ADVANCES IN NUTRITION

Current Developments in Nutrition Support, Dietary Issues, and Weight Management

Prevention, Detection, and Treatment of Osteopenia and Osteoporosis

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G&H Which gastroenterologic conditions are most commonly associated with osteopenia or osteoporosis?

SK Inflammatory bowel disease (IBD) is the leading disease, and it is of particular importance now because baby boomers are entering the 65-year age range. An estimated 77.2 million more people, including a large number of postmenopausal women who are at risk for IBD, are now eligible for Medicare benefits, so physicians are facing an increased population that will need attention. Other gastrointestinal conditions associated with osteoporosis include malabsorptive and maldigestive states, celiac disease, short gut syndrome, and pancreatic insufficiency in patients postgastrectomy. Other at-risk patients include those with cholestatic liver diseases, such as primary biliary cirrhosis. Patients who have undergone gastric bypass may be at risk for osteoporosis because of malabsorption and maldigestion. Whether proton pump inhibitors are associated with the risk of osteoporosis is a contentious issue. I do not believe they are, but there are Canadian data suggesting otherwise. Still, this is an area in which more study is needed.

G&H Does treating the underlying condition affect bone mineral density?

SK Absolutely. There is no question that the treatment of primary disease, particularly in IBD, is required. Control of the disease activity enables better control of its impact on osteoporosis. IBD is associated with very significant and active cytokines, such as tumor necrosis factor–alpha, interleukin (IL)-1 beta, or IL-6. All of these disrupt bone formation and remodeling.

Bone is a very dynamic organ. It is in a state of constant tension between the forces of bone formation and bone remodeling. Although 90% of the adult bone mass is achieved in the first 2 decades of life, there is a 10% turnover each year in the body's total bone content. IBD or other inflammatory conditions may be associated with a decreased nutrient intake as well as decreased absorption.

G&H What are the risk factors of osteoporosis?

SK Increasing age is a risk factor, particularly in postmenopausal women and persons receiving corticosteroid therapy, such as patients with rheumatoid arthritis (Figure). Other risk factors include a history of bone fragility or fracture, hypogonadism, a low body mass index (BMI), cigarette smoking, and excessive alcohol consumption. Family history of fractures and vitamin D deficiency are additional risk factors.

G&H Which patients should be routinely monitored, and what is the best method?

SK The most common modality used for routine monitoring and diagnosis of osteopenia and osteoporosis is the dual energy x-ray absorptiometry (DEXA) scan. The advantages of the DEXA scan are its wide availability and short radiation exposure. However, it has a few significant drawbacks. The DEXA scan is not a volumetric assessment

