

Achilles tendinopathy and rupture

Synonym: Achilles tendinosis; Achilles tendinitis (no longer used)

What is an Achilles tendinopathy?^[1]

Achilles tendinopathy is a chronic overuse injury of the Achilles tendon. It can affect anyone but is most common in active people, especially those who participate in sports which involve running or jumping.^[2]

The Achilles tendon begins near the mid-calf and inserts into the posterior of the calcaneus, connecting the gastrocnemius and soleus muscles to the ankle. It is surrounded by a connective tissue sheath (paratenon, or 'paratendon'), rather than a true synovial sheath. The paratenon, which is very vascular and highly innervated, stretches with movement, allowing maximum gliding action. Near the insertion of the tendon are two bursae - the subcutaneous calcaneal and the sub-tendinous calcaneal bursae - as well as Kager's fat pad, all of which can be a source of [heel pain](#).

Achilles tendinopathy generally occurs in the mid-substance of the tendon (55-65%), less commonly at the insertion (20-25%). The cause is not fully understood but is essentially a maladaptive response to increased loading that leads to thickening and stiffness of the tendon and then to dysrepair and degenerative changes.

Epidemiology

- Achilles tendinopathy typically affects athletes; long-distance runners have a lifetime risk of 52%.
- Achilles tendinopathy has an annual incidence of 2.35 per 1,000 adults registered with a GP.^[3]

- Achilles tendinopathy has been thought to be more common in men than in women and it has been proposed that oestrogen protects tendons; however in a study of athletes aged over 40 there was no gender difference.^[4] Similarly there was no gender difference identified in a GP-based cohort study.^[3]

Risk factors

The Achilles tendon can experience forces of up to 12.5 times body weight during running.

Activities such as running, jumping, dancing and tennis, where the tendon is susceptible to chronic overloading, are the likeliest associations. The main risk factors are:

- Rapid increase in the amount of time spent on the activity.
- Change in footwear or training surface, such as going from running on a treadmill to running on the road.
- Poor running technique, such as excessive pronation of the foot or forefoot, which may contribute to Achilles tendinopathy
- Poorly fitting footwear. Particularly, compression from firm or high heel tab on shoes may precipitate problems.
- Family history (increases risk 5x).
- Hypertension.
- Diabetes.
- Familial hypercholesterolaemia may present with Achilles tendon pain.^[5]
- Insertional tendinopathy may be due to an enthesitis; ankylosing spondylitis, reactive arthritis and psoriatic arthritis should be considered.
- Quinolone antibiotics (eg, ciprofloxacin, ofloxacin) can cause inflammation of tendons and predispose them to rupture.

Achilles tendinopathy symptoms

- Gradual onset of pain and stiffness over the tendon, which may improve with heat or walking and worsen with strenuous activity.

- Tenderness of the tendon on palpation: mid-substance tendinopathy is tender between 2-6 cm above the calcaneal insertion and insertional tendinopathy is tender at the insertion. There may also be crepitus and swelling.
- Pain on active movement of the ankle joint.

NB: rupture of the tendon should always be excluded (always do Thompson's test - see under 'Examination', below).

Investigations

Ultrasound or MRI may be necessary if the diagnosis is unclear and to differentiate between Achilles tendinopathy and partial-thickness tears.

Treatment and management^[1] ^[6]

- Immediate relief of symptoms of acute Achilles tendinopathy includes rest, application of ice and analgesics, including non-steroidal anti-inflammatory drugs (NSAIDs), and heel lifts (orthotic devices - used on both sides to prevent a gait imbalance).
- Gentle stretching of the front and back of the lower leg.
- The patient will need to alter their activities, at least in the short term; they may benefit from advice from a physiotherapist.

