UNIT NO. 1

OSTEOPOROSIS

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ABSTRACT

All patients who have had previous osteoporotic fractures should be started on drug therapy to lower the risk of further fractures. For patients who do not have fractures, use OSTA to decide who to send for a BMD measurement by DXA. The choice of pharmacological therapy depends on the patient profile and consideration of anti-fracture efficacy, side effects, cost and non-skeletal benefits.

PRESENTATION OF OSTEOPOROSIS

The WHO definition of osteoporosis is as follows: "a progressive systemic skeletal disease characterised by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture".

The main clinical presentation of osteoporosis is the osteoporotic fracture. This occurs after minimal or no trauma and typically affects the distal radius, the spine and the hip although any bone can be affected.

Before a fracture occurs, there are no symptoms.

POINTERS IN ASSESSMENT

When a fracture occurs after minimal trauma, one has to think of osteoporosis but other causes of pathological fracture must be considered. This is especially so if the site of fracture is not typical eg single compression fracture at T4 or if the patient is too young. The presence of clinical indicators of underlying malignancy or endocrine disease would point to a secondary cause of osteoporosis or other causes of pathological fracture.

If a fracture has not yet occurred there are usually no symptoms at all and the doctor has to identify the high risk patient who will need further tests. The best test by far is to measure bone density of the hip and spine using dual energy X-ray absorpiometry (DXA). The WHO definition of osteoporosis based on T scores is as follows: A T score of >-1 is normal, -1 to -2.5 is osteopenia and < -2.5 is osteoporosis. The presence of a fracture indicates severe osteoporosis.

Ultrasound techniques are less proven and bone turnover markers are best used in a research setting or to monitor response to therapy.

To decide who to send for a bone mineral density (BMD) measurement, the OSTA (Osteoporosis Self-Assessment Tool for Asians) based on age and weight can be used. (Table 1). This separates patients into a high risk group where a BMD test is likely to be useful and a low risk group where it is unlikely to be useful. The middle group would depend on risk factors (Table 2) and the decision whether to test or not has to be individualised.

TABLE 1: Osteoporosis Self-Assessment Tool for Asians (OSTA)

Age (yr)	Weight (kg)							
	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
45-49								
50-54								
55-59								
60-64						Low Risk		
65-69			Moderate Risk					
70-74								
75-79	High Risk							
80-84								
85-89								

Modification of OSTA: alternative approximate calculation to facilitate categorization of osteoporosis risk without having to refer to Age-Weight table.

Osteoporosis Risk	Suggested Action	Patient's Age (yr) *minus* Weight (kg) =
High	Measure BMD	> 20
Moderate	Measure BMD if has other risk factors* or past history of fracture	0 – 20
Low	Can defer BMD unless at risk* or has past history of fracture	< 0

* for other risk factors, refer to Table 3 Section A.

COMPLICATIONS

The main complications arise because of fractures. Colles' fractures usually heal well unless comminuted. Spine fractures cause severe acute pain and also chronic backache and deformity if recurrence occurs. Usually there are no neurological complications. Hip fractures occur in older patients and are associated with a first year mortality rate of around 20%. Half of survivors lose their independence.

PREVENTION

The main components of prevention in osteoporosis are:

1) calcium intake
2) vitamin D intake
3) exercise
4) prevention of falls

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TABLE 2. Risk Factors for Osteoporosis And Fracture

A. Risk factors for low bone mass for which BMD measurement might be considered:

Non-modifiable
- Personal history of previous fracture as an adult
- History of fracture in a first degree relative (especially maternal)
- Low body weight & older age (Table 1)

Potentially Modifiable
- Current cigarette smoking
- Alcohol abuse (stronger data in men)
- Early natural or surgical menopause before age 45 years, or prolonged premenopausal amenorrhea lasting > 1 year
- Drugs e.g. corticosteroids (equivalent to prednisolone > 7.5 mg/day for more than 6 months), excess thyroxine, anticonvulsants
- Ongoing disease conditions e.g. hypogonadism, hyperthyroidism, hyperparathyroidism, Cushing syndrome, chronic obstructive airways disease, liver disease, malabsorption, chronic renal failure, rheumatoid arthritis, organ transplantation and anorexia nervosa
- Low calcium intake (< ~500 mg/day among Asians)
- Lack of regular physical activity

B. Other BMD-independent risk factors for fracture:
- Taller individuals (> ~1.6m among Asian women, > ~1.7m among Asian men)
- One or more previous falls in the past year
- Strokes, poor balance, weak quadriceps muscle strength
- Impaired eyesight despite adequate correction
- Drugs e.g. sedatives, polypharmacy
- Environmental factors e.g. slippery floors, inadequate lighting

Calcium intake should be 700 mg a day for all above the age of 19. For patients below 65 years old, the vitamin D requirement is 400 iu a day and for those above 65,800 iu a day. Exercise should be weight bearing. Prevention of falls include patient factors such as correcting poor eyesight, limiting the use of sedative drugs and also environmental factors such as slippery floors and loose rugs.

NON PHARMACOLOGICAL ASPECTS OF MANAGEMENT

Treatment of fractures may involve plaster casts, external fixators for the radius, vertebroplasty for compression fractures and arthroplasty for hip fractures.

Pain relief after fractures is an important aspect of treatment.

Rehabilitation is crucial for a good outcome especially for hip fractures where patients who perish tend to be the ones who remained bedridden or wheelchair bound after arthroplasty.

EVIDENCE BASED PHARMACOLOGICAL TREATMENT

The appropriate therapy for an individual patient is based on considering a host of factors including anti-fracture efficacy, cost, side effects and non-skeletal benefits.

If anti-fracture efficacy is the sole criteria the two newer bisphosphonates alendronate and risedronate have the best evidence for reducing the risk of spine and non spine fractures including hip fractures. Both drugs are very similar in the strength of the data, side effects, most notably reflux esophagitis and cost. Both have to be taken in a special way because of poor absorption and there is a once weekly version of both drugs.

Raloxifene has the advantage of having non-skeletal benefits such as lowering the risk of estrogen receptor positive Ca breast. It lowers the risk of cardiovascular events in women at higher risk of cardiovascular disease. In Western studies there is a small increase in the risk of thromboembolism.

Calcitionin has weaker evidence for anti-fracture efficacy but it reduces the acute pain of osteoporotic fractures. Cyclical etidronate and vitamin D analogues also have weaker data. Hormone replacement therapy is now considered a less ideal treatment for osteoporosis as prolonged use is necessary and this has been shown to have adverse effects.

RECOMMENDED READING

MOH Clinical Practice Guidelines 2/2002
Annals of Academy of Medicine 2002 vol 31(1).

LEARNING POINTS

- All patients who have had previous osteoporotic fractures should be started on drug therapy to lower the risk of further fractures
- For patients who do not have fractures, use OSTA to decide who to send for a BMD measurement by DXA
- The choice of pharmacological therapy depends on the patient profile and consideration of anti-fracture efficacy, side effects, cost and non-skeletal benefits.