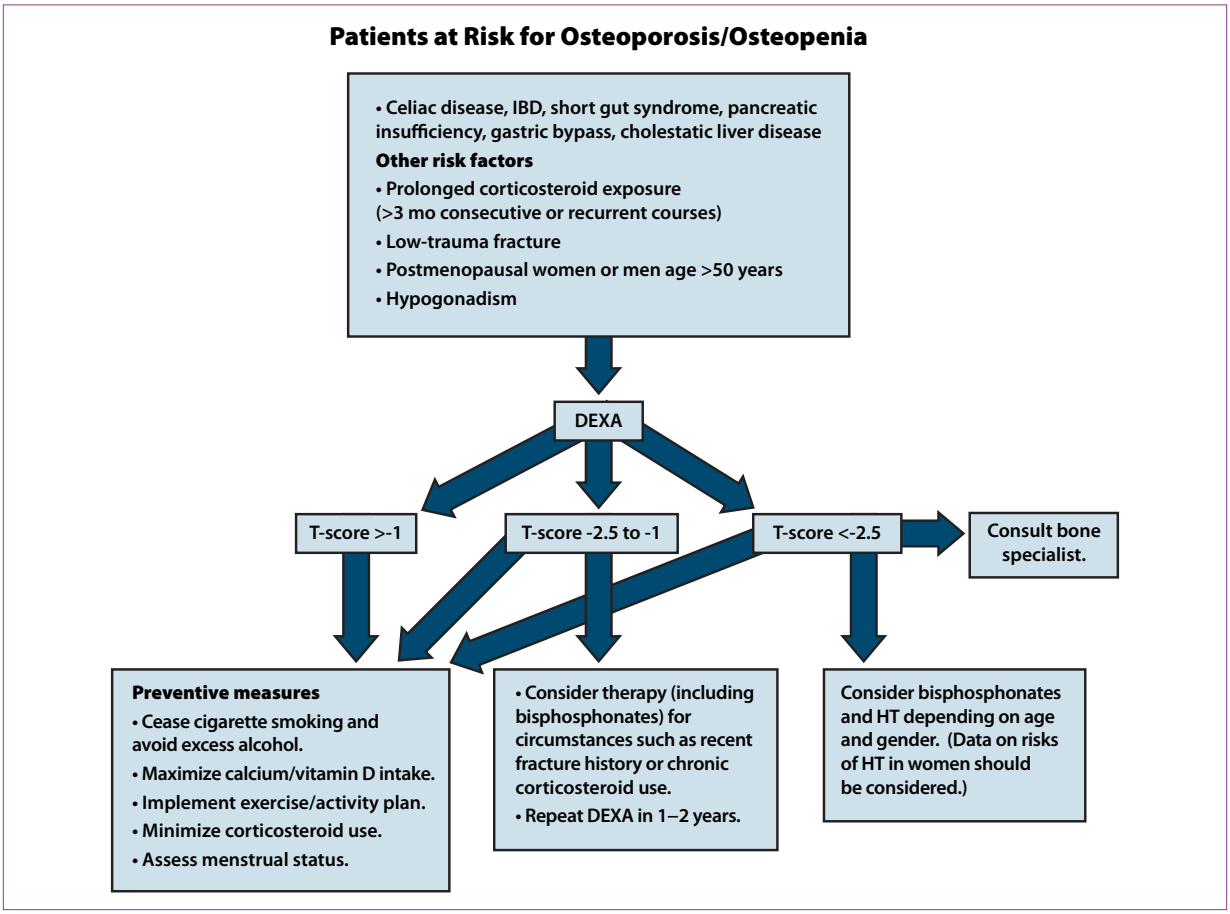

Figure. Assessment and management of osteoporosis in gastrointestinal diseases.

DEXA=dual-energy x-ray absorptiometry; HT=hormone therapy; IBD=inflammatory bowel disease.

Adapted with permission from Bernstein CN, Katz S. *Guidelines for Osteoporosis and Inflammatory Bowel Disease: A Guide to Diagnosis and Management for the Gastroenterologist*. Bethesda, Md: American College of Gastroenterology; 2003.

of bone; it is a 2-dimensional picture of a 3-dimensional structure. It can underestimate bone mineral density in shorter patients, which affects the pediatric population. Also, it does not distinguish between cortical and trabecular bone, and it is not predictive of future fracture risk. Because of these shortfalls, many clinicians interested in this field are now using the Fracture Risk Assessment Tool (FRAX) model, which does not use the DEXA scan. The FRAX model is a predictive measure that incorporates age, BMI, history of prior fracture or family fracture, steroid exposure, and comorbid diseases. Its use has been promulgated by the World Health Organization and the National Osteoporosis Guideline Group.

Our practice takes an aggressive approach. Older patients who have active inflammatory disease, especially postmenopausal patients, undergo DEXA scans every 2 years. Yearly examinations are performed in patients who have an extensive history of corticosteroid use or who have comorbid conditions that put them at high risk for bone loss. However, routine screening using DEXA scan has not been justified by the guidelines of the American Gastroenterological Association or British Society of Gastroenterology. In 2003, these organizations suggested that DEXA use should be extremely selective, not routine, and the decision to use this tool should be based on risk factors. I think there are reasonable data to support the association of celiac disease and IBD with metabolic bone disease to warrant the use of DEXA scans in select at-risk patients. Concerns regarding DEXA scan use include the fear of radiographic exposure and access-to-care issues related to a lack of insurance coverage.

