Surgery for Chronic Achilles Tendinopathy

Review of 91 Procedures over 10 Years

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The authors reviewed 91 surgical procedures in 87 patients with chronic Achilles tendinopathy. There were 62 males and 25 females (mean age, 44.9 years). The average interval between surgery and review for the group was 4.2 years (range, 1 to 10 years). Twenty patients underwent peritenolysis, with a mean return-to-activity time of 7.7 weeks. Four patients with concomitant bony procedures had significantly longer return-to-activity times than 16 patients who underwent peritenolysis only. The mean return-to-activity time was 13.2 weeks in 15 patients who had Achilles debridement for mucoid degeneration, 14.4 weeks in 32 Achilles tendocalcinosis repair patients, 18.6 weeks in 24 patients who had retrocalcaneal exostectomy procedures, and 34.0 weeks in 5 patients who had chronic Achilles rupture repair. Athletic patients (n = 47) had significantly shorter return-to-activity times than active (n = 38) and sedentary (n = 6) patients. Males returned to activity faster than females. Runners returned to activity faster than other patients. (J Am Podiatr Med Assoc 93(4): 283-291, 2003)

Achilles tendinopathy, which accounts for 11% to 20% of all injuries in athletes,[1] is attributed to the increase in stiffness and the decrease in elasticity of the Achilles tendon with aging.[2] Because of these factors, the Achilles tendon does not withstand the strain associated with increased stress. It has been shown that the number of Achilles ruptures has increased since the 1950s, perhaps because of the increasing popularity of sporting activities since the late 1960s.[3]

The success of conservative treatment for Achilles tendinopathy has been shown to be variable. Angermann and Hovgaard[4] state that the success rate of conservative treatment for chronic Achilles tendinopathy is approximately 65%, whereas the success rate of Johnston et al[5] was approximately 51%. It is widely believed that conservative treatment should be administered for 3 to 6 months before it is considered a failure.[4] Many researchers agree that after this time surgical treatment can be recommended.[5-10]

The present study focuses on return-to-activity (RTA) times for different types of patients who underwent Achilles tendon surgery. The authors sought to determine which differences account for decreased or increased RTA times across varying parameters such as activity level, sex, procedure, and body mass index (calculated as the weight in kilograms divided by the square of the height in meters). In a previous study,[11] patients with a body mass index of less than 25 had low levels of obesity-related health problems and good quality of life. The purpose of this study was to determine the overall success rate of surgery for chronic Achilles tendon conditions. The authors do not intend to imply that the procedures described here are the only ones available to surgeons who treat these types of conditions. It is proposed that RTA times be documented and rating scales be used so that other studies can be contrasted and validated similarly.

Paratendinosis is defined as chronic inflammation

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of the Achilles paratenon as described by Puddu et al.[12] Tendinosis is chronic inflammation within the Achilles tendon, which may coexist with paratendinosis and feature intratendinous degeneration.[6, 7, 12] Haglund's deformity was originally described as prominence of the posterior superolateral aspect of the calcaneus.[13] However, in the present study, patients who had prominence in the superior retrocalcaneal region that was resected were diagnosed as having retrocalcaneal exostoses.[6, 9, 12] Patients with calcified Achilles tendons were included in the Achilles tendocalcinosis group. Other studies[6, 7, 9] may describe these patients as having retrocalcaneal exostoses. The authors felt it was important to have precise definitions so that outcomes can be compared uniformly.

Materials and Methods

Eighty-seven patients who underwent surgery performed by the senior author (A.S.) for chronic Achilles tendinopathy and who were treated between January 1, 1990, and May 31, 1999, were included in the study. All patients had obtained no relief from conservative care, which included combinations of rest, physical therapy (massage, ultrasound, iontophoresis, and eccentric strengthening), heel lifts, anti-inflammatory drug therapy, foot orthoses, and, in some cases, immobilization. All patients were evaluated 6 months after surgery. Most patients were seen more than 1 year postoperatively as well. Verification of the patient's results and activity level was done at the time of the study by telephone interview.

