

Plantar Fasciitis

The 20th Annual Vancouver Sun Run was held on April 18, 2004 in downtown Vancouver, B.C. Nearly 50,000 runners “competed” in the event—many of who were first timers. It is not surprising that injuries could occur both in the preparation for the run and in the run itself. The Vancouver Sun newspaper had been following the training programs of several first-time runners leading up to the run. One such participant was a columnist doing her first Sun Run. However, she developed plantar fasciitis towards the completion of her training that almost sidelined her for the event. With some aggressive therapy, orthotics and some innovative intervention (as I will discuss later in this article) she completed the run. In reviewing the Running Room Discussion Forum at www.runningroom.com, it appears that plantar fasciitis is a relatively common occurrence that plagues runners.

Having personally read these discussions, I can see a varied description of the symptoms that these runners have ascribed to being caused by plantar fasciitis. Most of the information discussed in the forum is accurate, but there is a dearth of information about both the cause and the treatment of plantar fasciitis. I would like to expand on some of this information and add a little science to the theories.

Anatomy

The sole of the foot is known as the plantar surface. Fascia is a tough, fibrous tissue that has no active muscle in it. It also has a very limited blood supply so inflammatory changes are minimal. Hence the probably more accurate name of plantar tendonopathy instead of plantar fasciitis. However, I will continue to refer to the condition as fasciitis just for simplicity and consistency reasons. The plantar fascia serves as a connecting structure along the plantar surface of the foot extending from the heel bone in the back to the base of the toes in the front. It provides support for the arch of the foot and assists in the biomechanics of walking and running. (Figure 1). This fascia, if tight, can be a cause of high arched feet. If only a portion of the fascia is tight, it can also be seen then with pronated feet. So you can appreciate that plantar fascia conditions can be associated with over- or under- pronated feet. There are also other foot and leg structures that contribute to supinated or pronated feet. The activity of adjacent tibialis anterior and posterior muscles can have an effect on the foot position and thereby be associated with plantar fasciitis. Proximal muscle weakness farther up the leg and malalignment will affect the position of your foot at initial contact and mid stance when you are running. Running can at times produce up to two to three times body weight on ground reaction force measurements. If there are any pathological conditions in operation, this can lead to a number of various sports and activity-related injuries. Failure of the plantar fascia to adapt to these conditions is probably what is the final pathway in the development of plantar fasciitis. If it weren't for the runner getting plantar fasciitis, he/she would probably be experiencing tendonopathies or injuries in other locations of the body until the primary condition was rectified.

The above causative factors in plantar fasciitis are probably the reason it can take so long to diagnose the cause and for it to resolve. Frequently, as well, only the symptoms of plantar fasciitis rather than the actual cause of plantar fasciitis are being treated.

Symptoms

The classic symptoms seen with inflammatory conditions in other anatomical structures may not be visible in patients suffering from plantar fasciitis. Rarely is there overlying redness, and unless there has been acute trauma causing the plantar fasciitis (e.g. plantar fasciitis rupture), associated swelling may not be present. The only indication for a diagnosis of plantar fasciitis may be the presence of localized pain along the sole of the foot, often just beyond the heel bone and along the inside of the arch of the foot. This area may also be very tender to the touch, and you may feel some “nodules” in the area. This often represents areas of attempted healing of micro tears in the plantar fascia. Associated symptoms seen with plantar fasciitis and possibly partly

causative factors may be tenderness and pain along the shinbones, knee malalignment symptoms or even pelvic weakness. Symptoms of plantar fasciitis are worse with weight bearing usually after an initial period of rest or immobility—the so-called “first step sign.” Joint stiffness and pain are not unique to plantar fasciitis after periods of rest and immobility. Arthritic and other inflammatory conditions are also associated with post rest stiffness and pain. In the case of plantar fasciitis, resting the foot and ankle with prolonged elevation, or sleeping, often places the foot and ankle in an equinus (toe down) position. Weight bearing then will acutely stretch the plantar fasciitis in anticipation of the heel strike with initial foot placement. Continued weight bearing will result in further stretching of the contracted fascia such that the pain symptoms become less severe later in the day. Similarly, initial running may be associated with plantar fasciitis pain and then gradually improvement is seen over time.

