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Rehabilitation of the Achilles Tendon

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The Achilles tendon transmits the forces of the large gastrocnemius/soleus muscle group from the lower leg to the foot. It inserts into the heel at the most posterior aspect of the calcaneus. Conditions such as tendinitis and tears of this tendon require appropriate rehabilitation to prevent continuing problems and disability. Rehabilitation of the Achilles tendon can be performed easily in a chiropractic office, since it doesn't require expensive special equipment or extraordinary time commitments.

Biomechanical Function

Most injuries of the Achilles tendon do not result from recent acute injury, but develop gradually over weeks or months. These are "overuse" or "misuse" conditions caused by excessive and/or repetitive motion, often associated with poor biomechanics. The end result is a microtrauma injury: The body is unable to keep up with the repair and re-strengthening needs, so the tissue begins to fail and becomes symptomatic. If it is not very painful (or when the pain is eliminated by medication), continued stress eventually can lead to complete failure, with a resulting acute tear of the tendon.

The Achilles tendon insertion on the calcaneus is medial to the axis of the subtalar joint, making the calf muscles the most powerful supinators of the subtalar joint.¹ Therefore, when excessive pronation occurs, the tendon eventually undergoes overuse degeneration and inflammation. Clement, et al., described how "pronation generates an obligatory internal tibial rotation, which tends to draw the Achilles tendon medially. Through slow-motion, high-speed cinematography, we have seen that pronation produces a whipping action, or bowstring effect, in the Achilles tendon. The whipping action, when exaggerated, may contribute to microtears in the tendon, particularly in its medial aspect, and initiate an inflammatory response."² The researchers believe control of functional overpronation with corrective orthotic devices is a necessary treatment for most patients with Achilles tendinitis.

Impaired circulation may be a contributing factor to Achilles tendon overuse injuries, especially with tendon tears. The same researchers speculate, "In individuals who overpronate, the conflicting internal and external rotatory forces imparted to the tibia by simultaneous pronation and knee extension may blanch, or wring out vessels in the tendon and peritendon, causing vascular impairment and subsequent degenerative changes in the Achilles tendon."² This "region of relative avascularity" extends from 2 to 6 cm above the insertion into the calcaneus, and is a common site of rupture of the Achilles tendon. This makes it especially important to ensure good blood flow during the healing of this condition.

Achilles Tendinitis/Tendinosis

It's not surprising that abnormal biomechanics of the foot and ankle can cause problems with the largest tendon in the leg. Symptoms usually are described as diffuse pain in or around the back of the ankle (from the calf to the heel). The pain is aggravated by activity, especially uphill running or stairclimbing, and relieved somewhat by wearing higher-heeled shoes or boots. Palpation will reveal tender thickening of the peritendon, and there may be crepitus during plantar and dorsiflexion. Often, a recent increase in activity levels (such as more stairclimbing) or a change in footwear is reported by the patient.

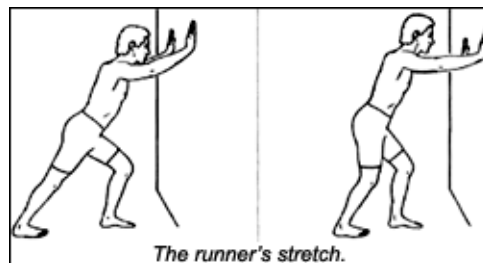
Macroscopically, overused Achilles tendon tissue examined at surgery is dull, slightly brown and soft, in comparison to normal tendon tissue, which is white, glistening and firm.³ There is a loss of collagen continuity and an increase in ground substance and cellularity, which is due to fibroblasts and myofibroblasts, not inflammatory cells.⁴ This explains why anti-inflammatory strategies (such as NSAIDS drugs and corticosteroid injections) are not indicated for these conditions, and actually may interfere with tendon repair.⁵ We now know that the condition we usually have described as "tendinitis" is actually better understood as "tendinosis," and is not due to inflammation, but an underlying degeneration of collagen tissues in response to mechanical overuse.⁶ This "new paradigm" will help to guide our management of all tendon problems, and provide more effective rehabilitation of Achilles tendon injuries.

