One & Done: Immediate Percutaneous Fixation of Displaced Intra-Articular Calcaneus Fractures with K-Wires

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No Conflict To Disclose

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Brandon Taylor, MD

My disclosure is in the Final AOFAS Mobile App.

I have no potential conflicts with this presentation.
Calcaneus Fracture Treatment Difficulties:

- 10% of calcaneus fractures are open injuries

- Awaiting soft tissue homeostasis may lead to non-operative treatment and painful malunions due to loss of calcaneal height.
  - Widened hindfoot
  - Subfibular impingement

- High risk of soft tissue complications with open extensile approach
Treatment Difficulties:

- Worse outcomes are associated with:
  - Non-Compliance
  - Tobacco use
  - Diabetes
  - Vascular disease
  - Severe soft tissue injury
  - Lower initial Böhler’s angle
Rationale

- Immediate percutaneous fixation is currently used to treat tongue-type calcaneus fractures.
  - This is often performed in the presence of significant soft tissue injury.

Instead of offering nothing to patients with displaced calcaneus fractures and significant adverse risk factors, why not offer immediate percutaneous treatment?
Materials & Methods

- A 15-month retrospective analysis was performed. This yielded seven patients with nine DIACFs. All fractures were treated percutaneously within 72 hours of the injury.

- A 5.0 mm Schanz pin was used to improve calcaneal height via distraction. A curved bone tamp was introduced through a stab incision to facilitate reduction if necessary.

- Reduction was followed by fixation with 2.0 mm unthreaded K-wires. The subtalar joint was violated with K-wires only when necessary to maintain reduction.

- All K-wires were removed in clinic after radiographic evidence of union was demonstrated.

- Bohler’s angle was measured radiographically upon initial presentation and post-operatively.

- The clinical outcome was measured using the Musculoskeletal Function Assessment (MFA).
Results

- Bohler’s angle was improved by an average of 31°

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Results

- Five out of nine (55%) calcaneus fracture outcomes were assessed using the MFA.
  - The MFA is a validated instrument available on the AAOS website.
- Eight out of nine patients would have an anticipated poor result if treated non-operatively.

MFA scores were calculated, and the results fell on a 0-100 scale.

- Excellent: 0-24
- Good: 25-49
- Fair: 50-74
- Poor: 75-100
Clinical Outcomes

Of the patients that were unable to complete the MFA:

- One refused to participate during questioning and hung up during the phone interview.
- One was unable to follow directions accurately, which was necessary to complete the test.
- One patient, who sustained bilateral calcaneus fractures which were both treated percutaneously, was contacted multiple times. This patient refused to conduct the phone interview or return to the office because he was “too busy” and “tired from working on ladders all day.”
Clinical Outcomes

- Only **one minor wound complication** (pin site infection)
  - This complication is seen in Figure A, prior to oral antibiotics.
  - This resolved after 7 days of oral antibiotics.

- The patient in Figures B and C underwent percutaneous intervention after our study collection ended.
- However, the **improvement in the subtalar joint using this percutaneous method** can be appreciated on CT imaging.

Figure A

![Figure A](image)

Figure B: Pre-operative CT	Figure C: Post-operative CT
In our One & Done Percutaneous Method:

- No retained hardware
- No patient needed a second operation.
- No invasive skin incision, decreasing the risk of infection
- No waiting for soft tissue homeostasis

We feel that the risk for an unfavorable outcome is drastically reduced while still providing the patients with a chance to heal in a more anatomically favorable position.
Discussion

Why treat surgically?

- Non-operative treatment can be functionally devastating.
  - Failure to restore calcaneal height can lead to increased risk of painful malunion, widening of the hindfoot, and subfibular impingement.

Why not open treatment?

- Proper patient selection for open treatment is critical.
  - Possibility of devastating outcomes with open treatment in patients with DIACFs and adverse risk factors
  - Inability to adhere to post-operative protocols can result in adverse outcomes including amputation.
    - The patient’s ability to follow-up and be compliant with treatment protocols should not be overlooked.

This study supports the use of immediate percutaneous fixation with K-wires as a safe treatment option that improves functional outcome while not severely compromising the limb, especially in patients with risk factors such as smoking, diabetes, vascular disease, and severe soft tissue trauma.