Osteoporosis

A Patient's Guide to Osteoporosis

Introduction

When people age - particularly women -- there often comes a loss of height and weight, and the development of stooped posture. A bone-thinning disease called osteoporosis often causes these body changes. This disease is characterized by loss of bone mass and structural deterioration of bone tissue, which leads to bone fragility and increased susceptibility to fractures of the spine, hip, and wrist. In fact, spinal fractures are the most common type of osteoporotic fractures that exist. Forty percent of all women will have at least one by the time they are 80 years old. These vertebral fractures can permanently alter the shape and strength of the spine.

Loss of bone mass begins at around age 30. Although men can be affected by osteoporosis, the typical sufferers are older women, particularly those who are past menopause. Bone loss becomes worse in women after menopause because of the body's lack of estrogen.

When bones lose mass they tend to weaken and become fragile, increasing the risk of fracture under stress or because of a fall - particularly in the spine and hip. However, falls in elderly women are often the result, rather than the cause, of fractures. In severe cases of osteoporosis, the bones can fracture with any kind of slight movement and patients are sometimes left bedridden.

Most women are likely to feel some effects of osteoporosis in their lifetime, but the good news is that much can be done to reduce and even prevent loss of bone mass and fractures. In fact, new treatments for this disease are being discovered each year, and you can actively work to decrease your chances of suffering the effects of osteoporosis. The key is prevention and intervention.

This website will offer you valuable information about the following:

- Causes of Osteoporosis
- Risk Factors for Osteoporosis
- Symptoms
- Diagnosis
- Treatment Options and Prevention
- Medications

Causes of Osteoporosis

Several causes and types of osteoporosis will be explained in this section. The first is primary osteoporosis, which has two types - (I) and (II). Type I is an excessive loss of the spongy tissue of the bone (cancellous bone), with some sparing of outer bone. This type of osteoporosis is six times more common in women than men, and the onset usually occurs in the 15-20 years following menopause. The loss of bone is thought to be linked to an estrogen deficiency in
women and a testosterone deficiency in men - both of which are due to aging. In this type of osteoporosis, vertebral spine fractures are the most common result.

Type II refers to a simultaneous loss of both the outer bone and the spongy tissue inside the bone. This type is only two times more common in women than men. It typically occurs once people reach their 70s and 80s. It is also thought to be the result of a deficiency in dietary calcium, age-related Vitamin D decline, or increased activity of the parathyroid glands (secondary hyperparathyroidism). Hip fractures are the most common result of this type of osteoporosis.

Secondary osteoporosis, also known as "high-turnover osteoporosis", is a condition of an increased rate of bone remodeling - or an increase in the amount of bone being remodeled. This condition causes an overall increase in the rate of bone loss. Bone turnover is caused by two functions: (1) the production of new bone, and (2) the loss (resorption) of old bone. The amount of bone mass you have depends on the balance between these functions, which is your bone turnover rate. If you have a high turnover rate, you are at greater risk for developing osteoporosis.

Secondary osteoporosis can also have four hormonal causes:

- Hyperparathyroidism - increased activity of the parathyroid glands
- Hyperthyroidism - an excessive secretion of the thyroid glands
- Diabetes - a disease where the body does not produce or use insulin correctly (This leads to: hyperglycemia - an increase in blood sugar, increasing susceptibility to infection, and glycosuria - glucose in the urine.)
- Hypercortisolism - a result of systemic illness or long-term use of oral corticosteroid

Osteoporosis can also be the result of disorders where the bone marrow cavity expands at the expense of the trabecular bone. The trabecular bones have a honeycomb appearance and large marrow spaces. They are called cancellous or spongious bone, and are found along lines of stress created by weight-bearing forces. If a trabecular bone is affected by increased bone marrow cavities, it loses some of its strength.

Other links to secondary osteoporosis are:

- Thalassemia - a hereditary form of anemia
- Multiple myeloma - multiple tumors within the bone and bone marrow
- Leukemia - a serious disease that is characterized by unrestrained growth of white blood cells in the tissues
- Metastatic bone diseases - when malignant tumor cells spread from one part of the body to another; the disease travels through the blood and settles in the bones
Risk Factors for Osteoporosis

Osteoporosis does not affect everyone. There are risk factors that help predict your chances of developing it. Some risk factors are simply genetic, meaning you inherited them from your biological parents. Some risks are due to medical factors that you may not be able to avoid, such as use of particular medications. Other factors are lifestyle-related, meaning you have control over reducing these risk factors.