Diagnosis (Cause of heel pain)

Although plantar fasciitis is a common problem in running sports, several other causes of heel pain must be considered and excluded before the definitive diagnosis of plantar fasciitis is made. Heel pain can also be because of entrapment neuropathy (pinched nerves), heel spurs, heel bone stress fractures and even tumours.

A clinical diagnosis of plantar fasciitis is usually possible without sophisticated tests. The location of tenderness and pain are usually typical for this condition. The presence of the appropriate history is also useful. In doubtful or atypical cases, your physician may wish to order a plain X-ray or bone scan to exclude other cause of heel pain (such as heel spurs or stress fractures), an ultrasound or even a Magnetic Resonance Image (MRI). There is evidence that on MRI the plantar fascia in this condition is thinner than normal. (*Skeletal Radiology*. 28(8): 447-52, 1999) This also serves as further evidence for the non-inflammatory cause for plantar “fasciitis” since most instances of inflammation the tissues are swollen and thicker.

Treatment

In as much as the precise cause of plantar fasciitis is not known there are a plethora of ideas for the correct and most effective treatment plans. Also, because the cause of plantar fasciitis is now considered not to be because of inflammation, the anti-inflammatory treatment advocates can step aside. Surgical and non-surgical techniques have been used in the treatment of plantar fasciitis.

Non Surgical Management:

Non-surgical techniques for the treatment of the symptoms and discomfort associated with plantar fasciitis can be classified into three broad categories: those that reduce pain and inflammation, those that reduce tissue stress to a tolerable level or those that restore strength and flexibility of the involved tissues.

1. Pain Reduction. Because inflammation alone is not thought to be the cause of plantar fasciitis, simple acetaminophen (Tylenol) should be appropriate to combat the pain associated with this condition. Some advocates may prefer simple non-complex anti-inflammatories such as ibuprofen. Topical Ibuprofen or Diclofenac, are popular but not really proven as significant factors in correcting the cause of plantar fasciitis. They may temporarily help in diminishing the symptoms.

But first and foremost for any injury or painful areas, the runner should begin a program of rest and rehabilitation. This program involves cutting back in their mileage, applying local massage and icing. A good technique involves rolling your foot’s sole over a frozen water bottle to both stretch, ice and massage in one movement. This exercise should be done several times a day, for at least 15 minutes.

Acupuncture for relief of symptoms of plantar fasciitis is popular in some areas of the world. There is no scientific evidence to support its use although there are anecdotal reports and quasi-scientific trials supporting its effectiveness. (*Journal of Traditional Chinese Medicine*. 9 (1): 40-44, 1989).

Local injections of cortisone have been a time-honoured method for dealing with cases of recalcitrant plantar fasciitis. Although frowned upon for repeated injections, the occasional use can be quite effective in relieving symptoms, however, often on a short-term basis only. (*American Journal of Sports Medicine*. 25(3): 312-6, 1997). Shock wave therapy is becoming a popular method of relieving the pain of plantar fasciitis as well as some other tendonopathies (e.g., tennis elbow). Sonorex involves the administration of electrohydraulically generated shock waves to the local tissue area of injury or pain. Results from Germany have shown 80% improved symptoms in patients with plantar fasciitis. It has only recently been approved for use in the USA by the FDA for plantar fasciitis. It has been in use in Canada at various centres for the past few years. (*Clinical Orthopedics & Related Research*. (387): 47-59, 2001). Dr. Brian Day, Clinical Professor of Orthopedics at the University of British Columbia, has considerable experience using shock wave therapy for shoulder tendonitis in patients from the Workers Compensation Board and expects similar good results with its use in patients with plantar fasciitis. The columnist to whom I referred to in the opening paragraph of this article, in fact, had several treatments with Sonorex. Was that the reason she was able to complete the Sun Run?

Low-intensity infrared (IR) laser therapy has not been found to be beneficial in the treatment of plantar fasciitis. (*Archives of Physical Medicine & Rehabilitation*. 79(3): 249-54, 1998).

