

# Diagnosis and Management of Achilles Tendinopathy

Manuel Duarte, DC, DABCO, DACBSP, CSCS

*Achilles tendinopathy* is a term used in a clinical setting to describe the occurrence of pain, swelling and tenderness typically experienced in the relatively hypovascular area, approximately 2 cm to 6 cm above the insertion of the tendon into the calcaneus. I suggest using the term *tendonopathies* rather than *tendonitis*, which suggests the fundamental problem of the involved tissue is inflammatory.

Approximately two-thirds of Achilles tendon injuries in athletes are believed to be paratenonitis, which is inflammation of the paratenon only. One-fifth are insertional complaints such as bursitis and insertional tendonitis. The remaining afflictions consist of pain syndromes of the myotendinous junction and tendonopathies.<sup>1</sup>

Tendonitis does not refer to any specific histopathological entity, but conditions that are tendinoses, as in tendon degeneration without associated inflammation. It is important doctors do not underestimate the chronic and degenerative nature of the condition.

There are three models of tendon pain:

- *The degenerative model:* There is an absence of inflammation and areas of mucoid degeneration, neovascularization and disordered collagen fibers.
- *The mechanical model:* Collagen fibers are disrupted, resulting in pain and dysfunction.
- *The biomechanical model:* Chemical irritation is the cause of pain due to local anoxia and the lack of phagocytic cells to remove noxious products of cellular activity.

Overuse injuries may be secondary to the activation of peritendinous nociceptors.<sup>2</sup> Chazan classifies Achilles tendon disorders as:<sup>3</sup>

- *Paratenonitis or paratendonitis:* Refers to paratendon pathology without tendon involvement.
- *Paratenonitis with tendinosis:* Refers to tissue degeneration and damage. This damage may include partial rupture.
- *Insertional tendonitis:* May begin as paratenonitis and progress to distal tendinosis.

The Achilles tendon runs from the top of the heel to the back of the calf. It is a strong, non-elastic, fibrous tissue that attaches the gastrocnemius muscle and the soleus muscle to the calcaneus.

Another commonly used term for the Achilles tendon is the *triceps surae*.<sup>4</sup>

The primary function of the Achilles tendon is to transmit the load of the triceps surae to the calcaneus. The soleus is the prime mover in plantar flexion of the ankle, assisted by the gastrocnemius, which also flexes the knee.

James, Bates and Osternig have documented that 11 percent of all running injuries can be attributed to Achilles damage. A typical runner who jogs one mile experiences 1,500 heel strikes. By placing such a high demand on the posterior musculature and Achilles tendon, overuse injuries

become commonplace.<sup>5</sup>

The etiology of Achilles tendinopathy remains unclear and a subject of debate. However, the astute clinician can - after a thorough history and physical examination - uncover the primary stimulus, resulting in the patient's diagnosis. The development of tendon pathology can be the result of both intrinsic and extrinsic factors. Causative intrinsic factors that predispose a person to developing Achilles tendon include:<sup>6</sup>

- insufficient triceps surae strength and inflexibility;
- functional overpronation, producing a whipping action on the Achilles tendon as the heel goes from varus on initial contact to valgus in midstance. Hyperpronation is mentioned in 56 percent of all cases;<sup>4</sup>
- tendon-shearing forces of the Achilles tendon due to twisting of the tendon on the calcaneus;
- disuse atrophy of the soleus;
- sudden eccentric loading associated with excessive force production;
- forefoot varum results in excessive pronation, allowing internal rotation of the tibia, forcing the Achilles medially;
- overuse injury with repeated forces (especially when associated with poor recovery time), causing tissue fatigue and resulting in microtearing;
- corticosteroid injections;
- systemic disease such as diabetes and arthritis;
- joint restrictions of the talocrural or subtalar joints;
- obesity;
- decreased shock absorption (running shoes decrease shock absorption at approximately 40 percent after about 300-400 miles);
- prolonged pronation during midstance, resulting in increased strain of the Achilles tendon; and
- rearfoot varus promotes excessive inversion of the calcaneus during initial contact. As a result, the subtalar joint overpronates faster than normal, which results in increased eccentric load on the Achilles tendon.

Extrinsic factors leading to tendon damage include:<sup>6</sup>

- training errors commonly considered a type of overtraining (i.e., too much too soon). The tissues do not have a chance to adapt to the increased demands and decreased recovery time;
- footwear that lacks support and poor shock absorption;
- running on hard, unyielding surfaces;
- trauma;
- number of years running;
- recent increase in training;
- hill training; and
- running on uneven surfaces.

