Calcaneal fracture malunion involved shortening of the height of the calcaneus commensurate with the collapse of the posterior facet and lack of reduction of Bohler’s angle. These so-called Sanders Type III (post fracture) calcanei, create malleolar impingement, anterior ankle impingement, subtalar arthritic pain, and peroneal tendon impingement or dislocation. This type of deformity can be present with both operative and non-operative calcaneus fractures.

Traditionally, this has been addressed with a subtalar distraction bone block arthrodesis, described by Carr and Hansen in 1988. This type of distraction artificially raised the height of the calcaneus, decompressing both the anterior ankle by increasing talar declination and calcaneal pitch, and decompressing the malleoli, allowing reduction of the peroneal tendons. Follow studies initially revealed the need to taper the graft to avoid varus malunion. In addition, nonunion and late graft collapse was evident in multiple studies, occasionally described as “settling” of the graft during revascularization at 6 to 12 months. Regardless, the result was the same, as the talus dorsiflexed, anterior ankle impingement returned, along with malleolar impingement. Symptomatic hardware (backing out) created further difficulties.

Methods have been described to try to avoid the bone block arthrodesis while still reestablishing calcaneal height. Sanders described a primary subtalar fusion in combination with a calcaneal osteotomy, which was more thoroughly described by Huang in FAI 1999. These authors echoed the benefits of a primary (direct bone contact of the talus and calcaneus) in compromised post calcaneal fracture bone, increasing the union rate substantially and providing a solid surface in contact to allow earlier weight bearing. Also, the vertical slide calcaneal osteotomy may artificially increase the talar declination ankle, though the authors did not find that to be statistically significant. Still, there is a certain utilitarian benefit of this procedure, as the vertical slide calcaneal osteotomy can be translated medial or lateral, and also have an additional biplanar wedge, all to created better alignment of the hindfoot.

My favorite personal technical tip for this procedure involves making flat cut surfaces at the subtalar joint with a macrosaggital saw with a wider blade. This allows broad bone contact surfaces, a more stable surface for earlier ambulation, and more surface area for fusion (difficult in the misshapen posterior facet post calcaneal fracture). In addition, I often perform fixation in the following order

1) Vertical screw placed from the plantar calcaneus (near the anterior neck) directly into the talus for the subtalar fusion. I use a washer with this screw to prevent the head of the screw from penetrating the softer calcaneal bone.
2) Secondary horizontal screw fixation at the calcaneal osteotomy site to maximize compression and prevent recurrent vertical translation. To assist with holding the reduction, I oven drive a thickened wire through and through the posterior tuberosity of the calcaneus so I can completely control its position while screw fixation is occurring.
3) Final screw fixation obliquely through the subtalar joint and calcaneal osteotomy site for increased triplanar rigidity.

Peroneal tendons are reduced in the fibula groove, which is often of significant depth. The retinaculum is attached to the apex of the fibula groove through drill holes for better security.

This overall stable construct addresses all problems of failed calcaneal fracture management.

NOTES