

Vira[®] system—A minimally invasive technique for severe fractures of the calcaneus treatment with primary subtalar fusion: A preliminary report[☆]

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ABSTRACT

Objective: We presented the surgical technique and applicability of the Vira[®] system for severe calcaneus fractures treatment.

Material and methodology: The Vira[®] system is a minimal invasive method for the reconstruction of severe calcaneal fractures with primary subtalar fusion. It comprises a fixation implant and a specific jig for the reduction of the fracture and placement of the holed nail and two screws for fixation to the talus.

Additional advantages of this system are its high strength and stability allowing early weight bearing and the fact that additional bone grafting is not needed in most of the cases.

The Vira[®] system is a new concept in calcaneal surgery to provide a definitive solution for patients, low aggression and complication rates combined with high clinical effectiveness and sooner recovery.

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1. Introduction

Modern surgical treatment for fractures is designed to reduce the bone fragments to achieve congruence in the joints and stable fixation, thereby allowing early mobilization. In fractures of the calcaneus, the principles of osteosynthesis are perfectly applicable, but the results in the literature have been controversial [1]. This is mainly due to technical difficulty, post-surgical morbidity and long-term results, which differ only slightly from those of conservative treatment. It has been shown that an imperfect osteosynthesis is considerably worse than conservative treatment [2], since it is inefficient and there is a higher rate of complications.

A calcaneal fracture may be so comminuted that surgical reconstruction is impossible. In such cases, the surgeon can decide to treat the sequelae later, or take the initiative by performing a reconstruction of the calcaneus together with a subtalar arthrodesis. This procedure has been shown to be effective and to reduce the time of recovery [3], but is not included in the usual treatment protocols [4].

Recently, primary fusion as an option for the surgical treatment of fractures of the calcaneus has received a major boost with the development of the Vira[®] system [5] which permits bony reconstruction together with simultaneous subtalar arthrodesis and restores function to the calcaneus–Achilles–plantar system. The surgical concept is minimally invasive and does not require bone grafts in most cases, since the arthrodesis is performed using bone extracted from the housing of the nail.

Our experience is that minimally invasive treatment with primary fusion of the subtalar joint in severe intraarticular calcaneus fractures permits early resumption of daily activities with fewer major complications.

2. Technique and treatment protocol

The Vira[®] system (Biomet, Valencia, Spain) is a minimally invasive method for the reconstruction of severe calcaneal fractures together with primary subtalar fusion. It comprises a locked nail with two screws for fixation to the talus. The two cannulated screws enter through the heel and fix it to the talar body to immobilize the subtalar joint.

The stainless steel nail is of a constant diameter and length (10 mm × 38.7 mm) and had lateral wings to prevent rotation. The holes have an angle of 20° to the axis of the nail for the two tuberosity screws. The screws have a core of 2.1 mm and a double thread. They are available in seven sizes from 55 to 85 mm in length (Fig. 1).

[☆] The Vira[®] system is manufactured by Biomet and has the CE approval and expecting for FDA approval.

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Fig. 1. Vira® implant.

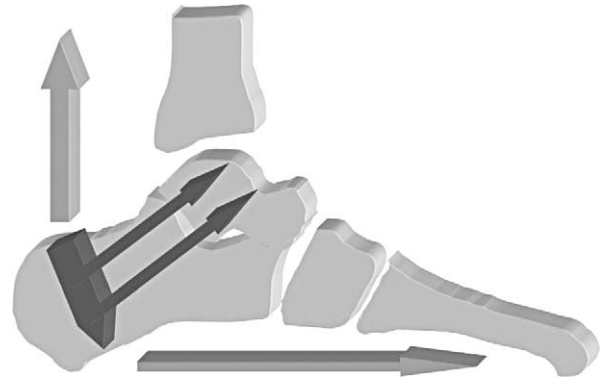


Fig. 3. The Vira® system restored the anatomy and functionality of the calcaneus–Achilles–plantar system.

The Vira® guide stabilizes and restores the axial alignment of the calcaneal tuberosity and restores the length and the height of the calcaneus. It incorporates carbon fibre pincers with nails to stabilize the greater tuberosity of the calcaneus during insertion of a titanium guide. The guide has a jig with a handle to hold and direct it (Fig. 2).

The guide restores the morphology of the calcaneus, placing the greater tuberosity in its normal anatomical relation to the talus. Subsequently it allows fixation by means of the nail and screws. It is not necessary for the bone to be whole at the point of nails insertion, since the function of the nail is to support and tense the Achilles–calcaneal–plantar system (Fig. 3).

According to the Sanders classification, the indication for the Vira® system for calcaneus fractures was type IV.

2.1. Surgical technique

The patient was placed in the prone position and the procedure performed under tourniquet control. The injured leg was raised higher than the healthy one to achieve a better fluoroscopic view. A closed reduction was performed first using the technique published by Omoto and Nakamura [6], particularly in the cases with a greater degree of displacement.

In the cases in which the inferior cortical of the calcaneus was broken and there was shortening of the bone, a guide wire was inserted into the talus, the spatial reference for the Vira® pin, by insertion from the inner aspect of the foot using fluoroscopy to locate the centre of the head of the talus. The guide wire stayed in the frontal plane, parallel to the joint line of the ankle and in the axial plane, perpendicular to the axis of the foot.



Fig. 4. Incisions in the hindfoot for the surgery.

A lateral para-Achilles incision around 3 cm long was made, taking care not to damage the sural nerve (Fig. 4). This approach exposes the superior aspect of the calcaneus and the posterior portion of the subtalar joint. Using a curette, we removed articular cartilage from the inferior surface of the talus and the chondral remains from the fractured surface of the calcaneus (Fig. 5).

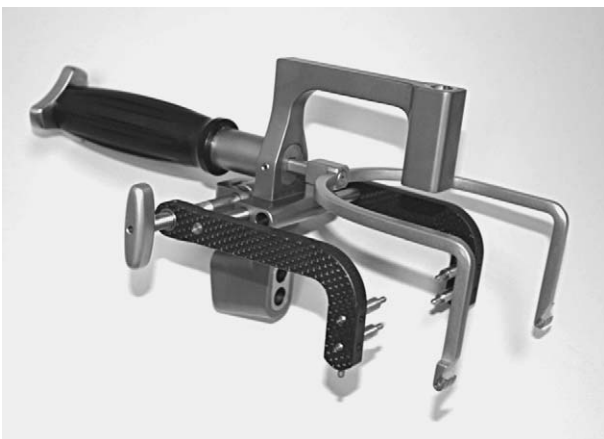


Fig. 2. The Vira® guide.

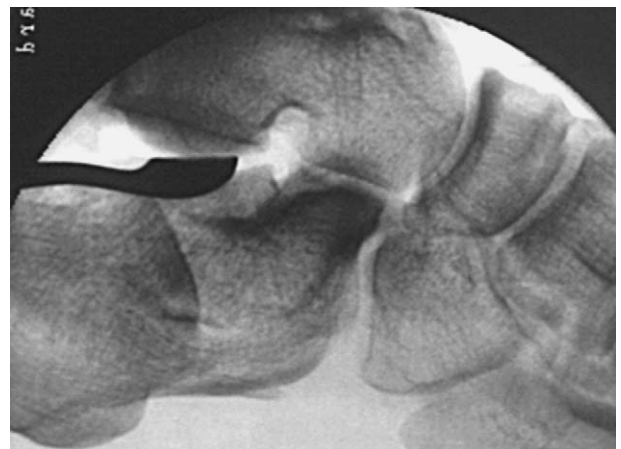


Fig. 5. Debridement of the subtalar cartilage by the posterior approach.

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