Journal club: 15 June 2011
Chair: Mr P. Williams (T+O consultant)
Morriston Hospital Journal Club, Swansea
Topic: Foot and Ankle

Format: Critical review of 1 paper (5 minutes powerpoint presentation) then briefly outline upto 3 related papers (2 minutes each) that are “classics” and relevant to the debate.

JOURNAL CLUB PAPERS

1. **Level of evidence in orthopaedic journals.**
   J Bone Joint Surg [Am] 2005;87-A:2632-8.
   Obremskey WT, Pappas N, Attallah-Wasif E, Tornetta P 3rd, Bhandari M.
   Presented by Dr H. Vint (CT1), Mr G. Roberts (ST4)

2. **Operative versus nonoperative treatment of acute Achilles tendon ruptures: a multicenter randomized trial using accelerated functional rehabilitation.**
   J Bone Joint Surg[Am] 2010;92-A:2767-75.
   Willits K, Amendola A, Bryant D, Mohtadi NG, Giffin JR, Fowler P, Kean CO, Kirkley A.
   Presented by Dr N. Marsden (CT1), Miss A. Tong (ST4)

3. **Extra-corporeal Pulsed-activated Therapy ("EPAT" Sound Wave) for Achilles Tendinopathy: A Prospective Study.**
   J Foot Ankle Surg 2011;50:315-19.
   Saxena A, Ramdath S Jr, O'Halloran P, Gerdesmeyer L, Gollwitzer H.
   Presented by Dr S. Jones (CT1)

4. **Operative compared with nonoperative treatment of displaced intra-articular calcaneal fractures: a prospective, randomized, controlled multicenter trial.**
   J Bone Joint Surg [Am] 2002;84-A:1733-44.
   Buckley R, Tough S, McCormack R, Pate G, Leighton R, Petrie D, Galpin R.
   Presented by Dr R. Graham (CT1), Mr R. Trickett (ST5)

5. **Level of evidence in orthopaedic journals.**
   J Bone Joint Surg [Am] 2005;87-A:2632-8.
   Obremskey WT, Pappas N, Attallah-Wasif E, Tornetta P 3rd, Bhandari M.
   Presented by Dr H. Vint (CT1), Mr G. Roberts (ST4)

Introduction

Level of evidence refers to the quality of the data obtained in a study.
Extrapolation to the general population must be viewed in light of the quality of the evidence. High level journals often have a poor level of evidence.

Methods

All articles in 9 orthopaedic journals over a 6 month period in 2003.

382 articles after exclusions.

Reviewed by an experienced and novice reviewer.

Research type: diagnostic, economic, prognostic, therapeutic.

Level of evidence: I-V[2]

RCT = I/II

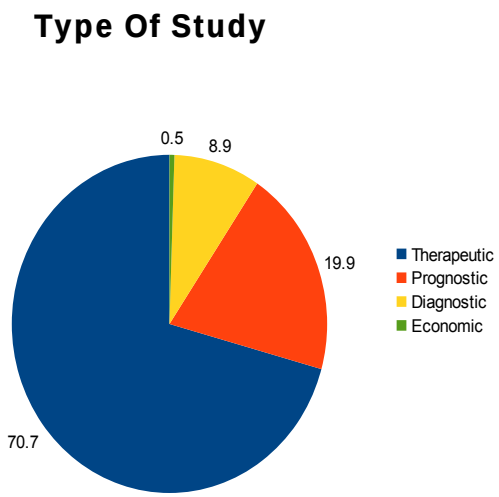
Cohort Studies = II/III

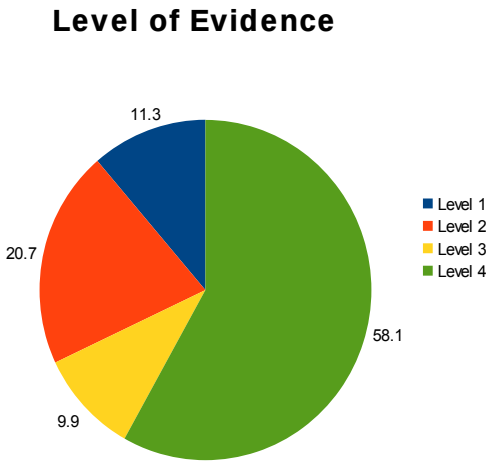
Case:Control Series = III

Case Series = IV

Expert opinion / Case Report = V

Paper Outline:Result





Findings and Recommendations

Kappa Values (-1..0...+1) as a measure of observer variation.

