

Osteoporosis: An Overview

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Purpose: The purpose of this course is to provide an overview of osteoporosis including its prevalence, signs and symptoms, diagnosis, prevention and treatment.

Objectives

1. Discuss the incidence and prevalence of osteoporosis
2. List five risk factors for osteoporosis
3. Discuss the major complication of osteoporosis
4. List four methods to prevent osteoporosis
5. Determine which patients should be screened for osteoporosis
6. Discuss treatment options for osteoporosis

Osteoporosis is a bone disease where more bone is resorbed than formed leading to an overall loss of bone mass. Osteoporotic bones are brittle and porous and are at high risk for fracture.

Osteoporosis is a common problem with more than 10 million Americans being afflicted (1). In addition, 34 million Americans have low bone mass known as osteopenia. Women are more commonly affected with osteoporosis than men. Eighty percent of osteoporosis is accounted for by women.

Race also impacts the prevalence of osteoporosis. Caucasians and Asians are at the highest risk for osteoporosis. About 50 percent of Caucasian women and 20% of

Caucasian men will have an osteoporosis-related fracture at some point in their life (1, 2).

Causes

Osteoporosis is classified as primary or secondary. Primary osteoporosis is bone disease related to aging and hormonal shifts in the absence of any disease or condition known to cause osteoporosis. Secondary osteoporosis is caused by another disease process or a medication.

Peak bone mass occur in the twenties and falls throughout life. The rate at which bone mass falls is determined by many factors including genetics, how active the individual is, nutritional status and overall health. In women, post-menopausal changes and declining estrogen levels are contributing factors.

Secondary osteoporosis is bone disease caused by a variety of disease states and medications which are known to reduce bone mass. For a listing of drugs and diseases that may lead to secondary osteoporosis see table 1. In addition, any condition that leads to a lack of mobility such as a stroke or advanced Parkinson's disease may result in reduced bone mass.

Table 1: Secondary Causes of Osteoporosis

Drugs	Diseases
<ul style="list-style-type: none">• Corticosteroids• Heparin• Anticonvulsants• Lithium• Aromatase inhibitors• Cyclosporine A• Chemotherapy for cancer• Barbiturates	<ul style="list-style-type: none">• Celiac disease• Alcoholism• Malabsorption• Hyperthyroidism• Chronic liver disease• Diabetes• Anorexia/Bulimia• Hyperparathyroidism• History of gastric bypass• Inflammatory bowel disease• Rheumatoid arthritis• Lupus• Renal failure

Risk Factors

Certain characteristics increase the risk of osteoporosis. Factors that increase the likelihood of developing osteoporosis include:

- Female gender
- Increased age
- Low body mass index
- Family history of osteoporosis
- Being Caucasian or Asian
- Smoking
- Abuse of alcohol – more than three drinks a day
- Sedentary lifestyle
- Hip fracture in a parent
- Premature menopause
- Previous fracture

Signs and Symptoms

Osteoporosis is typically not associated with any specific signs or symptoms. A common presenting symptom is back pain that turns out to be a vertebral collapse or fracture. The back pain caused by a collapsed vertebra will often radiate around the

trunk. Another common presenting symptom is loss of height with progressive kyphosis. Fractures in other parts of the body may also occur with minimal or no trauma in someone with osteoporosis.

Complications

The most common complication is fracture. Common fracture sites include the hip, wrist and back. Osteoporosis is a causative or contributing factor in about 80% of fractures in individuals over the age of 50 (3).

Fractures can lead to chronic pain and may be a major cause of disability in patients with osteoporosis. The chronic pain from the fracture may cause the patient to be less active leading to deconditioning. Chronic pain also has the potential to lead to depression.

