



Osteoporosis: A Bare Bones Look

Most often caused by loss of bone mass due to the aging process, osteoporosis is at the root of some 1 million hip and vertebrae fractures annually.

OSTEOPOROSIS IS A MAJOR PUBLIC health threat for an estimated 44 million Americans. In the United States, 10 million individuals are estimated to already have the disease, and almost 34 million more are estimated to have low bone mass, placing them at increased risk.

Osteoporosis is caused by decreased bone mass resulting in fragile bones. Progressive osteoporosis may cause loss of height, stooped posture, a humpback (kyphotic curve), and severe pain. It commonly affects the thoracic and thoracolumbar regions of the spine and may cause debilitating pain. The structural deterioration of bone increases the risk for fracture in the hip, spine, and wrist.

The Osteoporosis and Related Bone Disease National Resource Center reports that, "Osteoporosis is responsible for more than 1.5 million fractures annually, including 300,000 hip fractures, approximately 700,000 vertebral fractures, 250,000 wrist fractures, and more than 300,000 fractures at other sites."

Normally associated with aging, osteoporosis contributes to fractures chiefly in older people. Many adults reach peak bone mass by age 30; thereafter, small amounts of bone are naturally lost. This gradual bone density reduction increases the fracture risk. Spinal fractures (burst, compression, wedge) often affect one or more of the vertebral bodies. In some cases, the patient is unaware he or she has osteoporosis until a fracture occurs.

In severe osteoporosis, simple movements like walking, reaching, bending,

or twisting can cause vertebrae to collapse.

Assessing The Risks

Osteoporosis is often progressive, and, although it cannot be cured, it may in some cases be controlled or prevented.

Women are at higher risk than men because they have less bone mass and experience menopause.

Understanding the risks is important to prevention. Some of the uncontrollable risks include:

- **Gender.** Women are at higher risk than men because they have less bone mass, experience menopause, and live longer.
- **Race.** Asian and Caucasian women, especially small-boned women, are at higher risk for osteoporosis. African Americans, especially men, are at lower risk because their bone mass is greater.
- **Family history.** Having a family history of osteoporosis increases the risk of developing this disease.

Of the other common risk factors, some are controllable and some are not. These include:

- Chronic dieting, anorexia nervosa, or low body weight;
- Cigarette smoking or other tobacco use;
- Alzheimer's and other dementias;

- Corticosteroid therapy, use of anti-convulsants;
- Estrogen deficiency, menopause, or early menopause (before age 45);
- Excessive alcohol use;
- Personal history of fracture as an adult or history of fracture in a first-degree relative;
- Inadequate physical activity (weight-bearing exercise);
- Insufficient calcium intake;
- Low testosterone levels (men); and
- Frailty caused by poor health.

Making An Assessment

While there are a number of ways to test for osteoporosis, the first step is for the patient to undergo a standard physical examination that includes a thorough review of the patient's medical and family history. Lab work should include blood, urine, thyroid function, and hormone level testing.

Other diagnostic steps will depend on the patient's symptoms, or lack thereof, and may include:

- **Neurologic evaluation.** A neurologic evaluation assesses the patient's symptoms, including pain, numbness, paresthesias (tingling), extremity sensation and motor function, muscle spasm, weakness, and bowel or bladder changes. Particular attention may be given to the lower extremities. Either a CT Scan or MRI study may be

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required if there is evidence of neurologic dysfunction.

■ *Radiographs (X-rays).* An X-ray is performed if fracture is suspected. However, routine X-rays do not always confirm an osteoporosis diagnosis. Tests that reveal bone density are more accurate. Dual-energy X-ray absorptiometry, or DXA, is a radiographic test used to measure bone density in the spine, hip, and wrist. The physi-

cian compares the test findings to the patient's symptoms and formulates a treatment plan.

■ *Bone density testing and fracture risk.* According to the National Osteoporosis Foundation, the only sure way to determine bone density and fracture risk for osteoporosis is to have a bone mass measurement, also called a bone mineral density (BMD) test or bone densitometry. A BMD test

compares a patient's bone density to the average density of healthy young adults. A score of -2.5 or below indicates osteoporosis.