2. Tissue Stress Reduction: Although we do not believe the primary cause of plantar fasciitis is the plantar fascia itself, we still feel that reducing the pressure on the plantar fascia will help to relieve symptoms. This can involve using foot orthotics and resting splints, and doing stretching and strengthening exercises directed at the plantar fascia and some of the local muscle and tendon complexes. Foot orthotics are devices applied to the plantar surface of the foot to change the pressure and forces experienced by the foot during running, especially heel strike and full foot contact. Because excessive foot pronation has been shown to be associated with the plantar fasciitis complex, the traditional foot orthotics for this condition have involved using medial or inside foot posts or wedges. Doing so has been shown to in fact cause more pressure on the plantar fasciitis and thus lead to more pain. The use of lateral or outside foot postings tends to stabilize the outer joints of the foot leading to less stress across the plantar fascia and less plantar fasciitis symptoms. (*Journal of Bone & Joint Surgery*. 81(10): 1403-13, 1999)

The use of a resting or night splint has become popular to relieve the symptoms of plantar fasciitis. This is accomplished probably by preventing the tendency for the plantar fascia to contract when left in a shortened position while sleeping. One well-conducted study of 116 patients found no statistical difference with the presence or absence of a night splint for a 12-week period. (*Clinical Orthopedics & Related Research*. (368): 190-5, 1999) Another study, however, found a significant improvement in 37 patients with plantar fasciitis using a night splint in a double crossover analysis. (*Foot & Ankle International*. 19(1): 10-8, 1998)

3. Strength and Flexibility Restoration. The cause of plantar fasciitis is probably not inherent pathology in the fascia itself. Rather, the development of plantar fasciitis is most likely because of pathology at other levels in the kinetic chain. This means the primary problems must be identified and treated in order that the plantar fasciitis is permanently resolved. Knee malalignment, pelvic instability and weakness as well as overall trunk alignment may have to be addressed to allow the symptoms to be arrested.

Surgical Management:

Surgical treatment of plantar fasciitis should be reserved only for the very recalcitrant and severe cases. This implies the runner exhausting all non-operative approaches first. The non-operative treatment should have been conscientiously followed for at least six months before more invasive techniques are considered. Surgery can be classified according to the primary or secondary cause that is being treated.

1. Primary cause. As mentioned in the above discussion about the etiology of plantar fasciitis, if the primary factor thought responsible for the symptoms of plantar fasciitis cannot be treated without surgery, then

realignment surgery for those conditions of malalignment may be needed. If the primary cause is thought to be muscle weakness or in some cases joint instability, then no amount of surgery will cure the problem. In fact, in those situations it could very well make the condition worse.

2. Secondary cause. This implies operating on the plantar fascia either directly or indirectly. Doing surgery on the heel bone can alter the mechanical axis and pull of the plantar fascia. More directly, surgically lengthening or cutting the plantar fascia itself may relax it enough to decrease the stress and pull across it. This can be done with a minimal invasive procedure called a percutaneous plantar fasciotomy. Some surgeons feel it is a simple and cost-effective method for surgical treatment of chronic heel pain. (Journal of Foot & Ankle Surgery. 37(4): 269-72, 1998)

Conclusion: "What will I do when (if) I get plantar fasciitis?"

I consider myself a recreational runner who runs for enjoyment and health reasons. Because I am also an orthopedic surgeon, one might assume that I would resort to surgery as my preferred option if I had plantar fasciitis that was not responding to treatment. NOT!

In reviewing the Cochrane Database of Systemic Review (Issue 2, 2001), its conclusions were "although there is limited evidence for the effectiveness of local corticosteroid therapy, the effectiveness of other frequently employed treatments in altering the course of plantar heel pain has not been established in comparative studies." These other treatments include therapeutic ultrasound, laser therapy, electrogenerating devices and insoles with magnetic fields. There was limited evidence for the superiority of corticosteroid injections over orthotic devices as well as night splints or shock therapy. This has been reinforced with a new Cochrane Review (Issue 1, 2004).

Personally, with the unpredictable results of surgery, I would not even consider it. I would rather change my sport. Like most of the readers, I too would seek out the advice of experienced runners and even scout the discussion boards. I would modify my shoes or orthotics. I would rest, stretch and ice. I would make an appointment with an experienced physiotherapist (who runs) for treatment; and then, failing all that, I would write myself a referral to a Sonorex Centre for shock therapy to my heel!

