Osteoporosis and the Pituitary

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Overview

Osteoporosis is a well known condition which unfortunately is under-recognised and under-treated. Pituitary patients are at higher risk of developing osteoporosis compared to the general population.

To prevent osteoporosis:

1. Ensure adequate calcium intake and vitamin D levels
2. Stop smoking, exercise regularly and drink in moderation
3. Manage pituitary disorders early, and ensure adequate but not excessive hormone replacement

If already diagnosed with osteoporosis:

1. Start on an anti-osteoporosis treatment as directed by your doctor
2. Ensure adequate calcium and vitamin D replacement in conjunction with anti-osteoporosis drug therapy to maximize treatment effectiveness
3. Be aware of potential side-effects of treatments, and discuss with your doctor should any problem arise

Why do we care about osteoporosis?

Osteoporosis (osteo = bone, poros = porous/ with holes) is commonly known as brittle bone disease. The stereotypical image of osteoporosis is that of an old, frail woman who is hunched over and walks with a walking stick, and as such, many of us do not believe we suffer from osteoporosis. The truth of the matter is that any one of us can end up with osteoporosis! ‘Nope, not me!’ says a 35 year old man who goes to the gym daily and is as fit as a bull ‘I exercise daily to strengthen my bones and osteoporosis only affects women!’ Will it surprise you then to learn that I had diagnosed osteoporosis in an ex-professional AFL player in his late 30s? In fact, osteoporosis in men carries a worse prognosis than osteoporosis in women.

How much of a problem is osteoporosis? How does it compare with other illnesses? In 2001, osteoporosis was estimated to affect at least 10% of the Australian population… That’s 2 million Australians! To put this into perspective, although diabetes mellitus is widely publicised in the media, it only affects 7.4% of Australians (in 2005). Why is it that people are more concerned about diabetes and heart disease, yet very few people even think about osteoporosis? ‘If you break a bone, it heals, whereas diabetes stays with you for the rest of your life’ says a 55 year old post-menopausal diabetic patient of mine. Her statement could not have been more wrong. In terms of quality of life, osteoporosis is rated to be worse than diabetes, heart attacks and emphysema, and its impact is almost as bad as those suffering from chronic arthritis. In terms of mortality, after suffering a fracture, osteoporotic women are twice more likely to die, and men are three times more likely to die compared to those without osteoporosis. This increased mortality risk stays with you for 10 years after the fracture.

So, what causes osteoporosis?

To understand what causes osteoporosis, first we must understand the function of bone. Bone consists of a soft, flexible protein framework which is hardened by calcium phosphate to provide strength. It is a living organ which is constantly changing (bone remodelling) by removing old damaged bone (bone resorption by cells called ‘osteoclasts’) and replacing it with new bone (bone formation by ‘osteoblasts’).

In young people, bone formation occurs at a faster rate than bone resorption, achieving 'peak bone mass' at the age of 25 to 30. Unfortunately, bone resorption outstrips bone formation after that, and a person starts to lose bone density and bone strength from the age of 30. This process is further hastened in the first 5 years after menopause in women, thus more women have osteoporosis compared to men, but men are certainly not immune to osteoporosis.

Bone is also the largest reserve of calcium in the body, and it releases calcium into the blood-stream to be used by various organs. It makes sense that if you have low calcium intake from your diet, more calcium will be taken away from your bone for everyday use, and therefore your bone density and strength will be lower. It is therefore important to have adequate calcium intake to achieve maximum peak bone mass before the age of 30, and to reduce the rate of bone loss after the age of 30.

How does osteoporosis relate to pituitary disorders?

The majority of pituitary patients are at a higher risk of osteoporosis compared with the general population. Prevalence is different for different disorders. For example, Cushing's disease has a 50% prevalence of osteoporosis in some of the studies, but Acromegalic patients generally have a lower prevalence of osteoporosis.

In Cushing's disease, excess steroid causes increased activity of the bone resorbing osteoclasts whilst causing the bone forming osteoblasts to die prematurely. It also reduces calcium absorption by the gut and increases calcium loss through the kidneys.

In hypogonadism (due to hypopituitarism or hyperprolactinemia), the loss or inhibition of sex hormones lead to osteoporosis in ways similar to premature menopause, hastening the rate of bone mineral loss.

Hypopituitarism can also involve loss of growth hormone. It has been shown that loss of growth hormone in a young person prevents them from reaching maximum peak bone mass, and since growth hormone helps maintain bone strength, its loss also leads to faster bone loss later in life.

Hormone replacement after the diagnosis and treatment of pituitary disorders can also influence your risk of osteoporosis. Growth hormone replacement had been shown to reduce osteoporosis by improving bone density. However, excessive thyroid hormone or corticosteroid replacements both lead to osteoporosis. The converse is not necessarily true, such that deliberately under-replacing thyroid hormone and corticosteroid does not lower your risk of osteoporosis.

What can we do to prevent osteoporosis?

