Unit No. I

POSTMENOPAUSAL OSTEOPOROSIS: SCREENING & DIAGNOSIS BASED ON FRAX® AND BMD

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ABSTRACT

Osteoporosis is a common ailment, especially in older women, yet it is one of the most under-diagnosed and undertreated diseases. Screening of patients, therefore, is invaluable to identify those who require further evaluation. We shall discuss who requires screening and further evaluation of osteoporosis and discuss the diagnosis of osteoporosis.

Keywords: Postmenopausal osteoporosis, Singapore, osteoporosis screening, osteoporosis diagnosis, bone mineral density

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INTRODUCTION

Osteoporosis is a common ailment, especially in the elderly, yet is one of the most under-diagnosed and undertreated diseases not just in Singapore but globally. The prevalence of osteoporosis in Singapore is about 9.3 percent in women and 0.7 percent in men.¹ As age advances, the prevalence of osteoporosis increases to 58 percent in those more than 80 years of age.² However, there is a huge management gap for the diagnosis and treatment of osteoporosis. In a study of patients admitted to hospital for a low trauma hip fracture in several Asian countries, including Singapore, slightly less than a third had a bone mineral density (BMD) ordered. In the same study, only about half had the diagnosis of osteoporosis informed to them and a third had a prescription for osteoporosis medication in the six months post-fracture.³

WHO SHOULD BE SCREENED FOR POSTMENOPAUSAL OSTEOPOROSIS?

• Women who would be at risk of not having achieved their peak bone mass during their childhood or adolescent days. E.g., those with chronic childhood diseases, e.g., Type 1 diabetes, smoking from a young age, dietary deprivation, etc

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- Women who had a previous history of a secondary cause of osteoporosis or conditions that would increase their risk of osteoporosis when they are postmenopausal, e.g. endocrine disorders such as hyperthyroidism, hyperparathyroidism, Cushing's syndrome, diabetes, premature or premature menopause, female athlete triad, anorexia nervosa, oncological disorders necessitating oestrogen deprivation therapy such as breast cancer, rheumatological disorders such as rheumatoid arthritis, gastrointestinal diseases such as malabsorption, diseases that require long term treatment with steroids, etc.
- Women who have a present history of the aforementioned secondary cause of osteoporosis
- Women who have a current history that puts them at risk. These include smoking, drinking more than 2U alcohol per day, lean body habitus, loss of height of more than 2cm in three years, prolonged immobility, history of falls, family history of osteoporosis or fragility fracture, personal history of low trauma fracture(s), personal history of early menopause, and medications that may increase risk of osteoporosis such as chronic steroid use, anti-epileptics such as phenytoin, carbamazepine.⁴

OSTEOPOROSIS SELF-ASSESSMENT TOOL FOR ASIANS (OSTA)

We also have a tool that allows us to identify women at increased risk of osteoporosis – Osteoporosis Self-assessment Tool for Asians (OSTA).² This tool originated because there exists a paucity of bone mineral density machines in some Asian communities. Hence, it was envisaged to help classify postmenopausal women to a low, moderate, and high-risk group for osteoporosis to target those who would benefit from further osteoporosis assessment. Depending on the risk category, the risk of osteoporosis was different - 3 percent, 15 percent and 61 percent, respectively.² This tool and reference chart was highlighted in the Singapore Appropriate Care Guide (ACG) published on 7 November 2018.4 A fast method that can also be employed at the clinic without consulting the reference chart would entail calculating the difference between age in years and weight in kilogrammes, which will help place the patient into the appropriate risk group - a) score < 0 - low-risk, b) score 0-20 - moderate-risk and c) score > 20 - high-risk group.

Based on the risk classification for osteoporosis, one can then decide whether to further investigate osteoporosis. If the patient falls into the low-risk group, might consider deferring BMD assessment. If in the moderate risk group, consider referring for BMD assessment if the aforementioned situations exist that might alert the healthcare professional to screen for osteoporosis. If the patient is in the high-risk category, send for a BMD assessment.⁴

DIAGNOSIS OF OSTEOPOROSIS

This is required to identify those that should be assessed and treated. Osteoporosis is a systemic condition where the bone is brittle and prone to fracture and may be associated with an increased risk of mortality. There are several ways of establishing this:

- Clinically, if a patient suffers from a fragility or low trauma fracture, this is the clinical diagnosis of osteoporosis made.
- Satisfying the World Health Organisation (WHO) criteria of osteoporosis with a T-score of ≤-2.5 in any of the three regions of interest (ROI) total spine, total hip or neck of femur. A T-score of ≥ -1.0 connotes normality and osteopenia is < -1.0 and > -2.5.

Overall diagnosis of osteoporosis is based on the lowest of the T-score in any of the three ROIs. For example, if T-score is normal for the spine but osteopenia in the total hip and in the osteoporosis range for the neck of the femur– the diagnosis is the lowest of the three ROI– so the patient has osteoporosis.

The largest diagnostic group is the osteopenia group and also the group with the greatest absolute number of fractures because it is the largest group. As such, merely treating patients with osteoporosis alone would leave out a large proportion of patients who would benefit from treatment.

FRACTURE RISK ASSESSMENT TOOL (FRAX)

The Fracture Risk Assessment Tool (FRAX) was aimed at calculating the ten-year risk of fracture for major osteoporosis fractures (MOF) and hip fractures (HF). The former includes fractures in the spine, forearm, hip and shoulders. Many countries, including Singapore, have country-specific FRAX algorithms to enable fracture risk to be calculated for the population by inputting, amongst several factors, the age, gender, height, weight, and current risk factors such as smoking, personal history of fractures, alcohol intake of > 3U daily, rheumatoid arthritis, presence of secondary causes of osteoporosis, glucocorticoid intake and BMD in the neck of femur. This aims at identifying the group of postmenopausal patients who might be a high risk of fracture but do not fall into the category of clinical diagnosis of osteoporosis or fulfil the WHO criteria of osteoporosis.

What risk of fracture would denote sufficiency to establish the treatment threshold is still a question for many countries, including Singapore. The cost-effective threshold of 20 percent for MOF and 3 percent for HF was based on interventional thresholds established by the National Osteoporosis Foundation in the United States, however data in Singapore might seem to point to a lower risk threshold in Singapore, which might differ according to race and age.⁵ A cost-effectiveness analysis in Singapore using alendronate pointed to a possible intervention threshold for treatment at 14.1 percent for MOF and 3.5 percent for HF.⁶

There is an option not to input in the neck of femur BMD and the algorithm would still be able to arrive at a risk score. When used this way, it can also serve as a screening tool, just like OSTA, to screen for those that may have osteoporosis, especially if they fall into or near the risk threshold categories for treatment.

CONCLUSION

Given the high prevalence of osteoporosis in Singapore and the morbidity and mortality risk for osteoporosis, active screening of postmenopausal women for the possibility of osteoporosis should be carried out at the primary health care level if they have risk factors of osteoporosis or are alerted by OSTA or FRAX for further osteoporosis investigation. If osteoporosis is suspected, confirmation tests such as a BMD should be carried out. For osteopenia on BMD criteria, FRAX can also be used to detect fracture risk that is great enough to treat the patient.

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LEARNING POINTS

- There is a high prevalence of osteoporosis in postmenopausal women in Singapore. However, there is underdiagnosis and undertreatment of these patients.
- Screening for osteoporosis is essential in order to identify those that will benefit from further investigations to confirm osteoporosis. Risk factors for osteoporosis and tools for screening are discussed and include OSTA and FRAX.
- Diagnosis of osteoporosis can be made clinically and also via bone mineral density and this is discussed in the review.