The duration of preoperative symptoms ranged from 1 to 13 years in 79 of the patients. An exact mean was not calculated because many patients could not accurately report this value. The remaining eight patients had symptoms for less than 1 year—five patients with chronic rupture (four of whom previously received treatment elsewhere) and three elite athletes. The patients with chronic rupture had sustained their injury an average of 7.0 months before surgery. One patient had a Z-lengthening procedure, and two others were treated with a nonweightbearing below-the-knee cast.

The following information was collected during the postoperative period: age, sex, operative side, procedure, radiologic information, activity level (ie, athletic, active, or sedentary), and RTA time. Return to activity was defined as resumption of the patient's usual activity level, as described by the senior author in a previous study[14]; for example, a runner's RTA was when he or she took a first run (usually a 15-min jog). Patients were categorized as "athletic" if their sporting activity was competitive or at a very high level, according to the definition of Saxena.[14] Patients involved in sports but not necessarily on a routine basis or at a competitive level were termed "active." "Sedentary" patients had activity levels that did not extend beyond minimal daily functions.

Foot type was not recorded, as the senior author and others[6, 10, 13, 15-17] have found Achilles pathology to be unrelated to whether the foot is hyperpronated or cavoid. Other data recorded retrospectively included body mass index and complications such as infection, symptomatic suture knots, recurrence, and continued symptoms.

Fifty-two patients underwent magnetic resonance imaging (MRI) before surgery. Most of these patients underwent soft-tissue procedures. Ten patients who underwent tendon debridement or tenodesis-type procedures had steroid injections previously. Two patients were administered retrocalcaneal bursal injections and also had a period of immobilization.

Use of a rating instrument to assess results was desired. Other authors have used different rating scales not unique to Achilles pathology. Review of the literature revealed that studies on Achilles tendon surgery seldom use the same scale. One scale specific to Achilles tendon surgery on athletes and postoperative activity level was developed by a group of European authors.[18-20] This scale is an outcomes rating system for Achilles tendinopathy surgery. This group found the scale to be reproducible when evaluating athletes and their ability to return to sports.[19, 20] The authors chose to use the same scale here to enable comparison of the present study's results with the European results.[18-20] The scale of Testa et al[18] consists of the following four outcome levels: 1) excellent: pain completely relieved, with full return to previous sporting level without significant symptoms; 2) good: full return to sports with intermittent or mild discomfort; 3) fair: discomfort that did not allow full return to the pre-injury sporting level, resulting in cessation of competitive sports; 4) poor: patients stopped playing sports and had daily symptoms.

Surgical Techniques

Peritenolysis

The criterion for undergoing peritenolysis was failure of conservative care for paratendinosis for 3 months or more. A linear incision is made paratendinously on the side of greatest pathology, as judged on the preoperative MR image. The thickened paratenon in the watershed region is excised dorsally, medially, and laterally. The tendon is inspected for

any palpable fibrosis and defects. Variations of this procedure have been described previously.[6-8, 10, 15, 16, 21] The anterior vascular bed adjacent to the Achilles tendon in this region is left intact. Usually, the surgeon can see a thickening of the paratenon as a bandlike structure that courses from the medial and lateral retinacular structures (Fig. 1). This structure is excised. Any remaining paratenon is not reapproximated. Subcutaneous tissue is reapproximated with 3-0 monofilament absorbable sutures, and skin is closed with 3-0 polypropylene sutures subcuticularly. Patients are kept nonweightbearing in a posterior splint for 1.5 weeks, have the skin suture removed at 2 weeks, and then begin physical therapy.

Debridement

Patients who exhibited symptoms of tendinosis with intratendinous mucoid degeneration for more than 6 months underwent debridement. As in peritenolysis, the incision is made on the side of greatest pathology. The tendon itself is incised on the basis of the MRI findings for mucoid degeneration, and this abnormal tissue is excised. The excised defect is repaired with buried knot absorbable 2-0 sutures. The watershed region is then reinforced with No. 1 or No. 2 braided polyester sutures, similar to an Achilles tendon rupture repair. The plantaris tendon is expanded and placed over the Achilles tendon to reinforce the region. Closure is similar to that described for peritenolysis. Postoperatively, the patient is placed in a nonweightbearing cast for 2 to 3 weeks with the foot in an equinus position. The patient has the skin suture removed and then is placed in a removable below-the-knee cast boot with a 1/2-inch heel lift for the next 3 to 5 weeks. The boot may be used for an additional 2 to 4 weeks with a 1/4-inch heel lift for walking. Physical therapy is then initiated, and a 1/4-inch heel lift is used for 3 to 6 months.

