

Knee, Shin and Foot

Biomechanics of the Knee, Shin and Foot

August, 2007

The feet are the foundation of the lower limb. Poor biomechanics often start with the foot. If a foot has high arches or is flat there are changes that can to all of the postural joints of the body.

Our feet are highly adaptable. As they hit the ground and begin to absorb load, the motion they undergo is called pronation. The flexibility of our joints determines how much energy the lower extremity chain (foot-ankle-knee-hip-pelvis-low back) can absorb.

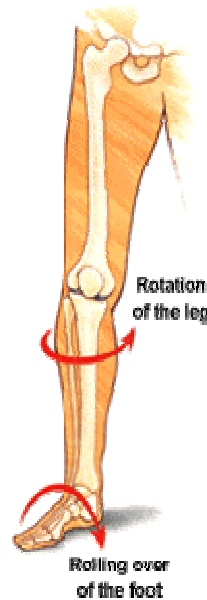
For different reasons, both flat and high-arched feet channel a large amount of energy to

skeletal structures high in this chain — especially the knee and the hip—making those structures more susceptible to injury.

For example, it is common for the kneecap (patella) to develop pain because a flat foot forces the petello-femoral joint to absorb more energy. The patella can become poorly aligned because of rotation of the foot as shown in the picture to the right.

Running sports add 'impact loading' to the equation. Running and jumping amplify the effects of failed biomechanics.

Sprains and strains are likely to occur when joints are poorly aligned or when they absorb forces that should be directed to another part of the body. Make sure your footwear is supportive and appropriate for the activity you're doing.



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Shin Splints

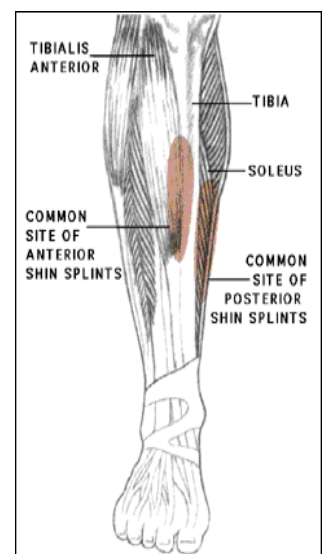
Shin splints are caused by overusing the lower leg or by using it incorrectly. Improper stretching, warm-up or exercise technique will increase the chances of shin splints. They can also be caused by improper footwear. The soft tissue becomes inflamed due to the stress that has been put onto the shin. This area is enclosed in a compartment and if the tissue swells, there is no place for it to go so the pressure increases. The increased

pressure makes it hard for the blood to flow freely and the net result is pain and sometimes tingling, numbness or weakness.

Chiropractic treatment of shin splints involves addressing any joint restrictions in the foot, ankle, and knee, muscle tightness and imbalances as well as assessing any biomechanical deficiencies in the feet that may be causing the shin splints. If deemed appropriate orthotics are

prescribed to remedy the condition.

The goals of massage are to reduce any inflammation, pain, swelling, muscle spasm, and trigger points. Massage will also maintain range of motion as well as eliminate any scarring or adhesions. Muscular imbalances that may be causing the problem would be addressed during the treatment as well as with the homecare exercises given to the client.



Plantar Fasciitis

The plantar fascia (*fash-ah*) of the foot is a thick band of tissue that connects your heel to the base of your toes. When it is torn, inflamed or over-stretched, this is called plantar fasciitis (*fash-e-it-is*). This condition can be a result of:

- An acute injury (strain) that places an excessive load on the foot
- Prolonged or excessive pronation (flat foot) of the foot
- A high-arch or a change in footwear

You will often feel the pain at the base of your heel when you step out

of bed in the morning. This injury can be very pesky and quite painful limiting your daily activities significantly.

Self Care Tips

Before you get out of bed, wrap a towel around your toes and gently pull them toward you. Do this with your knees straight as well as bent.

Massage your arch often by sitting on a chair and rolling a marble, golf ball or another massage device under your foot. Progress to standing position.

Stretch your calf and Achilles tendon - we have specific stretches that we

can suggest and print of for you to take home....Just ask us!!

Keep your shoes by your bed and wear around the house.

Massage and chiropractic are both effective treatments for plantar fasciitis. Custom orthotics are also very effective because they can correct the excessive pronation of the foot causing the problem.



Achilles Tendonitis

Achilles tendonitis is a common injury in the running community. It is an inflammatory process that leads to swelling, pain and tissue damage. It results from repetitive strain, which in turn makes it more susceptible to tearing or even rupturing.

The Achilles tendon attaches onto the heel of the foot as do the posterior muscles of the leg, which help to plantar flex the foot (point the toes down). It is responsible for providing the push that drives the foot down and forward when walking, running, and jumping. All in all, it generates a lot of tension and absorbs a lot of force. It's involved in most actions of the lower extremity and becomes more susceptible to tendonitis when engaging in sports where

it is under a constant, repetitive load.

A further danger exists for triathletes when making the transition from swimming to running later on. The tendon has been in a shortened position during the swim and then has to elongate during the run. Without stretching the tendon beforehand a strain on the fibers or even a tear can occur because the fibers are "accustomed" to the shortened position.

Prevention plays a major role in dealing with tendonitis. Proper running form, appropriate footwear and a good flexibility program are important areas to start with. Massage, A.R.T.™ (Active Release Technique) and acupuncture

are all treatments that not only help to restore flexibility once tendonitis has developed but are viable ways to **prevent** it as well.

Tendonitis rarely goes away on its own. Usually, the longer you have tendonitis the longer you will need treatment before you see improvements. Massage is an excellent way to maintain the integrity of the muscles by increasing circulation (bringing nutrients to the area and flushing out metabolites) and reducing tension on the fibers. Active Release Technique works quickly to break down adhesions and scar tissue that forms with tendonitis helping to restore full range of motion. Acupuncture is another effective way of reducing inflammation and pain.

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