HISTORICAL NOTE

The early history of tendo Achillis and its rupture

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Tendo Achillis does not occur in the great apes, our immediate ancestors, but is a hallmark of bipedal man. Its presence may be related to the greater relative length of the tarsal bones in man. The name is derived from the description in the Iliad by the Greek poet, Homer, written between 750 and 650 B.C. Achilles was a magnificent warrior and, according to myth, was made invulnerable in infancy by his mother Thetis, who plunged him into the river Styx, one of the five rivers of the nether world. Since he was held by one heel this part was not bathed in the waters, and so remained unprotected. This heel was the site where Achilles was mortally wounded by a poisoned arrow launched from the bow of Paris during the Trojan war (Fig. 1) which was waged by a confederation of Greeks against the people of Troy to recover Helen, who had been abducted from her husband Menelaus, King of Sparta, by Paris.1

Kirkup2 pointed out that the confusion between Achilles’ heel and tendo Achillis probably dates from 1693 when the Flemish anatomist, Phillippe Verheyen (1648-1710), Professor of Anatomy and later of Surgery at the University of Louvain, Belgium, first coined the term ‘tendo Achillis’ in place of ‘tendo magnus’, used by Hippocrates, and ‘chorda Hippocratis’ of later authors.3 Today’s anatomists call it ‘tendo calcaneus’.

The first closed rupture was described by Ambroise Paré (1510-1590),4 as follows:

“...It oftimes is rent or torn by a small occasion without any sign of injury or solution of continuity on the outside as by a little jump, the slipping aside of the foot, the too nimble getting on horseback, or the slipping of the foot out of the stirrup in mounting into the saddle. When this chance happens, it will give a crack like a coachman’s whip; above the head where the tendon is broken the depressed cavity may be felt with your finger; there is great pain in the part and the party is unable to go. This mischance may be amended by long lying and resting in bed and repelling medicines applied to the part….neither must we promise to ourselves or to the patient certain or absolute health. But on the contrary at the beginning of the disease we must foretell that it will never be so cured, and that some relics may remain...” From his description it does not appear to have been a rare event, but the treatment was ineffective.

Paré5 also wrote that, “For the wounds of that large tendon which is composed in the leg by the concourse of three muscles, and goes to the heel, I have observed that when it has been cut by a Sword, that the wounds have been long and hard to cure, and besides, when at the last they have been healed, as soon as the patient got out of his bed and endeavoured to go, they have grown ill and broke open again...” It has remained a difficult wound to treat.

In 1736, Jean Louis Petit6 (1674-1750), the foremost surgeon in Paris during the half first of the 18th century, described three cases, one of which was bilateral. He gave a detailed history of this bilateral case. Cochois, a circus tumbler missed a table three and a half feet in height, producing gaps in the tendons of three fingers’ width. The patient was treated prone with the knees flexed and the feet plantar flexed during which time a series of bandages soaked in alcoholic spirit was applied. A slipper on the foot was attached to the upper bandage with pins to maintain plantar flexion. The patient was turned with a pillow under the knees. The bandages were removed and reapplied after eight and 15 days. Healing was advanced at 22 days and weight-bearing commenced ten days later. The use of crutches was not mentioned but a good result was claimed. There was also no note as to whether or not the patient returned to tumbling. Petit’s second patient was an overweight woman of 35 years who skidded on a plank, while boarding a boat. She was treated with a perfect result.

John Hunter7 (1728-1793) described “Broken Tendo-Achilles” as case number 355 in his notebooks as follows:


"On Thursday morning at four o’clock the 20th of February 1766, I broke my Tendo-Achilles. I was jumping and lighting upon my toes without allowing my heels to come to the ground, by which means I supported the whole weight of my Body, joined with the velocity of it in falling, upon the Gastro-cnenii and Solei muscles: these two joined was too much for the tendon, which gave way at once, by which my heel came to the ground. The snap (or report) made by breaking of the Tendon was heard all over the room. I stood still without being able to make another spring; and the sensation it gave me was as if something had struck the calf of my leg, and that the noise was the body that had struck me, falling on the floor and I looked down to see what it was, but saw nothing. I walked to a Chair, but could not throw myself forwards on the toes on that foot; the Calf of the leg was extremely painful, and was in the state of a Cramp. I endeavoured to take off the Cramp by bending the foot, but found that the motion had no effect upon the muscles of the Calf of the leg, and upon further examination I found that the Tendo-Achilles was broken.

