Partial rupture in chronic achilles tendinopathy

A retrospective analysis of 342 cases

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342 achilles tendons in 298 patients were operated on for painful chronic achilles tendinopathy (81% men; mean age 35 (18–82) years; 79% athletes). A partial rupture was found in 23%, tendinosis (degeneration) in 49% and no macroscopic pathology in 28% of the tendons. In partial ruptures, as compared with non-ruptured tendons, the lesion was commoner in the distal part of the tendon and more frequent in physically active men slightly below middle age who had received local steroid injections before surgery. In a logistic regression analyzing age, gender, physical activity and preoperative steroid injections, only preoperative steroid injections and male gender predicted a partial rupture.

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Submitted 97-05-11. Accepted 98-04-16

Partial achilles rupture is commonly found in operations for chronically painful achilles tendons. Some authors regard the partial rupture as the commonest reason for chronic achilles pain (Ljungqvist 1967, Denstad and Roaas 1979, Skeoch 1981) whereas others do not report it at all (Snook 1972, Kvist and Kvist 1980).

It is reasonable to assume that a disruption of the tendon is a more advanced lesion with a worse prognosis and perhaps a greater need for surgical treatment. However, partial ruptures cannot be identified by symptoms and signs alone (Åström and Rausing 1995) or by imaging (Åström et al. 1996). This retrospective study aimed to describe the clinical characteristics of partial achilles ruptures to improve the diagnosis and find predictors for its occurrence.

Patients and methods

Patients

342 tendons in 298 consecutive patients (81% men; mean age 35 (18–82) years were operated on during the period 1972–1990 because of painful chronic achilles tendinopathy. 78% (232 patients) were athletes, most of them runners. 49% had manual work, 48% were office employees and 3% were retired. Physical activity was classified on a 5-point scale: 0 = none, 1 = leisure walks, office work (7%), 2 = recreational athlete, light manual work (32%), 3 = competitive athlete, moderately heavy manual work (37%), 4 = top-ranking athlete, heavy manual work (24%). The mean duration of symptoms at the time of surgery was 3 (0.2–30) years, 50% had suffered less than 1.5 years and 75% less than 3 years. All patients complained of one or more of the following local symptoms: tenderness, morning stiffness and pain on exertion. 30% of the lesions (102 tendons) were located at the distal insertion, 66% (225 tendons) in the middle of the tendon and 4% (15 tendons) in both the insertion and the tendon proper. In each case there was local tenderness around the achilles tendon and 73% (248 tendons) also had a tumor at the site of the painful lesion.

Surgery

Patients were eligible for surgery if they were unrelieved by— usually— a 6-month trial of closed measures such as a change in exercise, physical rehabilitation, nonsteroid anti-inflammatory drugs or local steroid injections.

The operation was performed under general anesthesia with a tourniquet and has remained unchanged during the study. The tendon was approached from a lateral incision and split longitudinally at the site of pain for closer inspection and in the hope of inducing a healing response. Gross changes, such as partial ruptures, were excised. In distal lesions, the posterosuperior corner of the calcaneal tuberosity was resected to decompress the tendon and permit inspection of the anterior portion, where most distal ruptures were located.

Surgical findings were classified according to the abnormalities encountered and described as 1) tendi-

Non-ruptured versus partially ruptured and non-injected versus steroid-injected tendons

	No rupture (n 264)	P-value	Partial rupture (n 78)	No injection (n 144)	P-value	Steroid injection (n 198)
Male gender	79%	0.003 [a]	94%	83%	0.6 [a]	81%
Age (years SD)	36 12	0.2 [b]	34 12	37 12	0.01 [b]	34 12
Duration (months)	34	0.7 [c]	29	37	0.8 [c]	30
Activity score ≥ 3	57%	0.005 [c]	73%	57%	0.2 [c]	63%
Athletics	76%	0.02 [a]	88%	76%	0.3 [a]	81%
Distal lesion	22%	0.001 [a]	56%	24%	0.07 [a]	34%
Partial rupture	–		–	16%	0.01 [a]	28%

[a] χ^2, [b] t-test, [c] Mann-Whitney test

nosis (degeneration), characterized by an area of greyish appearance and poorly defined fiber structure or 2) partial rupture, defined as a macroscopic, clearly discernible partial discontinuity. Partial ruptures are always surrounded by an area of tendinosis (Åström and Rausing 1995) but, since this study was focused on partial ruptures, they are presented as an independent lesion to avoid confusion.

Data analysis

All medical records were reviewed and a standardized set of data, including age, gender, physical activity, duration of symptoms, previous trauma, preoperative local corticosteroid injections at any time, and operative findings was collected for each patient. If the data on steroid injections were inconclusive, that case was considered as not having received steroid treatment.

The patients were classified according to 1) the presence of a partial rupture and 2) whether they had received preoperative steroid injections. The subgroups were compared separately with regard to age, gender, physical activity and clinical data. Continuous data were analyzed with the Student's t-test (age) or, if the distribution was skewed, by the Mann-Whitney test (duration of symptoms). Non-parametric data were analyzed by the χ^2 or Mann-Whitney tests. Age, gender, physical activity and preoperative steroid injections were analyzed by a logistic regression with respect to their ability to predict a partial rupture. A probability level < 0.05 was regarded as statistically significant.