Retrocalcaneal Exostectomy

Patients with retrocalcaneal pain without calcification of the Achilles tendon unresponsive to conservative care for 6 months or more underwent retrocalcaneal exostectomy. Preoperative radiographs and symptoms determine incision placement. If the patient's symptoms are purely lateral, then a lateral approach is used.[9] If the patient's symptoms are retrocalcaneal, then a curvilinear incision is created from superomedial to inferolateral, avoiding extension into the plantar heel fat pad (Fig. 2).[15] These incisions can be extended superiorly if peritenolysis or debridement needs to be performed concomitantly. The Achilles tendon can be linearly incised with a direct midline incision to gain access to the superior calcaneus and bursa, which can then be excised using osteotomes and a reciprocating rasp. Generally, one absorbable soft-tissue anchor (Panalok; Mitek Surgical Products, Westwood, Massachusetts) is placed at the junction of the middle and superior third, with one to three nonabsorbable anchors placed inferiorly (Fig. 3).[22] If only the lateral portion of the calcaneus is involved, then generally only one anchor is used laterally. Bone wax may be placed over the resected bone

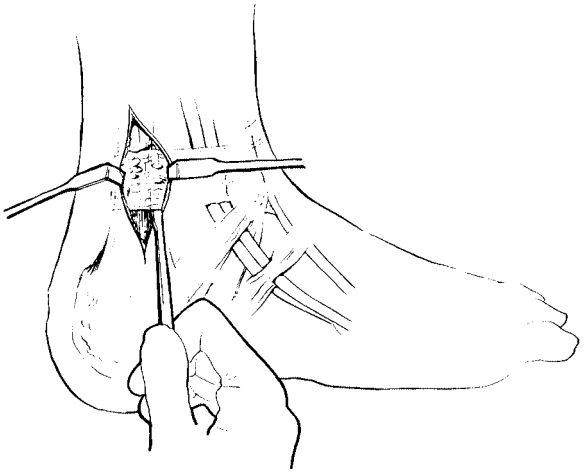

Figure 1. Thickening of the paratenon (watershed band).

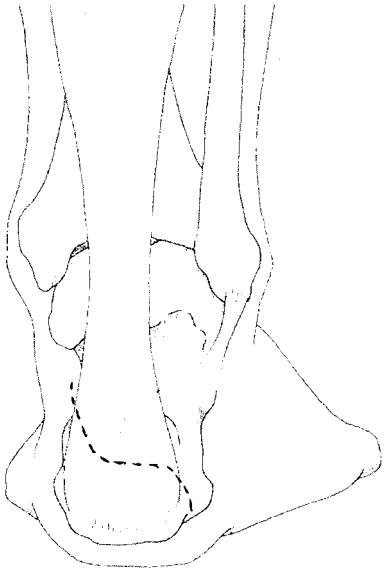

Figure 2. Skin incision for adequate heel exposure for retrocalcaneal and insertional tendocalcinosis procedures.

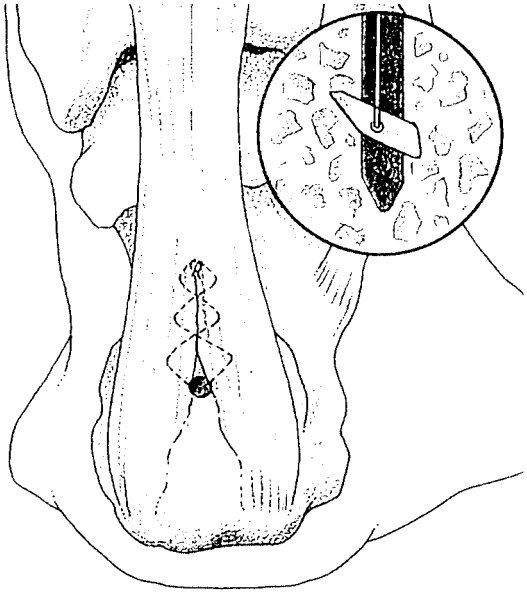

Figure 3. Absorbable anchor placement for Achilles tenodesis after retrocalcaneal exostectomy and tendocalcinosis excision.

