Chapter 15
Management of Osteoporosis

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Learning Objectives

1. Determine which patients should receive treatment for osteoporosis.
2. Identify three classes of drugs used for the treatment of osteoporosis.
3. Understand the role of calcium and vitamin D supplementation and lifestyle interventions.
4. Describe recommendations for monitoring and duration of treatment.

Clinical Vignette: A 65-year-old woman undergoes her initial screening dual x-ray absorptiometry (DXA) scan that reports a *T*-score of −2.9. She has never had a low-impact fracture. She smokes one pack of cigarettes per day and drinks two alcoholic drinks per day, with up to four drinks on weekends.

A. Does this patient have osteoporosis?

Outline the approach to diagnosing osteoporosis as shown in Fig. 15.1. *Point out that anyone with a fragility fracture should be treated. She has osteoporosis based on her low bone mineral density (BMD).*

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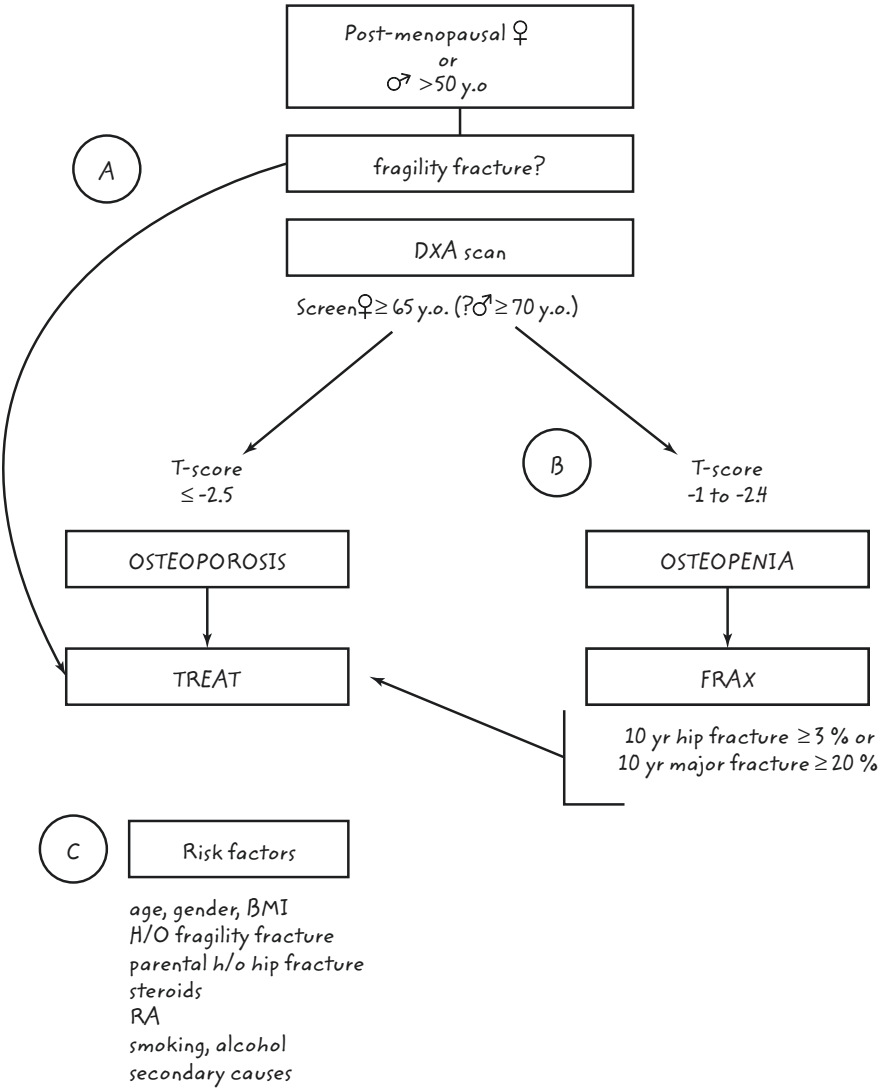

Fig. 15.1 Management of osteoporosis, A–C

Teaching point

- Osteoporosis is diagnosed in postmenopausal women or men aged 50 years or older with a history of a fragility fracture (i.e. low impact fracture of the hip, vertebra, wrist, humerus, or pelvis) **OR** DXA *T*-score ≤ −2.5, indicating bone mineral density (BMD) more than 2.5 standard deviations below the mean BMD of a young adult.

