

Incidence of Achilles tendon rupture

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We determined the incidence of a total Achilles tendon rupture in the city of Oulu and changes over the 16-year period 1979–1994. During this time, 110 ruptures occurred. The incidence increased from 2 ruptures/10⁵ inhabitants in 1979–1986 to 12 in 1987–1994, with a mean of 7. The peak annual incidence, 18, was

recorded in 1994. The incidence was highest in the age group 30–39 years. Male dominance was 5.5:1, and 81% of the ruptures were related to sports, with 88% occurring in ball games. The mean age was significantly lower for the sports injuries.

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Little is known about the incidence of Achilles tendon ruptures and whether it has changed with time. Nillius et al. (1976) reported an increased incidence in Malmö during the period 1950–1973. The peak age-specific incidence was 9/10⁵ at age 40–50. In a study by Rantanen et al. (1993), the annual incidence was 2/10⁵ inhabitants in Salo District Hospital in Finland during the years 1980–1991. We determined the incidence of ruptures in the city of Oulu in Finland during the 16-year period 1979–1994.

Patients and methods

111 closed Achilles tendon ruptures in 110 residents of the city of Oulu were treated at 5 hospitals in Oulu or nearby during the period 1979 through 1994. There were 93 men (85%) and 17 women (15%), with a mean age of 40 (19–79) years. 62 of the patients (56%) had a left-sided rupture, 47 (43%) a right-sided one, and 1 patient had bilateral ruptures at an interval of 1 month (a 79-year-old man with polymyalgia receiving systemic corticosteroid therapy). 18% of the patients were competitive athletes, 70% recreational athletes, and 12% practiced no sport.

The cases were recorded according to the diagnosis number and there was no change in the methods of registration in that period that could account for the differences in incidence noted. The methods of treatment were also the same during that period. 107 ruptures were operated on. Epidemiologic data were collected from the clinical records and missing information was obtained directly from the patients. The population of Oulu increased from 94 × 10³ to 104 × 10³ during the period.

Statistics

The time series was smoothed by calculating a 3-year moving average for each year. Linear regression analysis was used to determine the correlation between the annual incidence values, and the level of significance of the regression analysis was also determined. The Student's two-tailed t-test was used to compare age distributions between the groups. P-values less than 0.05 were considered significant.

Results

Incidence

The average incidence of AT ruptures increased from 2/10⁵ inhabitants in 1979–1986 to 12 in 1987–1994, with a mean of 7. The peak annual incidence was 18 in 1994. The annual incidence after 1985 increased more in men than in women (Figure 1) and the rise was steeper in sports-related injuries than in nonsports-related ones (Figure 2). The age-specific annual rupture incidence increased during the 16-year period in the following age groups: 20–29 years (r 0.57, p 0.02), 30–39 years (r 0.74, p 0.001), 40–49 years (r 0.72, p 0.002) and 50–59 years (r 0.68, p 0.004). The peak incidence occurred in the age group 30–39 years, and the incidence curve was flatter in older age groups. A biphasic pattern became obvious when the age-specific incidences were divided into sports-related injuries and others (Figure 3), the patients in the nonsports-group being older (mean age 53 vs 38 years, p < 0.001).

Sports-related ruptures

90 of the ruptures (81%) were related to sports (Tables

Incidence/100.000

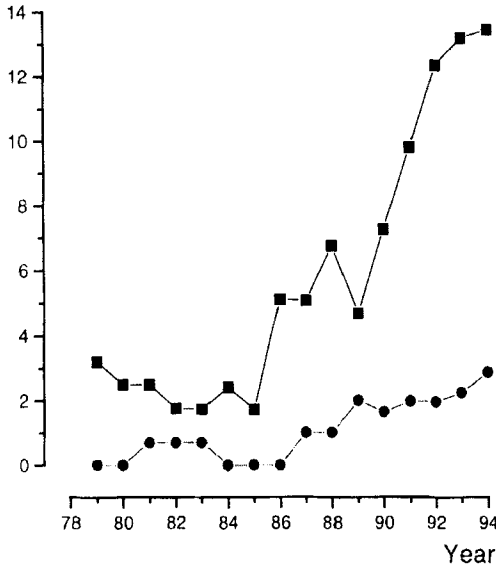


Figure 1. Annual incidence of Achilles tendon ruptures in men (■) and women (●). The time series was smoothed by calculating a 3-year moving average for each year.

