



Newsletter - February 2004

Stress Fractures of the Lower Limb

With the New Year there were doubtless resolutions to KICK START that new lifestyle with a diet and exercise routine with a "sound run or two and a few push-ups". As we drag the Dunlop Volleys from the cupboard, there are a few important considerations for the experienced and less experienced runners.

With any introduction or increase in exercise, there will be a small or not so small amount of PAIN. This is usually dependent on the intensity and frequency of the programme. One of the most common areas of pain (not including the lungs) is the lower limb, in particular, the shin and foot.

Repetitive loading of bone through ground reaction force or continuous traction by soft tissues may result in the mechanical failure and development of a stress injury. In healthy individuals this may be accentuated by biomechanical abnormalities, which focus stress on to vulnerable areas. Muscle fatigue may also contribute to the overuse injury as the muscles, ability to absorb impact is reduced.

Most of us are familiar with the generic term "shin splints". This describes a pain or tenderness of the front lower leg, along the inner border of the shin between the knee and ankle. This may usually be attributed to increased eccentric loading of the tibialis anterior muscle during heel strike or the tibialis posterior muscle in the case of over pronation. The condition may be exaggerated by tight calves, weak musculature and / or incorrect / ill-fitting / inappropriate footwear. This condition may be easily dealt with by modifying the cause and a graduated return to activity.

Stress fractures, the big brother of overuse injuries require careful diagnosis, management and training modification to ensure return to pre-injury levels of activity. Early warning signs include pain of a specific structure, night pain, difficulty with full weight bearing and pain during or post exercise. Definitive diagnosis is achieved with X-ray, CT, bone scan or MRI depending on the location of the fracture. Mismanagement of stress fractures may result in chronicity of the fracture, nonunion of bone and complete fracture in extreme cases. Usually the domain of serious athletes, stress fractures account for 10% of all overuse injuries. With the increase in recreational training, in particular running, stress fractures are becoming more common in the general population, (Korpelainen et al., 2001).

A stress fracture may result from normal bone undergoing abnormal stress (fatigue fractures), or abnormal bone undergoing normal stress (insufficiency fractures). There are groups within the population who have a higher predisposition to stress injury due to immature skeletal development (Magnusson et al., 2001). This low bone density or strength may be due to low calcium levels, previous inactivity, hormone irregularities (amenorrhea) or drug (Anabolic steroid) use. The most common areas to suffer are the tibia, ankle and foot, with the femur, pelvis and vertebral fractures being associated with jumping or gymnastic type sports. One study found tibial and fibial fractures accounted for 70% of stress fractures in men, while the foot accounted for 50% of female's fractures, stress fractures tended to occur at a younger age in the female population studied (Korpelainen et al., 2001).



In an Australian study of competitive track athletes (53 female, 58 male) twenty suffered a total of twenty-six stress fractures in a twelve-month period (21% incidence)(Bennell et al., 1996). These injuries accounted for 20% of all musculoskeletal injuries during the study period. The tibia accounted for 46% while the navicular bone (foot) accounted for 15% and fibula 12% of stress fractures.

The body is able to adapt to a gradual increase in loading. Bones that have been subject to higher forces are, by Wolff's law stronger than those, which have not. Basketball jumping sports place up to 5.5 times the force on leg bones than walking while running increases forces by approximately 2.7 times (Milgrom et al., 2000). This was demonstrated by the lower incidence of stress fractures in army recruits who had played basketball for over two years prior to enlisting. There are many contributing factors, both intrinsic and extrinsic that lead to stress fractures. Determining these factors is a significant part in the prevention and cure of stress injuries and fractures.

The intrinsic factors include poor muscle strength or length or balance, slow corrective reflexes, leg length discrepancy, high longitudinal arch morphology (pes cavus), low arch (pes planus), of the foot, hormone irregularities, body mass and bone density / stiffness. Many of these factors can be addressed through correct diet, training and shoes or where necessary, orthotic prescription. The extrinsic factors include training regime (rest periods, cross training, intensity, duration, progression), shoes (type, age), training surfaces and nutrition. A perfect situation to develop stress fractures is the BOOT CAMP scenario. A military type of intense, daily running and training program designed to make or break the body in 4-8 weeks.

Research has demonstrated many causes of overuse injury in groups of subjects. Each individual will respond in his / her own way to a training program. The key to successful fitness is to tailor the exercise and intensity to suit each individual and if trouble arises take precise action.

Happy New Year. Good running. Mark Ritchard

References:

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