Inter-observer variation decreased with experience.

Accurate classification of studies.

Impact factor is a poor indicator of quality of evidence.

To aim to produce the highest quality evidence wherever possible.

Control groups may increase the level of evidence.

Importance of clinicians understanding the level of evidence concept.

References

1. **Sackett DL.** Rules of evidence and clinical recommendations on the use of antithrombotic *Chest* 1986;89(2 Suppl):2S-3S.

Related paper:

The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomised controlled trial. The CRASH-2 collaborators, www.thelancet.com Published online March 24, 2011

Aim: The aim of the CRASH-2 trial was to assess the effects of early administration of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage.

Method: Multi-centre, multi national blinded randomized control trial involving 20,211 adult trauma patients with, or at risk of, significant bleeding who were within 8 h of injury. The patients were either given tranexamic acid (loading dose 1g over 10 minutes followed by infusion of 1g over 8 hours) or a matching placebo. They had a 99.6% follow-up and analysis was done on intention to treat. The primary outcome was death in hospital within 4 weeks of injury, with the causes of death categorised as bleeding, vascular occlusion, multiorgan failure, head injury and other. These were further analysed specifically with respect to time from injury, severity of haemorrhage, Glasgow coma score and type of injury.

Results: Bleeding was the cause of death in 35% of the patients. The administration of tranexamic acid lead to a significant reduction in death due to bleeding (4.9% versus 5.7%, RR 0.85, 95% CI 0.76-0.96.) The effect of the tranexamic acid on death due to bleeding was most significant if it was administered within 1 hour of injury. It had a positive effect on mortality up to 3 hours post injury, however after this time it actually increased the risk of death due to bleeding. The estimated OR (odds ratio) of tranexamic acid on death due to bleeding when given immediately after injury was 0.61 (95% CI 0.50-0.74.)

Take home message: Tranexamic acid should be given as early as possible to bleeding trauma patients. For trauma patients admitted late after injury (>3 hours post injury), tranexamic acid is less effective and could be harmful. It may have a role in the treatment of trauma patients in a pre-hospital environment.

Operative versus nonoperative treatment of acute Achilles tendon ruptures: a multicenter randomized trial using accelerated functional rehabilitation.

J Bone Joint Surg [Am] 2010;92-A:2767-75.

Willits K, Amendola A, Bryant D, Mohtadi NG, Giffin JR, Fowler P, Kean CO, Kirkley A.

Presented by Dr N. Marsden (CT1), Miss A. Tong (ST4)

Background: Acute Achilles Tendon Rupture is a common injury in adults. There is inconclusive evidence regarding operative versus nonoperative management, although good evidence exists supporting accelerated functional rehabilitation.

Aim: To compare outcomes of patients with acute Achilles tendon ruptures: open operative repair and accelerated functional rehabilitation versus accelerated functional rehabilitation alone.

Methods: It was an ethically approved, prospective randomised study, in two centres with a two year follow up. There was a good reflection of the general population (sample age: 18 to 70 years) and clear inclusion criteria (compliance with a strict rehabilitation protocol, acute (<14 days) unilateral closed injury, no surgical contraindications). The level of the tendon rupture was not stated – presumably these were all midsubstance, as tears at the musculotendinous junction may have been treated differently.

The methodology was clear. Patients wore a removable below knee pneumatic walking brace in 20° plantarflexion and entered the accelerated functional rehabilitation program.

The primary outcome was the re-rupture rate. The secondary outcome was an assessment of isokinetic strength, ankle range of movement and calf circumference. They used a Leppilahti score, reviewed the complications and the outcomes were measured at 3,6,12 and 24 months. The statistics used were appropriate (independent t test). A power calculation confirmed that the researchers needed 77 patients in each group to detect a difference of 11% in the rerupture rate (meta analysis data confirmed a rerupture rate of 2.5% in the operative repair group and 13% in the nonoperative group).