The highest biological and medical risk factors are:

- **Biological Sex** - Women have a greater chance of developing osteoporosis.
- **Race** - Caucasians and Asians are most likely to suffer this extensive bone loss.
- **Age** - Since bone loss begins at around age 30, as you age your risk for osteoporosis increases.
- **Family History** - If others in your family have experienced hip or spine fractures or become hunched over as they age, you are at greater risk of experiencing the same symptoms.
- **Body Frame** - A slight, thin body frame with a low body weight for height will increase the risk of osteoporosis.
- **Post Menopause** - Women past menopause have reduced estrogen, so their chances of losing bone mass increase.
- **Low Estrogen** - There is more risk if women have had a low rate of estrogen over their lifetime. The deficiency can be the result of late onset of puberty/getting their period, early menopause (before 40), or an absence or suppression of menstruation.
- **Medication Use** - Certain medications increase the risk of osteoporosis because they contribute to loss of bone mass when used long term; these drugs include steroids, inhaled steroids, antiepileptic drugs, immunosuppressants, anticoagulants, and thyroid hormone suppressive therapy.
- **Nutritional Conditions** - Conditions such as anorexia nervosa, chronic liver disease, malabsorption syndromes, or malnutrition can increase the risk of osteoporosis.
- **Endocrine Disease or Metabolic Causes** - These could include thalassemia, diabetes, or hemochromatosis.
- **Other Medical Disorders** - These include: Down's syndrome, mastocytosis, myeloma and some cancers, renal tubular acidosis, rheumatologic disorders, and immobilization.

Lifestyle risk factors that lead to bone loss include:

- **Low Calcium Intake** - Consumption below 300 mg per day (which is equal to one glass of milk) is considered low.
Low (or no) Vitamin D in Your Diet - Vitamin D comes from sunlight and foods such as egg yolks, fortified milk and cereals, and some types of fish.

High Caffeine Intake - More than two to three cups of caffeinated coffee each day is considered high if you have a low calcium intake.

Tobacco use - This includes current use as well as past use of tobacco.

Alcohol use - More than 7 oz. of alcohol per week can slightly increase the risk of hip fractures.

Low Activity - Your activity rate is considered low if you do not walk or exercise regularly.

Symptoms

Perhaps the most common symptom of osteoporosis is a vertebral compression fracture or hip fracture. The compression fractures in the spine, caused by weakened vertebrae can lead to pain in your mid-back area. The fractures often stabilize on their own and the pain goes away, but sometimes the pain persists because the crushed bone continues to move around and break.

In severe cases of osteoporosis, actions as simple as bending forward can be enough to cause a "crush fracture", or spinal compression fracture. These vertebral fractures cause loss of height and a humped back. This disorder (kyphosis or a "dowager's hump") is an exaggeration of your spine that causes the shoulders to slump forward and the top of your back to look enlarged and humped.

Diagnosis

If you have symptoms of osteoporosis, you should consult with your doctor. Additionally, older women should discuss their risks of osteoporosis with a health care provider, even if they are not currently exhibiting any signs of the disorder. All women should be aware of the many preventative steps to take to decrease the risk of developing osteoporosis.

To diagnosis osteoporosis, your physician can do several things. Diagnosis will begin with a physical examination that measures height, weight, and middle fingertip-to-middle fingertip arm span. This gives a rough estimate of what your original height might have been in young adult life. Vertebral tenderness will also be checked.

After a physical, laboratory tests, and bone mineral density might be performed. First is bone densitometry, which reports the density of your bone mass. This test is not part of routine screening, but will be done if osteoporosis is suspected or if you are at high risk for the disease.

