

Using Orthotics Made Easy: Achilles Tendonitis

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Inversion of the calcaneus at heel lift is assisted by the gastrocs and soleus muscle. When the foot accelerates into an excessively pronated position and the calcaneus is everted, increased medial tendo-achilles traction occurs and results in transverse shearing of the tendon and sheath resulting in inflammation and pain.



Figure 1: Testing for Achilles Tendonitis

Achilles Tendonitis is similar in biomechanical action to Plantar Fasciitis in that as the foot pronates, causing a tractional pull on the attachment and continued Subtalar Joint pronation for any length of time, it will continue the tearing of the sheath. Inflammation and swelling will occur as this continues to take place. This action of continual stretching and bending is likened to

constant bending of a piece of wire in which the wire heats up in the area of flexion and eventually dips/bends and snaps. The heat generated in the wire is similar to the inflammation that occurs in the Achilles in which inflammation is evidenced when constant stretching and strain occurs. If the patient pronates constantly the inflammation will be more prominent on the medial side and conversely, supination on the lateral side when the patient strikes with a high strike angle laterally and then proceeds to pronate through midstance, then to toe-off. Inflammation can occur on both sides due to this being the biomechanical pivot point.

The engineering graph below gives an insight into stress studies that have been conducted on building material, however, you will note I have taken this principle and applied it to 'body engineering'.

Looking at the graph we have stress and strain vs time. A-B is any material that returns to its shape over a period of time - in this case the stress and strain on the Achilles tendon is associated with abnormal foot function.

B-C is the yield point - the point at which the Achilles tendon is stretched so much that it is unable to return to its original shape. When this occurs inflammation occurs and pain is felt. At this point the patient seeks medical help, and often the symptom is treated - not the underlying biomechanical cause. Pain may subside or repetitive stretching of the Achilles tendon, will move the condition towards point D, i.e. continual flare up of the Achilles tendon occurs.

Point D is where complete rupture of the tendon occurs over a period of time, or a posterior calcaneal spur may develop.

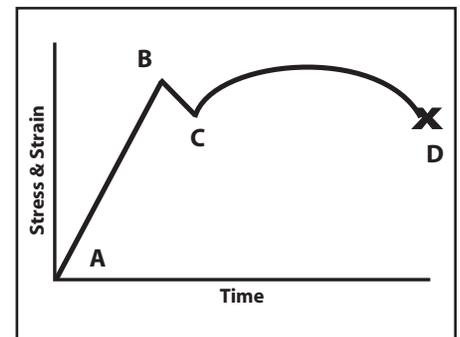


Figure 2: Stress & Strain vs Time.

A common example of this graph is a patient who may have been working at a desk job most of his life, and is then told by his GP to start walking as a means of maintaining cardiovascular health. Such changes to the patients' lifestyle may cause additional stress being placed on the biomechanical structure, causing aches and pains to occur in the ankle, knees, hips or even lower back pain. The additional stress on the body will most likely present as pain in an existing area of weakness, and be associated with biomechanical anomalies causing periods of pain and discomfort to occur.

Treatment

If the pain is on the medial side of the Achilles, it is associated with Subtalar Joint pronation - causing the medial Achilles tendon attachment to stretch and tear, and will need to be treated with an anti-pronation orthotic.

If the pain is on the lateral side it is associated with a high forefoot valgus or a high supination angle that causes

the lateral attachment to eventually tear and should be treated with a forefoot valgus addition.

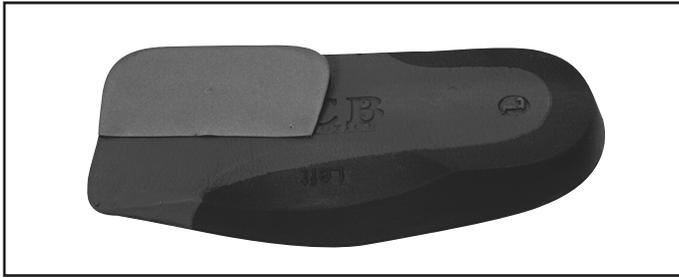


Figure 3: Adding a forefoot valgus addition.

If the pain is in the centre or both sides of the posterior heel it is associated with supination at heel strike to lateral leading to ground reaction force on the lateral side forcing the foot into pronation at the midstance to toe-off phase. The lateral to medial movement causes this to be the pivot point of traction of the Achilles tendon and will inflame or flare up the medial and lateral side of the tendon sheath and bursa. Treatment will require both anti-pronation and anti-supination orthotics to support the arch and address any valgus deformity.

Check for a structural leg length discrepancy, especially if it only affecting one foot - as the longer leg will pronate more to level the pelvis.

Repetitive stress and strain on the Achilles over a period of time may cause a posterior calcaneal spur to develop. This will be evident at the back of the heel at the attachment and

most likely starts as a Haglands deformity which is the scaring and adhesion after the tearing stage. A Posterior Calcaneal Spur can be operated on and removed without detaching the Achilles. The operation is much more successful than for an Inferior Calcaneal Spur.

Additional Treatment Option

- Mobilisations: especially to check if the calcaneus is displaced posteriorly, as this will exert additional tractional pressure on the Achilles.
- Short term use of a heel lift on both feet (in addition to an orthotic device) to shorten the gastroc and relieve pressure on the Achilles. Do NOT allow the patient to continue wearing the heel lift for more than 2 weeks as this should be enough time to allow the inflammation to subside.
- Acupuncture (or dry needling): at the point of pain to reduce to the swelling and inflammation.
- Anti-inflammatory Medication: only in the early stages of the condition.
- Cortisone: is initially effective, however it weakens the ligament structure and would only be used on one or two occasions. A more conservative approach will be far more beneficial to the patient.

REFERENCES:

BRUNKER, P., & KHAN, K. (1993) Clinical Sports Medicine, Sydney: McGraw-Hill Book Company