Results: Of 196 eligible patients, 52 were appropriately excluded. The remaining 144 were randomized into 2 groups of 72 patients (less than the 77 patients dictated by the power calculation). Also 10 in the operative group and 7 in the non operative group were withdrawn from the study.

Re-rupture rate: Two patients reruptured in the operative group (at 1 and 3 months) compared with 3 patients in the non operative group (1,2,3 months). Four of these patients were treated operatively and one non operatively. Of note was that one patient in the non

operative group failed to heal and the outcome of this patient is not known – technically this may also count as a treatment failure.

Secondary outcomes: There was no difference in the outcome measures apart from an improved plantarflexion strength (at the 240° test velocity) in favour of the surgical group ($P \leq 0.05$). There were 13 operative complications (9 soft tissue complications related to surgery) in the operative group and 6 nonoperative (including 1 who failed to heal). Both groups had a thromboembolic rate – **(**1 DVT and 1 PE in the operative group versus 1 DVT in the nonoperative group).

Discussion: In support of other studies, there is no difference in the re-rupture rates with early mobilisation. They have similar functional outcomes and there are a substantial number of complications in the operative management of acute Achilles tendon injury. Although a power calculation was made to establish sample size for the null hypothesis, the authors did not take into account the losses to follow up.

Conclusion: The authors state their study supports accelerated functional rehabilitation and nonoperative treatment for acute Achilles tendon ruptures. They go on to state that the application of a nonoperative protocol involving accelerated rehabilitation will avoid serious complications related to surgical management.

Appraisal summary

Did it fulfil the aim? Yes.

What were the results? Rerupture rate: operative group = 3.2%, non operative group = 6.2% (includes one patient who's tendon failed to heal), operative group soft tissue complication rate = 14.5%, thromboembolic rate: operative group = 3.2%, non operative group = 1.5%.

What were the conclusions? Evidence supports nonoperative treatment with accelerated functional rehabilitation.

Is it going to change current practice? Yes, if it was my Achilles tendon, I would want to give nonoperative treatment a go!

Three related papers: A pubmed search revealed 1807 articles on Achilles tendon rupture. The three chosen were picked to shed light (or create discussion) on management issues around this injury.

1) **Effect of Knee Position on gap size following acute Achilles rupture**.
   Trickett RW et al,
   Foot Ankle Int 2011;32:1-4.

Aim: Compare tendon gap at rupture site with knee flexed / extended and ankle neutral / plantarflexed.

Method: Prospective study of 25 patients. Ultrasound assessment of gap with a)knee flexed, ankle neutral, b)knee flexed, ankle plantarflexed, c)knee neutral, ankle neutral, d)knee neutral, ankle plantarflexed.

Results: No difference in tendon gap with knee flexed or extended provided the foot was in full equines.

Take home message: Patients with suspected Achilles tendon rupture should be immobilised in a below knee backslab with the ankle in full equines.

2) **High incidence of Deep Venous Thrombosis after Achilles tendon rupture: A prospective study.**
   Nilsson-Helander et al
   Knee Surg Sports Traumatol Arthrosc 2009;17:1234-8.

Aim: Evaluated the incidence of venous thromboembolism in patients with Achilles tendon rupture.

Method: Prospective randomised study (49 operative versus 46 non operative). All patients were immobilised in a below knee equines cast for 2 weeks. All patients had a clinical assessment at 2,8,12,26 weeks post injury. The operative group had DVT prophylaxis (500ml Macrodex). At 8 weeks post injury, colour duplex sonography (blinded assessors) was performed.

Results: Total DVT rate was 34% (32/95 patients - 18 in the nonoperative group, 14 in the operative group). This includes 3 patients who also had a PE. There was no significant difference between the DVT rate between the operative and the non operative group. At the 2 week stage, 10 patients were clinically symptomatic.

Take home message: Despite DVT prophylaxis, there is a significant DVT rate in patients with a tendoachilles rupture with a large proportion who were asymptomatic.

3) **Major functional deficits persist 2 years after acute Achilles tendon rupture.**
Olsson N et al.
Knee Surg Sports Traumatol Arthrosc 2011 April 30 (Epub ahead of print)

Aim: Evaluate function 2 years post injury.