After a fracture, especially a hip fracture, quality and quantity of life is impaired. After a hip fracture 24 percent of women over the age of 50 will die within the next year. Twenty percent of patients will require long term care after a hip fracture. Only 40% of those with a hip fracture re-establish their pre-fracture level of function (1, 2)

Vertebral fracture is associated with its unique set of complications. Women with a vertebral fracture have a 10 times greater risk than someone who has not had a vertebral fracture of having another vertebral fracture. Those who have a vertebral fracture are at increased risk to have abdominal pain, constipation, reduced oral intake and restrictive lung disease.

Diagnosis

The diagnosis of osteoporosis is often made on screening. The use of dual-energy X-ray absorptiometry (DEXA) measures bone mineral density and is the test of choice in the evaluation of osteoporosis. The DEXA scan is a quick and relatively inexpensive test. It can be done in about five minutes and costs less than 150 dollars (3).

A DEXA scan compares the bone density of the person being tested to a 20-29-year-old. A score (called a T-score) is reported, with an average bone density score of zero. The score of zero is what is considered a normal bone density of a 20-29-year-old. Scores above zero indicate more dense bones than the average 20-29-year-old. Scores less than zero indicate less dense bones than the average 20-29-year-old.

Osteopenia (bones that are thinner than average but not thin enough to be classified as osteoporosis) is diagnosed when the T-score falls between -1.0 and -2.4. Individual who have T-scores less than or equal to -2.5 have osteoporosis.

The T-score uses a statistical method called standard deviation. An individual with a T-score of -1.0 means that the patient is 1 standard deviation below the norm. Those with a T-score of -1.0 indicates that approximately 16 percent of the population has a lower bone density and 84 percent have a higher bone density.

When the diagnosis of osteoporosis is made some lab work may be done in selected cases to help rule out secondary causes and help optimally treat osteoporosis.

Tests that may be done include:

- Thyroid stimulating hormone (TSH) – to rule out hyperthyroidism
- Parathyroid hormone (PTH) – to rule out hyperparathyroidism

- Alkaline phosphatase, serum phosphate and calcium to evaluate for osteomalacia
- Serum and/or urine protein electrophoresis (SPEP) to rule out cancer of the plasma cells
- Vitamin D level
- Tests for celiac disease
- Testosterone level in men
- Kidney function tests - bisphosphonates should not be used in those with significant renal dysfunction

Imaging tests are the hallmark of osteoporosis diagnosis. The use of the DEXA scan is the gold standard, but sometimes other tests are done. Plain x-ray will help evaluate overall bone integrity, but is a poor modality for diagnosing osteoporosis. Plain x-ray is also helpful to rule out any fractures including compression fractures.

Computed tomography scanning can also be used to evaluate the bone density, but it is more expensive and requires higher doses of radiation than the DEXA scan and is therefore infrequently used.

Prevention

Preventative screening should occur in all women over the age of 65 and men should be screened by DEXA scan starting at the age of 70. Postmenopausal women and men over 50 should be screened if there are risk factors for osteoporosis.

Lifestyle choices are critical in the prevention and treatment of osteoporosis.

Lifestyle choices that offer a positive impact on bone health include: diet, exercise and toxic habits.

Calcium and vitamin D intake is an important step in the prevention of osteoporosis. Individuals at high risk should pay particular attention to getting adequate amounts. Individuals at risk for osteoporosis should consume 1200-1500 mg of calcium a day along with 800 - 1000 IU of vitamin D.

Exercise is a strategy that increases bone mineral density. The combination of weight bearing aerobic exercise and strength training is critical to optimize bone health. Non-weight bearing physical activity, while good for the cardiovascular system, is not optimal to build and maintain bone health. Non-weight bearing exercises include activities such as swimming, biking and water aerobics. The physical stress on the bone is what is necessary to optimize bone health. Exercises such as walking, land aerobics, tennis and jogging are helpful in building bone mass.

Strength training is helpful in maintaining bone mass in the upper extremities. It is the direct stress on the muscle and bone that helps maintain bone strength. Lower body aerobic exercise provides minimal benefit on upper extremity bone strength. Therefore, the addition of strength training is critical in the optimization of bone health.

