

Oxford Sport and Exercise Medicine

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Information Resource

Bone Stress injuries and Stress Fractures

What is a stress fracture?

A stress fracture is a break in otherwise normal bone, typically, an overuse injury, which is related to repetitive impact on a bone. Bone stress and stress fractures almost always occur in weight-bearing bones although they can occur in the upper limb and ribs in some sports.

What are the symptoms of a stress fracture?

Pain is usually felt over the injured area and tends to develop over a few weeks. It is typically worse on weight bearing and better when resting. As it gets worse the pain can be present at rest and at night. The involved bone may be tender to touch and there is often some swelling. However, it is important to remember not all stress fractures have these typical symptoms.

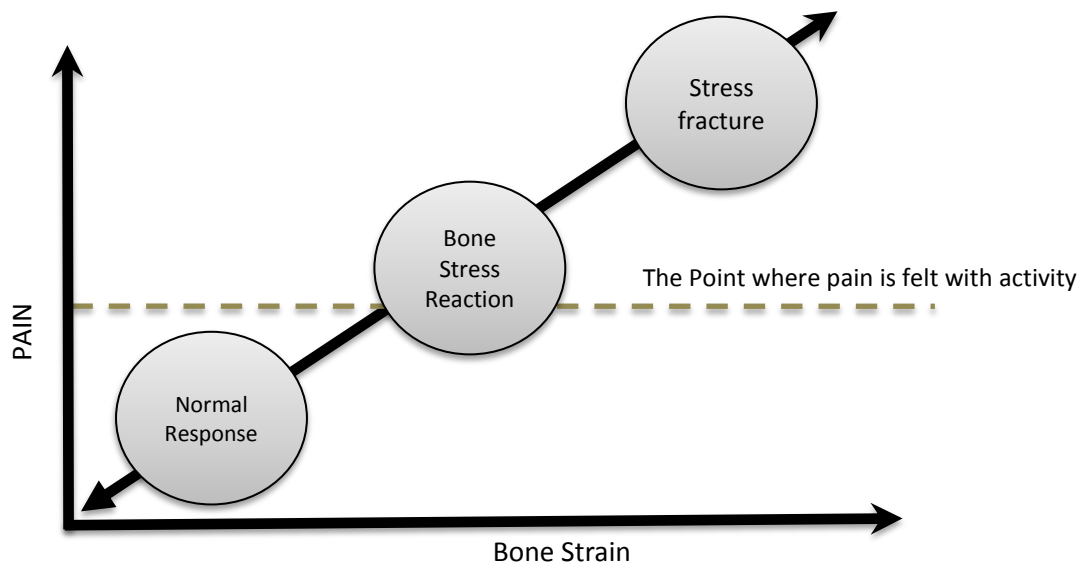
How does this injury occur?

Bone is alive, it is in a constant cycle of breaking down and building up. This is called bone remodelling. It is a normal process in which the body removes older and damaged bone and replaces it with new healthy strong bone. This gives our bones the ability to adapt and cope with the different loads we put them through. However if the bone fails to adapt quickly enough to a new load, there is an imbalance in bone remodelling and an area of weakness can develop. This is called bone stress. This can developed into a stress fracture if the level of load bearing/activity is not reduced.

Stress fractures commonly occur when there is a sudden change in physical activity or increase in training without enough rest time for the bone to adapt and remodel. Examples include having inadequate rest periods, training too frequently or a sudden, rapid increase in the intensity and/or volume of exercise.

As load is a key factor, stress fractures mostly occur in weight bearing bones. They are particularly common in the shin and foot, but can occur in other parts of the body, including the thighbone, pelvis and lower back. In some cases, fractures can occur in bone that is already weakened or abnormal (e.g. in osteoporosis - thinning of the bones).

A Diagram of the bone strain continuum model



How common are stress fractures?

Stress fractures occur in the general population infrequently, less than 1 in 100. They are more common in people who carry out certain activities, such as runners or those who do a specific sporting activity. In a sport and exercise medicine clinic up to 10% of patients seen will suffer with bone stress or a stress fracture.

How are stress fractures diagnosed?

Stress fractures can be diagnosed from your symptoms and the clinician's examination findings. Your clinician may suggest an X-ray, MRI or CT scan if they suspect that you have a stress fracture.

How are stress fractures treated?