Method: Prospective randomised study of 81 patients (42 operative, 39 non operative). Achilles Tendon Total Rupture Score, Physical Activity Scale (comparing injured side with non injured side).

Results: Decreased level of function in the injured side compared to pre-injury although the majority were satisfied with their outcome. There was no significant difference in outcome between the nonoperative and operative groups 24 months post injury.

Take home message: Counsel patients regarding the long term functional and set realistic rehabilitation goals.

Summary: With regards to acute Achilles tendon rupture, all patients should be immobilised in below knee full equines casts. Non operative treatment should be strongly considered. Consider DVT prophylaxis and inform the patient of the long term functional outcome; they may not get back to their pre-injury level of function.

Extra-corporeal Pulsed-activated Therapy ("EPAT" Sound Wave) for Achilles Tendinopathy: A Prospective Study.
J Foot Ankle Surg 2011;50:315-19.
Saxena A, Ramdath S Jr, O'Halloran P, Gerdesmeyer L, Gollwitzer H.

Presented by Dr S. Jones (CT1)

Introduction

Achilles tendinopathy is a common cause of posterior heel pain. Potential therapeutic interventions are many and varied, both conservative and surgical. Despite the breadth of options, eccentric calf exercises remain one of the cornerstones of treatment. More recently however, high- and low-energy extracorporeal shockwave therapy (ESWT) has been used for the treatment of Achilles tendinopathy. The primary aim of this study was to focus on the effect of low-energy radial-pulsed–activated (EPAT) shockwave as an isolated treatment for Achilles tendinopathy. They aimed specifically to see if activity levels were improved after treatment with a radial shockwave device.

Methods

This prospective cohort study consisted of 60 patients, all voluntarily enrolled from the senior author's clinical practice from August 2008 – August 2009. They were categorized by the senior author as having either a paratendinosis, insertional or non-insertional tendinosis. Exclusion criteria included history of acute tendon rupture, recent immobilization, current NSAID use, age <14 years, pregnancy, or prior surgery for the same condition in the last 5 yrs.

All subjects received 3 shock wave treatments spaced 7 +/- 3 days apart. They were requested to avoid NSAID use or other forms of treatment for 12 weeks post EPAT.

The Roles and Maudsley score was used to assess activity levels before and at least 1 year after administration of the therapy. This scoring system quantifies disability based on symptoms limiting daily and recreational activities, ranging from the best (score of 1) to the worst (score of 4). Patients were reassessed in the clinic or via telephone interview.

Results

A total of 74 tendons were treated, 30 ♀ and 44 ♂. Mean age was 48.32 +/- 12.04, and range 17-74. 14 patients had bilateral treatment. It is mentioned that 10 additional patients also received treatment, but did not respond to follow up; hence their data was excluded from analysis. Table 1 illustrates the main findings from the study:

- All results were statistically significant
- No statistically significant differences in pre- and post-treatment scores between ♂ and ♀

Treatment Group	***Roles and Maudsley Score (mean)***		
	Pre-treatment	***Post-treatment***	***P value***
Paratendinosis	3.22 +/- 0.55	1.84 +/- 1.05	<0.0001
Noninsertional	3.39 +/- 0.5	1.57 +/- 0.66	<0.0001
Insertional	3.32 +/- 0.58	1.47 +/- 0.7	0.0001

Table 1

4 tendons failed to satisfactorily improve, and underwent surgical intervention by the senior author. There were no complications recorded.

Points for Discussion

i) Study Population

- There was no comparison/control group, hence can we conclude that they truly isolated the effects of the EPAT
- What was the duration of symptoms for each subject prior to EPAT
- Did the patients receive any other form of non-operative treatments prior to EPAT

ii) Treatment + Outcome Measures

- The Roles and Maudsley score used to asses activity levels was originally referenced in a paper relating to tennis elbow, and there is minimal data online regarding this scoring system
- VISA-A is the only valid + reliable index of clinical severity of Achilles tendinopathy

iii) Treatment + Outcome Measures

- Telephone follow up is not ideal
- They have attempted to account for their drop-outs:
    - not paid to participate
    - poor follow up via telephone

Conclusion

- They have contributed to existing literature, as they assess change in activity post EPAT
- Where as most other studies concentrate on change in pain
- Although the Roles and Maudsley score not recognised for Achilles tendinopathy
- They could improve the study by using VISA-A questionnaires

2. Related Articles

1. **Eccentric Loading Compared with Shock Wave Treatment for Chronic Insertional Achilles Tendinopathy: A Randomized Controlled Trial.**
Jan D. Rompe, John Furia and Nicola Maffulli.
J Bone Joint Surg [Am] 2008;90-A:52-61.