Toxic habits (alcohol and caffeine intake and tobacco use) can hurt bone health. Consumption of more than three alcoholic drinks a day is detrimental to bone health(2). High caffeine consumption (330 mg or 4 cups of coffee a day) increases the risk of osteoporotic fractures (4). Many caffeinated beverages, such as soda pop, contain high

quantities of phosphorous which also have detrimental effects on bone health. Smoking cigarettes is known to reduce bone mass.

Here are five steps that patients can do to optimize bone health and help prevent osteoporosis and complications of osteoporosis.

- A diet high in calcium and vitamin D
- Regular exercise which includes weight-bearing exercise and weight training
- Do not smoke or consume excessive alcohol
- Discuss bone health with your health care provider
- Appropriate use of bone density testing and medication

Treatment

The goals of treatment are to attenuate or prevent bone loss, manage any pain and prevent complications. Treatment begins with teaching lifestyle changes to optimize bone health as outlined above. In addition to lifestyle options, medications are available for the treatment of osteoporosis.

Formal therapy programs (physical or occupational) may be incorporated into the treatment of a patient with osteoporosis. Physical therapy will include many of the exercises outlined above adapted specifically for the patient. Occupational therapy will focus on improving quality of life by enhancing the ability of the patient to perform activities of daily living by reducing the risk of falls and teaching how to use adaptive equipment.

Treatment Strategy

When considering who to treat it is important to evaluate each individual separately. Postmenopausal women and men over the age of 50 should be considered for therapy with medicines approved by the FDA for the treatment of osteoporosis if they have one of the following characteristics (1, 2, 3).

1. T-score less than or equal to -2.5 at the spine or femoral neck who do not have a secondary cause of osteoporosis
2. T score between -1.0 and -2.5 at the femoral neck or spine and a 10 year risk of a major osteoporotic related fracture greater than or equal to 20 percent or a 10 year risk of greater than or equal to 3% of a hip fracture based on the FRAX score (see explanation of FRAX score below)
3. A personal history of a vertebral or hip fracture
4. Others may consider treatment after careful consideration by the clinician after risks and benefits are discussed with the patient and the patient is in agreement

Some controversy exists regarding who needs to be treated. Most agree that those with osteoporosis should be treated, but there is question about those with osteopenia. The recent introduction of the fracture risk assessment (FRAX) tool has helped clinicians decide who is best suited for treatment.

As outlined in point 2 above, those with osteopenia and 10 year risk for hip fracture of greater than 3% or a 20% risk of a major osteoporotic fracture should be treated. The World Health Organization has developed a scoring system to help clinicians

determine this risk. The tool can be found at:

<http://www.shef.ac.uk/FRAX/tool.jsp?locationValue=9> . The tool asks 12 questions that revolve around risk factors for fracture and osteoporosis. Information about the patient can be put directly into the tool and the tool will calculate the risk of hip and major osteoporosis related fracture.

Medications

Medications used to treat osteoporosis stimulate bone formation or reduce bone resorption. Multiple medications in different classes are available in the management of osteoporosis.

Bisphosphonates are considered the primary agent in the treatment of osteoporosis in most individuals. Certain individuals are not able to tolerate bisphosphonates and in these situations other medications are used. Below different medications used in the management of osteoporosis will be discussed.

Bisphosphonates

Bisphosphonates are the most popular drug prescribed for the treatment of osteoporosis. These drugs work by decreasing the breakdown of bone. They are formulated so they can be taken once a day, once a week, once a month or even once every three months. Bisphosphonates should be taken in the morning, on an empty stomach and the patient should not lie down or eat for 30-60 minutes after taking the medicine.

Bisphosphonates are the most commonly used medications in the treatment of osteoporosis. Medications in this class include: alendronate sodium (Fosamax), risedronate (Actonel) and ibandronate (Boniva).

After taking alendronate and risedronate the patient should wait 30 minutes before eating, drinking or taking other medicines and when taking ibandronate the patient should wait 60 minutes. Bisphosphonates should also be taken with a full glass of water. Major side effects include irritation of the gastrointestinal tract which may include upset stomach or irritation or erosion of the esophagus. Patients with significant kidney dysfunction should not use this class of medications.

