

Evaluation of performance following Achilles tendon surgery in competitive runners

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“ 12 elite runners with chronic disability from Achilles tendinitis were studied to evaluate their performance before and after Achilles tendon surgery. Times achieved by each runner both prior to surgery and following postoperative recovery were analysed. 67% of the runners were able to improve upon their pre-surgical performances. The authors conclude that runners may return to elite level in racing following Achilles tendon surgery and have a high likelihood of improving their personal best performances. ”

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1 Introduction

Competitive runners are at constant risk from injuries to the lower extremities. Injury to the Achilles tendon can produce chronic pain and disability and often lead to an early retirement from top-level competition. Elite runners particularly seem to be at great risk as tremendous force is delivered through the Achilles tendon during the extensive training that is required at international level. Total distance covered in aerobic training plus high-intensity repetitions in anaerobic preparation creates an accumulated impact which may outstrip the adaptive capacity of the musculotendon unit (James, 1978).

Injury to the Achilles tendon is a common problem. Brubaker (1974) found 12% of track injuries involved the Achilles tendon. According to James, injuries involving the Achilles tendon were the third most common running injury; Clement (1981) found injury to the Achilles to be the second most common leg injury in runners. The frequency of Achilles problems ranges from 6-18% of all overuse injuries amongst runners (Clement, 1981; Krissoff, 1979). The trend towards a lower injury frequency may be related to increased awareness of gastrocnemius and soleus flexibility, and improved technology in the development of footwear.

Conservative intervention with physiotherapy, oral anti-inflammatories, orthotic devices and control of training loads is usually successful in Achilles tendon injury but a significant number of runners revert to a chronic course and are unable to train or compete at an elite level. Surgery to the tendon involves slitting the sheath-like paratendon (tenolysis) and can also involve the

removal of the lubricating sac between the tendon and the underlying heel bone (bursectomy) or removal of a bony projection from the calcaneus (osteotomy).

The purpose of this study was to evaluate the post-surgical competitive performances of athletes who had suffered from chronic Achilles tendon injury in order to determine their ability to return to high-level training and racing.

2 Methods

The records of the Allan McGavin Sports Medicine Center were surveyed to obtain information on elite runners who had undergone Achilles tendon surgery between 1982 and 1990. All athletes were active at a national or international level and registered with Athletics Canada, the governing body affiliated to the IAAF. All were disabled with chronic Achilles tendon injury, unable to train or compete despite extensive conservative treatment. 12 athletes were identified in this manner, and all underwent surgery at the University Hospital at the University of British Columbia. The surgical procedures included a tenolysis (T) or a tenolysis with bursectomy and/or osteotomy (TBO). The statistical publications of Athletics Canada were used to obtain each athlete's best performance up to the time of surgery and during the period following rehabilitation after surgery. The athletes who produced personal bests following surgery in the major event were classified as improved (I), and the runners who did not reach a new personal best were classified as not improved (NI).

3 Individual case reports

3.1 Case 1

A 24-year-old sprinter who competed in the 100, 200 and 400 metres had been limited by posterior heel pain for five years prior to surgery. She underwent bilateral Achilles tenolysis and was able to return to full training in 16 weeks. In her best event, the 100 metres, she was able to sprint within 13/100ths of a second of her best pre-surgery performance.

3.2 Case 2

A 19-year-old female hurdler and multi-event athlete who competed internationally had tenolysis on her right Achilles tendon as well as a bursectomy. She was able to return to full training within 26 weeks. However, she was never able to return to her pre-surgery level of performance and retired soon afterwards.

3.3 Case 3

A 28-year-old international 800 metres runner underwent tenolysis, bursectomy and osteotomy on the left heel. A second surgery was necessary 18 months later to remove a post-traumatic neuroma and the pain which it was causing. This athlete was able to improve his pre-surgery performance substantially.

3.4 Case 4

A 22-year-old national team member in the 800 metres had three operations, two on the left leg and one on the right leg, between 1983 and 1988. This large runner (185 cm and 81 kg) returned to full training 26 weeks later and was able to improve his 800 metres time by over one second.

3.5 Case 5

A 22-year-old female middle-distance runner competing primarily in the 1500 and 3000 metres had pre-operative symptoms for only nine months. After bilateral tenolysis she was able to compete for the national team and improve her pre-surgery times in both of her events.

3.6 Case 6

A 29-year-old female middle-distance runner who competed internationally in both the 1500 and 3000 metres underwent tenolysis of her left Achilles tendon. She returned to training 16 weeks after surgery and during the competitive season cut her 1500 metres time down by 1.5 seconds.

3.7 Case 7

A 27-year-old female international middle-distance runner had a five-year history of right heel pain before a tenolysis was performed. She later had a second surgery on her left Achilles tendon. This athlete

achieved an improvement of 40 seconds in her best 3000 metres time following surgery.

3.8 Case 8

A 22-year-old male middle-distance runner had surgery on his left heel in 1982. He had three further operations (two on his right leg and one bilateral) between 1984 and 1989. After each surgery he was able to return to full training within 24 weeks. In his primary event, the 5000 metres, he improved his pre-surgery performance by over 23 seconds.

3.9 Case 9

A 26-year-old male middle-distance runner, troubled for 2.5 years by right posterior heel pain, underwent tenolysis, bursectomy and osteotomy. He was able to return to training 23.5 weeks later and to improve his pre-surgery performance in the 5000 metres.

3.10 Case 10

A 28-year-old long-distance runner had a tenolysis, bursectomy and osteotomy on his right heel. He returned to full training 33 weeks after surgery but was not able to attain his past level of performance.

3.11 Case 11

A 29-year-old long-distance runner had heel disability for five years. He underwent a

tenolysis, bursectomy and osteotomy on his left heel and was training fully 26 weeks later. He was not able to improve his pre-surgery performance.