in regions where tenodesis is not being attempted to help decrease ectopic bone formation (provided that the patient is not allergic to bee stings). Alternatively, gel foam may be used. The tendon is repaired using No. 2 braided polyester sutures, with the remainder of the closure performed as before. Patients are kept nonweightbearing for 2 to 4 weeks in a below-the-knee cast or boot, and they maintain weightbearing in the boot for an additional 4 to 6 weeks with a 1/4-inch heel lift. Physical therapy is then initiated.

Achilles Tendocalcinosis Repair

Patients with actual calcification within the Achilles tendon whose symptoms persisted despite 6 months or more of conservative treatment underwent repair of the Achilles insertion after excision of the tendocalcinosis. As with retrocalcaneal exostectomy, preoperative examination is important in determining incision placement. A 0° axial heel view can help reveal where the calcification lies on the posterior heel. After the skin incision is completed, a linear incision is made through the tendon over the calcified tendon, dissecting out the diseased portion.[15] The superior calcaneus is inspected for any prominence, as often there is a cartilaginous ridge that needs to be remodeled using a reciprocating rasp. Bone wax is then applied. It was noted early on with the first several patients that despite excision of the tendocalcinosis, many of these patients still had symptoms of retrocalcaneal bursitis. Therefore, the retrocalcaneal region was removed.

Tendon repair and tenodesis is performed similarly to that for retrocalcaneal exostectomy using one to four Mitek suture anchors (Fig. 4). Postoperative care is similar to that described for retrocalcaneal exostectomy; however, the patient may be maintained nonweightbearing for up to 6 weeks and in a below-the-knee cast or boot for 12 weeks or more for ambulation with a 1/4-inch heel lift. Physical therapy is initiated at 10 to 12 weeks.

Chronic Rupture Repair

For patients with a history of previous Achilles tendon rupture and the inability to perform unilateral toe raises, preoperative MRI is performed to determine the degree of separation and degeneration of the Achilles tendon. A linear incision is made just medial to the Achilles tendon, avoiding the neural structures. The mucoid degeneration is excised. If the gap between the ends of the Achilles tendon is 2 cm or less, the tendon has a standard Achilles repair with No. 1 or No. 2 braided polyester sutures, with reinforcement using the plantaris tendon and turn-down flaps as described by Lindholm.[23] If a larger gap exists, a portion of the flexor hallucis longus tendon is harvested and mobilized to reconstruct the anterior portion of the Achilles tendon, and the deep fascia

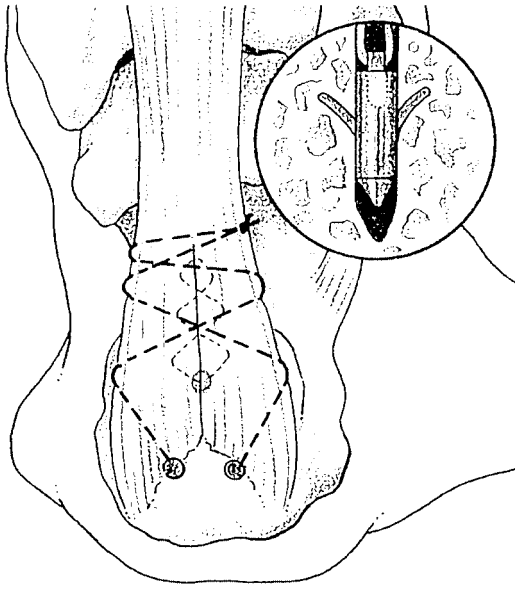

Figure 4. Tendon repair after additional metallic anchor placement.

laterally is used to re-create the lateral portion of the tendon.[24] The plantaris tendon is used to reconstruct the medial tendon. If the distal stump of the Achilles insertion is tenuous, then a Mitek Super Anchor is used to aid in tenodesis. Patients are kept nonweightbearing for 4 to 6 weeks in an equinus position with a below-the-knee cast or boot. The boot is used for another 8 to 12 weeks for ambulation, and then physical therapy is begun (Table 1).