Results

A partial rupture was found in 23% (78 cases), tendinosis in 49% (168 cases) and no apparent pathology in 28% of the tendons (96 cases). 58% of the painful tendons (198 cases) had been treated by one or several steroid injections before operation. A sudden onset was noted in 23% of the tendons (77 cases) of which 46 cases occurred in connection with strenuous activities and 31 in connection with a trauma such as an ankle sprain. 15 partial ruptures were diagnosed in the former group and 10 in the latter. A greater proportion of partially ruptured tendons was found in cases with an acute onset as compared with nonruptured tendons (25/78 vs. 52/264 tendons, χ^2: p = 0.02)

Partial ruptures, as compared with other painful tendon lesions, were commoner in the distal part of the tendon and more often seen in physically active men. Furthermore, partial ruptures were almost twice as common in steroid-injected tendons (Table). Patients who had received steroid injections had a lower mean age but were similar with regard to gender, physical activity, duration of symptoms and the location of the lesion to those who had not been treated with steroid injections (Table).

In the logistic regression, preoperative steroid injections and male gender were found to be independently predictive of a partial rupture (steroid injections: odds ratio 2.0, 95% CI 1.2–3.5; male gender: odds ratio 3.6, 95% CI 1.3–9.8), whereas age and physical activity were not.

Discussion

The size of the lesion in tendinosis is easily underestimated (Åström and Rausing 1995) and it may be difficult to identify. In our series (28% normal findings), some pathological cases were probably overlooked. If partial ruptures are strictly defined as a macroscopic discontinuity of the tendon fibers they are found in about 20% of all cases of chronically painful achilles tendons (Schepsis and Leach 1987, Nelen et al. 1989, Leppilahti et al. 1991).

In a recent survey of histopathology in chronic achilles tendinopathy, we found that partial ruptures were always surrounded by a non-inflammatory, degenerative lesion (tendinosis) (Åström and Rausing 1995), indicating that partial ruptures are not an inde-

pendent entity but a complication of tendinosis (Denstad and Roaas 1979, Skeoch 1981, Nelen et al. 1989, Leppilahti et al. 1991, Schepsis et al. 1994). Macroscopic partial ruptures probably develop from degenerative microruptures of the collagen fibers. Over-exertion could promote this process, but most of my patients had an insidious onset without a history of trauma or extreme temporary over-exertion.

Chronic achilles pain is mostly reported in athletes (Williams 1986, Kvist 1994). In my series, patients with a partial rupture were physically more active and more often had an acute onset due to trauma or over-exertion than those who did not have a rupture. Ageing of the tendon has been associated with decreasing vascularity (Niculescu and Matusz 1988, Klocke 1991), blood flow (Håstad et al. 1958, Åström and Westlin 1994) and tensile strength (Stucke 1950, Wilhelm 1972) as well as an increasing incidence of asymptomatic tendinosis (Jozsa et al. 1990, Kannus and Jozsa 1991) and more advanced histopathologic changes in symptomatic achilles lesions (Åström and Rausing 1995). It is interesting to note that patients with a partial rupture in the present series were 10 years younger but quite similar, with regard to gender and physical activity, to patients suffering a total achilles rupture (Möller et al. 1996). Even if overloading and aging of the tendon may promote tendon lesions neither physical activity nor age could independently predict a partial rupture.

The male dominance in most clinical reports on chronic achilles pain has been explained by the fact that men participate in sports more often than women, although some data also point to male gender as a specific factor (Kvist 1994). Male gender emerged as the strongest prediciton of partial ruptures in this study but the present data are insufficient to explain whether achilles tendon degeneration is directly related to male gender.

Some authors have observed more advanced tendinosis (Williams 1986, Nirschl 1989) and frequent partial ruptures (Williams 1986, Nelen et al. 1989) after steroid injections. In my study, steroid injections predicted a partial rupture which could be due to a synergistic effect between the degenerative lesion and the catabolic effect of steroids on collagen (Fadale and Wiggins 1994). However, patients with a preexisting partial rupture may have been selected for steroid treatment because of severe pain. Cortisone given for relief of pain, may allow premature loading of the tendon, causing partial or total ruptures (McWhorter et al. 1991, Read and Motto 1992, Fadale and Wiggins 1994). This hypothesis is offset by the poor clinical effect of steroid injections reported in randomized trials (Withrington et al. 1985, White et al. 1986, Petri et al. 1987, DaCruz et al. 1988). 50–75% of patients treated with surgery have received steroid injections (Ljungqvist 1967, Denstad and Roaas 1979, Kvist and Kvist 1980, Kvist 1991, Leppilahti et al. 1991). Chronic achilles pain is usually diagnosed as "tendinitis" or "paratenonitis" (Kvist 1994). Both suggest an inflammatory process which forms the rationale for using steroid injections. Paratenonitis has been shown (Kvist et al. 1985, 1987) but "tendinitis" is a misnomer for nonspecific pain over a tendon (Leadbetter 1992). In a recent study on histopathology (Åström and Rausing 1995), tendinosis proved to be the major lesion, whereas paratenonitis was hardly ever observed. As pointed out by Read and Motto (1992), steroids have no logical place in the treatment of a primarily degenerative disorder.

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