

Tendinopathy

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Achilles Tendinopathy – Anatomy & Pathology

Anatomy:

The Achilles tendon is the largest and strongest tendon in the body, and in adults is approximately 15cm in length. It is the conjoined tendon of the gastrocnemius and soleus muscles. It is wide and flat proximally, becomes rounded as it descends, and becomes flatter and wider again close to its insertion. In the transitional region from round to flat tendon, the collagen fibres twist 90°. Tendon fibres from gastrocnemius are situated more posteriorly and laterally, while those from soleus are relatively anterior and medial.

There is no synovial sheath surrounding the Achilles tendon. However it is contained within a ‘paratenon’, a single layer of fatty areolar tissue. This permits gliding of the tendon within its surrounding tissues, and provides a limited blood supply to the tendon. Blood vessels also enter at the musculotendinous junction, and the distal insertion. However the region of tendon 2 to 6cm proximal to the calcaneus is relatively avascular. This, and the change in orientation of tendon fibres, may be factors in the development of mid-substance tendinopathy (see below).

Achilles tendinopathy is most prevalent in middle aged and older individuals. It is associated with decreases in musculotendinous strength, endurance and plyometric ability. This is because the mechanical properties of the tendon are known to change with disease. Because the turnover rate of collagen decreases with increasing age, recovery in older athletes is likely to be slower.

Types of tendon pathology:

1. *Mid-substance tendinopathy.* 55 to 65% of cases of Achilles tendinopathy occur in the mid-portion. This is usually a persistent or chronic disorder associated with a degenerated tendon. It is considered to be non-inflammatory. There will be a palpable thickening 2-6cm above the heel, which moves with dorsi- and plantarflexion (unlike a paratenonitis – see below). On current understanding, the Achilles is the only region of the body where a true mid-substance tendinopathy occurs. The difference here is that there is no direct bony contact with the diseased area of tendon. While tendinopathy can occur in the mid region of other tendons, - such as supraspinatus, psoas major, tibialis anterior, and peroneus longus - compression between tendon and bone is an important causative factor in these examples.
2. *Insertional tendinopathy.* The pathology associated with insertional Achilles tendinopathy has been found to be similar to that of mid-substance tendinopathy. That is, the process is one of degeneration rather than inflammation. However insertional Achilles is often associated with retrocalcaneal bursitis



and sometimes with a Haglund's deformity (see below). It is also more common in sedentary and obese individuals, unlike mid-substance tendinopathy which is more common in recreational and elite sportspeople. The mechanism is thought to be compression of the undersurface of the tendon against the calcaneal tuberosity. For this reason, the condition is more likely to be aggravated by uphill running and other activities that cause repeated or sustained ankle dorsiflexion.

3. *Paratenonitis*. This can occur in conjunction with tendinopathy. The paratenon surrounding the Achilles can become inflamed. This will result in diffuse tenderness and swelling on both sides of the tendon. There may be associated nodularity and crepitus. This is particularly common in middle and long-distance runners. It often results in swelling between the paratenon and tendon, which can be visualized and palpated. The area of swelling and tenderness typically remains fixed with ankle plantar- and dorsiflexion. Paratenon pathology may co-exist with degenerative tendon disease.
4. *Retrocalcaneal bursitis*. The retrocalcaneal bursa is a horseshoe shaped bursa between the anterior Achilles and the posterior surface of the upper calcaneus. There will be pain and often swelling palpated anterior to the tendon. Like insertional Achilles tendinopathy, it will be exacerbated by activities that involve ankle dorsiflexion. The superficial bursa, which is posterior to the Achilles tendon, can occasionally become inflamed. However this is not as common as retrocalcaneal bursitis.



5. *Haglund's deformity*. This is an abnormal prominence of the posterosuperior aspect of the calcaneal tuberosity. This deformity increases the risk of insertional Achilles and retrocalcaneal pathology, due to mechanical irritation. There is also a possibility that chronic insertional tendinopathy or bursitis may in turn lead to the development of the Haglund's lump.



References:

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2. Heckman, D et al (2009). Tendon disorders of the foot and ankle, part 2: Achilles tendon disorders. AJSM, 37, 6, 1223-1234.
3. Jonsson, P et al (2008). New regime for eccentric calf muscle training in patients with chronic insertional Achilles tendinopathy: results of a pilot study. British Journal of Sports Medicine, 42, 746-749.

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