- If there is no improvement after 7–10 days of rest and gentle stretching, eccentric heel-drop exercises, first described by Alfredson, are the best treatment for Achilles tendinopathy.^[7]
 - This involves pushing up on to the toes of both feet then lowering over the edge of a step on the affected foot.
 - There are two exercises, one is done with the knee straight and the second with the knee in flexion.
 - Alfredson's research dictated three sets of 15 repeats of both exercises twice a day. This may be difficult for people to adhere to but they need to do as close to this many as they can of both exercises, twice a day.
 - Eccentric loading may be painful.
 - These exercises should be done daily for three months, with increasing load, and may need to be continued for much longer.
 - There are many potential explanations as to why eccentric loading is effective, the likeliest being changes in neuromuscular control that reduce the tendon load.^[8]
- A Cochrane review of injection therapies concluded that there is insufficient evidence, possibly due to the poor quality of the available research, to support the routine use of injection therapies and that more research is needed in this area, particularly in the older non-athletic population.^[9] There is a risk of tendon atrophy and rupture with steroid injection.^{[10] [11]} In the UK the National Institute for Health and Care Excellence (NICE) does not approve steroid injections into or around the Achilles tendon.^[12]
- There is some evidence that combining eccentric loading with extracorporeal shock-wave therapy (ESWT) is an effective treatment in recalcitrant Achilles tendinopathy.^{[13] [14]}
- Autologous blood injection, using either whole blood or platelet-rich plasma, that contains growth factors, is safe but the efficacy is uncertain.^[15]
- NICE advises that ESWT and autologous blood injection should only be used with special arrangements for clinical governance, consent and audit but encourages further research into both approaches.^[16] ESWT can be painful.

- Topical glyceryl trinitrate used for six months may be effective but possibly no more so than a formal exercise programme.^[17] It is not licensed for this use in the UK.
- Casting is an option for resistant Achilles tendinopathy.
- Surgery is sometimes used for resistant Achilles tendinopathy but usually as a last resort. Open surgery involves excision of fibrous adhesions and degenerative nodules. Minimally invasive operative treatments include tendon stripping or percutaneous tenotomy.^[17]

Prognosis

Achilles tendinopathy recovery usually takes weeks to months. 85% of patients who have had achilles tendinopathy will have completely normal function with no symptoms eight years after their initial injury.^[1]

Achilles tendon rupture^[18]

Although the incidence of Achilles tendon injuries is increasing, the necessity for surgical intervention is decreasing due to improved conservative therapies, which may provide comparable outcomes without the implied surgical risk. If surgery is undertaken, no difference has been found between open and minimally invasive techniques.^[19]

Epidemiology^[1]

- Achilles tendon rupture can occur at any age but most often occurs in recreational athletes aged 30-50 years. It is commonly seen in football, running, basketball, diving, tennis and other sports that require a forceful push off with the foot.
- Incidence is 7 injuries per 100,000 of the general population increasing to 12 per 100,000 in competitive athletes.
- Other causes are:
 - Injury such as a fall, where there is forced dorsiflexion of the foot (producing a sudden stretch on the tendon).
 - Deep lacerations over the site of the tendon.

Risk factors

These include:

- Increasing age.
- Chronic/recurrent Achilles tendinopathy.
- Steroids:
 - Systemic corticosteroids (prolonged or high doses) or Cushing's syndrome.
 - Previous steroid injections into or around the Achilles tendon.
- Systemic conditions – eg, gout, rheumatoid arthritis, systemic lupus erythematosus.
- Quinolone antibiotics, which triple the risk.^[20] Risk is increased if there is concomitant steroid use.

Achilles tendon rupture symptoms^[21]

The diagnosis may not be obvious initially and can be missed. It is important to look actively for features of Achilles tendon rupture, to do Thompson's test (see under 'Examination', below) and to refer if Achilles tendon rupture is suspected.

History

- Acute onset of pain in the tendon, felt as a sudden, sharp pain initially, sometimes described as the feeling of being hit in the back of the leg. A 'snap' may be heard as the tendon ruptures. The pain then settles into a dull ache.
- There may also be a history of less intense pain for several days before rupture.
- Patients may notice an inability to stand on tiptoe and altered gait (inability to push off with the affected foot).

Examination

- Observe gait.
- There is usually localised swelling.

- There may be a palpable defect in the Achilles tendon (if rupture is complete rather than partial). However, the tendon defect may be masked by bruising.
- Active plantar flexion is weak or absent. (Some active flexion may be possible through the action of other muscles.)
- Thompson's test is performed with the patient lying prone with the knee passively flexed. Absence of normal plantar flexion on squeezing the calf muscle indicates a complete tendon rupture (compare with the other leg).

