

The Bones and IBD

Introduction

Bone is living, growing tissue. It is made mostly of collagen, a protein that provides a soft framework, and calcium phosphate, a mineral that adds strength and hardens the framework. Our bones are constantly repairing themselves. Throughout our lives, specialist bone cells break down and remove old worn out bone (bone resorption), and other cells lay down new bone (bone formation). However, this process tends to slow down as we get older. Bone resorption begins to outpace bone formation, and our bones become less dense. In some people the bones become considerably thinner and more fragile.

Having IBD may also make developing weaker bones more likely. The following information looks at why this may happen, and recent developments in diagnosis, treatment and prevention.

What causes bone loss?

Some loss of bone density happens naturally with age. During childhood and early adult life bone density, also known as bone mass, increases, reaching a peak at around age 25-30. After this, bone mass generally declines. Normal peak bone mass may never be reached if a disease affects bones during early life.

Bones can also lose density if there is insufficient calcium in the body to form enough bone tissue. A shortage of sex hormones (oestrogen and testosterone) can lead to a reduction in bone formation. Lack of exercise may also result in increased bone loss because regular impact or weight-bearing exercise stimulates the body to strengthen the bones.

What types of bone loss are there?

- The most common type of serious loss of bone density is **osteoporosis**. Most of our bones have a hard outer shell with a strong honeycomb-like inner structure. In osteoporosis, (which means 'porous bones') the struts of bone that make up the inner structure become thin, so the bone becomes fragile and breaks more easily.
- **Osteopenia** is the term used to describe a mild loss of bone density not severe enough to be labelled as osteoporosis.
- **Osteomalacia** is a decalcification (softening) of the bones usually caused by lack of Vitamin D. Osteomalacia in growing children is known as Rickets and can lead to bone deformity.
- **Avascular necrosis** is a rare condition where there is a reduction in blood supply to a bone, such as a hip joint, causing the bone and the surrounding cartilage to deteriorate.

Why does loss of bone density matter?

Bone density is sometimes known as BMD (bone mineral density) and is usually measured by a DEXA scanner (see below). Having a serious loss of bone density, or a low BMD measurement, does not automatically mean that your bones will break. But, it does generally mean you are at greater risk of fracturing (breaking) a bone. Thin bones are not in themselves painful, but fractures usually are, and some, such as hip or spine fractures, can lead to a serious loss of mobility.

How can I tell if I have loss of bone density?

Perhaps surprisingly, there are usually no obvious symptoms of bone loss apart from fractures. So, the best way of working out how likely you are to be affected is to consider how many of the main risk factors may apply to you.

What are the main risk factors?

For the general population, the main factors associated with a higher risk of developing bone loss are:

- age – although loss of bone density can affect any age group it is most common in the elderly
- gender – women have smaller bones and tend to lose bone faster than men, because of the hormonal changes that happen with the menopause. Younger women who have been through an early menopause may also be more at risk
- ethnic background – people of Caucasian or Asian race appear to be more likely to develop bone loss
- genes – having a family history of osteoporosis or fractures
- previous fractures – if you have already broken bones easily you are more likely to have fractures in the future
- low body weight
- smoking
- drinking too much alcohol
- in men, low levels of testosterone, for example following medical treatment
- poor diet – if it is low in calcium or vitamin D, which helps the body absorb calcium
- long-term immobility or an inactive lifestyle (for example, being housebound)

What are the additional risks if you have IBD?

Research has suggested that having IBD is another factor that may make bone loss and fractures more likely. For example, people with Crohn's Disease appear to be about one and a half times more likely to break a hip than people in the general

population. The increased risk for people with UC is slightly lower, but still significant.

Why are people with IBD at extra risk?

Several factors might be contributing to this increased risk. There are two which may apply to anyone with IBD:

- **The use of corticosteroids ('steroids')**
Treatment of UC or Crohn's Disease with steroids can be a significant cause of weak bones, because steroids can inhibit bone formation and accelerate bone loss. They can also affect the amount of calcium absorbed from food and increase the calcium lost from the body in urine. How seriously the bones are affected usually depends on the dose given and the length of the steroid treatment. Steroids taken rectally (in enemas or suppositories) are less likely to cause bone weakness than steroids taken by mouth.
- **Avoidance of dairy foods.**
If you avoid dairy products, perhaps because of lactose (milk sugar) intolerance or abdominal pain, you are more likely to have a shortage of calcium in your diet, unless you are taking a regular supplement. This shortage can also slow down bone formation.

If you have Crohn's Disease two more risk factors may also be relevant.