1. Off load (take the weight off) the bone and allow it to heal

It is very important to off load the bone and allow it time to heal. For some stress fractures this may mean just avoiding the exercise or activity that may have caused it in the first place, for others it may mean using crutches or wearing a padded walking boot. Depending on where your stress fracture is and the type, we will recommend the appropriate treatment and timeline to follow.

How will I know when I am loading my limb too much?

Pain is often used as a guide for your level of loading. We can help you to adjust this until you are pain free. We will then design a gradual return programme to your normal activities.

2. Maintaining your fitness

Maintaining fitness levels for your general health and wellbeing will aid a swift recovery. This can be achieved through cross training with less load bearing exercises. This includes static cycling, swimming or aqua jogging. Your clinician will encourage this and can give you advice on the best activity for you. They may also recommend stretches and conditioning exercises to help keep you in shape and reduce muscle wasting (called deconditioning) whilst you recover.

3. Addressing Biomechanical factors:

Your clinician may review these factors and address any areas that could be improved.

This may include:

- Having an orthotic or podiatry assessment (to check the structure of your feet and how you walk/run)
- Stretching and strengthening exercises for certain muscle groups or adjusting your gait (how you move). As muscles act as shock absorbers for our bones, if they are areas of muscle weakness and/or tightness then it can increase the risk of a stress fracture. Therefore you may be referred to a physiotherapist to help address this.

When you start to return to activity the correct supportive footwear is essential. We recommend you change your trainers every 300-400 miles to make sure you get the correct support.

4. Improving your Bone health:

Following a balanced diet, which contains a good level of calcium, protein, carbohydrates and fats is essential for healthy bones. Useful leaflets regarding how much calcium to have in your diet and helpful tips on how to improve it depending on your dietary requirements can be found under the 'Calcium leaflets' section on the weblink below.

<http://www.ouh.nhs.uk/osteoporosis/useful-info/useful-information.aspx>

Vitamin D is important for healthy bones and a low level of vitamin D has been associated with stress fractures. Vitamin D is mostly made in our bodies in response to sunlight on your skin. However, we can absorb some vitamin D from our diet but very few foods contain vitamin D. The box below highlights foods that contain vitamin D.

Some people are at greater risk of vitamin D deficiency (low levels) than others. Spending a lot of time indoors, having darker skin and wearing sun block or being covered up can all reduce your vitamin D production. This is why many people are advised to take vitamin D supplements. Your clinician may organize a blood test to measure your vitamin D.

**Foods Containing Vitamin D:**

Oily fish (such as sardines, pilchards, herring, trout, tuna, salmon and mackerel)

Liver ,egg yolk ,mushrooms ,cheese, milk and butter (very small amounts)

Fortified foods (some margarines and breakfast cereals in UK).

In addition to diet, addressing other lifestyle factors such as stopping smoking, reducing caffeine intake, maintaining a healthy weight (not too high or too low) and making sure you take in enough fuel (calories) to support the amount of physical activity you are doing will further aid your bone health. Some medical conditions and medications can also affect your bone health and it is important to discuss this with your clinician.

Recovery time and returning to activity

Your recovery time will depend on a number of factors. These include how long you have had your symptoms, the location of the fracture, your previous activity levels and other factors that are specific to you.

However, as a general guideline, bone can take up to six weeks to heal and the majority of people get back to sport or their activities within 10-16 weeks.

You will be advised when you can start a return to activity program. Initially this will be every other day. The volume and intensity of your exercise will be gradually increased. The program will typically take 4-6 weeks. Remember, you should also continue to maintain your fitness with non-weight bearing exercise as mentioned on page 3.

Your symptoms (mostly pain) are the best guide to know when you're ready to build up your activity. If you start to develop pain then it is important to reduce the activity back to the level you were last pain free, then in a week try to gradually increase again. It is important to build your return to sport up gradually to avoid any risk of re-injury.

Preventing further stress fractures:

People who have suffered a stress fracture are at an increased risk of developing another one. Therefore it is important to look at the factors which may have contributed to the initial injury. This includes having a sensible training programme, addressing any biomechanical factors and taking steps to maintain your bone health.

Possible complications

The vast majority of stress fractures will heal if treated correctly and promptly. If not correctly treated there is a possibility that healing may be delayed or even not occur. Some bones are at a greater risk of this and so the period of off-loading may be longer.

If stress fractures do fail to heal after a period of rest, there is a possibility that surgery may be recommended.

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