Alendronate reduces the risk of hip and spine fracture by 50% over three years in those with a history of a spine fracture. It also reduces vertebral fracture by about 50 percent in those with no history of vertebral fracture (2). Ibandronate has similar efficacy to alendronate in its effect in the reduction of vertebral fracture (2). Risedronate reduces vertebral fractures by 41-49 percent and non vertebral fractures by about 35% over three years (2).

Estrogen

Estrogen is approved to treat post-menopausal osteoporosis in women. It works by decreasing the rate of bone resorption. Estrogen used to be a staple in the management of osteoporosis, but recently data has indicted that estrogen therapy increases the risk of coronary heart disease, stroke, thromboembosim and breast cancer (2, 3). Because of these recent findings, hormones have fallen out of favor as a primary treatment option for osteoporosis. Estrogen should not be used long-term for

the treatment of osteoporosis. If it is chosen as a treatment options it should be used for the shortest period of time possible.

Examples of estrogen therapy used for the treatment of osteoporosis include conjugated estrogens (Premarin), estradiol (Estrace, Vivelle, Climara, Estraderm, Esclim and Alora), ethinyl estradiol and norethindrone (Femhrt).

Conjugated estrogen and medroxyprogesterone (Prempro) is given in individuals who have not had a hysterectomy. These women need to take estrogen that is combined with progestin to provide protection to the uterine lining. Treatment with Prempro reduced the risk of hip and vertebral fractures by 34% and other fractures related to osteoporosis by 23% (2).

Estrogen Agonist/Antagonist

Estrogen Agonist/Antagonist decrease bone resorption and provides the positive bone effects of estrogen without as many of the negative side effects. It does increase the risk of deep vein thrombosis and increases hot flashes. Raloxifene (Evista) is the agent approved in this class for prevention and treatment of osteoporosis in postmenopausal women.

It has been shown to reduce the incidence of fractures. Raloxifene reduces vertebral fractures by 30% when there is a history of vertebral fracture and by 55% in those who never had a vertebral fracture (2).

Calcitonin analogs

Calcitonin (Miacalcin and Fortical) decreases the amount of bone being broken

down. This drug is given as an injection or a nasal spray. It should be used in those who are five or more years past menopause and is not as effective as bisphosphonates. Side effects of this drug include nausea, flushing, diarrhea and nasal irritation. Research has not proven that they reduce the incidence of fractures (3).

Parathyroid hormone

Parathyroid hormone helps make new bone and increases the strength of the bone. One product - teriparatide (Forteo) - is available in this category and it is given by daily subcutaneous injection.

This product helps regulate calcium and phosphorus in the bones and can be used in men and women who have osteoporosis. This agent appears to have the highest rates of fracture reduction. The risk of vertebral fracture is decreased by 65% and the risk of non-vertebral fracture is reduced by 53% (2).

Common side effects include dizziness and leg cramps. Studies also showed that rats had an increased risk of osteosarcoma and individuals at high risk of should not use this agent. High risk individuals include those with a history of hypercalcemia, bone cancer or any radiation therapy to the bones in the past.

Some interest has been considered with the combined use of teriparatide and alendronate. In a recent study, the bone mineral density of the spine and femoral neck was higher in those treated with teriparatide alone than with alendronate alone. The results were not positive when they were combined. Alendronate lowered teriparatide's ability to increase bone mineral density and bone turnover in women (5).

Vitamins and Minerals

In addition to medications, foods and supplements and even sunlight are essential to optimal bone health. The primary vitamin and mineral that is important in the prevention and treatment of osteoporosis is vitamin D and calcium.

The use of calcium was discussed above. At least 1200 mg of calcium should be consumed every day. It may be necessary to supplement the diet if patients are unable to consume adequate calcium in the diet. Higher doses than 1500 mg per day may increase the risk of cardiovascular disease and/or kidney stones.

