FOOT AND ANKLE

Operative versus non-operative treatment of acute rupture of tendo Achillis

A PROSPECTIVE RANDOMISED EVALUATION OF FUNCTIONAL OUTCOME

A total of 80 patients with an acute rupture of tendo Achillis were randomised to operative repair using an open technique (39 patients) or non-operative treatment in a cast (41 patients). Patients were followed up for one year. Outcome measures included clinical complications, range of movement of the ankle, the Short Musculoskeletal Function Assessment (SMFA), and muscle function dynamometry evaluating dorsiflexion and plantar flexion of the ankle. The primary outcome measure was muscle dynamometry.

Re-rupture occurred in two of 37 patients (5%) in the operative group and four of 39 (10%) in the non-operative group, which was not statistically significant (p = 0.68). There was a slightly greater range of plantar flexion and dorsiflexion of the ankle in the operative group at three months which was not statistically significant, but at four and six months the range of dorsiflexion was better in the non-operative group, although this did not reach statistically significance either. After 12 weeks the peak torque difference of plantar flexion compared with the normal side was less in the operative than the non-operative group (47% vs 61%, respectively, p < 0.005). The difference declined to 26% and 30% at 26 weeks and 20% and 25% at 52 weeks, respectively. The difference in dorsiflexion peak torque from the normal side was less than 10% by 26 weeks in both groups, with no significant differences. The mean SMFA scores were significantly better in the operative group than the non-operative group at three months (15 vs 20, respectively, p < 0.03). No significant differences were observed after this, and at one year the scores were similar in both groups.

We were unable to show a convincing functional benefit from surgery for patients with an acute rupture of the tendo Achillis compared with conservative treatment in plaster.

Rupture of the tendo Achillis most commonly occurs in middle-aged men and is usually sustained during sporting activity. An acute rupture may be treated non-operatively or by surgical repair. Recent reviews have recommended surgery as the treatment of choice, based mainly on evidence of a reduction in the rate of re-rupture associated with surgery compared with non-operative treatment. Surgery is most commonly performed as an open procedure, although percutaneous techniques have increased in popularity. It is assumed that surgical repair will result in more rapid rehabilitation, with improved muscle function and earlier return to sports and occupational activity. However, a recent meta-analysis of randomised trials of treatment of rupture of the tendo Achillis did not provide definitive evidence that operative repair was associated with any benefit in terms of functional outcome. The evidence for earlier return to work and sporting activity was also equivocal.

Previously published trials have concentrated on the complications of treatment, particularly re-rupture, rather than detailed objective assessment of functional outcome. Thus, our aim was to investigate whether surgical treatment conferred any benefits over non-operative management on the functional outcome following an acute rupture of the tendo Achillis, in a single-centre randomised trial comparing open surgical repair with cast treatment. In particular we wanted to find out whether operative treatment was associated with a quicker or better recovery of muscle function.

Patients and Methods

The trial was approved by the local research ethics committee and was carried out on patients presenting to our department with an acute rupture of the tendo Achillis. All patients with this injury were considered for entry into the trial. Exclusion criteria were age > 60 years, presentation > ten days after injury, systemic...
disease including rheumatoid arthritis and chronic renal failure, and steroid treatment or other medication influencing soft-tissue healing, such as chemotherapy. Patients were randomly allocated to have operative repair or non-operative treatment in a cast. The allocation of treatment was through blind envelope selection. Cards allocating surgical or non-operative treatment were placed in unmarked sealed envelopes. The patients initially presented to the emergency department and were referred to the fracture clinic service. They were identified as suitable for inclusion in the trial by a research physiotherapist (EMW). Consent and randomisation took place in the clinic by opening the envelope and allocating the treatment accordingly.

Those to be treated surgically were admitted as a scheduled urgent case within seven days of presentation, and the operation was carried out either by a consultant orthopaedic surgeon or by a senior trainee under consultant supervision. A total of four consultant surgeons with a subspecialist interest in lower-limb trauma were involved in the operations. The outpatient follow-up was performed by the authors (JFK, EMW).

Repair was carried out by an open technique via a posteromedial longitudinal incision. Dissection was continued into the paratenon and full-thickness flaps were reflected to expose the ruptured tendon. A core Kessler stitch with a double-stranded PDS suture (Ethicon, Wolfen, Belgium) was used to appose the tendon ends and then supplemented with interrupted Vicryl circumferential sutures (Ethicon). The paratenon was sutured over the repair and the skin closed with interrupted fine nylon mattress sutures (Ethicon). The limb was immobilised in a full equinus cast for four weeks, and changed to a semi-equinus cast for a further two weeks. The cast was then removed and weight-bearing allowed.

