Achilles tendon rupture: still not fully understood

Achilles tendon pathology has presented dilemmas to patients, athletes and physicians as far back as ancient Greece. The medical literature on the subject is extensive, with many hotly contested debates over differing, often contradictory, aetiologies and treatments.

The Achilles tendon is constantly exposed to high structural and functional demands that involve long-term and repetitive loads of high magnitude. Thus it is extremely susceptible to acute and chronic injury which manifests itself through a spectrum of conditions. This issue of *Hospital Medicine* includes two sobering case reports of probable ciprofloxacin-mediated rupture (p. 308) and of bilateral spontaneous Achilles tendon rupture (p. 310) that highlight massive deficiencies in our understanding of the pathology of Achilles tendon failure.

AETIOLOGY

The aetiology of Achilles tendon rupture is usually an excessive loading of the tendon, most often during sporting activity. Rupture usually occurs in tandem with a weakening of the tendon as a result of pre-existing tendinopathy, which might not be symptomatic. Tendinopathy is recognized in most ruptures of the Achilles tendon, where histological examination of material adjacent to the rupture reveals inflammation and degeneration within the tendon. Similar but less severe changes can be seen on biopsy of the contralateral tendon (Cetti et al, 2003).

The epidemiological evidence suggests that age is also a risk factor for tendo Achilles rupture, which is probably related to focal hypovascularity (Kvist, 2004) in the 'watershed' area of the tendon. A unilateral rupture appears to predispose to contralateral injury (Aroen et al, 2004).

INCIDENCE

The incidence of Achilles tendon rupture is increasing; in one of the larger studies by Puddu et al (1976), a total of 292 Achilles tendon ruptures were reviewed; 59% of these occured during sports and the majority of ruptures were in the 41–50-year-old age group. The under-21-year-old age group accounted for less than 5% of ruptures.

Bilateral Achilles tendon ruptures are rare, accounting for only 1% of all Achilles tendon ruptures; these patients usually have one of the predisposing risk factors discussed below, although cases do occur with no discernable cause (Orava et al, 1996). Spontaneous rupture, involving a minimal load, tends only to occur in a tendon that is significantly compromised by these risk factors; corticosteroids have been associated with 90% of these cases (Orava et al, 1996).

Acute rupture of the Achilles tendon typically occurs with rapid eccentric loading with the foot and ankle in dorsiflexion and the knee in extension. The patient may feel a 'pop' or feel as though he/she has been struck from behind. In the short term the pain may not be dramatic but the patient is unable to continue athletic activity. A palpable gap in the tendon and weakness of plantar flexion are highly suspicious of significant rupture.

The Simmonds (or Thompson's) test is one of the best clinical tests to determine complete rupture of the Achilles. This is performed by squeezing the relaxed calf – lack of plantar flexion indicates tendon discontinuity. If there is any doubt ultrasound or magnetic resonance imaging can be used to differentiate between tendonitis and rupture. Treatment is generally surgical, although non-surgical management is possible in some patients.

PATHOLOGY

Disease of the Achilles tendon is probably a spectrum of manifestations on a continuum from peritendinitis to tendinosis to rupture. Puddu et al (1976) divided the pathology into three stages:

1. Peritendinitis
2. Peritendinitis with tendonitis
3. Tendinitis.

Peritendinitis is characterized by thickening and inflammation of the peritenon, fluid may accumulate adjacent to the tendon, and adhesions may develop, while the tendon itself appears normal.

Peritendinitis with tendonitis is characterized by macroscopic changes in the tendon which may include thickening colour changes and fibrillation. Microscopically, areas of focal degeneration with fragmentation of collagen fibres within the tendon, and occasionally cystic areas containing granulomatous or mucoid material, are observed, which are often quite avascular. Inflammatory changes in the peritenon are also seen. Tendinitis, where there are degenerative lesions within the tendon without peritendinitis, is often associated with partial or complete rupture of the tendon.

CAUSATIVE FACTORS

The aetiology of tendonitis may be secondary to intrinsic or extrinsic factors. Extrinsic factors which predispose to Achilles tendinopathy and rupture include: overuse syndromes, sudden increase in training intensity, poor footwear, drugs (e.g. corticosteroids, quinolones) and organ transplantation.

The drug-induced changes reported with quinolones (Van der Linden et al, 2001) and corticosteroids are thought, in part, to interfere with normal tendon repair and collagen synthesis, and involve release of matrix-degrading proteases and inhibition of fibroblast activity. Local ischaemic factors are also likely to contribute. The precise

mechanisms of these processes are still unclear but seem to be multifactorial. However, it is interesting that histological examination of tendon adjacent to the rupture following prolonged corticosteroid or quinolone administration show degenerative changes almost identical to Achilles tendon ruptures with no known risk factors (Movin et al, 1997).

Intrinsic causes predisposing to spontaneous tendo Achilles rupture include Cushing's disease, rheumatoid arthritis, systemic lupus erythematosus, diabetes mellitus, hyperparathyroidism and gout. Patients who have had a renal transplant appear to have an increased risk of tendon rupture compared to those with other organ transplants which indicates a possible metabolic aetiology. Vigilance should be maintained with patients who present with Achilles tendon pain and one or more of these risk factors, and patients using corticosteroid or quinolone medication should be carefully monitored. **HM**

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KEY POINTS

- Achilles tenson injuries are common and still sometimes difficult to manage.
- Intrinsic and extrinsic factors are clearly involved and need to be clarified further.
- All the aetological factors are not understood but drugs such as corticosteroids and some antibiotics such as ciprofloxacin may well play a role.
- The diagnosis of Achilles tendon rupture is a clinical one and both surgical and non-surgical treatment options are possible.