A low level of vitamin D is a risk factor for osteoporosis (6). Low levels of vitamin D affect the ability of calcium to enter the bone. When vitamin D in doses of over 700 IU a day is given with calcium, bone loss is reduced (7).

There is question to the benefit of vitamin D alone. Most of its benefit (in osteoporosis) comes when combined with calcium. Doses of vitamin D of at least 400 IU is needed to reduce the risk of non vertebral fractures (6).

Osteoporosis is significantly more risky when individuals fall. Vitamin D has some benefit in reducing the risk of falls. This may occur because vitamin D is linked to improved muscle function (6). One study suggested that 800 IU every day reduces the risk of falls. When doses were less than 800 IU there was no reduction in falls (8).

Another study showed that those supplemented with vitamin D have a 22% decrease in fall risk. Fifteen people need to be treated to prevent one fall. This study recommended the use of 800-1000 IU each day to prevent falls (9).

Controversies

A few major controversies have arisen over the past few years regarding treatment of osteoporosis. They include the risk of osteonecrosis of the jaw and atypical fractures with bisphosphonates and calcium supplementation leading to heart problems.

Osteonecrosis of the jaw is death to the bone due to a reduced blood supply. This condition has been linked to use of intravenous bisphosphonates – which is not typically used in the treatment of osteoporosis. Intravenous bisphosphonates are used in those who have cancer and are associated with an approximate 20% risk of osteonecrosis over three years (10).

The risk of osteonecrosis with oral bisphosphonates is very small. The risk is one case per 10,000 to 100,000 patient-years. Since this complication has been reported in the literature, there has been a decreased use of bisphosphonates.

Most cases of osteonecrosis do not occur spontaneously; they typically occur after a dental extraction and it is recommended that the bisphosphonate is stopped 1 to 2 months before oral surgery (10). Routine dental work is not associated with osteonecrosis of the jaw.

Atypical fracture of the femur has been reported in some individuals taking long-term (over 4 years) bisphosphonate therapy, but a cause and effect relationship has not been proven. It is possible that the long-term use of bisphosphonates alter bone strength. Atypical fracture is seen in less than 1 in 1000 individuals and is most commonly reported in those with osteopenia being treated with alendronate (10). Despite the

evidence for atypical femur fracture, changes in how osteoporosis is treated are not recommended.

A 2008 study suggested that there may be an increased risk of cardiovascular disease including heart attack, sudden death and stroke in healthy women who use calcium supplements (11). Before changes in clinical practice occur there should be more well designed studies that evaluate the effect of calcium on cardiovascular health (12). It may be sensible to limit the intake of calcium among older women, especially in those with cardiovascular disease, to a maximum of 1500 mg a day.

How long to use medications

Many of the concerns with bisphosphonates are related to their long-term use. It is unclear exactly how long to use agents. Bisphosphonates build up in the bone and may be released for years after treatment is stopped. Therefore, it may be reasonable to stop treatment in some patients.

Long-term safety and efficacy have been reasonably well studied. Risedronate has shown benefit through 5-7 years and alendronate has proven safety for up to 10 years (13).

If alendronate or risedronate have been used for 3-5 years there is evidence that there is continued antifracture benefit for at least 1-2 more years (13).

One author recommends that after 5-10 years of treatment with bisphosphonate therapy the drug should be stopped for a period of time. Those at low risk should consider remaining off therapy and closely watching the bone density. Those at high

risk may consider treatment for 10 years and take a drug holiday for 1-2 years. During the drug holiday for the high risk patient other therapies to improve bone density should be considered (13).

Prognosis

The prognosis is good with osteoporosis, especially if screening catches the disease early. Many treatments are available to reduce the risk of falls and fractures. Most of the complications of osteoporosis are related to fracture and if treatment can prevent fracture the prognosis is good.

When fractures do occur there is an increased risk for poor prognosis such as pain, disability and progression of underlying medical conditions. The use of proper treatment and pain management has the potential to significantly improve quality of life.