Patients allocated to non-operative treatment were immobilised in a below-knee cast for a total of ten weeks. The initial cast was in full equinus for four weeks; it was then changed to a semi-equinus cast for four weeks, followed by a cast in neutral for two weeks. Patients were advised to be non-weight-bearing while in the equinus and semi-equinus casts, and partial weight-bearing was allowed in the neutral cast. This was our standard regime for the non-operative treatment of tendo Achillis rupture before the trial, and an internal audit had shown a re-rupture rate of 8%, which compares favourably with reported rates of re-rupture.\(^5\)-\(^10\) The shorter period of immobilisation was used in the operative group as this has been shown to be safe\(^11\),\(^12\) and could be considered an advantage associated with operative treatment. Surgical patients were detained for one night in hospital and received one 20 mg dose of enoxaparin as thromboprophylaxis. No other form of thromboprophylaxis was used in either group.

Following removal of the cast patients in both groups had physiotherapy. In the first two weeks they were asked to concentrate on increasing their range of movement and non-weight-bearing dorsiflexion stretches were permitted. Patients were encouraged to commence weight-bearing on removal of the cast. From week two to week six, ankle range of movement was emphasised using non-weight-bearing range-of-movement exercises and weight-bearing stretches. Strengthening of the calf muscle was introduced using bilateral heel raises and eccentric calf loading, progressing to unilateral heel raises as strength in the injured limb recovered. Proprioception exercises were used concentrating on single-leg balance. During this period patients were seen twice weekly by the supervising physiotherapist. From six weeks to six months a similar exercise programme was followed, increasing functional activity and progressively working on calf muscle strength. Patients were discharged from physiotherapy when the range of movement of the ankle and the pattern of gait were normal, good proprioception was restored, and a single-leg hop on the injured leg matched the normal leg for height and distance. Physiotherapists involved in the programme were provided with guidelines that were identical for both groups.

Data were collected during admission, and at assessments three, four, six and 12 months after presentation. The surgical details were recorded by the operating surgeon, who otherwise had no role in collecting the outcome data. All data collection was coordinated by a research physiotherapist (EMW) who was independent of the recruitment and randomisation of the patients, and who also collected other data from the case notes and interviewed patients at the time of outpatient follow-up.

The clinical and functional outcomes were evaluated. The primary outcome measure was muscle dynamometry and the main clinical outcome measure was the rate of re-rupture in both groups. Any other complications associated with treatment were also recorded. Functional outcome was assessed using the Short Musculoskeletal Function Assessment questionnaire (SMFA),\(^13\) which is a validated and well-recognised measure of function in the lower limb. This allocates a possible score of 100 points, where a high score correlates with increased disability and a low score correlates with normal function. We also recorded the time to return to work, to sport and to driving as additional indirect measures of outcome.

The range of plantar and dorsiflexion in the injured and the uninjured ankle was measured using a goniometer. Muscle function was assessed using a Biodex System 2 Dynamometer (Biodex Medical Systems Inc., New York, New York). This measured isokinetic peak torque (PT), total work (TW) and average power (AP) for plantar flexion and dorsiflexion of the ankle. Each evaluation consisted of an active warm-up period followed by repetitions carried out at speeds of 60° and 120° per second for the ankle joint (these are test speeds recommended by Biodex Medical Systems Inc. in their operating manual). The values for the uninjured limb were also measured for comparison. The research physiotherapist measured the range of movement and carried out the isokinetic tests. These measurements were taken at three, four, six and 12 months.
of 80 patients would give adequate power. This size of comparison previously described, we estimated that a total important differences. Using a nomogram for a two-sample (faster) speed of 120º per second was used, as it had been parameters (PT, TW, AP) and at all dynamic speeds.14,15

We wished to conduct a trial that would detect clinically important differences. Using a nomogram for a two-sample comparison previously described, we estimated that a total of 80 patients would give adequate power.16 This size of study would have 90% to 95% power to detect a difference of 10% in muscle function at any time, assuming a standardised difference (postulated true difference divided by the estimated sd) of between 0.7 and 0.8 for this variable. We chose the level of 10% based on the limited data available at the time of designing our study on what differences could be expected after tendo Achillis rupture compared with the normal side.8 In addition, in our previously published work evaluating functional outcomes after knee injuries we showed differences of 10% or more in isokinetic muscle function persisting for 12 months or more.14,17

These differences were correlated with reported abnormalities on functional outcome questionnaires.