Results

A total of 87 patients underwent 91 surgeries. There were 62 males and 25 females. There were 52 right-limb and 39 left-limb procedures. The mean ± SD age of the group was 44.9 ± 14.3 years (range, 16 to 75 years). Minimum follow-up time was 1 year. Eighty-three patients had their results and activity levels verified at the time of the study. Postoperative evaluation was at a mean ± SD of 4.2 ± 2.2 years (range, 12 to 120 months).

The mean ± SD RTA time of the group was 13.4 ± 7.3 weeks. Twenty patients underwent peritenolysis (four patients with concurrent bony procedures) and had a mean ± SD RTA time of 7.7 ± 6.6 weeks (range, 3 to 24 weeks). Those with soft-tissue removal only (n = 16) had a mean ± SD RTA time of 4.7 ± 1.4 weeks, as compared with 19.5 ± 5.6 weeks for those who had bone removal ($P < .0001$).

Table 1. Postoperative Protocols

1. Nonweightbearing posterior splint immediately after surgery. Patients advised to ice proximal to the splint behind the knee or in front of the shin and to lie in the prone position.
2. Continue posterior splint for 1.5 weeks for peritenolysis; otherwise, a nonweightbearing below-the-knee cast with slight equinus is applied for 2 to 3 weeks for all other procedures. Patients then transition to a removable below-the-knee cast or boot with a 1/4- to 1/2-inch heel lift.
3. Nonweightbearing course may be 3 to 6 weeks depending on the extent of the repair.
4. Active range of motion permitted after cast removal at 4 to 5 weeks.
5. Removable cast or boot maintained for ambulation for 6 to 10 weeks for retrocalcaneal exostectomy and debridement and 10 to 16 weeks for tendocalcinosis repair.
6. Formal physical therapy starts at 2 weeks for peritenolysis, 6 to 8 weeks for retrocalcaneal exostectomy and debridement, and 10 to 12 weeks for tendocalcinosis repair.
7. Heel lift maintained (except for peritenolysis) for 3 to 6 months.

Source: Adapted with permission from Saxena.[14]

Fifteen patients underwent Achilles tendon debridement; their mean ± SD RTA time was 13.2 ± 5.3 weeks (range, 6 to 26 weeks). The 32 patients who underwent tendocalcinosis repair had a mean ± SD RTA time of 14.4 ± 4.6 weeks (range, 8 to 26 weeks). The 24 patients who underwent retrocalcaneal exostectomy procedures had a mean ± SD RTA time of 18.6 ± 11.3 weeks (range, 8 to 26 weeks). The five patients who underwent repair of chronic Achilles ruptures had a mean RTA time of 34.0 ± 16.6 weeks (range, 20 to 52 weeks). Some patients underwent more than one procedure at the same time, eg, peritenolysis and retrocalcaneal exostectomy.

There were statistically significant differences in RTA time using the *t*-test when comparing patients who underwent two of the procedures—peritenolysis (faster) and chronic rupture repair (slower)—with the entire group ($P = .02$ and .05, respectively). Also, patients involved in running sports, such as track and marathoning (37 patients), had a mean ± SD RTA time of 10.6 ± 6.3 weeks, which was significantly faster than the group as a whole ($P = .004$). The mean ± SD age of the runners was 36.4 ± 12.4 years. There was a significant difference between the ages of runners and the group as a whole ($P = .002$). The runners ran, on average, more than 40 miles per week.

The patients were categorized as follows: 47 athletes, 38 active patients, and 6 sedentary individuals. The mean ± SD RTA time for the athletic group was 12.0 ± 8.5 weeks and for the active group was 14.5 ± 4.9 weeks ($P = .09$ by two-sided *t*-test). The mean ±SD RTA time of the sedentary group was 29.3 ± 18.0 weeks. No statistical comparison was performed for the sedentary group because of its small size (n = 6) and the fact that four patients had chronic ruptures, which overall had the slowest RTA time.