Nurse's Role

A primary role of the nurse is educating the patient. Nurses should teach patients who have osteoporosis or are at risk for osteoporosis about lifestyle changes to maximize bone health. Nurses should encourage all patients to perform weight bearing exercise, get adequate calcium and vitamin D, avoid smoking and excessive alcohol, and get some sun exposure on the face and hands most days of the week. Nurses need to understand the screening guidelines and recommend screening to appropriate patients.

Safety precautions are critical in patients with osteoporosis. Prevention of falls is important because patients with low bone mass are at high risk for fracture. Some strategies that the nurse can implement to prevent falls are listed in table 2.

Table 2: Fall Prevention Strategies

- Assure adequate vision – have patients at risk see an eye doctor
- Have occupational therapy perform a home safety evaluation
- Assure that the home is free of clutter
- Assure that the home has adequate lighting
- Assure surfaces in the home are non-skid (floors, mats and shower mats)
- Make sure the patient has good shoes
- Have the patient perform balance exercises, such as Tia Chi
- Encourage regular exercise
- Evaluate patient medications as some medications increase the risk for falls such as anti-anxiety medications, blood pressure medications, pain medications and sleeping pills. If you suspect a medication is contributing to falls speak with the doctor.
- Encourage the patient to have an evaluation with his/her primary care provider to assure all medical conditions are well controlled. Uncontrolled health problems increase the risk of falls.
- Recommend assistive devices if appropriate

Helping your patients understand osteoporosis and their risk for disease is a major role of the nurse. Patients who speak intelligently to their doctor will receive better care. Below is a list of questions that nurses should encourage each patient to discuss with their doctor to help them fully understand their disease.

- *Do I have any risk factors for osteoporosis?*
- *What is my T-score?*
- *What caused this disease in me?*
- *What are my risk factors for this disease?*
- *When will I have my next DEXA scan?*
- *Could I benefit from medicines to increase my bone density?*
- *What are the side effects of the medications that you are prescribing for me?*
- *What can I do to reduce my risk of falls?*
- *How much calcium/vitamin D should I take in a day?*
- *What type of exercise should I do? How often should I exercise?*
- *Do any of my health problems put me at risk for falls?*
- *Do any of my medications put me at risk for falls?*

Case study 1

A 65-year-old post-menopausal female presents to her doctor for her annual exam. She is 5' 4" and weighs 122 pounds. She is afflicted with mild osteoarthritis of both knees, hypertension and mild depression. Her current medications include a multivitamin, hydrochlorothiazide 12.5 mg a day and sertraline 50 mg a day. She averages one drink a day and does not currently smoke, but quit smoking 10 years ago and has a 20 pack-year history. She does not do any formal exercise, but reports being quite active cleaning houses as she owns a house cleaning business. She has no family history of osteoporosis, her mother never had a fracture and she never had a fracture in her life.

Her doctor recommends that she is screened for osteoporosis by dual-energy x-ray absorptiometry. Her T-score at her hip is – 2.6 and -1.8 at her spine. When her information was placed in to the FRAX calculator she came up with a risk of a major osteoporotic fracture of 9.8% and the risk of hip fracture of 2.0%

She is seen back in her primary care doctor's office in one week to follow up on her abnormal DEXA scan. The doctor gives her a diagnosis of osteoporosis based on her T-score being below -2.5. The doctor discusses the following point.

1. Start aledronate at 70 mg once a week – she is a candidate for therapy because she has a T score at her hip of -2.6. Her kidney function is within normal limits for her age. Renal failure is a reason to not use bisphosphonates.
2. Routine blood work ruled out any disease of the thyroid or parathyroid. Alkaline phosphatase, serum phosphate and calcium and vitamin D levels were normal.