**Statistical analysis.** This was carried out using SPSS software v.14.0 (SPSS Inc., Chicago, Illinois) using paired-sample t-tests for comparing parameters at different time intervals and one-sample t-tests for assessing differences between groups at one time point.

The rate of re-rupture and other categorical data were compared using the chi-squared or Fisher’s exact test. Student’s t-test was used to compare mean values of the SMFA. Muscle function parameters and range of movement of the ankle were calculated as a percentage of the normal side, and Student’s t-test was used to compare the groups. Non-parametric data were compared using the Mann-Whitney U test. All patients entered into the trial had the treatment randomly allocated, so there was no violation of the ‘intention-to-treat’ principle.

**Results**

Of the total of 80 patients in the study, 39 were randomised to surgical and 41 to non-operative treatment. The demographic characteristics of both groups were similar (Table I). Over the same period (between 2000 and 2004), 76 patients who presented with a rupture of the tendo Achillis were excluded from the study for the reasons given in Table II. In patients randomised into the study, most injuries were sustained during sport. Racket sports and football
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The progress of patients through the trial is shown in Figure 1. All patients allocated to the surgical group had their operation within three days of injury, except for two who were treated after seven days. In the non-operative group, 33 (80%) were immobilised in a cast within a week of injury and the remaining eight between seven and 14 days. In each group one patient withdrew from the study: one selected to have an operation declined and was treated in a cast, and a patient allocated to non-operative treatment withdrew from the trial and was operated on elsewhere. Both of these patients had satisfactory clinical outcomes with no complications, but had no follow-up functional outcome scores or isokinetic data collected. This left a total of 38 patients in the operated group and 40 in the non-operated group. One patient from each group failed to attend after the four-month appointment, and there were no data for six and 12 months for either of them; however, they were doing well without complications at four months. Full follow-up was therefore obtained for 37 patients in the operative and 39 patients in the non-operative group. Patients in the operated group had a mean of 12 (1 to 30) sessions of physiotherapy, compared with a mean of 13 (1 to 24) sessions in the non-operative group. This difference was not significant (p = 0.4).

**Clinical complications.** Re-rupture occurred in two (5.4%) of the operative group and four (10.3%) of the non-operative group. This difference was not significant (Fisher’s exact test, p = 0.676). In the operative group the two re-ruptures occurred at 12 and 16 weeks after surgery, respectively. In the non-operative group one re-ruptured at 11 weeks and three at 12 weeks, two of which occurred during the first muscle function assessment on the dynamometer at the three-month follow-up.

There were three infections (8.1%) in the operative group and none in the non-operative group. Of those with an infection, one was a cellulitis which responded to antibiotics. There were two deep infections, one of which responded to local dressings and antibiotics, but the other required surgical debridement and split-skin grafting. No patient had a

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**Table I. Characteristics of the treatment groups at randomisation of treatment**

<table>
<thead>
<tr>
<th></th>
<th>Operative (n = 39)</th>
<th>Non-operative (n = 41)</th>
<th>Total (n = 80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>41.2 (27 to 59)</td>
<td>39.5 (21 to 58)</td>
<td>40.6 (25 to 58)</td>
</tr>
<tr>
<td>Male:female</td>
<td>28:11</td>
<td>32:9</td>
<td>60:20</td>
</tr>
<tr>
<td>Cause (n, %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racket sports</td>
<td>13 (33.3)</td>
<td>11 (26.8)</td>
<td>24 (30.0)</td>
</tr>
<tr>
<td>Football</td>
<td>9 (23.1)</td>
<td>11 (26.8)</td>
<td>20 (25.0)</td>
</tr>
<tr>
<td>Dancing</td>
<td>8 (20.5)</td>
<td>7 (17.1)</td>
<td>15 (18.8)</td>
</tr>
<tr>
<td>Running</td>
<td>5 (12.8)</td>
<td>4 (9.8)</td>
<td>9 (11.2)</td>
</tr>
<tr>
<td>Rugby</td>
<td>3 (7.7)</td>
<td>3 (7.3)</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td>Other sports/fails</td>
<td>1 (2.6)</td>
<td>5 (12.2)</td>
<td>6 (7.5)</td>
</tr>
</tbody>
</table>

