individual attains, the lower their risk of osteoporotic fracture in the future.

Peak bone mass is determined by endogenous factors such as sex, race, genetics, and hormonal influences, in combination with exogenous (lifestyle) factors. Genetics account for 60–80% of its variance. Overall, men attain a higher peak bone mass than women do, due to a larger body size. Hormones play a major part in both the achievement of peak bone mass and the maintenance of bone mass in later life. Peak bone mass may be reduced in men who had a constitutional delay in puberty. Exogenous factors such as physical activity and dietary calcium intake are also positively correlated with bone-mineral density.

The age-related bone loss seen in elderly people occurs when bone turnover exceeds bone formation. Causes for this imbalance include calcium and vitamin D deficiency, increased parathyroid hormone (PTH) levels, declining renal function, decreased physical activity and sex-hormone influences. Oestrogen plays a pivotal role in maintaining bone density in women, and while men do not experience the accelerated period of bone loss that occurs with the menopause, levels of oestrogen may fall with age. In men ageing normally, serum total testosterone declines by 25%. In normal elderly men, oestrogen accounts for approximately 70% of the total effect of sex steroids on bone resorption, with testosterone accounting for only 30%.

Secondary osteoporosis

The loss of bone in secondary osteoporosis is caused by certain diseases, lifestyle behaviours, or medications. The most common causes of secondary osteoporosis in men, accounting for 40–50% of all cases, include exposure to long-term glucocorticoid therapy, hypogonadism, and alcohol abuse. Additional causes are listed in box 1.

Consensus statements have consistently defined osteoporosis as a systemic disease characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to increased bone fragility and susceptibility to fracture. However, because the condition is not generally recognised clinically until a fracture occurs, WHO subsequently redefined osteoporosis according to bone mineral density (box 2). The aim of this change was to allow diagnosis before the occurrence of a fracture. The diagnosis is based on the number of standard deviations (SD) from the bone mineral density of an average young adult female, referred to as the T score. This means it primarily applies to women. Although one review suggests that applying the same definition to men on the basis of the equivalent male reference values has equal value, others suggest that using female standards for bone-mineral density may result in osteoporosis being underestimated in men. Men have a higher bone-mineral density to begin with and sustain fractures at a higher bone density than do women.

There is no consensus definition for osteoporosis in men, and until recently its diagnosis has been complicated by ongoing debate on whether to use female reference values for bone mineral density or sex-specific reference values. The National Osteoporosis Guideline Group (NOGG) published its guideline for the diagnosis and management of osteoporosis in postmenopausal women and men from the age of 50 years in the UK.

Box 1: Causes of secondary osteoporosis in men

- Hypogonadism
- Alcoholism
- Hyperparathyroidism
- Thyrotoxicosis
- Hypercalciuria
- Immobilisation
- Gastrointestinal disease
- Chronic renal failure
- Chronic liver disease
- Type-1 diabetes mellitus
- Malignancy
- Osteogenesis imperfecta
- Homocystinuria
- Organ transplantation
- Smoking
- Excessive vitamin A intake

Drugs

- Long-term glucocorticoids
- Other immunosuppressants
- Anticonvulsants
- Anticoagulants
- Thyroid hormone replacement
- Psychotropic drugs
- Aluminium-containing antacids
- Gonadotropin-releasing hormone agonists

Box 2: WHO definitions of osteoporosis

<table>
<thead>
<tr>
<th>Definition</th>
<th>T Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;1 SD</td>
</tr>
<tr>
<td>Osteopenia</td>
<td>1–2.5 SD</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>&gt;2.5 SD</td>
</tr>
</tbody>
</table>

Established or severe osteoporosis

As defined above plus a fragility fracture
in November 2008. This guidance recommends that osteoporosis is diagnosed on the basis of bone mineral density as assessed by central dual energy X-ray absorptiometry and WHO diagnostic criteria.

An individual’s 10-year probability of major osteoporotic fracture (spine, hip, shoulder, or forearm) can be calculated using an online fracture-risk assessment tool (FRAX). FRAX estimates risk on the basis of clinical risk factors with or without bone-mineral density. In the absence of computer access, NOGG provides charts to calculate average fracture probability in men with no previous fracture, on the basis of the number of clinical risk factors, age, and either body-mass index, or bone-mineral density.

