

## Percutaneous Posterior Calcaneal Osteotomy

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### ABSTRACT

Different types of posterior calcaneal osteotomy are used for calcaneal realignment in the management of hindfoot deformity. We describe a percutaneous technique of posterior calcaneal osteotomy that can be either a Dwyer-type closing wedge osteotomy or displacement osteotomy.

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Different types of posterior calcaneal osteotomy are used for calcaneal realignment (1–15) in the management of hindfoot deformity. It is usually performed through a lateral approach. Although complications of the posterior calcaneal osteotomy procedure are rare, occasional wound dehiscence, delayed union, and soft tissue or peroneal tendon fibrosis along the osteotomy site can occur (10). In the present report, a percutaneous technique of posterior calcaneal osteotomy is described that hopefully reduces the risk of complications.

#### Surgical Technique

Under fluoroscopic guidance, the planned location and orientation of the posterior calcaneal osteotomy site are determined. The proximal and distal ends of the osteotomy site are marked with needles, and small stab wounds are then made at these sites over the lateral heel (Fig. 1). Two bone tunnels were made using a 2.5-mm drill bit from the proximal lateral corner to the distal medial corner of the posterior calcaneal tubercle and from the distal lateral corner to the proximal medial corner of the posterior tubercle of the calcaneus (Fig. 2). If a Dwyer lateral closing wedge osteotomy is planned, corticotomy of the dorsal, plantar, and lateral walls is performed. The Isham straight flute burr (Vilex Inc., McMinnville, TN) was inserted from the dorsolateral drill hole to the dorsomedial drill hole, and the dorsal wall was cut from the medullary side outward. Similarly, plantar corticotomy can be performed with the

burr inserted from the plantar-lateral to the plantar-medial drill holes. The lateral wall corticotomy should usually be performed from both the dorsolateral and plantar-lateral drill holes because the length of the lateral wall will exceed the length of the burr. If the osteotomy site cannot be closed, the cancellous bone of the osteotomy site can also be cut using the burr, and the dorsal and plantar corners of the medial cortical hinge can be broken using a small osteotome (Fig. 3). The thickness of the bone removed can be adjusted using different burr sizes or performing the burring while keeping the wedge closed. If a displacement calcaneal osteotomy is planned, the remaining medial cortical wall can be cut using an osteotome or the burr. The osteotomy is then distracted with an osteotome to stretch the medial periosteum and to allow for medial displacement. The osteotomy site is stabilized using a percutaneous cannulated screw (16) (Fig. 4).

#### Case Series

From December 2010 to March 2013, 11 percutaneous calcaneal osteotomies were performed in 10 patients (Table). The mean age at surgery was 47 (range 19 to 72) years. Of the 11 osteotomies, 10 were Dwyer type (91%; Fig. 5) and 1 was a medial shift calcaneal osteotomy (9%; Fig. 6). Other concomitant procedures were performed in 10 operations (91%). The mean duration of follow-up was  $36.27 \pm 10.37$  (median 37, minimum 22, maximum 49) months. All calcaneal osteotomies healed without any complication noted.

