

COMPARATIVE STUDY OF THE TREATMENT OF INTRAARTICULAR CALCANEAL FRACTURES BY CANNULATED SCREWS VERSUS MULTIPLE KIRSCHNER WIRES VIA MINIMALLY INVASIVE TECHNIQUE

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INTRODUCTION

Intraarticular calcaneal fractures are among the most complex fractures of the foot, often resulting from high-energy axial loading such as falls from height. These injuries involve disruption of the posterior facet of the subtalar joint and are associated with significant long-term morbidity if not properly managed. Due to the intricate anatomy of the calcaneus and its limited soft tissue envelope, open reduction and internal fixation (ORIF) carries a risk of wound complications, infection, and soft tissue necrosis. Minimally invasive surgical techniques have gained popularity as they aim to reduce soft tissue damage while achieving satisfactory anatomical reduction and joint alignment. Two commonly used fixation methods through a minimally invasive approach are cannulated screws and multiple Kirschner wires (K-wires). Cannulated screws provide rigid internal fixation and compression across the fracture site, while multiple K-wires offer a simpler and less invasive method with less hardware but may require longer immobilization and carry a risk of pin tract infection.

AIM OF THE WORK

The aim of this study was to evaluate the efficacy of cannulated screws in treating intraarticular calcaneal fractures compared to numerous Kirschner wires in a minimally invasive procedure known as the sinus tarsi approach.

PATIENTS AND METHODS

This study included 40 adult patients diagnosed with intra-articular calcaneal fractures who were admitted to El-Hadra University Hospital and Gamal Abd El-Nasser Hospital. Patients were randomly assigned into two equal groups of 20 using a computerized randomization system. Inclusion criteria were patients aged 18 to 60 years with isolated intra-articular calcaneal fractures and no contraindications to general or spinal anesthesia. Exclusion criteria included extra-articular fractures, associated urgent or multiple fractures (e.g., talar or Lisfranc fractures), morbid obesity (BMI >35), diabetes, heavy smoking, osteoarthritis, ankle stiffness, neurovascular injuries, and open fractures.

All patients underwent detailed clinical assessment including personal data, history of injury, comorbidities, and thorough physical examination focusing on neurovascular status and associated injuries. Radiological evaluation included standard X-rays and CT scans to assess fracture configuration and measure calcaneal angles and dimensions. Group I was treated using cannulated screws via a minimally invasive sinus tarsi approach, with careful anatomical reduction aided by traction and fluoroscopy, followed by fixation using transverse and positional screws. Group II underwent the same reduction technique, but fixation was achieved using multiple conically arranged Kirschner wires inserted into the talus and/or cuboid. All patients received standard postoperative care including immobilization in a below-knee cast for six weeks. Radiological follow-up was performed at six weeks and monthly for six months to assess fracture union and alignment.

RESULTS

In this comparative study assessing the outcomes of intraarticular calcaneal fracture treatment using either cannulated screws (Group I) or multiple Kirschner wires (Group II) via a minimally invasive technique, results showed slightly better functional outcomes in Group I. The mean final score for Group I was 79.05 (range 50–92), while Group II had a mean score of 75.75 (range 52–91) (Figure 1). In terms of outcome categories, Group I had a higher proportion of patients achieving excellent results (20%) compared to Group II (10%). Both groups had a similar percentage of poor outcomes (10%), but Group I had a slightly more favorable distribution across excellent and good categories.

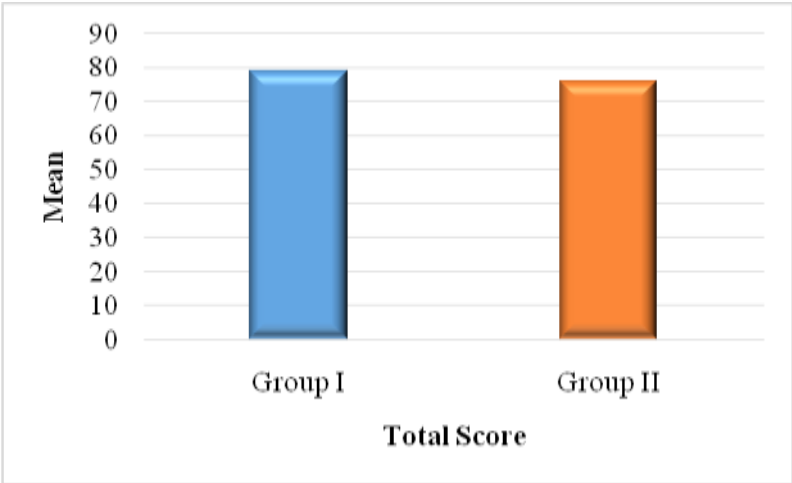


Figure1: Comparison between the two studied groups regarding Total Score.

Functional parameters including pain, activity limitation, walking distance, gait abnormality, sagittal motion, hindfoot motion, ankle-hindfoot stability, and alignment were also compared. Results demonstrated generally better performance in Group I across these measures, with a higher total score and more patients falling within the "excellent" and "good" categories (Table I).

Table 1: Comparison between the two studied groups regarding total score category.

Total score category	Group I “n=20”		Group II “n=20”		X² P value
	No.	%	No.	%	
Excellent	4	20.0	2	10.0	1.642
Good	12	10.0	1	5.0	
Fair	2	10.0	1	5.0	0.649
Poor	2	5.0	2	10.0	

CONCLUSION

Closed reduction and fixation using minimally invasive techniques (MITs) is a viable surgical option for intra-articular calcaneal fractures, especially in comminuted cases with soft tissue compromise. This approach effectively restores calcaneal height, width, and subtalar joint alignment, with advantages including reduced operative time, fewer major wound complications, no retained hardware (in pinning), and minimal soft tissue disruption. However, it carries risks of technical difficulty and incomplete fracture reduction, and the optimal treatment approach may differ based on individual case factors and surgeon preference.