Incidence/100.000

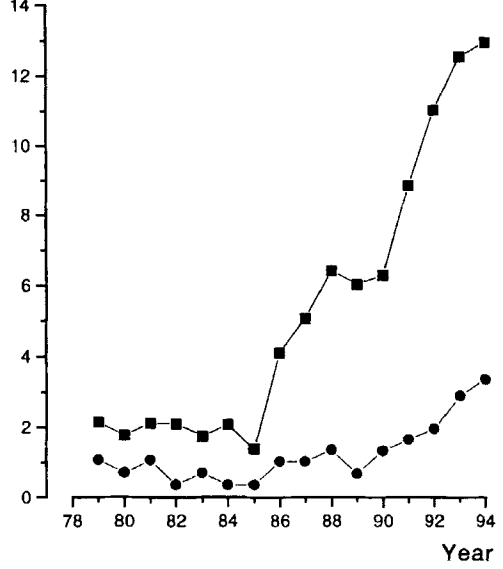


Figure 2. Annual incidence of sports-related (■) and nonsports-related (●) Achilles tendon ruptures. The time series was smoothed by calculating a 3-year moving average for each year.

Incidence/100.000

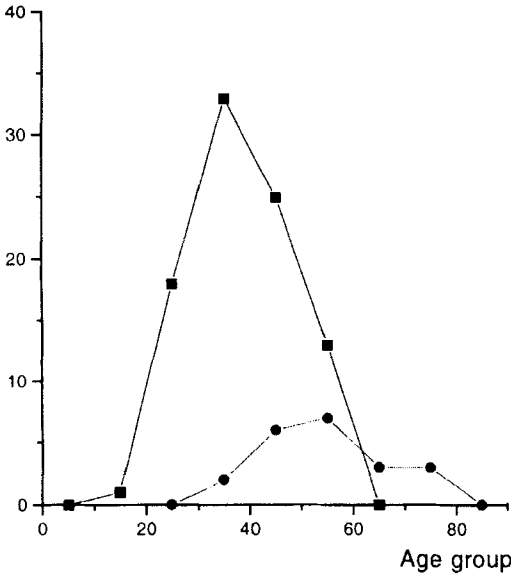


Figure 3. Age-specific incidence of sports-related (■) and nonsports-related (●) Achilles tendon ruptures during 1979-1994.

Table 1. Distribution of Achilles tendon ruptures by sport, other injuries and sex

	Men	Women	Total	Percent
Sport	78	12	90	81
Other	16	5	21	19
Total	94	17	111	100

Table 2. Distribution of Achilles tendon ruptures by sport and sex

Sport	Men	Women	Total	Percent
Volleyball	18	4	22	24
Badminton	19	1	20	22
Soccer	15	-	15	17
Tennis	7	1	8	9
Squash	4	2	6	7
Finnish baseball	4	1	5	6
Running	4	1	5	6
Gymnastics	2	1	3	3
Basketball	2	-	2	2
Slalom	1	-	1	1
Icehockey	1	-	1	1
Boxing	-	1	1	1
Indoor hockey	1	-	1	1
Total	78	12	90	100

1 and 2). 88% of the ruptures occurred in ball games, most often volleyball, badminton and soccer. Badminton has become popular in Oulu during the last few years. The players in badminton clubs numbered 40 in 1985, 150 in 1989, but in 1994 there were about 2,000 players. One third of the ruptures occurred in badminton in 1993. The mean age of the badminton injury patients was lower than that of the volleyball cases (35 vs 42 years, $p < 0.01$).

Nonsports-related ruptures

21 of the AT ruptures (19%) were nonsports-related cases. 13 ruptures occurred at home, 3 at work and 5 in traffic. The cause of the rupture was exertion in 2 of the cases, slipping in 11, blunt trauma in 3, falling in 3, and twisting in 1.

Discussion

Weiner and Lipscomb (1956) reported the Achilles tendon to be the third most frequent tendon ruptured after finger and knee extensors, whereas in a study by Jozsa et al. (1989) it was the most frequent one and accounted for 40% of all operated tendon ruptures.

Nillius et al. (1976) reported an increased incidence in Malmö during the period 1950-1973. The peak age-specific incidence was $9/10^5$ /year in the age-group 40-50 years. In our series, the main finding was an increase in the annual incidence, from 2 in 1979-1986 to 12 in 1987-1994, with a mean of 7.4 and a peak incidence of $18/10^5$ in 1994. The incidence increased from ages 10-19 up to 30-39, followed by a decrease to age 70-79. The rise was steeper among men and, in cases of sports-related injuries, than among women and in nonsports-related injuries.

We found that four fifths of the ruptures were related to sports activities which agrees with the findings by Schönbauer (1986). 88% of the injuries occurred in ball games requiring sudden acceleration or jumping. Although there are national differences in the frequencies of different sports, ball games account

for over 60% of the ruptures in many series (Nillius et al. 1976, Inglis and Sculco 1981, Jozsa et al. 1989, Leitner et al. 1991, Cetti et al. 1993). In our review of the literature football accounted for most of the AT ruptures in 13 of 40 articles and badminton in 12. Badminton has become popular in Oulu during the last few years.

Most ruptures occur in men, the ratio varying from 2:1 (Carden et al. 1987) to 12:1 (Puddu et al. 1976), we found 6:1. The left tendon was ruptured more often than the right one, as in other reports (Hatrup and Johnson 1985, Jozsa et al. 1989, Cetti et al. 1993).

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