3. She is encouraged to start a calcium supplement. The doctor recommends 500 mg twice a day in addition to a couple servings of dairy each day such as milk, cheese or yogurt.
4. Add a vitamin D supplement to get 800 IU of vitamin D each day.
5. The doctor recommended sunlight on the face and hands 2-3 times a week to maximize vitamin D levels.
6. She was encouraged to engage in weight bearing exercise 5 times a week.
7. She was encouraged to perform upper body weight training three times a week to maximize bone strength in the upper body.
8. She is to have a repeat DEXA scan in 2 years to assess the efficacy of therapy.

Case Study 2

A fifty-four year old female presents to her doctor's office because of irregular periods and hot flashes. The patient is an advertising executive who lives a very stressful life and works 60-70 hours a week. She has no significant medical conditions and takes no regular medications. She does not engage in regular exercise, eats a lot of fast food and smokes about 2 packs of cigarettes per week. She is 63 inches tall with a body weight of 146 pounds. She reports that her job keeps her locked up inside most of the day. She drinks about 7-10 alcoholic drinks per week, mostly on the weekend and consumes about six cups of coffee each day.

Her mother currently lives in a nursing home due to immobility secondary to a hip that she broke 10 years ago. She is unsure if her mother has been diagnosed with osteoporosis. She reports no personal history of fracture.

The doctor performs a complete history, physical exam, selected blood work and a DEXA scan. The history and physical exam were without significant abnormality except for the irregular periods, hot flashes and a slight increase in body mass index. Blood work showed hormonal levels that suggest perimenopause. The other abnormality on laboratory evaluation was a low vitamin D level of 14 ng/dl. The remaining blood work was all normal.

Her DEXA scan shows a T-score of -1.4 at the hip and -1.4 at the spine. Her FRAX score shows a 10 year risk for a major osteoporotic fracture and risk for a hip fracture at 17 percent and 1.6 percent, respectively.

The doctor diagnoses her with osteopenia and opts to not treat her with pharmacological agents to treat low bone mass. The physician discusses the possible short-term benefits of hormone replacement therapy, but after the negative effects are discussed with the patient, they decide against hormone replacement. Her doctor makes the following recommendations.

1. Engage in regular weight bearing exercise at least three times a week.
2. Engage in weight training exercise at least twice a week
3. Take vitamin D 50,000 IU once a week for 8 weeks and follow up after treatment for a repeat blood test.
4. Get 10-15 minutes of sunlight exposure at least twice a week on the face and arms to increase the vitamin D level. Her low vitamin D level was partly caused by her lack of sunlight exposure.
5. Take 500 mg of calcium supplementation twice a day and consume a couple servings of dairy each day such as milk, cheese or yogurt.
6. Quit smoking because smoking may contribute to bone loss as well as lead to many other health problems.
7. Reduce binge drinking. She was counseled about the negative effects of alcohol on bone as well as overall health.
8. Reduce coffee intake. She was encouraged to switch to green tea. If coffee is to be continued she is encouraged to cut back and substitute decaffeinated coffee.

9. She was counseled on stress management and healthy eating. She was offered an appointment with a stress management specialist and dietitian.

10. She was encouraged to have a repeat DEXA scan in two years to assess for progression of her osteopenia.

Summary

Thin bones are a major problem associated with aging. It is associated with an increased risk of fracture and the complications that are associated with fracture such as pain, disability and depression.

Preventing osteoporosis is critical in the management of the disease. Consuming adequate amounts of calcium and vitamin D is one step. Maintaining a regular exercise program, avoiding excessive alcohol consumption and not smoking are important steps in the prevention of osteoporosis.

Regular screening should be carried out in all women over 65 years-old and selected women over the age of 50 years-old. Men should be screened when they are 70 years-old. Individuals with low bone mass may be candidates for treatment if they are at high risk for fracture based on the FRAX score.

Treatment of low bone mass will reduce the risk of fracture. While multiple options exist, bisphosphonates are recommended as primary treatment options for osteoporosis.

With the aging population, there will be an increase in the incidence of osteoporosis. Nurses need to take the lead in teaching and monitoring patients who are at risk for osteoporosis.

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