### Evaluation and Clinical Findings

Review the patient history and discuss activity levels and changes in training schedules. Inspect footwear for uneven wear. Assess to differentially diagnose the presence of a heel spur, Achilles tear, fracture, plantar fasciitis, tarsal tunnel syndrome, compartment syndrome, seronegative spondyloarthropathies or lumbosacral radiculopathy.

Patient presentation includes increased retrocalcaneal pain, decreased range of motion, altered gait, and an impaired ability to perform activities of daily living and sports. Achilles tendinopathy is

frequently seen in active patient populations and athletes. High-profile sports include: running, ballet, basketball, racquet sports and other jumping sports.

### Physical Examination

The physical exam must include a postural examination, paying particular attention to pes planus and pes cavus, calcaneal alignment, hallux valgum or rigidus, leg-length discrepancy and pelvic rotation patterns. Next, test the muscle strength of the tibialis anterior and posterior, peroneus longus, brevis and tertius, and gastrocnemius and soleus. Then identify the tight ankle muscles and capsule that might restrict ankle motion. Also evaluate joint play of the talocrural, subtalar and tarsals. Functional testing of the lower extremity through biomechanical assessment of gait and running should be standard.

There are five grades of tendon injuries and tissue repair:<sup>4</sup>

Grade 1: There is no pain during regular activity, but pain in the Achilles tendon is felt about one to three hours after sports training has ended. Achilles tendon tenderness usually clears up within 24 hours with no intervention.

Grade 2: Slight pain is felt at the end of sports training, but it does not affect performance. Treatment will help to prevent a grade 3 injury.

Grade 3: The Achilles tendon feels painful when training begins and will interfere with the training session's duration. Treatment is necessary to prevent a grade 3 injury from turning into a grade 4 injury.

Grade 4: Achilles tendon pain restricts sports training and is noticeable during daily activities. The athlete can no longer train for sports. Low-impact training can be done to improve cardiovascular health, and aggressive musculoskeletal therapy can decrease the injury's severity. Activities such as swimming and biking can aid in restoring the tissues, helping the athlete to recover and return to pain-free training.

Grade 5: Achilles tendon pain will interfere with daily living and still be present during training activities. In this grade, the Achilles tendon becomes deformed and function of the triceps surae is lost. Surgery may be necessary, but additional therapy is required. A history and examination of the Achilles tendon will aid in finding the cause of injury. The therapeutic goals are to reduce swelling, as well as inflammation of the Achilles tendon and paratendon, to alleviate flare-ups, so the injured patient can resume their daily living routine.

Therapeutic intervention during the acute phase includes the following:

- protection of the damaged tissue by relative rest through unloading the tendon with a heel lift about 12-15 mm or taping the ankle into plantar flexion;
- patient education in activity modification by reducing pronation with custom-made orthotics, avoiding twisting motions and decreasing jumping activities to prevent re-injury;
- modalities to decrease inflammation; and
- soft-tissue mobilization.

Therapeutic intervention during the subacute phase of healing includes: joint mobilization, muscle strengthening and stretching, and proprioception training with a wobble or rocker board for functional mobility.

Digitally scan the patient for custom-made flexible orthotics and review the scanned image with the patient so they understand the need for orthotics and the benefits associated with wearing orthotics for this condition. This is a powerful opportunity to educate patients and increase compliance to care.

During the chronic phase of therapy:

- Continue with ice treatment to control pain and residual inflammation, joint mobilization, transverse-friction massage, muscle stretching in subtalar neutral-strengthening exercises for the gastrocnemius and soleus.
- Add a muscle-strengthening program utilizing eccentric-loading strategies and sport-specific activities.
- Slowly resume sport activities.

Once the training errors and biomechanical dysfunctions have been corrected, the athlete should be educated on proper shoe wear and orthotic use. Rehabilitation procedures should continue and include stretching and strengthening activities and icing after exercise.<sup>7</sup> Modified activity should be done until the athlete is pain-free and rehabilitated. Before returning to daily activities, the athlete should be placed in a running program. If pain is felt, the running program should be modified until the athlete can handle it. Athletes should run on soft, flat surfaces and must be careful when jumping. However, Achilles tendon stretching must be continued. Any athlete who has returned to activity should be monitored during activity.

### References

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