- **The inflammatory process itself**
People with active Crohn's Disease tend to have a higher level of cytokines (hormone-like proteins), which are released as part of the inflammatory process. These chemicals can affect the rate at which new bone is formed.
- **Poor absorption of nutrients because of inflamed intestines**
The nutrients important to bone formation, especially calcium and vitamin D, are absorbed in the small

intestine. So if you have extensive disease, or have had parts of your small intestine removed, you may be at additional risk.

How do doctors diagnose weak bones?

Osteoporosis is best diagnosed by measuring bone density or BMD using a DEXA (dual energy x-ray absorptiometry) scanning machine. This uses low dose x-rays and is a simple and painless test which takes about 20 minutes. DEXA scans require specialist interpretation, however, and the scanning equipment is expensive, so is not available at all hospitals.

Smaller and more portable ultrasound scanners can also be used to measure bone density through scans of heel, wrist, or finger bones. This type of test has been shown to be a good way to predict fracture risk in older women, but less accurate for younger women and men. So, DEXA hip scans remain the preferred way to confirm a diagnosis of osteoporosis.

Conventional x-rays are of little help, unless fractures have already occurred.

Biochemical tests, including blood vitamin D levels, are helpful in the diagnosis of osteomalacia. Avascular necrosis of the hips is usually diagnosed by an x-ray of the hip joint, or by a MRI scan. (MRI scanners produce computer images of internal organs and the bones using strong magnets and radio waves rather than x-rays).

Will I be offered these tests?

You are most likely to be offered a bone scan if you not only have IBD, but are also in a higher risk group for other reasons: for example, if you are a postmenopausal woman, have been through an early menopause, or have been taking steroids. Some doctors may measure your bone density even if you do not come into the above categories.

The World Health Organisation has recently developed a new way of assessing fracture risk, called FRAX. This takes into account a number of clinical factors, including steroid use and malabsorption, and can be used to give an initial risk rating even without a bone density measure. Those shown by FRAX to be at intermediate or high risk can then be referred for a bone density scan and for treatment if this is confirmed as appropriate.

Will I be offered treatment?

The results from a DEXA scan are used to work out a bone density 'score', by comparing your bone density measure to that of the general population. Treatment recommendations then depend on this score and on your other risk factors.

What treatments are there?

Treatments for low bone density and osteoporosis are aimed at strengthening existing bones, preventing further bone loss and reducing the risk of fractures.

Making sure that you are taking enough calcium and vitamin D is an important first step, and supplements may be recommended. If you have malabsorption, as sometimes happens with Crohn's Disease, you may be prescribed additional high dose vitamin D as tablets or by injection.

In post-menopausal women, taking extra oestrogen, also known as hormone replacement therapy (HRT) can help reduce bone loss. However, it does not suit everybody, and may have side effects such as blood clots (thrombosis). HRT has also been linked with a slightly increased risk of breast cancer, and so is now used less often than a few years ago. Post-menopausal women with IBD who have stopped taking HRT may be at particular risk of bone loss and should discuss this with their doctor.

Bisphosphonate drugs, such as risedronate, alendronate, pamidronate

and ibandronic acid, have been shown to reduce bone loss and are increasingly used for both men and women with osteoporosis. Research shows that such bisphosphonates are effective in people with IBD, and that risedronate in particular can be used to prevent and treat steroid-induced bone loss. When given in tablet form bisphosphonates can irritate the gut and are not always well absorbed. As an alternative, some can be given as an intravenous (into a vein) injection. Bisphosphonates are not recommended for women who might become pregnant.

Strontium ranelate is a newly introduced drug for treatment of postmenopausal osteoporosis. It has been linked with a small increased risk of a blood clot, but may be recommended if you are over 75 and find you cannot tolerate bisphosphonate drugs.

Other drugs which may be suitable for some older women unable to take bisphosphonates are teriparatide and raloxifene. However, neither of these has been tested in people with IBD.

Calcitonin is a naturally occurring hormone which has been shown to increase spinal bone density in postmenopausal women. It is now available in a nasal spray form. In some men with osteoporosis, testosterone replacement may be effective.

Avascular necrosis of the hip, which is a serious, although uncommon, condition, often needs surgical treatment. So, if you develop hip pain during steroid therapy, report it to your doctor.

Improved bone density can usually be confirmed with follow up DEXA scans. However, as bone strengthening is a gradual process, it will not show up immediately.

How can bone loss be prevented?

Osteoporosis is far better prevented than treated. If you are concerned that you

may develop weak bones, consider the following suggestions.