Study Objective
Compare the efficacy of 2 protocols, eccentric calf strengthening and repetitive low-energy shock wave therapy (SWT), for the treatment of chronic insertional Achilles tendinopathy

Design	RCT (Group 1=eccentric loading or Group 2=SWT)
Study Population	50 patients Defined as athletes or non-athletes Age range 18-70 years Symptoms for ≥ 6months, with failure of previous treatment
Treatment	SWT administered by senior author: - 3 sessions, 1 week apart Eccentric exercises demonstrated by senior author
Outcome Measures	Primary end point = change in VISA-A score 4 months follow up
Results	Mean VISA-A of 2 groups prior to treatment = no sig. difference (Group 1 = 52.7 +/- 8.4)(Group 2 = 53.2 +/- 5.8) Both groups shows improved mean scores post-SWT But the mean difference between the 2 groups was statistically significant (mean difference = 16.2, p= 0.005)
Discussion	Short follow up period, hence no long term data available Details given regarding duration of symptoms, and any prior treatments Results indicate that both treatments have a role to play

2. Shock Wave Therapy for Chronic Achilles Tendon Pain: A Randomized Placebo-controlled Trial.

ML Costa, L Shepstone, ST Donell, T. L. Thomas

Clinical Orthop 2005;440:199-201.

Study Objective

Does shock wave therapy relieve chronic Achilles tendon pain?

Design	RCT, double blind (Intervention group, control group)
Study Population	49 patients Level of sport participation given Inclusion criteria = ≥18 yrs old, Symptoms ≥3 months Minimal exclusion criteria (CI to SWT only)
Treatment	SWT administered by 2 radiographers: - 3 sessions, 1 month apart Same radiographers for placebo group
Outcome Measures	Primary end point = change in VAS score for pain on walking 3 months and 1 year follow up
Results	Mean VAS score (for pain on walking) for the 2 groups prior to treatment = no sig. difference (Both = mean of 55) VAS score for pain on walking post SWT = 34 for intervention group, 50 in control group (not statistically significant p = o.127; CI -4.7 – 36.2)
Discussion	Short follow up period 2 ruptures reported in intervention group (both >60 yrs old): - caution in treating older pts with SWT

3. Shockwave therapy for chronic Achilles tendinopathy: A double-blind, randomized clinical trial of efficacy.

S Rasmussen, M Christensen, I Mathiesen, O Simonsen.

Acta Orthopaedica 2008;79:249–56.

Study Objective

To investigate the effects of supplementary ESWT in enhancing recovery of Achilles tendinopathy

Design	RCT, double blind (Intervention group, placebo group)
Study Population	48 patients Inclusion criteria = ≥18 yrs old, Symptoms ≥3 months
Treatment	SWT: - 4 sessions, 1 week apart Conservative treatment = stretching + eccentric exercises
Outcome Measures	Primary end point = change in AOFAS score 4, 8, 12 weeks follow up
Results	Both groups improved during the follow up period Mean AOFAS score increased from 74 to 81 in placebo group, and from 70 to 88 in intervention group (p=0.05) Better results seen in intervention group at 8 and 12 weeks F/U (p=0.01 and p=0.04 respectively)
Discussion	AOFAS score not ideal as an index of severity of Achilles tendinopathy Results indicate that SWT appears to be a clinically relevant supplement to conservative management

Operative compared with nonoperative treatment of displaced intra-articular calcaneal fractures: a prospective, randomized, controlled multicenter trial.
J Bone Joint Surg [Am] 2002;84-A:1733-44.
Buckley R, Tough S, McCormack R, Pate G, Leighton R, Petrie D, Galpin R.

Presented by Dr R. Graham (CT1), Mr R. Trickett (ST5)

AIM: To determine whether open reduction and internal fixation of displaced intra-articular calcaneal fractures results in better general and disease specific health outcomes at 2 years when compared to nonoperative management.