The mean ± SD RTA time for males was 12.2 ± 5.8 weeks and for females was 18.6 ± 12.9 weeks. There was a significant difference in RTA times between males and females using a two-sided *t*-test ($P = .002$).

Body mass index did not seem to be a factor in RTA time. Seven patients with a body mass index greater than 25 took longer than the group average to return to activity, while six patients with a body mass index greater than 25 had RTA times shorter than the group average.

There were seven recurrences, four of which required additional surgery. Five of these patients had excision of tendocalcinosis and displayed symptoms of retrocalcaneal bursitis that did not respond to the usual treatment. Two of these patients underwent additional surgery successfully, and another is slated for surgery. Two of these patients had developed ec-

topic bone. In addition, two other patients who also had retrocalcaneal bursitis were initially operated on elsewhere for calcific tendinitis. Patients who had previous steroid injections were found to have tendon degeneration at the site of the injection or frank rupture. Another recurrence occurred in a patient with bilateral peritenolysis who redeveloped paratendinosis on one side. A second procedure yielded a good result. The fourth patient who had additional surgery had undergone tendon debridement, but he had restless leg syndrome and a significant suture reaction that did not resolve with local wound care and antibiosis. The patient had scar revision surgery twice and took 26 weeks to return to activity.

Three other patients had superficial wound infections that required antibiotic drug therapy. One patient with a body mass index of 40 and rheumatoid arthritis sustained a partial rupture of her Achilles tendon 1 month after tendocalcinosis repair when weightbearing was initiated. She was maintained in a below-the-knee boot until 5 months after surgery. Three patients had irritation from the soft-tissue anchors' sutures (No. 2 braided polyester). These knots were removed in the physician's office under local anesthesia.

Using the rating system of Testa et al,[18] there were 63 excellent results, 20 good results, 6 fair results, and 2 poor results. This yielded a 91% good or excellent rate. This scale was modified for the sedentary patients because they were not engaged in sports, substituting "daily activities" for "sports." Calculating the recurrences as failures, the overall success rate was 92%.

Discussion

This series of Achilles tendon patients yields several interesting findings. Males healed significantly faster than females. Heavier patients did not necessarily have longer RTA times than those with a body mass index less than 25.

Runners, and athletes as a group, returned to their desired activity level significantly faster than others. This may be because of their higher motivation level and possibly their willingness to use rehabilitation more often. It may be argued that RTA time may not be a good parameter compared with full return to sports or competition. However, the latter two items have high variability.[14] For example, one elite track athlete had peritenolysis in the middle of the season and returned to competition in 7 weeks. Another elite marathoner underwent an identical procedure but waited 21 months to engage in competition, although he had fully recovered within 6 months.

This study is perhaps the first to document that athletes as a group heal faster than active patients and sedentary individuals with chronic Achilles tendon pathology. The authors are unsure why females took longer to return to activity than males. Perhaps this finding will stimulate further study. The overall success rate of greater than 90%, with an average follow-up time of more than 4 years, confirms that in the appropriately selected individual surgery for chronic Achilles tendinopathy is worthwhile.

The results of this study compare favorably with those of the 1994 study by Schepsis et al.[6] That study was the largest in North American literature and included patients with paratendinosis, tendinosis, Haglund's deformity, and insertional calcinosis of the Achilles tendon. The authors studied 79 cases in 66 patients who underwent surgery over a 13-year period. Their study included 49 males and 17 females with an average age of 33 years. Many of their patients were athletically active. Their study yielded 51% excellent results, 28% good results, 17% fair results, and 4% poor results. The best results were in the paratendinosis group, and the worst results were in the tendinosis group (success rate of 87% *versus* 67%, with success defined as a "good" or "excellent" result). There was a 16% recurrence rate in cases with more than 5 years of follow-up. Soft-tissue anchors were not used in their retrocalcaneal procedures. This may have contributed to their lower success rate in this region and may have been due to fear of disruption of the Achilles insertion.

