Stress Fractures to the Foot

Stress or fatigue fractures result from a series of loading and unloading cycles that cause damage to the bone. If these forces continue and the bone is unable to repair itself fast enough, a fracture may occur. In the foot the metatarsal bones (the five long bones between the toes and the midfoot), especially the second metatarsal, are the most common location for a stress fracture. However, stress fractures can be seen in any of the bones of the foot as well as the lower extremity. Other common sites include the ankle, tibia, fibula, and hip.

Types of Fractures

There are two types of stress fractures. In one type, the bone is normal but is overloaded as a result of sudden increase in activity. This type of stress fracture is seen in athletes, military recruits, or in anyone undergoing a rapid change in physical activity (too much, too quickly). This type may also occur from training errors, improper techniques or equipment.

In the second type of stress fracture, the bone is abnormal often as a result of osteoporosis (loss of bone strength) or another related metabolic disease which involves bone. While a stress fracture may also occur as a result of overloading, if the bone quality is markedly abnormal a fracture can occur from normal usage. This is sometimes called an "insufficiency fracture," as the quality of bone that is present is insufficient to prevent a fracture with normal activities. Since osteoporosis can progress without symptoms for many years a stress fracture may be the first sign of osteoporosis. A stress fracture which occurs, especially without a history of overloading, should be further evaluated. If there are risk factors
present for osteoporosis (see table on back) or other bone diseases, then a bone-density measurement should be obtained. In a recent study, 95 percent of patients (both male and female) evaluated for an unexplained metatarsal fracture were found to have an abnormal bone density.

A particularly high-risk group for stress fractures are female athletes who have hormonal imbalances resulting in abnormal or absent menstrual cycles. These imbalances adversely affect the strength and density of the bone increasing the susceptibility to fracture, especially when combined with an intensive training regimen.

The most common symptom of a stress fracture, regardless of type or cause, is pain. Pain may appear suddenly or gradually increase over several days. Swelling is also common, especially in the foot and lower leg. X-rays obtained in the first 2-3 weeks of symptoms may appear normal. After this time a faint fracture line or repair bone formation can usually be seen.

A bone scan or MRI scan can be obtained, if needed, to confirm the diagnosis in the first days or week of symptoms when the plain radiographs are often still normal. Pain and swelling usually decrease with activity modification or decreased weight bearing. This decrease in loading forces permits the bone to repair itself. The extent and duration of treatment may vary. If an underlying cause can be identified, it too should be addressed, if possible, to minimize the risk of recurrent stress fractures.

For stress fractures of the foot, activity modification and use of a stiff-soled shoe for 2-4 weeks is usually adequate treatment. Occasionally immobilization in a cast or use of crutches may be needed. Stress fractures in some sites such as the 5th metatarsal, talus, and navicular bone may heal very slowly or not at all due to poor blood supply. Longer periods of treatment and surgical intervention may be needed in order to get these fractures to heal.

**Risk Factors for Osteoporosis:**

- Female
- Age (over 55)
- Family history
- Race (white, Asian)
- Small skeletal frame
- Low calcium diet
- Sedentary lifestyle
- Smoking and/or alcohol use
- Estrogen deficiency
- Exercise-related amenorrhea (cessation of menstruation)
- Early menopause
- History of previous fractures
- Steroid use