BMD is an important diagnostic tool that not only measures the amount of calcium in certain bones but is also used to estimate fracture risk. Testing is easy, fast, painless, and noninvasive.

Although a BMD test is not recommended for all women and men, ➤

Hip Protectors Found Ineffective

As they are currently designed, hip protectors are not effective in preventing hip fractures among elderly nursing facility patients, according to a recent study published in the *Journal of the American Medical Association*.

"In this first clinical trial (to our knowledge) of an energy-absorbing/shunting hip protector conducted in U.S. nursing homes, we were unable to detect a protective effect on the risk of hip fracture, despite successful recruitment, retention, and adherence to the protocol," the study's authors wrote.

"In summary, this large multicenter clinical trial failed to demonstrate a protective effect of a hip protector on hip fracture incidence in nursing home residents despite high adherence, confirming the growing body of evidence that hip protectors are not effective in nursing home populations," the authors said. "With the development of better pad materials and more thorough testing, future studies should examine new hip protectors using non-clustered randomized designs like ours to avoid many methodological biases."

What makes this study unique, the authors said, is that the study design used one-sided hip protectors on all participants. "In this way, we avoided biases that have been present in previous trials that have either randomized residents within a facility or units with-

in a facility. In such designs, staff may have differentially cared for the treated nursing home residents compared with the control residents."

Another major strength of the study was that, to the knowledge of the authors, the study had the most comprehensive and precise way of monitoring and measuring adherence ever reported. Accordingly, the research staff made three random visits per week to each patient during the course of the study throughout all nursing facility shifts, the authors said.

The Trial's Scope

The trial included 37 nursing facilities in which 1,042 patients averaging 85 years of age wore a hip protector on one hip only, so that each participant served as his or her own control. The average duration of participation was 7.8 months, while the overall adherence rate was 73.8 percent.

Douglas Kiel, MD, of Hebrew SeniorLife and Harvard Medical School, Boston, and colleagues conducted the randomized controlled trial from October 2002 to October 2004 to test the effectiveness of the hip protectors, which consisted of an outer layer of polyethylene backed by a hard high-density polyethylene shield that was backed by ethylene vinyl acetate foam.

Although the study was terminated "due to lack of effectiveness," an

accompanying editorial, written by two UKK Institute for Health Promotion Research researchers in Finland, advises that "although Kiel *et al.* provide useful data from an important trial, these findings and those from past studies are not sufficient to make evidence-based recommendations for or against hip protectors among frail nursing home residents."

The Finnish researchers explain this conclusion by stating that "given the wide variation in the biomechanical force attenuation capacity among various hip protector models and potential differences in adherence among users, the antifracture efficacy of each protector model should first be examined in vitro (as it was for the protectors used by Kiel *et al.*) and then in actual falls, continuing with analyses of protector position at the time of fall impact, as well as user adherence."

Concluding the editorial, the two researchers suggest that additional randomized trials should be conducted in which the individual is randomized to hip protection or not, or the individual serves as his or her own control, as in the study by Kiel *et al.* "The importance of this health problem—falls and hip fractures among older adults—should make the work a compelling ongoing priority for health research throughout the world."

—Meg LaPorte

testing should be considered when:

- An X-ray reveals low bone mass, osteopenia, or possibly osteoporosis;
- Menopause occurs prior to age 45 and the patient is not taking estrogen;
- A woman is age 65 or older;
- A post-menopausal woman sustains a fracture (any type);
- A patient has a family history of osteoporosis;
- Steroids have been (or are) taken regularly; or
- A patient has hyperthyroidism, diabetes, liver/kidney disease, or rheumatoid arthritis.

Measuring Bone Density

Different types of machines are used to measure bone density in the hip, spine, or other parts of the body (heel, finger, wrist). A radiologist reads and compares the results to normal values and prepares a report for the referring

physician. The physician bases treatment recommendations on the results of the BMD test score and patient's medical history.