G&H What is the role of biologic markers in clinical diagnosis and management, and what other diagnostic technologies are available?

SK The markers for osteoclastic bone resorption, such as *N*-telopeptide type 1, and the marker for bone formation, osteocalcin, are primarily research tools. However, peripheral quantitative computerized tomography is a promising technology that assesses bone through 3 dimensions,

separates trabecular from cortical bone, measures actual bone size, and assesses the geometry and quality of bone. Another resource is the quantitative ultrasound test. It measures the speed of sound through bone or any other tissue. It appears to be fairly decent at identifying fractures. It is a low-cost procedure and, being free of radiologic exposure, it is appealing for pediatric use.

G&H Therapeutically speaking, how can the risk of osteopenia be reduced in patients with IBD? How are osteopenia and osteoporosis best managed in these patients?

SK Treatment consists of controlling inflammatory cytokines. This tactic prevents the further impairment of calcium and phosphorus absorption and lessens bone resorption. Nonpharmacologic approaches include abstaining from cigarette smoking and alcohol consumption, improving nutrition, performing impact exercise, and discontinuing corticosteroid use.

Taking nutritional supplements that contain calcium and vitamin D is another recommendation, although it is very contentious. Pediatric studies have failed to demonstrate that such supplements are of value in terms of bone mineral density. The Institute of Medicine has reported little benefit from supplements, stating that they had no impact on the reduction of bone fractures. However, the Institute did recommend calcium supplementation of 1,000 mg in premenopausal women and 1,200 mg in postmenopausal women.

In our practice, we encourage vitamin D supplementation to achieve a vitamin D level greater than 30 ng/mL, which is the recommendation of the endocrine societies. The literature suggests that higher vitamin D levels in the IBD population are protective and somewhat lessen the degree of disease activity. Supplementation with calcitriol, an analog of vitamin D, is expensive and is not needed in patients who have normal parathyroid or renal function.

Phosphorus replacement is another strategy. It is useful in the elderly patient on a "tea and toast" diet. Such a patient is usually an elderly man or woman living alone with a reduced nutrient intake. Vitamin K supplements are needed as well as lifestyle modifications, as already mentioned.

Bisphosphonates, which inhibit osteoclastic activity, are the most commonly used pharmacotherapeutic agents in the prevention of osteoporosis. They increase bone density and have, in some instances, reduced vertebral and nonvertebral fractures. Of concern is that these drugs are cleared by the kidneys and so may compromise renal function in older patients. They also remain in bone for at least 10 years and are associated with a number of adverse events, such as osteonecrosis of the jaw in patients with underlying jaw disease or rheumatoid arthritis. Bisphosphonate pills can also cause significant contact disruption of the esophageal mucosa. Patients should take these drugs with plenty of fluids and remain in an upright position for at least half an hour after taking the medication. These agents are also contraindicated in pregnant patients. Generally speaking, however, the markers of bone resorption can be reduced within 3 months of using these drugs.

G&H What does the future hold for the prevention and management of osteopenia and osteoporosis?

SK A better understanding of micronutrients and the roles of vitamins D and K are needed. A better screening tool than the DEXA scan is also needed. In addition, better anabolic agents to stimulate the osteoblast need to be developed. Odanacatib is one such agent in the pipeline. It isolates the osteoclast, preventing osteoclastic bone resorption. Calcilytic antagonists target calcium-sensing receptors on parathyroid cells to induce parathormone. An antisclerostin antibody that induces bone formation is also under study.

G&H When should gastroenterologists step in to evaluate and subsequently treat bone loss?

SK This should be done immediately at the first office visit. Vitamin D and calcium levels should be obtained, and a DEXA scan should be performed in select patients, such as patients who have been taking corticosteroids for more than 3 months; in addition, nutrition, exercise, and smoking history should be assessed.

Suggested Reading

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