As for laboratory tests, the following are conducted to rule out any secondary disorders that might be causing the osteoporosis. There is testing of urine and serum to look for concentrations of calcium, serum protein, inorganic phosphorus, alkaline phosphates, or CBC. These tests are done to exclude the presence of another disease that may be the cause of secondary osteoporosis. Biochemical measures of bone turnover can also be looked at along with other clinical
information to evaluate risk of osteoporosis. A complete blood cell count, with a separate white cell count, can be taken to rule out other diseases. In elderly people, thyroid function tests, serum, and urinary protein electrophoresis should be taken to rule out hyperthyroidism and multiple myeloma.

X-rays might be taken if your bone mass is suspected to be 30%-50%. If bone loss is not thought to be this high, X-rays are not beneficial in determining osteoporosis.

Treatment Options and Prevention

Though there is no cure for osteoporosis, in recent years many effective treatments and prevention plans have been discovered. The most common are listed below:

Calcium

The most fundamental suggestion is to increase your calcium intake, either through dietary changes or supplemental pills. It is best for people to begin adequate calcium intake at an early age, as bone mass begins to decrease around the age of 30. After age 30, calcium helps decrease bone loss, strengthen bones, and decrease the risk of fractures. The recommended daily intake for women, 25-50 years of age, and women over 50 who take hormone replacements, is 1,000 mg per day. Women over 50 who do not take hormone replacements should have 1,500 mg per day. Men 25-65 years should have 1,500 mg per day, and men and women over 65 should have 1,500 mg per day. If you take calcium supplements, make sure they contain Vitamin D, as this helps with absorption. In addition, calcium citrate is better absorbed than calcium carbonate, which has to be taken with food.

Vitamin D

A vitamin D deficiency may contribute to bone loss and fracture, and at least 800 mg per day is recommended for all adults. Many calcium supplements contain vitamin D. You can also get vitamin D through foods such as: egg yolks; fortified milk and cereals; and fish, such as halibut, mackerel, sardines, shrimp, pink salmon, and cod liver oil.

Exercise

Exercise five days a week for at least 30 minutes helps reduce bone loss. The best exercises for maintaining bone mass are weight-bearing exercises. This includes walking.

Medications

Currently, four medications have approval from the Food and Drug Administration (FDA).

Hormone Replacement Therapy (HRT)

Hormone/estrogen replacement therapy is used for both prevention and treatment of osteoporosis. HRT can reduce bone loss, increase bone density in the spine and hip, and reduce the risk of hip and spinal fractures in postmenopausal women.
HRT is usually given as a pill or skin patch. It is effective even when started after age 70. However, when estrogen is taken alone, it can increase the risk of developing endometrial cancer (cancer of the uterine lining). For this reason, the hormone, progestin, is usually prescribed in combination with estrogen for women whose uterus is intact.

Side effects of HRT can include: nausea, bloating, breast tenderness, and high blood pressure. Some studies indicate a relationship between estrogen use and breast cancer, while other studies do not. Please discuss the pros and cons of estrogen replacement therapy with your health care provider.

**Bisphosphonates**

These compounds inhibit breakdown of bone and slow down bone removal. They are also shown to increase bone density and decrease the risk of fractures at both the hip and spine. The bisphosphonate that has been approved by the FDA for preventing and treating osteoporosis in postmenopausal women is alendronate.

The strongest side effect of alendronate is gastrointestinal problems. For this reason, it has to be taken on an empty stomach. To minimize side effects, take it with a full glass of water and remain in an upright position for at least one half hour after taking the medication.

**Calcitonin**

This is used for women who cannot, or choose not to, take estrogen. For women who are at least five years past menopause, calcitonin can increase spinal bone density and slow bone loss. Calcitonin is a protein, so it cannot be taken orally - otherwise it would digest before it could work. Calcitonin is available as an injection or nasal spray.

**Selective Estrogen Receptor Modulators (SERMs)**

These compounds have effects similar to estrogen in some parts of the body, such as the spine and hip. SERMs seem to prevent bone loss at the spine, hip, and total body. Raloxifene is the SERM drug currently approved by the FDA for prevention of osteoporosis. However, its impact on the spine does not appear to be as powerful as either estrogen replacement therapy or alendronate. There are no common side effects with raloxifene, but sometimes women have experienced hot flashes and deep vein thrombosis (DVT).

**Summary**

Remember that osteoporosis is a highly preventable and treatable disease. If you are at risk for osteoporosis, please consult with your health care provider to develop a prevention and treatment plan.