By now, you should be able to answer this question yourself. The obvious measures are to diagnose and treat pituitary disorders early and to ensure adequate (but not excessive) thyroid hormone, corticosteroid and growth hormone (especially in children) replacement.

As mentioned earlier, bone is the largest reserve of calcium in the body, and in order to strengthen bone we must provide enough calcium as raw materials for the bone. How much is enough? The recommendation is 3 serves of dairy products a day (1 glass of milk, 1 tub of yogurt and 1-2 slices of cheese everyday). A quick survey at our inaugural national seminar demonstrated that majority of pituitary patients have 1-2 serving of dairy products per day, but few achieve 3 serves on a daily basis. One way to overcome this is to have a calcium supplement which is cheap and effective. Please also note that dairy products can be quite fattening, so the low fat/diet versions are probably better for your general health, and they also contain slightly more calcium than the full cream versions.

Vitamin D is also very important. It helps calcium absorption from the gut, and has many other beneficial effects on bone and other organs that are just beginning to be discovered. For example, vitamin D has recently been shown to prevent osteoporosis, colon cancer, diabetes and heart disease. Most of us know that you get vitamin D from sunlight, and since Australia is well known for beautiful beaches and perennial sunshine, you'd think vitamin D deficiency is rarely a problem. This belief is wrong! Most studies have shown that up to 40-50% of Australians are deficient in vitamin D irrespective of age, gender or ethnicity, although those that are dark skinned, covered up in traditional clothing and elderly seem to fare worse. I myself record a deficient vitamin D level. 'Why?' you ask… well, I work indoor all day like most people, and even on weekends, driving is the preferred method of transportation, and since I do not have a

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convertible, direct sunlight becomes a rare commodity. The best thing to do is to go for a walk either early in the morning or late in the afternoon, as walking is beneficial for osteoporosis and general health, and your risk of skin cancer is minimised by not exposing yourself to scorching mid-day sun. I would recommend that you start doing some exercise with moderate sun exposure, then measure your vitamin D level, and if still deficient (<50 nmol/L), to consider vitamin D supplements. This is best done in conjunction with your endocrinologist.

Lifestyle factors can also increase osteoporosis risk. These include excessive alcohol intake, smoking, and a sedentary lifestyle. Certain illnesses such as hyperparathyroidism, malnutrition and malabsorption syndromes can also cause osteoporosis, and may need to be treated.

What if I already have osteoporosis?

If you already have osteoporosis, there are several treatments available, including oral bisphosphonates (Fosamax, Actonel), intravenous bisphosphonates (Zometa, Pamidronate), Strontium (Protos), oestrogen based treatments (hormone replacement therapy, Evista), and recombinant parathyroid hormone (Forteo). Each treatment has its own advantages and disadvantages, and needs to be tailored to the person depending on the age of the person, extent of osteoporosis, and concurrent illnesses. But irrespective of the type of treatment, calcium and vitamin D need to be given concurrently to ensure maximum efficacy. In fact, in all the studies performed that demonstrated effectiveness of these anti-osteoporosis drugs, patients are always given calcium and vitamin D concurrently; to put it another way, if you are not taking calcium and vitamin D with your
anti-osteoporosis drugs, there are no guarantee that the drugs will work properly.

A brief note about osteonecrosis of the jaw

At the Foundation's national seminar 2007, I briefly described the concept of Bisphosphonate related osteonecrosis of the jaw (ONJ). It is a condition described in people using bisphosphonates who have undergone dental procedures. ONJ has no clear definition as yet, some people define it as >6 weeks of exposed jaw bone after dental extraction in those using bisphosphonates.

Some of you may have seen the 7:30 report broadcasted by ABC on the 11th of December 2007 which featured osteonecrosis of the jaw. Since then, I have received numerous phone calls. The story left an impression in many of my patients that you would only use bisphosphonates if you have both osteoporosis and cancer, and that calcium and vitamin D may be sufficient to treat osteoporosis without the need for bisphosphonates, especially given osteonecrosis of the jaw as a side-effect. I'd like to use this opportunity to restate some of the important facts.

Firstly, calcium and vitamin D are effective in preventing osteoporosis, but alone, they are not sufficient in treating moderate to severe degrees of osteoporosis. Bisphosphonates in conjunction with calcium and vitamin D can prevent fractures by up to 50%, and have been shown to reduce osteoporosis related mortality by up to 28% in recent studies.

Secondly, bisphosphonates are used to treat osteoporosis, but are also used by oncologists to treat cancers that have metastasised to the bone. The two conditions are unrelated even though the treatment is similar.

Thirdly, the risk of ONJ in patients receiving bisphosphonates for osteoporosis and undergoing dental procedures is about 1 in 100,000. The risk is much higher in cancer patients, because they require much higher doses and frequency of bisphosphonates, and cancer patients account for the majority of cases of ONJ.

As a precaution to prevent development of ONJ, the current recommendation is to stop bisphosphonates for around 3 months prior to receiving dental procedures. It is therefore important to let your endocrinologist know about any planned dental procedure, and if possible, to have all dental procedures performed prior to starting bisphosphonate treatment.

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