ABSTRACT

Purpose. To report the one-year outcome of 44 patients treated with a novel technique of calcaneoplasty and reattachment of the Achilles tendon.

Methods. 15 men and 29 women (mean age, 53 years) with insertional tendinopathy of the Achilles tendon underwent calcaneoplasty, retrocalcaneal bursa excision, debridement and reattachment of the Achilles tendon with suture anchors via a lateral approach. Outcome was measured using the visual analogue score (VAS) for pain, the SF-36 health survey, the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot scores. Patient expectation and satisfaction were also assessed.

Results. Of the 44 patients, 37, 43, and 21 were followed up at 3, 6, and 12 months. The mean VAS for pain and AOFAS ankle-hindfoot score improved significantly up to 6 months. The mean SF-36 score improved significantly up to 6 months for physical functioning, role functioning (physical), and bodily pain. Patient expectation and satisfaction also improved significantly. No patient had postoperative infections or rupture. Three patients had delayed wound healing, which resolved after simple dressings.

Conclusion. Calcaneoplasty and reattachment of the Achilles tendon via a lateral approach for insertional tendinopathy enables early weight bearing and achieves good outcome and pain relief.

Key words: Achilles tendon; tendinopathy

INTRODUCTION

Pain over the posterior heel most commonly arises from the Achilles tendon. This can originate from the insertional or non-insertional portion of the tendon. Insertional Achilles tendinopathy is described as a triad of tendon pain, swelling, and impaired physical performance. It is characterised by localised tenderness over the insertion of the Achilles tendon. Pain may be due to contact between the Achilles tendon and the posterior calcaneum or Haglund’s
deformity.

Conservative managements include the use of orthotics and shoe modification, eccentric training and stretching exercises, extracorporeal shockwave therapy, and non-steroidal anti-inflammatory drugs. Surgical options are used for persistent or recalcitrant cases and include decompression of the retrocalcaneal bursa and superior calcaneal tuberosity, Achilles tendon detachment and reconstruction, V-Y plasty lengthening, and endoscopic debridement of the posterior space.2,4–6 Decompression of the posterior-superior calcaneal tuberosity remains the most common surgical treatment, but a large proportion of patients have residual pain, even up to 2 years.4,7,8

The pathology in insertional tendinopathy of the Achilles tendon consists of degenerative changes in the insertional portion of the tendon, enlargement of retrocalcaneal bursa or bursitis, and Haglund’s deformity.9 Ankle equinus contracture with a tight Achilles or gastrocnemius tendon is also a pathological factor.10 Poor outcome is usually associated with having more than one pathological factor.

We report the one-year outcome of 44 patients treated with a novel technique entailing calcaneoplasty and reattachment of the Achilles tendon to address all pathological factors.

**Materials and Methods**

15 men and 29 women (mean age, 53 years) with insertional tendinopathy of the Achilles tendon treated by a single surgeon from August 2007 to September 2010 were recruited. Patients first underwent conservative management involving activity modifications, eccentric stretching exercises, modification of footwear, and analgesics. Those with persistent pain and posterior heel swelling despite 6 months of conservative management underwent surgery entailing calcaneoplasty, retrocalcaneal bursa excision, debridement and reattachment of the Achilles tendon with suture anchors via a lateral approach. Smokers were not excluded.

Patients were evaluated clinically before and after surgery by the same surgeon. Outcome was measured by a physiotherapist, using the visual analogue score (VAS) for pain, the SF-36 health survey, the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot score. Patient expectation (score range, 1–7; 1 being totally expected), and patient satisfaction (score range, 1–6; 1 being excellent) were also assessed.

A thigh tourniquet was applied, and a 4-cm incision was made parallel to the lateral border of the Achilles tendon (Fig.). The Achilles tendon was identified and retracted posteromedially. The

**Figure**

(a) A lateral incision to expose the Achilles tendon, (b) partial detachment of the Achilles tendon off the calcaneus, (c) marking of the osteotomy site beginning 1.5 cm anterior to the Achilles tendon, (d) calcaneal osteotomy directed at an angle of 45° postero-inferiorly, (e) 2 Mitek Fastin sutures are used in the posterosuperior aspect, (f) Fastin sutures are passed through the Achilles tendon, (g) Fastin sutures are cross-tied on the posterior surface of the Achilles tendon, and (h) drain is inserted and skin is closed.
retrocalcaneal bursa was identified and excised completely. The Achilles tendon was detached partially (approximately 80%) from the lateral calcaneus; the remainder (approximately 20%) was left attached to the medial calcaneus. Thorough debridement to excise all unhealthy tissues and calcifications was made. Calcaneoplasty involved osteotomising the posterosuperior aspect of the calcaneal tuberosity with an oscillating saw, followed by smoothening of the resultant osteotomised surface. The osteotomy began 1.5 cm anterior to the Achilles tendon and directed at 45° postero-inferiorly and included the pathological bony spur at the back of the calcaneus. The detached portion of the Achilles tendon was then reattached to the calcaneoplasty site while maintaining the ankle in a plantigrade position, using two 5.0-mm suture anchors deployed in the posterosuperior aspect. The Fastin sutures were then passed through the previously detached portion of the Achilles tendon and tied down. A drain was inserted and the skin closed. The ankle and hindfoot were immobilised in a below-knee plaster-of-Paris backslab, with the ankle in a plantigrade position.

Postoperatively, mobilisation in a walking cast was allowed on day 1, with the ankle in a plantigrade position. Skin sutures were removed after 2 weeks. The cast was used for 6 weeks before rehabilitation to regain ankle motion and calf muscle strengthening.