Differential diagnosis

- Achilles tendinopathy
- Retrocalcaneal bursitis
- Plantaris muscle injury
- Posterior ankle impingement
- Sural nerve entrapment
- Other [ankle injuries](#)
- Ankle [osteoarthritis](#)
- Ruptured [Baker's cyst](#)
- [Deep vein thrombosis](#)

Investigations

Ultrasound or MRI scan may help if the diagnosis is unclear (for example, to distinguish partial Achilles rupture from Achilles tendinopathy).

Complete Achilles tendon rupture is usually diagnosed clinically by GPs. The extent of clinical misdiagnosis is unknown, but may be high. This is important as delayed treatment has unfavourable consequences. One paper in the BJGP reported how GPs in Norway used pocket-sized ultrasound to confirm complete Achilles tendon rupture.^[22] GPs with no clinical ultrasound experience, recorded images with a pocket-sized ultrasound device under supervision to confirm a complete Achilles tendon rupture. This could present a new indication for GP ultrasound.

Achilles tendon rupture treatment and management

- Non-weight-bearing as soon as a rupture is suspected.
- Urgent referral to an orthopaedic specialist for assessment.
- Treatment options: [21]
 - Open surgical treatment of acute Achilles tendon ruptures significantly reduces the risk of re-rupture compared with non-surgical treatment but produces significantly higher risks of complications, such as wound infection. Percutaneous surgery may reduce the risk of wound infection. [23]
 - Surgery may be recommended for competitive athletes and others with a high level of physical activity; if there has been a delay in treatment or diagnosis; and for those with a recurrent rupture.
 - Conservative management is an option, especially for older or less athletic patients. This consists of rest, pain control, a walking boot from two weeks and weight bearing as tolerated from four to six weeks. Physiotherapy to guide controlled early motion is important. [1]
 - There are different approaches to rehabilitation. With both surgery and conservative treatment, a period of non-weight-bearing and a brace (orthosis) or plaster cast will be required. The use of a brace rather than a plaster cast may reduce complications. There is a trend towards earlier weight-bearing or early mobilisation using a removable orthosis, with some good results. [24]

The management of chronic ruptures is more difficult than that used for acute tears, because of the retraction of the tendon ends, and the gap making primary repair impossible. Wound complications and infections are frequent after open procedures. Minimally invasive treatments provide good functional results and lower complications rates. [25]

Editor's note

Dr Sarah Jarvis, 14th April 2022

Review of surgical vs non-surgical management of acute Achilles' tendon rupture ^[26]

A multicentre randomised controlled trial comparing non-operative treatment, open repair, and minimally invasive surgery in 554 adults with acute rupture of the Achilles tendon concluded the following 12 months after rupture:

The Achilles' tendon Total Rupture Score, looking at health status, changes from baseline in physical performance and patient-reported physical function, were similar between the groups.

There was a higher rate of tendon re-rupture in the non-operative group (6.2%) than in the open-repair or minimally invasive surgery group (0.6% in each).

The incidence of nerve injuries was 5.2% in the minimally invasive surgery group, 2.8% in the open-repair group and 0.6% in the non-operative group.

Complications

- Achilles tendon contracture and/or scarring may occur from excessive immobility.
- Re-rupture can occur. Traditionally, it was found that re-rupture rates were lower with surgery rather than conservative treatment. ^[23] ^[27]
- Deep vein thrombosis has a high incidence after Achilles tendon rupture.

Prognosis

- Achilles tendon injury has a good prognosis but the slight loss of function may be very significant for the competitive athlete.
- Midportion Achilles tendinopathy can cause long-term absence from sports participation, and shows high recurrence rates. ^[28]
- Surgical treatment of acute Achilles tendon ruptures significantly reduces the risk of re-rupture compared with non-operative treatment but has a higher risk of other complications, including wound infection. ^[29]

- Athletes may be unable to resume full activities for one year.

Further reading

- [Extracorporeal shockwave therapy for Achilles tendinopathy](#); NICE Interventional Procedure Guidance, December 2016

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