Percutaneous fixation of the calcaneus
Patient information

- 50-year-old man
- Sustained a 10-foot fall from a ladder
- No significant past medical history
- On presentation to the ER he was complaining of heel pain, wrist pain and states that he had a loss of consciousness.
- Original ankle radiographs show a double density sign (Figure 1).

Case information

The CT scan demonstrates a Sander’s two-part fracture with significant displacement at the posterior facet (Figures 2a and 2b). On the axial CT view one can see that there is good bone for screw fixation in the three crucial areas: the anterior calcaneus, the sustentaculum tali and the posterior tuberosity (Figures 3a and 3b).

Considering that this patient sustained a Sander’s two-part fracture with adequate bone for purchase in the three crucial areas, he is an ideal candidate for treatment of the calcaneal fracture with a small incision technique utilizing a plate specifically designed for “percutaneous” insertion. The potential benefits of percutaneous plating include: lower wound healing and infectious complications, earlier range of motion therapy, and possibly better long-term functional outcome.

### Implants

<table>
<thead>
<tr>
<th>VLP® FOOT Percaneous Calcaneus Locking Plate</th>
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<tr>
<td>2.7mm Locking Screw</td>
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<tr>
<td>4.0mm Locking Osteopenia Screw</td>
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<td>2.7mm Cortex Screw</td>
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Procedural notes

The surgery is performed with the patient either supine or in the lateral decubitus position and stabilized with a beanbag. The surgical approach is a small incision from the tip of the fibula towards the anterior process of the calcaneus (Figure 4a). Care must be taken to protect the sural nerve. First, the medial wall is disimpacted with a smooth curved elevator working through the fracture. The posterior tuberosity is pulled out of the way with a threaded pin attached to a “T-Handle” Chuck. A dry arthroscopy technique is utilized to help assess the reduction along with fluoroscopy.

The posterior facet is easily visualized. More posterior aspects are evaluated with the arthroscope (Figure 4b). The posterior tuberosity is brought out to length and out of varus. A medial “column” pin or screw can be used to maintain alignment between the posterior tuberosity and the constant fragment (Figure 4c).

The superior lateral fragment is reduced and fixated to the constant fragment with two screws (Figure 5). The plate template is then utilized to assess for correct size. The appropriate plate is placed on the lateral wall along the pathway created by a blunt elvator (Figure 6a). Care must be taken to stay on the outside of the lateral wall. The screws are placed in the following order: anterior calcaneus, posterior facet, and finally the posterior tuberosity using the half pin to bring the posterior tuberosity out of varus. The posterior screws are placed through a small incision, taking care to protect the sural nerve (Figure 6b). The screws can be 2.7mm cortex screws in good quality bone, 4.0mm osteopenia screws in bone of moderate density (especially in the posterior tuberosity) or 2.7mm or 4.0mm locking screws in cases of severe osteopenia or comminution.

Final fluoroscopic views show adequate reduction of the posterior facet and of the body (Figure 7).
Results

The patient was immobilized in a posterior and short leg "U" splint for one week to allow for early wound healing. At one week the patient was then placed into a tall CAM boot and he was taught how to do range of motion exercises. Sutures are removed at two weeks if the wound is healed. The patient sleeps with the boot until six weeks post-op to decrease the risk of equinus. Touch down weight bearing is continued until eight weeks at which time gradual increase in weight bearing are achieved as tolerated until full weight bearing by 12 weeks.

At eight month follow-up the patient had a good range of motion in all planes was pain free, had resumed his job and was wearing comfortable shoes. Final radiographs are shown in Figure 9.

Case study author

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Dr. Steinlauf specializes in foot, ankle, and lower leg surgery and post trauma reconstruction. He received his undergraduate degree from the University of Florida in 1990. He received his medical degree from the University of Miami, finishing at the top of his class in 1994. He completed his Orthopaedic Surgery Residency at the University of Miami in 1999, and his post-graduate fellowship in Foot and Ankle Surgery/Lower Extremity Reconstruction at the Florida Orthopaedic Institute in 2000. He currently serves as the Director of Foot and Ankle Residency Training for the University of Miami Department of Orthopaedic Surgery, and is a Clinical Assistant Professor for the University of Miami Department of Orthopaedic Surgery. In May 2010, he was selected by the residents as Teacher of the Year amongst the faculty of orthopaedic surgery at the University of Miami. He has served as Chief of Orthopaedics and is the Current Vice Chief of Staff for Memorial Regional Hospital.