Rehabilitation of the Achilles Tendon

With acute injury an initial period of relative rest is needed. Occasionally, the weakened tissues will tear through, resulting in a ruptured Achilles tendon. This may require surgical repair and a period of rest before rehabilitation can begin. During this period, however, exercise of the opposite ankle should be encouraged. Vigorous exercise of the uninvolved contralateral ankle muscles produces a neurological stimulus in the injured muscles (the "crossover effect"), and helps to prevent atrophy.⁷ Initial treatment also should include

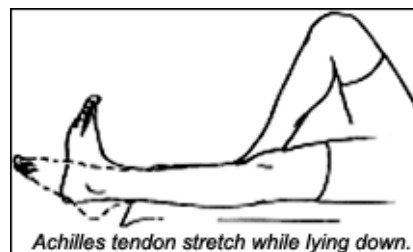
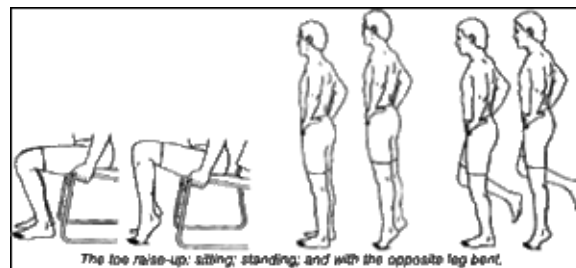
heel lifts to reduce the strain on the Achilles tendon, and crossfiber friction to improve circulation. Complete return to function will require attention to range of motion, functional strength and orthotic support.

Range of motion: In addition to appropriate foot and ankle adjustments, stretching of the tight and shortened gastrocnemius/soleus muscle complex is a necessary part of Achilles tendon rehabilitation. Gentle stretching should be started early, putting a linear stress on the tendons and stimulating connective tissue repair. The standard is the "runner's stretch," performed against a wall. Patients with tightness and pronation will often allow the foot to flare outward while stretching, which forces the medial arch to drop. This tendency must be carefully corrected, with the foot positioned straight ahead and the medial arch kept elevated.⁸ It is even better for the patient to perform the stretches with corrective orthotics in place.



Functional strength: Isotonic strengthening exercises that focus on the eccentric (negative) component have been shown to improve the healing of tendons and accelerate return to sports participation.⁹ These exercises should be progressed to closed-chain, heavily loaded eccentric exercises to stimulate collagen fiber re-orientation and strengthening.¹⁰ One example of these exercises requires that the patient sit on the edge of a stair, perform a toe raise-up, then rapidly drop the involved heel as far as possible, returning by pushing back up with the uninvolved leg.

Orthotic support: A shoe insert made with shock-absorbing material will help decrease the amount of stress on the feet, legs, and back during running.¹¹ Orthotics have been found to be quite useful in the long-term improvement of running biomechanics.¹² While there is still controversy regarding exactly how and why orthotics are so useful, there is solid empirical evidence of their benefits to runners, both for treatment and prevention of overuse injuries.¹³ As described above, most Achilles tendon problems develop from poor foot and ankle biomechanics, and control of pronation is needed to prevent recurrent injuries.¹⁴ Custom-made, flexible orthotics are now available that can support the hindfoot, midfoot and forefoot, thereby providing biomechanical control throughout the entire gait cycle.



Conclusion

Achilles tendon injuries can be successfully rehabilitated conservatively. Steroid injections and casting are seldom used these days. Once the local inflammation has been controlled, improved blood flow to the region of relative avascularity is necessary. Correct stretching and strengthening exercises can be demonstrated and monitored in the office. One of the most important long-term goals is to reduce any tendency to pronate excessively. In addition to custom-made orthotics, all runners should be encouraged to wear well-designed shoes that provide good heel stability with a small amount of additional heel lift. This helps prevent Achilles tendon problems, and is especially important in athletes who run more than a few miles at a time.

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