RESULTS

Of the 44 patients, 37, 43, and 21 were followed up at 3, 6, and 12 months. The mean VAS for pain decreased from 7.2 preoperatively to 3.3 at 3 months, 2.6 at 6 months, and 1.7 at one year (p<0.05, repeated measures ANOVA). The mean AOFAS ankle-hindfoot score improved from 43.5 preoperatively to 66.2 at 3 months, 78.5 at 6 months, and 86.5 at one year (p<0.005, repeated measures ANOVA). The improvement of these 2 measures was significant up to 6 months. The mean SF-36 score improved significantly up to 6 months for physical functioning (p=0.001), role functioning (physical) [p=0.005], and bodily pain (p=0.001) [Table]. The mean patient expectation score improved from 2.4 at 3 months to 2.1 at 6 months to 1.5 at one year (p=0.012, Friedman test), whereas the mean patient satisfaction score improved from a mean of 2.4 at 3 months to 1.9 at 6 months to 1.7 at one year (p=0.040, Friedman test). No patient had postoperative infections or rupture. Three patients had delayed wound healing, which resolved after simple dressings.

DISCUSSION

In a series of 22 patients who underwent tendon detachment, debridement, and reattachment with suture anchors for calcified insertional tendinopathy and were followed up for a mean of 34 months, the mean AOFAS ankle-hindfoot score improved from 53 to 89.11 Our patients achieved good functional outcome as early as 6 months after surgery. In 21 heels treated by endoscopic calcaneoplasty for retrocalcaneal bursitis, patients achieved excellent outcome with no complications and rapid return to normal functions.12 Although minimally invasive endoscopic techniques are useful for distal tendinopathy, they cannot address pathologies at the tendon-bone interphase by detachment and debridement of the Achilles tendon. Our technique using a lateral-approach calcaneoplasty and reattachment of the Achilles tendon could address all these potential pathologies, and thus achieved good early improvement in pain.

In another series, 6 years following excision of the posterior calcaneal tuberosity and bursectomy without tendon detachment, 10% of patients had persistent pain, and 83% had residual pain for 0.5 to 2 years.7 In a study with a mean follow-up of 20

<table>
<thead>
<tr>
<th>SF-36 subscale</th>
<th>Preop</th>
<th>3 months postop</th>
<th>6 months postop</th>
<th>1 year postop</th>
<th>p Value (repeated measure ANOVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical functioning</td>
<td>60.5</td>
<td>62.3</td>
<td>73.5</td>
<td>80.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Role functioning (physical)</td>
<td>30.4</td>
<td>39.7</td>
<td>55.1</td>
<td>73.9</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>35.7</td>
<td>51.5</td>
<td>58.4</td>
<td>67.0</td>
<td>0.001</td>
</tr>
<tr>
<td>General health</td>
<td>69.1</td>
<td>78.3</td>
<td>75.2</td>
<td>71.4</td>
<td>0.776</td>
</tr>
<tr>
<td>Vitality</td>
<td>66.5</td>
<td>66.3</td>
<td>69.5</td>
<td>69.5</td>
<td>0.222</td>
</tr>
<tr>
<td>Social functioning</td>
<td>69.0</td>
<td>71.5</td>
<td>80.7</td>
<td>85.2</td>
<td>0.101</td>
</tr>
<tr>
<td>Role functioning</td>
<td>83.3</td>
<td>88.9</td>
<td>88.6</td>
<td>97.0</td>
<td>0.275</td>
</tr>
<tr>
<td>Mental health</td>
<td>76.8</td>
<td>79.9</td>
<td>79.3</td>
<td>85.8</td>
<td>0.561</td>
</tr>
</tbody>
</table>
months, the mean pain score decreased from 4.7 to 1.5 out of 6, indicating persistent residual pain. Our patients achieved early reduction in pain, although residual pain persisted at the one-year follow-up, with a mean VAS for pain of 1.7. The long recovery period for pain relief is a concern. Six out of 36 patients opt not to recommend surgery to others in view of the long recovery period. The persistent pain may be due to inadequacy in addressing all the pathologies. In our study, all potential pathologies were addressed, and most patients were satisfied with the outcome, probably owing to early functional improvement and pain relief. Full weight bearing was allowed in a walking cast on day 1. This minimised the complications associated with immobility. As the foot was in a plantigrade position, weight bearing did not put excessive tension on the re-attached tendon. Rehabilitation was also easier. Patients benefited from early rehabilitation and achieved early improvement in functional outcome and pain. Reattachment of the Achilles tendon with the ankle in a plantigrade position prevented ankle equinus contracture. In cases of complete Achilles tendon detachment, a proximal V-Y lengthening is necessary to relieve tension on the tight reinserted tendon. Other surgical options for ankle equinus contracture include gastrocnemius recession through a more proximal approach. This requires a separate incision, which was not necessary with our surgical technique. When the Achilles tendon detachment is <50%, immediate mobilisation is safe. No postoperative rupture of the Achilles tendon was reported after complete detachment of the tendon followed by a Arthrex suture bridge technique. The use of 2 Mitek Fastin suture anchors provides superior load resistance compared to one suture anchor and as good as 3 suture anchors in cadaveric models.

One limitation of this study was the short follow-up period. We focused on early postoperative improvement in functional outcome and pain. The improvement was significant up to 6 months.

DISCLOSURE

No conflicts of interest were declared by the authors.

REFERENCES

10. Hansen ST. Functional reconstruction of the foot and ankle. Lippincott Williams & Wilkins.