The same lead authors (Schepsis and Leach) published other studies on Achilles tendon surgery. In their initial study[7] in 1987, they reported successful results in treated runners. In a separate study[16] in 1992, they concluded that the short-term success rate was 85% in runners. The present study showed a slightly higher success rate using similar techniques and postoperative care. An interesting finding by Schepsis et al[6] in their 1994 work was that before the advent of MRI, they used to debulk the Achilles tendon, and the results often were not as favorable as for peritenolysis. With MRI, they found it unnecessary to debulk the Achilles tendon in cases of chronic tendinitis if there was no intratendinous mucoid degeneration. This improved their results and is the basis for the present authors' surgical plan: the Achilles tendon is not incised or excised if there is no intratendinous degeneration.

Other European groups advocate peritenolysis for chronic paratendinosis. Kvist and Kvist[21] had favorable results in 201 procedures using a similar surgical technique as in the present study. They used a lateral incision, incising what they termed the crural fascia, trimming away the adhesions. They differed in that

they only reapproximated the skin and did not use any immobilization. Their patients, mostly athletes, returned to activity in 3 to 4 weeks.

Nelen et al[8] reviewed 93 cases of peritenolysis (of 170 cases of chronic Achilles tendinitis surgery), yielding 54 excellent results, 28 good results, 8 fair results, and 3 poor results. This group also performed similar debridement techniques for tendinosis, yielding 27 excellent results and 13 good results in 50 procedures. Jones[10] also describes excellent results with peritenolysis.

The senior author believes that the use of MRI preoperatively, in particular to ascertain a "halo sign," is helpful in diagnosing paratendinosis and in justifying peritenolysis (Fig. 5).[9, 18] Occasionally, an accessory or "low-lying" soleus will cause similar symptoms, and this can be visualized on MRI (Fig. 6).[25] One can also verify intratendinous lesions and decide on treatment accordingly (Fig. 7).[19, 25]

Injections for chronic Achilles tendon pathology remain controversial and should be studied further. Brisement or volume adhesiotomy injections have been noted to provide relief for paratendinosis, especially with local anesthetic.[5, 10] Some authors, however, state that they prefer to avoid steroid injections, especially for retrocalcaneal bursitis.[10] This is the senior author's preference as well. The recommendation of following a phosphate injection with a period of immobilization, particularly in an active or athletic patient, should not be taken lightly (Fig. 8).[10]

Besides the work of Schepsis and Leach, others[6, 9, 13, 26-32] state that the results of retrocalcaneal surgery have been variable in series of 18 to 35 cases. Nesse and Finsen[13] reported good results in 20 heels, satisfactory results in 10, and poor results in 5. They found that continued heel pain was not dependent on the amount of heel bone resected. Many authors[9, 10, 13, 15] relate their frustration with the fact that surgery in this region may take a year to eliminate symptoms. Perhaps even more frustrating is that the nomenclature for the pathology in the retrocalcaneal region overlaps Achilles tendocalcinosis, with retrocal-

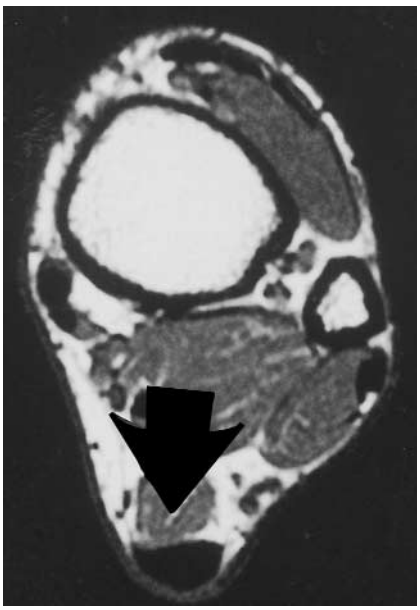

Figure 6. T1-weighted magnetic resonance image of a patient with accessory soleus muscle (arrow).

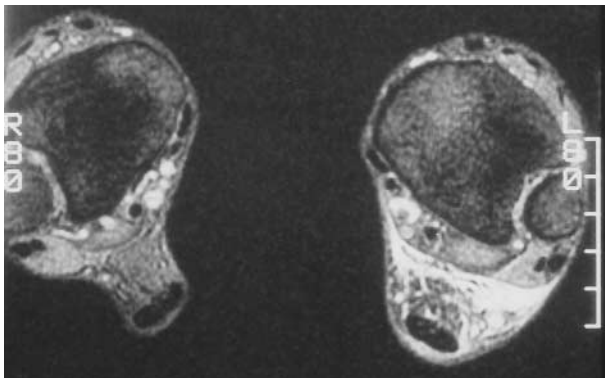

Figure 5. "Halo sign" with T2-weighted axial image revealing fulminant paratendinosis.