B. **What if her *T*-score was −2.1? How would you decide if she should be treated?**

Outline the diagnosis and evaluation of osteopenia as shown in Fig. 15.1.

Teaching points

- Osteopenia is defined by a *T*-score of −1.0 to −2.4 at the femoral neck or lumbar spine.
- The need to start treatment is determined by estimated probability of a fracture—the Fracture Risk Assessment Tool (FRAX) model is used for this and is accessible online.
- The FRAX model incorporates validated clinical risk factors and BMD for more accurate and individualized fracture risk prediction.
- She should start a medication for fracture prevention if her 10-year probability of a hip fracture is ≥3% or 10-year probability of any major osteoporosis-related fracture is ≥20%.

C. **What clinical risk factors for fracture would you ask our patient about? What are examples of secondary causes of osteoporosis?**

Write down risk factors as they are mentioned in Fig. 15.1. *Emphasize that these are the risk factors included in the FRAX model.*

Teaching point

- Secondary causes of osteoporosis include hypogonadism, premature menopause, inflammatory bowel disease and other causes of malnutrition or malabsorption, type I diabetes mellitus, untreated hyperthyroidism, or postorgan transplant.

D. **What are the classes of pharmacologic treatments for osteoporosis? Which would you recommend to our patient?**

As classes are mentioned, ask about mechanism of action, common side effects, and typical duration of efficacy—write these down as shown in Fig. 15.2.

Teaching points

- Osteonecrosis of the jaw (ONJ) is seen with bisphosphonates and denosumab.
- Teriparatide is a parathyroid hormone analog, and stimulates osteoblastic function.
- Denosumab is a receptor activator of nuclear factor kappa-B ligand (RANKL) inhibitor, and prevents osteoclast activation.
- Nonbisphosphonates have only temporary effects and patients may experience rapid bone loss after treatment discontinuation.

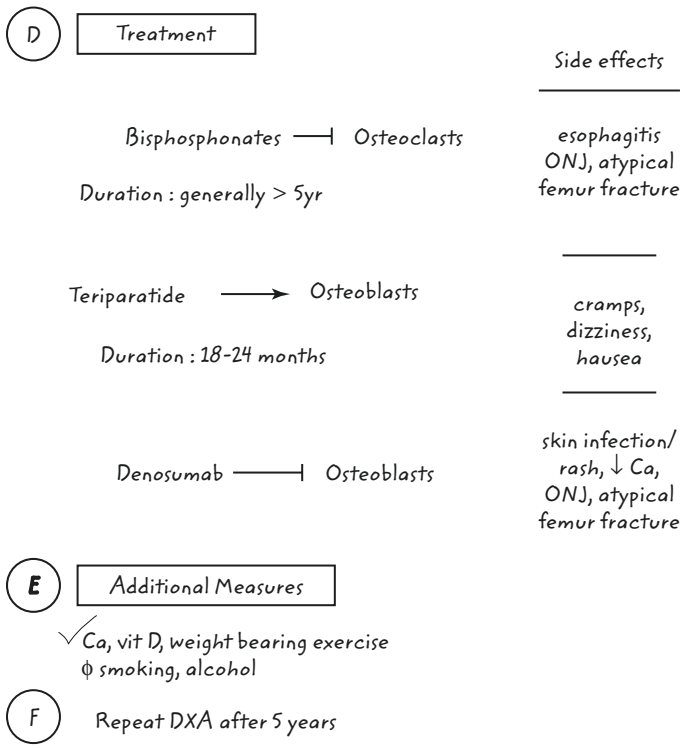

Fig. 15.2 Management of osteoporosis, D–F

- There is limited evidence regarding the benefit of combination therapy, or the optimal sequence of therapy.