METHOD: Investigation was performed at 4 trauma centres in Canada between April 1991 and Dec 1997. Data was collected from 424 patients with 471 displaced intra-articular cancaneal fractures. 309 (73%) were followed up for a minimum of 2 years.

Inclusion criteria – age 15 – 68 / intra-articular calcaneal fracture displaced >2mm. Exclusion criteria – medical contraindications to surgery, previous calcaneal abnormality (eg infection, tumour or fracture), open fracture, delayed presentation and associated head injury.

OUTCOME MEASURES: Short form-36 and visual analog scores were used. Patients were followed up at 2-4 weeks, 6, 12, 26, 52 weeks and 2 years. Patients completed the SF-36 (general health questionnaire) and visual analog score at 1 and 2 years.

DATA ANALYSIS: Data was entered into Epi Info software and analysed using SPSS and Stata software. Data analysis focused on bivariate comparisons. Bivariate analysis with use of odds ratios was used to determine if there were differences between strata for the independent variables and the treatments. These independent variables included age, gender, Bohler angle, status with regards to workers compensation, pre-op workload and operative reduction.

RESULTS: For those who had non operative treatment the scores for satisfaction did not differ with regard to age, gender or workload but were significantly higher for those with a Bohler angle 15-36 degrees and those not receiving workers compensation.

For those who had surgical fixation no significant differences were detected with respect to age however patients who were female, had a Bohler angle 15-36, had a light workload, were not receiving workers compensation and had an anatomical reduction had significantly higher SF-36 scores. Young adults were more likely to have higher scores following surgery than with conservative management. Initially clinical outcomes were so similar that they had to revise the projected number of patients needed to complete the study.

CONCLUSIONS: Regardless of treatment patients receiving workers compensation scored significantly lower than those not. In summary this study demonstrated that operative treatment as a whole provides no improvement over non operative however as previously noted higher scores were found when some independent variables where identified. The results suggest that non operative treatment is definitely suitable for selected patients – eg older males, receiving workers compensation that have an occupation involving a heavy workload.

REVIEW

Good Points

The paper sets out to answer an un-answered question with a sound methodology behind the original study design. The authors went to great efforts to ensure that patient recruitment across the centres was adequate and that the operating/supervising surgeons in each of the centres was managing a reasonable number of patients to ensure familiarity with the problem. All surgeons who failed to recruit less than 20 patients were subsequently excluded along with their patients from the definitive analysis.

A priori and interim sample size calculation was performed to ensure adequate an adequate sample size. The priori calculation was performed and a sample size of 86 patients in each arm of the study was recommended. The authors decided that to ensure adequate sample size predicting a 10% loss to follow-up a sample of 100 patients in each arm would be appropriate. An interim sample size calculation using the data collected at the time, suggested that a total number of 436 patients would be required. The study design was subsequently altered accordingly.

The results were analysed on a bivariate basis aiming to not only compare the results of operative versus non-operative treatment but to also determine risk factors within these groups for those patients who would benefit from surgical intervention.

The paper honestly reports a negative result, with no significant difference noted in outcomes between the operatively and non-operatively treated calcaneal fractures. The paper also attempts to make practical recommendations on how surgeons should be managing these patients in their own practice.

Criticism

Although the study is well designed, the application of the results of this paper to the UK population is flawed. The study population was an adult Canadian population. The Canadian health care system is similar in nature to the North American health care system having a Worker's Compensation scheme that employees can pay into. This has been shown to have a significant impact of functional outcomes following injury (REF). The authors in this paper have shown that Worker's Compensation is a significant predictor regardless of treatment

arm. Whilst this is an important observation in itself, it does not help predict outcomes in the UK study population.

The priori sample size calculation has been performed using a estimation of the variance and the predicted clinical effect. The authors rightly performed an interim sample size calculation when they noticed that the predicted clinically significant effect size was significantly overestimated. The interim sample size calculation suggested that a total sample size of 436 patients. However, the exact method for the sample size calculation is not clearly described for either the priori and interim calculations, and particularly the standard deviation is not documented for the interim calculation. The authors also clearly describe the modification of the priori sample size to account for loss to follow-up. However the same is not described for the interim calculation leading to uncertainty here. By using the published standard deviation from the study group for a post-hoc sample size analysis give a total sample size of 1350 patients in each group, using Dallal's method of sample size calculation (REF).

