

Recent Advancements in the
Management of Calcaneal FracturesT M Harding¹ and B Jamal^{1*}¹Department of Trauma & Orthopaedics, Glasgow Royal Infirmary, Glasgow

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Editorial

Intra-articular calcaneal fractures make up 2% of all fractures [1]. The management of displaced intra-articular calcaneal fractures remains controversial. This is largely due to the lack of good quality clinical trials, variability in outcomes between different treatment modalities, and high complication rates. Calcaneal fractures usually occur as a result of high impact trauma and are often associated with other injuries. Calcaneal fractures are associated with a high morbidity and therefore it is important that patients are offered the best treatment available. But what is the best treatment?

Historically the chosen treatment modality has been open reduction and internal fixation for Sanders II-IV fractures [2]. The standard approach to open reduction internal fixation is through an extensile lateral approach which gives good operative exposure to the calcaneus. However open reduction and internal fixation is associated with high wound complication rates, particularly in smokers, diabetics and those with peripheral vascular disease. Despite this, a study in the Netherlands confirmed the enthusiasm for fixation of these fractures. Up to 50% of these fractures were treated with open reduction and internal fixation, 40% conservatively and 10% were fixed with percutaneous fixation [3].

In 2014, Griffin et al performed a UK based multi-centre randomized control trial comparing open reduction and internal fixation via an extensile lateral approach with non-operative management of calcaneal fractures [4]. 151 patients were randomized into two equal groups and followed up for 2 years. The results showed no difference in terms of symptomatic or functional outcome between the two groups at 2 year follow-up.

This has potentially led to fewer patients receiving open reduction and internal fixation for displaced intra-articular calcaneal fractures, but it certainly has not ended the controversy over management of these fractures or put an end to operative management of these fractures. Minimally invasive techniques and external fixation techniques are now coming into vogue.

Percutaneous fixation of the calcaneus has been described for some time and has been shown to be effective [5]. Several minimally invasive techniques have been described in the literature. The reduced disruption to the soft tissues ultimately leads to reduced wound complication rates when compared with open reduction and internal fixation. A systematic review by Wallin, et al. did not show superior functional outcome when compared with open reduction and internal fixation, but did confirm reduced wound complication rates [5]. Some studies have shown good results with functional and symptomatic outcomes, but there are few randomized controlled trials proving this. Percutaneous fixation has been shown to provide comparable outcomes to open reduction and internal fixation [5], but that is no different to non-operative management. Whether percutaneous fixation is the future for treatment of Sanders II-IV fractures remains to be seen, and further research is required.

Primary subtalar joint arthrodesis has been shown some promise in the treatment of comminuted fractures of the calcaneus. A recent case series of 17 patients has shown good outcomes with primary arthrodesis [6], but again further research is required to validate this.

However the most recent development in the management of intra-articular calcaneal fractures is the advent of the mini external fixator. Historically external fixation has not shown good results when compared with open reduction and internal fixation [7]. However, recently the use of mini external fixation devices in combination with percutaneous reduction has been described [7,8,9]. External fixation has the same benefits as percutaneous fixation in reduced soft tissue disruption, and therefore fewer wound complications than open reduction and internal fixation, and can even be used in high risk patient groups (diabetes, peripheral vascular disease). The advantage of using a mini-external fixator over percutaneous fixation is increased stability of the fracture. This enables earlier mobilisation with non-weight bearing exercises. Other advantages include reduced operating time and shorter hospital stays, compared with open reduction and internal fixation. Some potential drawbacks are patient compliance, and the need for regular follow-up.

2 recent studies, by Magnan, et al. and Corina, et al. have described using the Orthofix minifixator device in combination with percutaneous reduction [7,8]. As described by Magnan, et al. the operative technique involves using 4 self drilling and self tapping 4mm pins and the appropriately sized Orthofix mini-fixator [7]. Firstly a small 1cm incision is made over the sinus tarsi to allow for percutaneous reduction of the fracture fragments and restoration of the articular surface under the guidance of the image intensifier. Once reduction is achieved fixation can then be performed. The pins are positioned according to the fracture configuration, with the thalamic pin being inserted first. 4 pins are used to achieve stability. Further reduction and elevation of the fracture fragments can be achieved once the fixator is in position by adjusting the clamps. In Magnan, et al's study the external fixator was kept on for 8 weeks in Sanders II fractures and 10 weeks in Sanders III and IV. Passive and active range of motion exercises was started immediately after surgery, but the patients were non-weight bearing for 8 weeks in total [7].

Both Corina, et al. and Magnan, et al. showed that 90% of patients had excellent or good functional outcomes with percutaneous reduction and external fixation [7,8]. Given the reduced wound complication rate and comparable functional outcomes, this approach is favourable to open reduction and internal fixation of calcaneal fractures. However neither study compared this technique to non-operative management, which is also comparable to open reduction and internal fixation.

In conclusion there is still no real consensus over the most effective management of calcaneal fractures. While open reduction and internal fixation has fallen out of favour in recent times, the development of minimally invasive fixation techniques will be certain to provide some basis for debate. Further research and good randomized controlled trials are required to evaluate the efficacy of these newer fixation techniques.

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