**Table II. Reasons for exclusion in 76 patients**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late presentation/unwilling to take part</td>
<td>24</td>
</tr>
<tr>
<td>Systemic disease</td>
<td>9</td>
</tr>
<tr>
<td>Lives outside area for follow-up</td>
<td>7</td>
</tr>
<tr>
<td>Partial rupture diagnosed by scan</td>
<td>13</td>
</tr>
<tr>
<td>Age &gt; 60 years</td>
<td>20</td>
</tr>
<tr>
<td>Bilateral ruptures</td>
<td>3</td>
</tr>
</tbody>
</table>
persistent infection. Deep-vein thrombosis, as proven on Doppler ultrasound, occurred in none of the operative group and in two patients (5%) with cast treatment.

**Functional outcome assessments.** Pain was no different between the two treatment groups. The median visual analogue pain score was 4 in the operative group (1 to 6) and 2 in the non-operative group (0 to 10) at the two-week follow-up (p < 0.07, Mann-Whitney U test). There was no difference in the pain score between the groups at any subsequent time point, with a median value of 1 in both. In general, the differences in the ranges of plantar flexion and dorsiflexion for both injured and uninjured ankles were minimal, except at 26 weeks, where the mean range of plantar flexion in the operative group was 5° greater than in the non-operative group, reaching statistical significance (p < 0.02).

The range of movement expressed as a percentage of the normal side is presented in Figure 2. There was a difference in the range of plantar flexion and dorsiflexion of the ankle between the two groups at three months (Fig. 2; Table III). The operative group had by this time regained slightly more movement in comparison to the normal side, although the difference was not significant (p = 0.11). This can occur as some stretching of the tendon may occur during healing, with a resultant increase in dorsiflexion on the injured side. However, at four and six months the range of dorsiflexion was better in the non-operative group. Compared with the normal side at six months, eight patients in each group (21.6% and 20.5% in the operative and non-operative, respectively) had a slight increase in dorsiflexion, possibly indicative of some tendon lengthening. There was no significant difference in the range of plantar flexion between the two groups. In addition, the mean range of dorsiflexion at final follow-up was no different from the normal side, indicating that the dorsiflexion was normal at that stage of treatment. Plantar flexion recovered more quickly and the difference from the normal side was < 10% at four months in both groups. There was no significant difference between the two groups in the range of movement at any time point (dorsiflexion, between p = 0.113 and p = 0.734; plantar flexion, between p = 0.135 and p = 0.928).

Muscle recovery showed a similar pattern. The differences observed in the absolute values of peak torque and total work were not significant at any point in the study (Tables IV and V). The absolute values of peak torque are affected by considerable individual variation in muscle mass. Similarly, total work is affected by body habitus and the gradual improvement in the range of movement that tends to occur with time from injury.

The rationale for using peak torque expressed as a percentage of the normal limb was that it allows more meaningful comparison of muscle function with time between groups (Fig. 3). At 12 weeks the peak torque difference of plantar flexion and dorsiflexion from the normal side was greater in the non-operative group. The difference in the peak torque of plantar flexion between the two groups was significant, at 47% vs 61% for operative vs non-operative, respectively (p < 0.005; Fig. 3b). There was no significant difference in the recovery of dorsiflexion peak torque at any stage (p = 0.625, p = 0.658, p = 0.571 and p = 0.06 for 12, 16, 26 and 52 weeks, respectively). The difference in both groups was between 5% and 10% at 26 weeks, and there was no difference from the normal side in either group at one year.
Some difference from the normal side for the peak torque of plantar flexion persisted in both groups. It was 26% and 30% at 26 weeks and 20% and 25% at 52 weeks for the operative and non-operative groups, respectively (Fig. 3a). The observed differences between the two treatment groups were not statistically significant at any time point, with the exception of the 12-week measurement (p = 0.06, p = 0.437 and p = 0.314 for 16, 26 and 52 weeks, respectively).

At three months the mean SMFA scores were significantly better in the operative than the non-operative group, at 15 vs 20, respectively (p < 0.03; Fig. 4, Table VI). Slightly better mean scores were observed in the operative group at four and six months, but the differences were not significant (p = 0.22 and p = 0.47 for 16 and 26 weeks, respectively). At one year the mean SMFA scores were similar in both groups.

