Achilles tendon rupture in badminton

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Summary

The typical badminton player with an Achilles tendon rupture is 36 years old and, despite limbering up, is injured at the rear line in a sudden forward movement. He resumes work within three months and has a slight lack of dorsiflexion in the ankle as the main complication. Most patients resume badminton within one year, but some finish their sports career, mainly due to fear of a new injury. The investigation discusses predisposing factors and prophylactic measures.

Keywords: Achilles tendon rupture, badminton, injury, preventive measures

Introduction

Badminton is a frequent cause of Achilles tendon rupture¹⁻⁵. We therefore investigated injury mechanisms, preventive measures, training and competition activity and work and sport absence caused by the injury. This has not previously been described.

Materials and methods

During the period January 1984 to June 1986 in the orthopaedic department, Aalborg Hospital, 39 patients with Achilles tendon rupture during badminton were treated. All the patients were operated on within 48 hours by simple 'end-to-end suture', in one case supplemented by plantaris tendon transposition. Post-operative treatment comprised an above knee plaster cast with the foot in equinus position. The cast was shortened to below knee after three weeks. Casts and sutures were removed after a total of six weeks. For a further three months a three centimetre heel lift was recommended. There was no formal rehabilitation programme.

Patients were re-examined after a period of from 11 to 39 months (mean 23 months). None had predisposing conditions such as diabetes mellitus or connective tissue disease. Eight patients had been experiencing pain in the Achilles tendon and one had received a steroid injection. The height and weight of the subjects were noted. Compared with a standard height/weight table⁶ ten subjects were between 10 and 20 per cent above the

ideal weight with none greater than 20 per cent overweight. Thirty-five were in full employment, three were students, and one was unemployed.

Results

The 39 patients comprised 40 per cent of all patients with Achilles tendon rupture in the above mentioned period (Table 1). The subjects were aged between 20 and 59 years (mean 36 years) and there were 35 men and 4 women (Figure 1). All the ruptures were caused by indirect trauma and all were complete ruptures.

Complications

Complications included one rerupture, two months after operation. Twelve players had 5–10° loss of dorsiflexion, five complained of exercise pain in the tendon region, three had pain from the heeltabs of their shoes, three had a slight lack of subtalar movement, and three had adherence from the scar. Two had suralis nerve damage. There were no healing problems or wound infections.

Table 1. Causes of Achilles tendon ruptures

	N	%
Badminton	39	40
Soccer	17	18
Handball	15	16
Volleyball	2	2
Gymnastics	2	2
Tennis	1	1
Other injuries	20	21
	96

Figure 1. Age of badminton players. □: men; ▨: women

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Figure 2. Total weekly exercise taken by badminton players
□: badminton; ▨: total hours

Table 2. Time of injury during the game

	N	%
At the start	4	10
In the middle	9	23
At the end	25	64
No information	1	3

Training activity and injury mechanisms

Figure 2 illustrates the playing activity in badminton in hours per week spent on badminton, and the activity of both badminton and other sports. Twenty (51 per cent) played badminton for less than two hours per week, and thirty-two (82 per cent) less than four hours. By adding other sports, only nine (23 per cent) were placed in the group with less than two hours per week. Eight patients were either beginners or had had a break of several years from badminton.

Limbering up procedures were carried out by twenty-five, and nine of these practiced stretching as well. Achilles tendon rupture occurred in the middle or at the end of the game in 87 per cent of the cases (Table 2). Of the four ruptures that occurred during the early phase of the game, two reported that they limbered up.

The crucial movement at the time of injury was registered. In 34 cases, the rupture happened during a sudden forward movement, 18 at the rearline and four during a sudden backward movement.

Absence from sport and work

Eighteen players (46 per cent) resumed sport in less than six months, thirty two (82 per cent) within one year; eleven had not regained their former badminton level, seven not returning to any sport, in six cases because of fear of a new injury.

Twenty persons (51 per cent) resumed their occupation within six weeks of the rupture i.e. while still wearing their cast, and thirty four (87 per cent) did so within three months. There were no occupational changes on account of the rupture.

Discussion

Badminton is our most frequent cause of Achilles tendon rupture (Table 1), as also showed in earlier studies¹⁻⁵. Soccer, the most popular sport in Denmark, caused only 18 per cent of the Achilles tendon ruptures.

The tension in the Achilles tendon is influenced by a number of factors. Weight is one of them^{7,8}. No patient weighed more than 20 per cent over 'ideal weight'⁶, and we therefore cannot attach importance to the weight as a predisposing factor in this investigation. The age of the patients was the same as in other studies⁹⁻¹². It is stated that Achilles tendon ruptures affects the untrained person^{8,13,14}. If the training activity is measured in hours per week, one may consider the persons in our study as active, 72 per cent playing sport for two hours or more per week.

It is further maintained that rupture happens in persons who do not limber up^{2,15,16}. Most of our subjects did limber up. As this procedure may be considered as an injury prevention measure only at the beginning of the game, it might be important in two cases. We therefore cannot show that lack of limbering up is the cause of Achilles tendon rupture.

In 87 per cent of our cases the ruptures happened at the end (25) or middle (9) of the game. The injury therefore happens when the player is tired. Tiredness can lead to poor muscle co-ordination and on account of the many accelerations and decelerations in badminton, the possibility of increased tension in the Achilles tendon may arise because of non-linear traction^{1,3,7,8,13-15}. This is supported by the fact that the rupture in 87 per cent of the cases happened in a sudden forward movement, 18 of these near the rear line. Four ruptures were caused by a sudden backward movement, where rotation of the leg and non-linear traction in the tendon may occur. In all of these sudden movements there is a possibility of eccentric contraction and further increase in tendon tension.

Absence from sport was quite long and only eighteen (46 per cent) resumed sport within six months of the injury, while thirty-two (82 per cent) waited for a year before they resumed activities. Absence from work was much shorter; twenty patients (51 per cent) returned to work within six weeks, and thirty-four (87 per cent) within three months. Eleven patients did not reach their former level of performance, seven not participating in sports at all, six of these due to fear of new injury. Achilles tendon rupture causes a relatively short break from work, but a slow recovery for sport and a number end their sports career because of it.

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