The study initially set out to recruit patients from 7 centres across Canada under the care of 14 surgeons. The requirement of a recruiting surgeon was to treat and follow-up to 2 years, at least 20 patients during the study period. Whilst this ensures that all the surgeons recruiting to the trial ae familiar with the treatment of this patient group, it does subsequently reduce the general applicability of the results to the practice of other non-subspecialised surgeons.

The paper briefly describes the surgical techniques used as either lag screws and plates, lag screws alone or K-wires. These techniques appear not to include more modern surgical techniques such as contoured locking plates or minimally invasive surgery.

Group	No of Patients	Mean SF-36	Mean VAS	No of Patients fused
Non-operative	218	64.7	64.3	37 (17%)
Operative treatment	206	68.7	38.6	7 (3.4%)
P value		0.13	0.12	**0.001**

The study assessed functional outcomes using 2 methods – the Short Form-36 (SF-36) item health related quality of life measure and the Visual Analogue Score (VAS). The SF-36 is a well validated measure of quality of life measure which is not specific to a particular disease. Recent evidence has suggested that the use of generic, non-disease specific quality of life

measures can be criticised when used in the trauma population (REF). The VAS is a tool developed Buckley in REF. Whilst it is “specific” for calcaneal fractures, patients were not involved directly in the development of the tool. Neither was there any psychometric analysis performed on the newly developed tool. However the tool as validated against concurrent outcome measures at the time of its development. Interestingly, in a paper looking at clinical outcome measures on calcaneal fractures published in 2008 (Schepers REF) looked at the validity and reliability of 34 outcomes used in the literature. Hildebrand and Buckley’s score was not included in this analysis and is not widely used in the literature.

Whilst this paper looked at functional outcomes post-operatively there was little focus on surgical outcomes. There was statistically significant difference in the number of patients undergoing subtalar fusion between the conservatively and surgically treated patients, with 17% in the conservative group requiring fusion within the 2 year follow-up period. This is in line with the study published in REF REF. Buckley et al. also note that arthrodesis was the most significant predictor of ultimate functional outcome with a odds ratio of 20.34 i.e. the patients who underwent subtalar arthrodesis were 20 times more likely to have a SF-36 and VAS below the median for the whole sample, than those patients who did not require a fusion. Despite this, the arthrodesis patients were completely excluded from the final analysis of functional outcomes.

A recent meta-analysis has reviewed the current literature concerning calcaneal fractures in depth and this included a review of Buckley et al.’s paper from 2002. The conclusions from the meta-analysis were that the risk versus benefit equation is still poorly resolved for the management of calcaneal fractures and that new surgical techniques needed to be assessed separately to older techniques. It is hoped that current randomised control trials, such as the UK Heel Fracture Trial may answer these questions with a robustly designed methodology and analysis.

Conclusions

The study showed statistically sound methodology with power calculation, interim analysis and bivariate analysis of results. There was honest reporting of a“negative” paper. They answered the aim and offered practical conclusions. However they had a very different study population, variable surgical techniques throughout the study as well as lack of clarity of “outcome measures” and lack of focus on “surgical outcomes”.

Implications for Practice

Unfortunately the question with regards to how to best manage displaced calcaneal fractures remained inadequately answered. Factors such as comorbidity, smoking status and fracture pattern must be taken into account by a surgeon experienced in the management of these injuries before a sufficient risk-benefit decision can be made.

OTHER RELEVANT LITERATURE

Management of Calcaneal Fractures: Systematic Review of Randomized Trials
Gougoulias et al. 2009

This was a robust meta-analysis which included Buckley's paper.They concluded there is need for carefully designed large RCT, continued to ask 'Do benefits outweigh risks'? and how do 'New surgical techniques' affect outcomes?

Clinical Outcome Scoring of Intra-Articular Calcaneal Fractures
Schepers et al. 2008

They identified widely accepted outcome scores, testing both reliability and validity. They identified 34 outcome measures but Buckley's score was not included. We wonder why?