#### Discussion

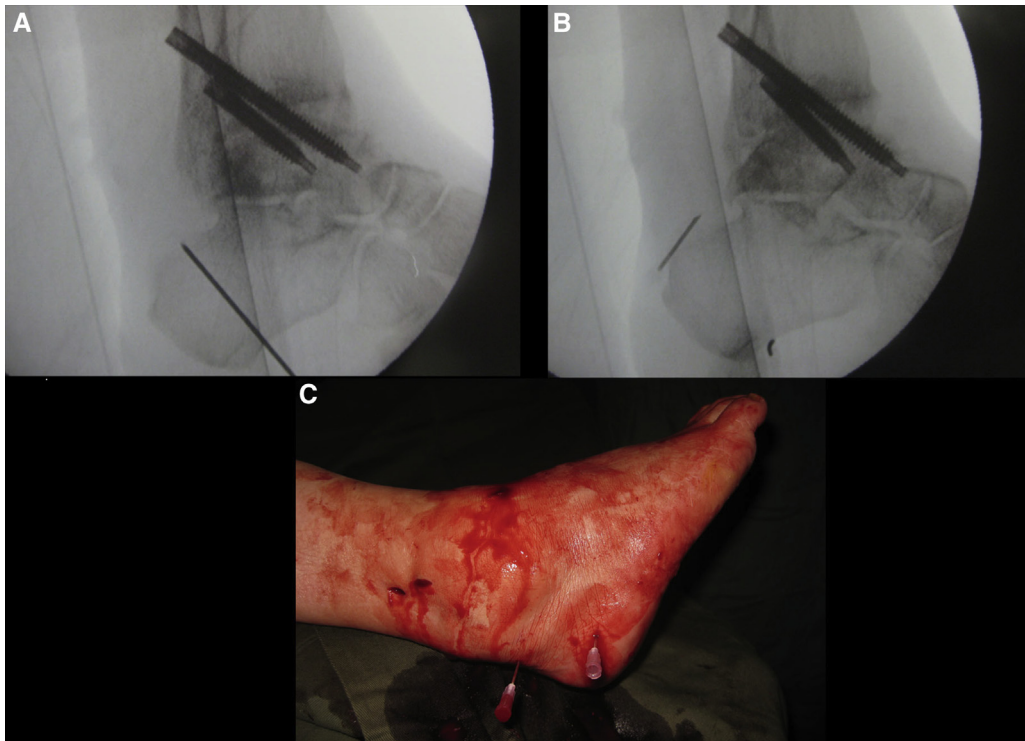
The findings of the present case series show that the percutaneous calcaneal osteotomy is a viable and safe alternative to the open procedure. However, its effectiveness cannot be determined from the present study because of the small case load and the great diversity in

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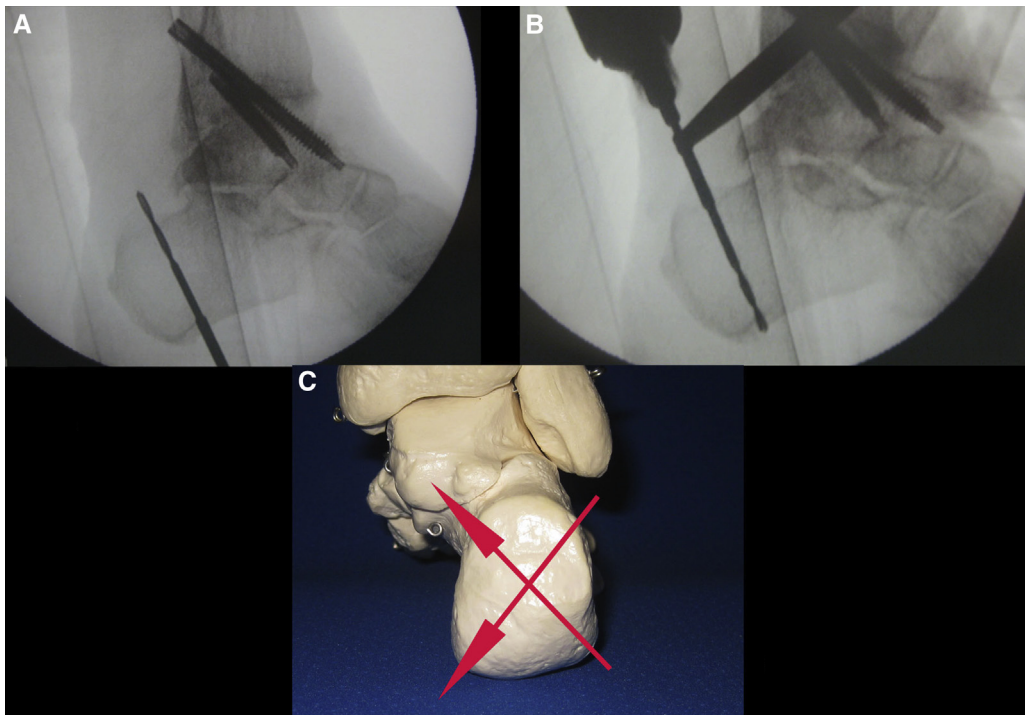
**Conflict of Interest:** None reported.

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**Fig. 1.** Using fluoroscopic guidance, the planned location and orientation of the posterior calcaneal osteotomy site were determined and marked by (A) a Kirschner wire, (B) The proximal and distal ends of the osteotomy site were marked with needles, and (C) small stab wounds were then made at these sites over the lateral heel.



**Fig. 2.** Two bone tunnels were made using a 2.5-mm drill bit from (A) the distal lateral corner to the proximal medial corner of the posterior calcaneal tubercle and (B) the proximal lateral corner to the distal medial corner. (C) The arrows show the directions of drilling in the coronal plane.

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