Return to previous levels of sporting activity occurred in 26 of 37 patients (70%) in the operative group and 25 of 39 (64%) in the non-operative group. The mean time to return to full sporting activity was 34 weeks (14 to 52 weeks) in the operative group and 35 weeks (17 to 52 weeks) in the non-operative group. The mean time of return to work was 12 weeks in both groups. Patients treated operatively returned to driving at a mean of 12 weeks after injury, compared with 14 weeks in the non-operative group. None of these observed differences were significant.

Discussion
The main difference in outcome between the operative and the non-operative treatment groups was the rate of re-rupture, which was higher in the non-operative group. This finding is not surprising and is consistent with previously published literature. Although the observed difference was not significant, it is consistent with previous studies showing a reduced risk of re-rupture with operative treatment, a fact confirmed by meta-analysis of the literature. Analysis of the functional outcome also showed very little difference between the two groups. The range of dorsiflexion was slightly better in the operative group at three months, but the range of ankle movement was no different after this time. These findings were similar to objective assessments of muscle function recovery. Dorsiflexion peak torque was within 10% of the normal side in both groups at four months, and by six months the difference was less than 5%.
As might be expected, plantar flexion peak torque showed greater differences from the normal side and was significantly better in the operative group at three months. Although this parameter remained slightly better in the operative group, the difference was not significant at later stages. It is notable that in both groups at one year the differences in this value compared with the normal side were still between 20% and 25%. These objective assessments were reflected in the SMFA scores, which showed an early but not significant advantage for operative treatment which was not maintained. Considering how similar the outcome measures were, it is perhaps not surprising to find that cruder measures of outcome, such as return to work, driving and recreational activity, were no different.

It would be reasonable to assume that the early differences seen at three months were attributable to the slightly shorter duration of cast immobilisation in the operative group. A criticism of the trial design was the use of different post-operative immobilisation regimes in both groups. There is general agreement in the literature that accelerated rehabilitation protocols are safe following surgical repair.11,12,18 Previous trials have varied in their approach to immobilisation following treatment. Nistor9 and Cetti et al.10 used similar periods of cast immobilisation for both treatment groups, whereas Möller et al8 had an accelerated rehabilitation protocol in the operative group. Costa et al19 randomised patients undergoing operative and non-operative treatment into early weight-bearing mobilisation in an orthosis with cast immobilisation for eight weeks. In the operative group the early weight-bearing group had a better functional outcome. There was no advantage demonstrated for early weight-bearing over cast immobilisation for the non-operative group. We consider therefore that our choice of post-operative immobilisation in the non-operative group was reasonable, based on our experience and the existing literature.

The main strengths of this study are the prospective randomised design with incorporation of objective functional outcome measures of calf muscle strength and ankle movement, and the use of the SMFA, which is a validated outcome instrument for lower-limb injury.13 More recently a specific score has been developed by Nilsson-Helander et al20 to assess functional outcome after tendo Achillis rupture (Achilles tendon Total Rupture Score). It might have been preferable to use a specific outcome measure, but unfortunately none was available when we began our study. All of the assessments were performed by a research physiotherapist independent of treatment selection to minimise bias. Loss to follow-up was minimal. The sample size chosen was based on a power calculation to detect differences of 10% or more in isokinetic muscle function dynamometry. It is possible that some of the differences observed might have achieved statistical significance with larger patient numbers, raising the possibility of a type II error with the numbers of patients in the study. However, the difference was small in the parameters studied even when present, and therefore would not represent a clinically important difference between the two groups.

Table VI. Short Musculoskeletal Function Assessment scores in the two groups (mean, 95% confidence interval)

<table>
<thead>
<tr>
<th>Time since injury</th>
<th>Operative group</th>
<th>Non-operative group</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 12</td>
<td>15.0 (14.0 to 16.0)</td>
<td>20.0 (18.0 to 22.0)</td>
<td>&lt; 0.036</td>
</tr>
<tr>
<td>Week 16</td>
<td>8.0 (6.4 to 9.6)</td>
<td>10.0 (7.5 to 12.5)</td>
<td>0.220</td>
</tr>
<tr>
<td>Week 26</td>
<td>3.9 (2.6 to 5.2)</td>
<td>4.7 (2.9 to 6.5)</td>
<td>0.476</td>
</tr>
<tr>
<td>Week 52</td>
<td>1.2 (0.6 to 1.8)</td>
<td>1.9 (1.1 to 2.7)</td>
<td>0.216</td>
</tr>
</tbody>
</table>
Percutaneous techniques of repair were not used, so it could be argued that the reduction in surgical morbidity might have enhanced the outcome in the surgical group if this method had been used. However, the majority of tendo Achillis repairs are still performed with an open surgical technique, so our results are representative of the method most commonly used in clinical practice.