- Take regular weight-bearing exercise, such as brisk walking, jogging, dancing, aerobics, or active team sports. Gardening and housework, even just using the stairs whenever possible, can also be useful, as any weight-bearing activity stimulates bone formation. If in doubt, ask your doctor for guidance on exercise.
- Avoid smoking.
- Ensure you have adequate calcium and vitamin D, which are important for bone strengthening. (See list of sources at the end). Guidelines produced by the British Society of Gastroenterology recommend a daily intake of 1000mg of calcium for people under 55, 1200mg for over 55s. The daily recommendation of Vitamin D is 800 units.
- If you cannot tolerate or are avoiding dairy products you may need calcium supplements. Discuss this with your doctor: you may be able to get combined calcium and vitamin D supplements on prescription. It may also be worth checking your exact level of lactose intolerance if you believe this to be a problem. Some people overestimate their sensitivity, and avoid milk and milk products unnecessarily.
- If you are taking steroids, talk about prevention of bone loss with your doctor or IBD team. Calcium and vitamin D supplements are even more important for those on steroid treatment. You may also be given bisphosphonates while on steroids.

Some of the newer steroids, such as budesonide, may be less harmful to the bones, and might be suitable if you have Crohn's Disease of the terminal ileum (at lower end of the small intestine). Prolonged use of steroids can sometimes be avoided by the use of newer drugs such as azathioprine and infliximab. Some recent research

has shown that infliximab may improve bone density in people with Crohn's Disease.

- If you are a woman with IBD who has reached the menopause make a special point of discussing bone loss with your doctor, even if you are not on steroid treatment.
- Some research suggests that Vitamin K may help in preventing bone loss, so eating foods rich in Vitamin K may be a good idea. (See list of sources)
- Continuing medications such as azathioprine or mesalazine, even when you are feeling well, may reduce the risk of osteoporosis by minimising the amount of ongoing inflammation in the gut.

By being aware of the risk of bone disease if you have IBD, especially Crohn's Disease, you may be able to change your diet or lifestyle to help prevent it. Also, appropriate treatment can now significantly reduce the risk of bone disease.

Further information is available from the British Society of Gastroenterology (www.bsg.org.uk), which published a new set of Guidelines for Osteoporosis in IBD and Coeliac Disease in 2007.

Sources of Calcium

Dairy sources

- Milk (skimmed milk contains slightly more calcium than whole milk)
- Hard and soft cheeses
- Yoghurt, fromage frais, dairy ice cream

Non-dairy sources

- Fortified soya milk, tofu (soya bean curd)
- Fortified bread, fruit juice or mineral water
- Green vegetables such as spinach, kale, broccoli, watercress and okra
- Oily fish such as salmon, pilchards and sardines, especially if eating the bones, as in tinned fish; prawns
- Pulses, eg lentils, kidney beans, chick peas; baked beans

- Seeds, especially sesame
- Dried fruit and nuts eg almonds, peanuts (peanut butter)
- Cereals, eg muesli, bran, oatmeal

Sources of Vitamin D

- Exposure to sunlight
- Oily fish such as mackerel, herring, salmon and sardines, fish liver oil
- Egg yolk
- Milk, butter, fortified margarine

Sources of Vitamin K

- Most green vegetables, but especially kale, spinach, broccoli, and sprouts
- Margarine and oils such as olive oil, soybean oil and rapeseed oil
- Egg yolk
- Dairy products including milk, cheese, yoghurt and butter
- Beans such as butter and soya beans
- Meat and fish

For more information on eating healthily with IBD see our booklet: *Food and IBD*.

Further help

National Osteoporosis Society

Camerton, Bath BA2 0PJ

General enquiries: 0845 130 3076 or 01761 471771, weekdays 9am-4.30pm

(4pm Fridays) or info@nos.org.uk

Osteoporosis Helpline: 0845 450 0230 or 01761 472721, weekdays 9am-5pm or email nurses@nos.org.uk

Website: www.nos.org.uk

Crohn's and Colitis UK Information line: 0845 130 2233, open Monday to Friday 10am – 1pm.

There is an answerphone service outside these hours or you may email:

info@crohnsandcolitis.org.uk. Information staff will help with any IBD related queries.

Crohn's and Colitis Support :
0845 130 3344, open Monday to Friday 1pm – 3.30pm and 6.30pm-9pm.
This is a supportive listening service

staffed by trained volunteers with personal experience of IBD.

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Crohn's and Colitis UK is the working name for the National Association for Colitis and Crohn's Disease (NACC). NACC is a voluntary Association, established in 1979, which has 30,000 members and 70 Groups throughout the United Kingdom.

Membership of the Association costs £12 a year. New members who are on lower incomes due to their health or employment circumstances may join at a lower rate. Additional donations to help our work are always welcomed.