3.12 Case 12

A 28-year-old male international marathon runner underwent tenolysis, bursectomy and osteotomy and resumed full training 26 weeks later. He improved his best performance in the Marathon by 3.5 minutes.

4 Results

The 12 elite runners consisted of two sprinter/hurdles; seven middle-distance runners; and three long-distance runners. There were five females and seven males. The average age was 25.6 years. Ten of these runners had competed internationally. The average follow-up time was 69 months.

Eight of these runners improved their pre-surgery performances. Table 1 shows the percentage change in performance for each athlete. Five of the athletes underwent T only, while the remaining seven had TBO. Four of the five who had T only improved, while as a result of the combined procedure four of the seven improved.

Table 1: Summary of each case study

Case	Sex	Age	Surgery	Pre-Surgery Performance	Post-Surgery Performance	%	Change
Sprints/Hurdles							
1	F	24.8	T	12.06(100m)	12.19(100m)	-1.1	(NI)
2	F	19.9	TBO	14.34(100mH)	15.54(100mH)	-8.4	(NI)
Middle Distances							
800m							
3	M	28.5	TBO	1:48.13(800m)	1:46.88(800m)	+1.2	(I)
4	M	22.6	T	1:48.20(800m)	1:46.87(800m)	+1.2	(I)
1500m/3000m							
5	F	22.7	T	4:16.20(1500m)	4:12.53(1500m)	+1.4	(I)
6	F	29.4	T	4:13.40(1500m)	4:11.80(1500m)	+0.6	(I)
7	F	23.0	T	9:34.99(3000m)	8:55.45(3000m)	+6.9	(I)
5000m							
8	M	22.9	TBO	13:59.46	13:34.45	+3.0	(I)
9	M	26.9	TBO	13:59.60	13:58.00	+0.1	(I)
Distances							
10	M	28.8	TBO	29:05.81(10,000m)	30:15.57(10,000m)	-4.0	(NI)
11	M	29.7	TBO	2:14.28(Marathon)	2:17.11(Marathon)	-2.0	(NI)
12	M	28.1	TBO	2:14.00(Marathon)	2:10.20(Marathon)	+2.7	(I)

In the case of the athletes who did not improve, their pre-operative symptoms had lasted for an average of 3.9 years, more than twice the duration of the symptoms of those who did (1.7 years). The average number of weeks to return to full training is shown in Table 2. Five runners had bilateral surgery on the Achilles tendon. Four of the twelve required more than one operation. All of this group ultimately improved their performances.

5 Discussion

Most often posterior heel pain can be alleviated through conservative measures (Clement, 1984). Surgery is usually elected if conservative methods fail to control the symptoms associated with Achilles tendon problems (Taunton, 1985). Successful treatment, whether conservative or surgical, is crucial for elite runners. The treatment must allow the athletes to return to or improve upon their pre-injury level of performance. A high percentage of the elite runners studied in this report were able to improve upon their pre-Achilles tendon surgery performance. This included all seven of the middle-distance runners. The remaining athletes who failed to improve differed somewhat amongst themselves. Case 1, now 27 years old, is still sprinting competitively with times very near her pre-operation times. Case 2 was unable to return to the same level of activity and was forced to retire from competitive athletics. Cases 10 and 11 involved older (now both 35) long-distance runners who may have been approaching the end of the peak of their competitive careers.

11 of the 12 athletes were able to return to close to the same level of performance following surgery. This supports the findings

of Schepsis (1987), who obtained an 87% success rate following surgery. However, our current study is the only one to use an objective measure of performance times in sanctioned competitions to analyse post-surgery results.

80% of the athletes who had tenolysis only were able to improve upon their pre-surgery performances, while only 57% of those who had undergone the combined procedure were able to improve. This differs from Schepsis' results; he found a similar success rate for both procedures.

The pre-operative symptom period of 1.7 years in the improved group is similar to that in the work of Nelen, who found the average to be 1.5 years. That a failure to improve performance post-operatively is associated with a prolonged pre-operative symptom period was found both in this study and in earlier work by Taunton (1985 - 3.9 years versus 3.1 years). This suggests that it is important to seek effective treatment surgically if conservative approaches do not succeed in the first year. A similar conclusion was drawn in other studies by Smart (1980).

Athletes who ultimately improved returned to full training 2.6 weeks earlier than those who did not (22.9 versus 23.5 weeks). This exceeds the reported recovery period reported by Taunton of 16 weeks. Taunton suggested that operations involving bone resection *delay recovery compared to surgery where only tenolysis is performed*. This was shown in this study as recovery after tenolysis was 20 weeks but when combined with bursectomy and osteotomy was delayed to 26.4 weeks.

Kvist and Kvist (1990) reported a second surgical procedure in over three quarters of their series, while in our study only one third

Table 2: Average number of weeks to return to full training

	Athletes (I)	Athletes (NI)	Overall
Surgery T	21.0	16.0	20.0
Surgery TBO	24.9	28.3	26.4
Overall	22.9	25.5	23.7

of the athletes required repeat surgery and every one of them ultimately improved their performances. Nelen reported over one half of his series to have either repeat or bilateral surgery, while in our series five out of 12 subjects fell into that category and four of them had improved post-operative performance. These data indicate that multiple surgeries or bilateral surgery did not prevent these runners from returning to an elite level.

6 Conclusion

Injuries to the Achilles tendon are common and a serious problem for the elite runner. Surgery is usually selected if conservative treatment fails. Surgery is an effective treatment for elite runners who wish to return to top-level competition. This is evidenced by the fact that a majority of elite runners studied were able to improve upon their pre-surgery performances.

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