There is an extensive literature on the management of tendo Achillis rupture but few randomised trials evaluating operative versus non-operative treatment. Despite the lack of extensive evidence upon which to base management choices, operative treatment is now widely recommended. Examination of previously published randomised trials provides equivocal evidence to support operative management.

Nistor reported 105 patients with tendo Achillis ruptures treated either operatively or non-operatively. This was a quasi-randomised trial, as treatment selection was based on the institution where the patient presented. Muscle function was assessed by isokinetic dynamometry as in our study, but the evaluations were not carried out at specific intervals and varied between one and five years. The re-rupture rate was 2 of 45 (4%) and 5 of 60 (8%) in the operative and non-operative groups, respectively. There were two deep infections in the operative group, but no difference in function. The author concluded that as the overall complication rate and function were no different, non-operative treatment was the preferred option.

Cetti et al. published a study of 111 patients mainly evaluating the clinical complications in the two treatment groups at one year. The functional outcomes were rather subjective, but they reported less calf muscle atrophy, better ankle movement and a higher rate of return to sports in the operative group at one year. They concluded that operative treatment was preferable.

Möller et al. reported on 112 patients randomised to surgical treatment with early functional rehabilitation or non-operative treatment in a cast for eight weeks. The main finding in that study was a marked disparity in re-rupture rates, which were 1.7% in the operative group compared with 21% in the non-operative group. The authors used a visual analogue scale to allow patients to express an opinion about treatment. This favoured operative treatment, but was not matched by any convincing difference in return to sport or occupational activity.

A recent trial reported by Metz et al. involved 83 patients comparing minimally invasive surgery with non-operative treatment. Complications other than re-rupture occurred in 21% of surgical patients and 36% of non-operative patients. The majority of these complications in the non-operative group were minor skin problems associated with the use of a functional brace. The re-rupture rate was 7% in the operative and 12% in the non-operative group. There was no significant difference in the rate of return to work and sports. The authors also published some data on isokinetic muscle function in a subgroup of their patients, which indicated no significant differences between the two groups.

The most recent trials comparing operative and non-operative treatment with re-rupture as the primary outcome measure yielded similar results. Nilsson-Helander et al. in a randomised trial with 97 patients, showed that operative treatment reduced the re-rupture rate. No difference in functional outcome score as measured by the tendo Achillis total rupture score was reported. Willits et al. in a study of 144 patients, reported no significant difference in re-rupture rates between the two treatment groups. They also reported no clinically important difference between groups with regard to strength, range of movement, calf circumference or Leppilähti score.

The main aim of our study was to determine whether there was any functional advantage associated with operative treatment, as the increased risk of re-rupture with non-operative treatment is already well established. The comprehensive outcome assessments we used failed to show any clear functional benefit associated with operative treatment. Our study incorporated a more detailed assessment of recovery of calf muscle function than did previously published trials. Two other studies incorporated isokinetic muscle function assessments one year after injury. Möller et al. reported ratios between 0.82 and 0.90 of the normal side, with no difference in the two groups. Willits et al. did note a very small difference for peak torque favouring the operative group at a testing speed of 240°/s at one year, but no other significant differences at other testing speeds.

Based on our findings and those in the published literature to date, we do not recommend routine operative management of acute tendo Achillis rupture. We were unable to demonstrate any functional benefit associated with operative treatment. The main benefits associated with surgical treatment are a reduction in the duration of cast immobilisation and a lower risk of re-rupture. Non-operative treatment remains a valid alternative to surgery, and avoids the complications of operative treatment.

Further opinion
A further opinion by Mr. M. Costa is available with the electronic version of this article on our website at www.jbjs.org.uk/education/further-opinions

Supplementary material
Two tables detailing the mean values of a) peak torque in and b) total work for plantar and dorsiflexion for both groups at each time-point is available with the electronic version of this paper at www.jbjs.org.uk

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References