For our patient, we would recommend bisphosphonates, which are typically first line and can have beneficial effects that last for years even after the medication is discontinued.

E. **Together, you decide she should start a bisphosphonate. Would you also start her on calcium and vitamin D supplementation? What other lifestyle interventions would you recommend to increase bone density?**

Write down the additional measures as shown in Fig. 15.2.

Teaching points

- Guidelines advise an adequate intake of dietary calcium (1200 mg/day) and vitamin D (800–1000 IU/day). Supplementation is controversial since randomized trial data do not support efficacy for reducing fracture risk.
- Counsel patients to engage in regular weight-bearing activity (e.g., walking, jogging, Tai Chi) and resistive exercises (e.g., yoga, Pilates) to reduce the risk of falls. The evidence regarding fracture risk reduction, however, is limited.
- Counsel patients to quit smoking and moderate their alcohol intake (e.g. less than 3 oz spirits or 12 oz wine per day).
- Avoid the use of medications that can increase falls.

F. **When should you repeat her DXA to monitor her bone density while on treatment?**

Write down "5 years" as shown in Fig. 15.2.

Teaching points

- There is no consensus on optimal monitoring practices.
- The newest American College of Physicians guidelines recommend against repeating a DXA during the initial 5 years of treatment.
- Randomized trial data do not suggest that more frequent DXA scans improve fracture risk prediction or treatment adherence.

Return to objectives and emphasize key points

1. Determine which patients should receive treatment for osteoporosis.
   - State that postmenopausal women, or men older than 50 years, with a history of fragility fracture or *T*-score ≤ -2.5 should be treated for osteoporosis.
2. Identify three classes of drugs used for the treatment of osteoporosis.
   - Draw a star next to bisphosphonates as listed on your board, emphasize that these agents are first line, and that the evidence strongly supports that these agents effectively reduce fracture risk.

3. Understand the role of calcium and vitamin D supplementation and lifestyle interventions.
    - Draw a star next to calcium and vitamin D and exercise as listed on your board and emphasize that these interventions are generally recommended, but there is little evidence to support their efficacy.
4. Describe recommendations for monitoring and duration of treatment.
    - Draw a star next to repeat DXA on your board and emphasize that there is insufficient data regarding the benefit of bisphosphonate treatment beyond 5 years.

Resources

1. Black DM, Rosen CJ. Postmenopausal osteoporosis. N Engl J Med. 2016;374(3):254–62. https://doi.org/10.1056/NEJMcp1513724.
2. Cosman F, de Beur SJ, LeBoff MS, Lewiecki EM, Tanner B, Randall S, et al. Clinician's guide to prevention and treatment of osteoporosis. Osteoporos Int. 2014;25(10):2359–81. https://doi.org/10.1007/s00198-014-2794-2.
3. Ensrud KE, Crandall CJ. Osteoporosis. Ann Intern Med. 2017;167(3):ITC17–32. https://doi.org/10.7326/AITC201708010.
4. Qaseem A, Forciea MA, McLean RM, Denberg TD. Treatment of low bone density or osteoporosis to prevent fractures in men and women: a clinical practice guideline update from the American College of Physicians. Ann Intern Med. 2017;166(11):818–39. https://doi.org/10.7326/M15-1361.
5. Sözen T, Özışık L, Başaran NÇ. An overview and management of osteoporosis. Eur J Rheumatol. 2017;4(1):46–56. https://doi.org/10.5152/eurjrheum.2016.048.
6. FRAX Fracture Risk Assessment Tool https://www.sheffield.ac.uk/FRAX/tool.jsp?locationValue=9.