**Treatment**

NOGG defines treatment thresholds for men aged 50 years and older, on the basis of both 10-year probability of major osteoporotic fracture and average fracture probability, and offers guidance on general management and major pharmacological interventions. General management includes assessment of falls risk and prevention, maintenance of mobility, and the correction of nutritional deficiencies. Major pharmacological interventions include bisphosphonates, strontium ranelate, raloxifene, and parathyroid hormone peptides, in combination with calcium and vitamin D supplements.

Preventing falls prevents fractures. NICE provides guidance on the assessment and prevention of fall in older people. Box 3 details the factors considered most predictive of falling. Other risk factors include muscle weakness, arthritis, generalised pain, reduced activity, high alcohol consumption, diabetes, Parkinson’s disease, stroke, and low body-mass index.

Successful multifactorial intervention programmes include home-hazard assessment and intervention, vision assessment and referral, strength and balance training, and review of medications with modification or withdrawal if appropriate. To reduce nighttime trips to the toilet, and thus, increased risk of falling at night, patients should be advised to go to the toilet before they go to bed; limit their fluid consumption in the late afternoon and evening; to keep eyeglasses, hearing aids, walking aids, and telephone where they can be found easily in the dark; and to watch out for rugs and loose carpets.

The NHS provides guidance on the treatment of men with osteoporosis in their clinical knowledge scenarios. This guidance recommends that we consider referral for all men with osteoporosis. Treatment in men is best initiated after specialist assessment, unless a considerable delay in seeing a specialist is expected, in which case it may be appropriate to start drug treatment sooner. All men should be investigated for hypogonadism, which is excluded by investigating testosterone, gonadotropins, and sex-hormone-binding globulin.

Secondary causes should be ruled out with the following tests: full blood count and erythrocyte sedimentation rate to exclude multiple myeloma; bone, liver, and renal biochemistry to exclude metabolic causes; and thyroid function tests to exclude hyperthyroidism. Lifestyle advice is also important regarding intake of calcium and vitamin D, increasing physical activity, stopping smoking, and reducing consumption of alcohol.

**Prevention**

The physical and financial costs of osteoporosis can be avoided if the disease is prevented in the first place. Primary prevention strategies can start early, with provision of information on osteoporosis and stressing the importance of achieving a high peak bone mass to young men. The following steps can then help to preserve bone density at any age:

- Avoid smoking;
- Moderate alcohol intake;
- Adequate weight-bearing physical activity;
- Adequate intake of calcium and vitamin D;
- Maintain a healthy weight for height;
- Be aware of and seek treatment for any underlying medical condition that can affect bone health;
- Review the necessity of any medications known to affect bone health.

**Conclusion**

The number of patients with osteopenia exceeds the number of patients with osteoporosis, so a significant proportion of fragility fractures will occur in this group, even though they are at lower risk and do not have osteoporosis as

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**Box 3: Factors predictive of falling**

- A history of falls
- Impaired mobility
- Balance and gait deficits
- Fear
- Visual impairment
- Cognitive impairment
- Urinary incontinence
- Home hazards
defined by WHO. Lifestyle advice can slow or prevent continuing deterioration and there are opportunities for fall prevention.

Ultimately, preventing osteoporotic fractures in our ageing male population will require an increased awareness of the disease among both physicians and patients. Clinicians should be alert to those patients at risk and be proactive with regard to identification, investigation and treatment.

I have no conflict of interest.

References


Key points

• Osteoporosis in men is a significant and increasing problem
• Male osteoporosis may be primary or secondary
• Osteoporosis is diagnosed on the basis of bone-mineral density as assessed by dual energy X-ray absorptiometry and the WHO diagnostic criteria
• Treatment thresholds can be based on an average or 10 year probability of osteoporotic fracture
• Management is likely to include both lifestyle and pharmacological interventions
• Primary prevention strategies are the ultimate aim in reducing the morbidity and mortality associated with osteoporotic fractures in men