Outcome of calcaneal fractures treated operatively and non-operatively. The effect of litigation on outcomes

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Abstract
Background The optimum management of calcaneal fractures is controversial. These injuries are frequently associated with compensation litigation, which affects the outcome.
Aims To assess the outcome of operatively and conservatively managed intra-articular calcaneal fractures and to examine the effect of compensation litigation on outcome.
Methods This was a retrospective study of calcaneal fractures from a single regional trauma unit, with management decided by the admitting consultant surgeon’s preference. Fifty-four patients (33 operative, 21 conservative) with an average follow-up of 40 months (range 14-78 months) were reviewed. Sixteen patients (30%) were pursuing a compensation case resulting from the injury.
Results Despite similar fractures, medical co-morbidity and trauma energy, significantly worse outcome scores were seen in litigants (p<0.0001). Footwear fitting problems were greater in litigants. Time off work was more than twice that of non-litigants (14.5 vs 6 months, p<0.01). Results were similar between the operative and non-operative groups in terms of functional score, footwear problems and time off work.
Conclusions Litigation was the major determinant of outcome following calcaneal fracture repair, highlighting the unreliability of subjective evaluation in determining outcome in the face of litigation. No subset of patients appeared to significantly benefit from internal fixation of their fracture.

Introduction
To fix or not to fix, that is the question regarding the management of intra-articular calcaneal fractures. Previous studies comparing operatively versus conservatively managed calcaneal fractures have been conflicting in their conclusions. Some show advantages to internal fixation, whereas others show no difference. Fracture configuration has been the main predictor of outcome and many classification systems have been produced to predict outcome on the basis of fracture pattern. Recommendations regarding operative fixation have been based largely on the fracture geometry and the degree of comminution of the posterior facet.
Poorer outcomes have been noted in many conditions in which the patient is pursuing litigation or receiving workers compensation. In a small series of 13 patients treated with internal fixation of a calcaneal fracture, poorer outcome scores were noted in litigants, leading to recommendations that litigants should be excluded from further outcome studies.
The primary aim of this study was to compare the outcome of operatively versus conservatively managed patients in an Irish regional hospital. In particular, we hoped to identify whether there was a particular subset of patients that benefited from internal fixation. In the course of this study we also noted the effect of litigation on patient outcome following calcaneal fracture.

Patients and methods
Seventy-six patients were admitted to Waterford Regional Hospital with an intra-articular calcaneal fracture from 1994 to 1998 inclusive. Average time to follow-up review was 40 months (range 14-78).
Calcaneal fractures occurring from an axial load to the heel were included in the study. Extra-articular and avulsion fractures were excluded. Fifty-four of those with intra-articular fractures were available for follow-up (33 operative, 21 conservative).

We compared all patients with an intra-articular calcaneal fracture rather than trying to perform a case-matched study, which may have given a biased result. Management of the calcaneal fracture was according to the admitting consultant surgeon’s preference (seven surgeons). Four of the seven surgeons performed calcaneal internal fixation. There was no unit policy regarding the management of calcaneal fractures; thus, patients may have, in effect, been quasi-randomised in their treatment. As patients may have been conservatively managed because of other injuries or due to intercurrent medical problems, we also noted patients’ pre-morbid status and the energy of trauma.
Fracture configuration was graded according to the widely used Sanders’ calcaneal fracture classification. Medical status scores were recorded in accordance with the American Society of Anesthesia (ASA) physical status classification. The energy of the injury was classified as low, medium or high. We defined a low energy injury as an isolated injury arising from a fall (or equivalent) of <3m (10ft). A medium energy injury was a fall from between 3 and 6m (10-20ft) or if another single skeletal injury was present, such as a contralateral calcaneal or vertebral fracture. High energy injuries included any high velocity injury, falls from >6m (20ft) and in patients having multiple other high energy skeletal fractures.
The medical and trauma energy scores were ascertained from the medical records, along with any wound or other complications.
Fracture grading was judged from examination of all pre-operative X-rays and computed tomography (CT) scans without knowledge of subsequent management.

All operatively managed patients were fixed using A.O. instrumentation via a lateral approach, without the use of bone graft. Intra-operative fluoroscopy was available. All were given peri-operative antibiotics at induction and for 24 hours post-operatively. Patients were mobilised non-weight bearing out-of-cast following surgery for a minimum of six weeks (range 6-10 weeks).

Patients in the conservatively managed group had all been admitted to hospital. All had aggressive soft tissue oedema management, consisting of icing, elevation and use of a foot impulse pump. On discharge, they were allowed to mobilise free-of-cast, but kept non-weight bearing for a minimum of six weeks (range 6-10 weeks).

Current functional status was obtained by a telephone/postal questionnaire by an observer (AC), who was blinded to the patient's fracture grading, medical scores and trauma scores. We used Kerr's calcaneal scoring system for assessing the functional outcome of calcaneal fractures. It has been derived from meta-analysis of six commonly used calcaneal outcome scoring systems. It focuses on the patient's pain and functional capabilities, which may be independent of anatomical result, radiological findings or sub-talar range of motion. A stiff hindfoot is not necessarily a painful hindfoot. We obtained a subsequent management.

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The average age of patients in this study was 46 years (range 11-73 years). Twelve per cent (9/76) of patients had bilateral fractures and 10% (8/76) had an associated (lumbar) vertebral fracture. Patient age, fracture grade, medical grade, trauma grade and time to follow-up were also similar in both groups (see Table 1). There were no deep infections in the operative group. However, there was a 15% (5/33) superficial infection rate, all of which settled without sequelae on oral or intravenous antibiotics, without requirement of surgical débridement or removal of metal. There was no correlation with their fracture grade, medical score or trauma energy score, which may have predicted these cases.

Median outcome scores and percentage good results of operative versus conservatively managed patients were similar when charted against their Sanders’ calcaneal fracture grade, ASA grade and trauma energy score (see Table 2). Similar results were found when including and excluding litigants. No difference was seen either in terms of time off work or in footwear fitting problems between the operative and conservative groups (see Figure 1).

Table 3 compares the litigation and non-litigation groups. Similar fracture grades, medical scores and trauma scores were seen in both groups. Mean outcome scores were significantly lower in those with compensation cases arising from the injury (56 vs 83; p=0.0001, unpaired t-test; [see Figure 2]). There was a greater rate of footwear fitting problems in the litigation group (64% vs 39%), with an odds ratio of 2.6 (95% confidence interval 0.8-8.5). Litigants also averaged more time off work (14 vs six months, p<0.01, unpaired t-test).

Discussion Our results show the outcome of internal fixation of calcaneal fractures to be similar to that of conservative management, regardless of fracture grading. Outcome was shown to be similar in terms of functional outcome, time off work and reported problems with footwear. This is despite apparently successful surgery, with no major complications seen.

In attempting to identify a subset of patients who benefit from internal fixation, we examined all parameters individually. Patients with higher energy injuries fared worse, as did those with medical co-morbidity. Conservative management may be a better option in these patients. However, there still may be a role for surgery in very selected cases, in particular young, healthy patients who have a displaced Sanders’ grade II fracture resulting from low energy trauma. These patients should be expected to have a better outcome. This study had insufficient numbers of these patients to fully assess the benefit of surgery. Our study shows a significantly worse outcome in those pursuing compensation arising from their injury. This is despite similar fracture grading, medical scores and trauma scores and regardless of treatment modality. We found the effect of litigation to be the major determinant of outcome following calcaneal fracture. These results highlight the unreliability of using subjective evaluation in determining patient outcome in the face of ongoing litigation. Comparison studies should exclude litigants in outcome evaluation because of this effect.