Procedures for measuring bone density in the hip or spine include:

- DXA measures bone density in the hip or spine. This common test requires no patient preparation and takes about 15 minutes.
 - Quantitative computed tomography, or QCT, accurately measures bone density in the spine or hip.
- Procedures for measuring bone density in the heel or wrist include:
- Peripheral dual-energy X-ray absorptiometry, or pDXA;
 - Peripheral quantitative computed tomography, or pQCT;
 - Quantitative ultrasound, or QUS; and
 - Single-energy X-ray absorptiometry, or SXA.

The bone density score determines if the patient has osteopenia (low bone mass) or osteoporosis. A woman's bone mass peaks around age 30 and levels off during menopause. Bone density declines sharply during the first years of menopause. A DXA scan is refined enough to detect even 1 percent loss of bone mass. A BMD can be critical to a woman's health later in life when the risk of fracture increases.

Treatment Options

Patients need to know about osteoporosis. They must understand the diagnosis and treatment requirements, as well as how to prevent fractures. This might include making healthy lifestyle changes to diet and exercise and addressing safety measures to prevent falls. The treatment for osteoporosis is usually nonoperative. Conservative treatment options may include:

1. Pain management. Depending on the level of pain, treatments may include nonsteroidal anti-inflammatory drugs, narcotics, prescription anti-inflammatory medications, topical pain-relieving agents, nerve blocks, or nerve ablation (nerve removal). A pain management specialist is consulted when pain is difficult to control.
2. Hormone or estrogen replacement therapy. This approach may be beneficial to many post-menopausal women or those at high risk for osteoporosis. It is known that for the first five years following menopause women rapidly lose bone mass.
3. Alendronate (brand name Fosamax) is a drug known to stop bone breakdown.
4. Raloxifene (brand name Evista) is part of a drug class called selective estrogen receptor modulators.
5. Calcitonin-salmon (brand name Miacalcin) is a non-sex hormone known to slow the loss of bone while helping to increase bone density. It is reported to relieve pain associated with fractures. It currently is in nasal spray form.

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6. Calcium and vitamin D are important to bone health (mass, density). Follow the physician's instructions.

7. Bracing may be used to alleviate pain and provide spinal support. However, this treatment is controversial. In severe cases of osteoporosis, bracing may do more harm than good. A spine physician can determine if the patient may benefit from bracing.

8. Physical therapy (PT) may be incorporated into the treatment plan. PT can help the patient build strength, flexibility, and increase range of motion. Exercise promotes circulation stimulating bones to heal. Strength builds balance and may help prevent falling. During PT, the patient learns safe movements to help prevent injury. The therapist may provide a customized home exercise program.

If surgery is necessary, one approach is kyphoplasty and vertebroplasty,

which can be used to treat the pain and instability associated with vertebral compression fractures. Kyphoplasty uses tools designed to restore lost vertebral body height. Using both techniques, orthopedic bone cement is injected into the affected vertebrae to stabilize the fracture and strengthen the bone. Both procedures carry little risk, and a spine practitioner can advise as to which is the most appropriate procedure.

Prevention Tips

Prevention, when possible, is obviously the best approach, and there are a few clear steps that can be taken to maintain bone health in frail elderly patients. These include:

- **Calcium supplements.** Calcium plays an important role in maintaining bone health, although by itself it cannot prevent or cure osteoporosis.

Nevertheless, calcium supplementation is an important part of an overall prevention or treatment program.

- **Vitamin D³.** Adding this to a patient's regimen can play a major role in calcium absorption and bone health.

- **Exercise.** Bone is living tissue that responds to exercise by becoming stronger. Just as muscles get bigger and stronger the more one uses them, bones can become stronger and denser when one places demands on them. ■

For More Information

- Additional information on osteoporosis can be found at www.SpineUniverse.com, an online resource providing information and treatment options pertaining to spinal disorders and pain management.

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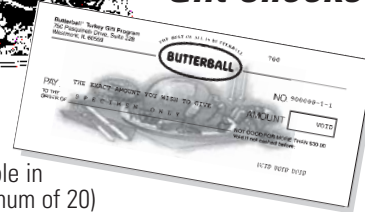
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