I bound it up at first with the foot extended, and the knee a little bent; with the ends of the Tendon about half an inch distant (asunder). This bandage remained for five days, when I got Monro’s bandage. In shifting the bandage I had the opportunity of examining the parts but they were a good deal swelled, so that I could not now tell whether the ends of the tendon were closed together or not. I examined the parts every day, and when the swelling of the inflammation abated, which was in less than a fortnight, the parts were so smooth that I could not find any inequality: the only swelling that remained was of the oedematous kind, which only swelled at night and was down in the morning....

It continued much the same for about three weeks after the accident, when my Foot slipt upon a Wet floor, which made me pitch on the toe of that foot; which gave me great pain at the time, and which continued for a considerable time. Whether the parts were torn asunder or not I could not tell; the inflammation from this accident was more than the former; was now in a good deal of pain upon the least motion of the parts; and the swelling was more considerable than before.

In about a fortnight after this last accident, the parts became again more easy, and the swelling abated. I now began to walk again; for this purpose I got an old shoe.
raised in the heel about an inch, with a strap behind the buckle to a laced bandage round the Calf; but this was principally when I went to bed that I wore it; which was to avoid the consequence that might arise from any involuntary motions in those muscles in my sleep."

Hunter’s request that his injured tendo Achillis be preserved after his death was not obeyed, but it was confirmed at post-mortem that there was ossification at the site of the rupture. This accident led him to perform an experiment in 1767 in which he divided the tendon of several dogs using a couching needle, which is the type of needle used for dislocation of the lens in the treatment of cataracts, to stimulate a ruptured tendon. The dogs were killed at different periods to show the progress of the union. Subsequently, for almost two centuries the injury has been recorded by a number of authors, although usually in single instances.6

Monro’s bandage, mentioned by Hunter, was described by Alexander Monro (1697-1767), the first of a family which monopolised the Chair of Anatomy and Surgery in Edinburgh for three generations, in a book on his work published by his son in 1781.8 Monro described how he sustained a ruptured tendo Achillis and how he dealt with it. His bandage was carefully designed (Fig. 2). There was a strong quilted calf-piece with a slipper-like foot-piece which Monro applied having wrapped soft flannel “smoked with benzoin” around his foot and leg. There was a strap passing through a buckle from the heel to the calf which allowed adjustment of the degree of plantar flexion. He also devised a splint which he wore during the day for five months after using the bandage for six weeks. This splint combined with raised heels prevented dorsiflexion at the ankle. He wrote: “I think it is my duty for the benefit of future patients to make my method of management as public as I can”. He also mentioned that he knew of 16 people who had sustained a similar injury.

The first major series describing rupture of tendo Achillis was published by Qenu and Stoianovitch in 1929.9 They compared the results of operation in 29 patients with those obtained by conservative treatment in 39 patients. The operated group included two of their own patients, of whom one had repair after 48 hours and the other after five weeks. The former had a gap of 8 cm and the latter was seen to have a gap in the tendon of 2 cm. The ends of the tendon were freshened and linen sutures inserted. The authors’ patients were not allowed to bear weight for three weeks. Both had achieved excellent results at review but the authors were clearly in favour of open repair; first performed in 1888 by Polaillon.9 This was the start of a long controversy which still persists today. Harry Platt, who later became President of the Royal College of Surgeons of England and lived to 100 years of age, recorded 11 cases in 1931.10 For fresh ruptures he advocated a stout transfixion suture of kangaroo tendon inserted well above the line of the rupture to provide contact between the ends of the tendon. Additional security was provided by a number of catgut sutures of lesser calibre. Surgeons from the Massachusetts General Hospital reported a series of 31 cases treated between 1900 and 1954, and found that 25% sought treatment from two to 14 months after the injury.11 Arner and Lindholm12 noted that the total number of cases described up to 1958 was between 300 and 400. The numbers described are small in contrast to those of more recent series because of the greater awareness of the injury and more careful examination, particularly the use of Simmon’s squeeze test for diagnosis,13 in addition to more frequent occurrence. This increase has been recorded in the city of Oulu in Finland.14 Over a period of 16 years between 1979 and 1994, 110 ruptures occurred. Between 1979 and 1994 the incidence increased from two ruptures per 100,000 inhabitants between 1979 and 1986 to 12 per 100,000 between 1987 and 1994 with a mean of 7 per 100,000.13 Similarly, between 1950 and 1973, in Malmö, Sweden, 229 cases of rupture of tendo Achillis were diagnosed.14 During this period the incidence of rupture increased more than could be accounted for by changes in the population. The increase could only partly be explained by the increasing interest in sporting activities in the population at risk.15

Although the debate still continues on the lines of conservative and operative management, the trend towards surgical treatment predominates and, recently, has been followed by early supervised weight-bearing.16

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References