Figure 7. Intratendinous mucoid degeneration within the Achilles tendon.

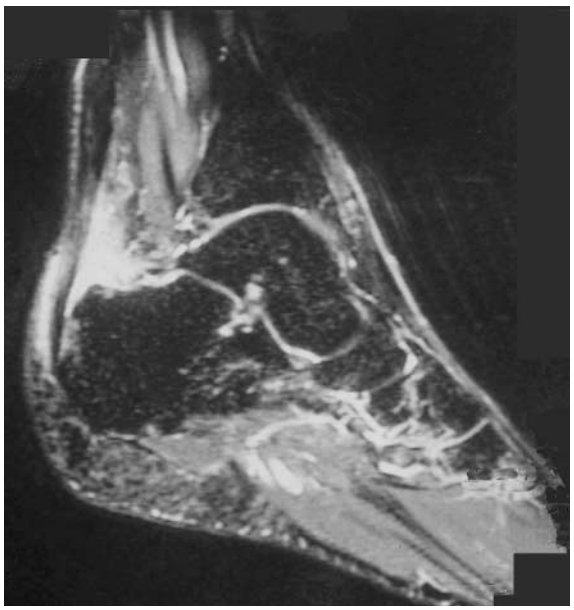

Figure 8. Patient who previously received steroid injections displays partial avulsion/rupture at and near the Achilles insertion.

caneal exostosis (Haglund's deformity) confounding the surgeon's ability to properly evaluate the outcomes.[6, 7, 9, 10, 13, 31, 32]

There is scant literature documenting the results of surgery for Achilles tendocalcinosis and subsequent activity levels. The use of soft-tissue anchors has been advocated for tenodesis procedures, and the authors believe that these anchors help decrease morbidity.[9, 15] Cadaveric studies[33] show that one can adequately resect bone from up to 50% of the Achilles insertion without violating it. The 0° calcaneal (Weil) axial view helps to accurately depict the location of calcification and prominence in the transverse plane.[34]

Symptomatic ectopic bone formation is an issue to be studied in further detail, as it was the cause of recurrence in four patients in the present study. Perhaps trials with and without indomethacin use postoperatively can be conducted similar to previous studies on hip replacement. Two separate studies[35, 36] revealed that use of 75 mg of indomethacin daily for 2 weeks significantly reduced ectopic bone formation. Future studies with radiographic evaluation and longer follow-up would be particularly helpful (Figs. 9 and 10).

Transferring the flexor hallucis longus tendon, which was popularized by Hansen,[24] can be used to repair chronic Achilles tendon ruptures.[37] The actual activity levels of patients before and after surgery have not been fully documented. Larger series are needed to determine the functionality of this procedure. Perhaps MRI could reveal whether revascularization really does occur. It is postulated that if adjacent musculature such as accessory soleus can cause paratendinosis, some patients with persistent Achilles tendon symptoms after flexor hallucis longus transfer may also be developing this condition iatrogenically.

Figure 9. Lateral radiograph obtained immediately after Achilles tendocalcinosis repair.

Figure 10. Lateral radiograph obtained 1 year after surgery on the patient shown in Figure 9. Note that ectopic bone formed elsewhere.

Future studies should include preoperative and postoperative long-term follow-up radiographs, particularly for bony procedures, and possibly MR images for soft-tissue Achilles tendon surgeries. Researchers are encouraged to use the same nomenclature and rating scale in future studies. Correlation of foot types with outcomes may be of benefit as well.

Conclusion

The results of this study show that surgery for chronic Achilles tendinopathy is successful in relieving symptoms. Using the described techniques, there were minimal complications and few recurrences. Males returned to activity faster than females. Athletes returned to activity faster than active and sedentary patients. The authors propose that future studies with longer follow-up and use of the same scale be conducted, particularly for athletes.

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