Treatment of Joint Depression Calcaneal Fractures
Utilizing Combination Mini External Fixator and Percutaneous Screw Fixation

Amanda L. Wiest, DPM, Laura E. Sansosti, DPM, Whitney E. Ellis, DPM, Andrew J. Meyr, DPM, Gabriela Yurkanin, DPM, and Jennifer C. Van, DPM

Purpose
Joint depression fractures of the calcaneum remain complex and challenging for foot and ankle surgeons. The goals of calcaneal fracture operative reduction include restoring the height to correct the shortened and widened heel, correcting varus mal-alignment of the tuberousity, and reducing blow out of the lateral calcaneal wall. Additionally, preservation of the soft tissue envelope by managing fracture blisters, superficial and deep abrasions and edema remains paramount. The objective of this preliminary investigation is to describe a method of reducing joint depression fractures of the calcaneus utilizing a combination of mini external fixation with percutaneus screw fixation and to compare pre and post-operative radiographic outcomes with this technique.

Methodology
In this retrospective observational study, a total of 5 patients with 5 joint depression calcaneal fractures were included. A limited sinus tarsi incisional approach was used to visualize the posterior facet. Next, a mini external fixator was applied by first inserting a 4mm pin through the neck of the talus followed by another 4mm pin through the plantar posterior calcaneal tubercle. The preconfigured frames were then applied medially and laterally over the aforementioned pins in preparation for joint distraction and reduction manipulation. A third 4mm pin was inserted through a central hole in the lateral frame into the distal aspect of the calcaneus, just inferior to the anterior process, for added stability in anticipation of the distraction process.

Results
Results are displayed in the following charts and tables:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient demographics</td>
<td>46.6 (range 32-63)</td>
</tr>
<tr>
<td>Ag, y</td>
<td>5 (0-6)</td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td>Women (0)</td>
</tr>
<tr>
<td>Time from fracture to surgery, d</td>
<td>8.8 (range 0-15)</td>
</tr>
<tr>
<td>Time from surgery to external fixator removal, d</td>
<td>43.6 (range 26.5-89)</td>
</tr>
</tbody>
</table>

Fracture, n (%) | Right side (2) | Left side (3); (60)

Biomechanical, n (%) | 3 (60) | None (0)

Postoperative complications, n (%) | 2 (40) | Superficial pin tract infection (1; 20), Deep infection (1; 20)

Characteristics of fractured feet | 90.0° - 121.8° | Fracture, n (%) | Right side (2) | Left side (3); (60)

Biomechanical, n (%) | 3 (60) | None (0)

Postoperative complications, n (%) | 2 (40) | Superficial pin tract infection (1; 20), Deep infection (1; 20)

Conclusion
Our findings suggest that this method of utilizing a combination of mini external fixation with percutaneous screw fixation is an effective option for treating joint depression calcaneal fractures. Still, comparative studies with more patients and longer outcomes are needed.

References