

Partial Calcaneotomy

Pre-Op:

For a partial calcaneotomy, prone position in the OR is required. This is a 44 year old gentleman with a spinal cord injury from a fall 13 years ago. He was recently admitted by plastic surgery for excision of sacral ulceration and flap coverage. We have been asked to address his chronic heel ulceration with exposed calcaneus. This ulceration has been present for several years.

His sacral decubitus and flap is now healed.

Incision planning

When planning the incision, look for the obliquity to the soft tissue defect. This particular defect tends to slope from proximal lateral, to distal medial. Do not transect the ulceration, but rather plan the location of the proximal and distal surgical extensions and the location of the two fasciocutaneous flaps off the corners of the defect. The entire chronic ulceration is excised with approximately a 2mm margin.

Distal and proximal extensions

The distal extension will be directed medially, and proximally the extension needs to be located lateral to the Achilles tendon.

2 flaps: A&B

This creates two fasciocutaneous flaps labeled **A & B**. These flaps will rotate, slide, and translate into position to fill and cover the soft tissue defect.

Location of vessels and nerves in distal extension

In planning the distal extension, you must consider the anatomic pathway of the posterior tibial vessels and tibial nerve as it divides into the medial and lateral plantar nerves. The distal extension is drawn, and if further distal extension is needed, the incision will curve away from the neurovascular structures.

Incisions down to bone

The incisions are made in a decisive fashion, down to bone, in order to avoid feathered edges and assist in developing full-thickness fasciocutaneous flaps.

Dissection off of calcaneus

The flaps are elevated directly off the calcaneus. This is important in maintaining the thickest and most viable soft tissue flaps for closure and coverage.

Proximal incision

Dissection off of calcaneus

Dissection directly off the calcaneus, proximally and medially. By dissecting onto the bone, it also assists in protecting the neurovascular structures.

Similarly, dissection laterally and distally directly down to bone, elevating the flap off the bone.

Plantar fascia origin elevation

The distal dissections include transecting and elevating the origin of the plantar fascia off the rigid plantar surface of the calcaneus.

Palpation of the plantar surface of the anterior process of the calcaneus distal to the fascial attachment point shows full exposure of the posterior process of the calcaneus.

Direction of osteotomy cut

Interoperative x-ray with fluoroscopy shows the direction of the osteotomy.

The bone cut starts a few millimeters posterior to the subtalar joint and aims to a point a few millimeters proximal to the inferior edge of the calcaneocuboid joint.

Detach Achilles insertion and expose posterior subtalar joint

Dissection on bone to detach the insertion of the Achilles tendon and expose the posterior edge of the subtalar joint. The distal Achilles tendon and Achilles insertion are sacrificed.

Complete osteotomy

Completion of the osteotomy and removal of the entire posterior process of the calcaneus.

***NOTE: biggest mistake**

The biggest mistake I see is when the surgeon fails to remove the entire posterior process in hopes of maintaining some hindfoot function. Then the flaps fail to rotate in and fill the defect entirely, and poor soft tissue coverage results in a fragile situation and poor healing, or recurrence of a new lesion.

Trial flap rotation

Trial rotation of the soft tissue flaps shows how the coverage will happen easily without any tension.

Lateral x-ray cut surface

Contour sharp edges

The sharp bone edges must be contoured, rounded, or removed. A ronger is used to round the edges. The bone is much more osteopenic than average because this gentleman has a spinal cord injury. The bone, while soft, does not have an infected or inflammatory appearance.

Peroneal tendons seen laterally

The peroneal tendons are seen laterally.

Contour sharp edges (rasp)

A rasp is used to smooth the bone.

Remove lateral bone edge

The lateral bone is prominent and might lead to tissue pressure and breakdown. The decision was made to remove the lateral bone edge. This is not done in all cases, but was felt to be indicated here.

Round new edge

A ronger was used to round the new bone edge.

Remove soft tissue, tendon sheath, periosteum

Laterally, devitalized soft tissue, periosteum and tendon sheath are removed.

Contour sharp edges

A small rasp, then a larger rasp, are used to smooth the remaining calcaneus.

Tourniquet down

The tourniquet is let down, and hemostasis obtained with pressure and electrocautery.

Irrigation with saline

Irrigation was performed with several liters of saline.

Trial flap rotation

Trial positioning of the flaps shows the rotation and translation to close the defect.

Digital palpation over the very thin lateral skin shows where the lateral calcaneus was a previous problem, with potential internal pressure. Now that the lateral bone is removed, there is no bone prominence.

Deep hemovac drain

A deep hemovac drain is placed. It is cut between holes.

Periosteum and fascia closure

The closure must position and inset the flaps to minimize the dead space. The deep layer of periosteum and fascia is closed with absorbable suture placed in a figure 8 fashion. The closure should start centrally to ensure proper position of the flaps.

Absorbable suture, figure 8 pattern, closure starts centrally

Additional figure of 8-style absorbable 0-suture is used as necessary to close the deep layer proximally and distally. Additional central deep suture is added to minimize the dead space that may fill with hematoma and slow the healing process.

Subq closure, 2-0 absorbable suture

The subq closure is performed with 2-0 absorbable suture.

3-0 nylon skin closure

The skin closure is performed with 3-0 nylon skin suture placed loosely in a figure 8 fashion to line up the skin edges.

Mobile, thick coverage

This shows the contour of the heel after rotation of the flaps. The tissue should have redundant or excess appearance and provide a mobile, thick coverage over the remaining calcaneus. The flaps have fully filled the defect. The posterior coverage is soft and well-padded.

Dorsiflexion adds tension, equinus relieves tension

Ankle motion shows that dorsiflexion adds tension to the closure and equinus relieves tension. Without any Achilles, there is no worry of equinus contracture. Splinting in equinus is preferred.

Splint in equinus

Non-stick Adaptec

Dressing starts with non-stick Adaptec gauze.

Layered 4x4 to avoid bulky pressure points

4x4 gauze layered on one at a time to avoid bulky pressure points.

Fluff gauze, around drain and dorsum

Fluff gauze is added. It is added around the drain and the dorsum of the foot.

Overwrap with Kerlex roll gauze, then cotton Webril padding

Apply Reston foam

Reston self-adherent foam will stay in place to pad the plantar foot and flap area, the back of the calf, and medial and lateral malleolar areas.

More Webril padding

More Webril cotton padding added on top of the Reston.

Foot in slight equinus, lateral, medial, posterior plaster splints

Plaster splints are laid on the lateral and medial surfaces with the foot in slight equinus position. They are then added posteriorly.

Overwrap with Webril, bias-cut stockinet, tape

The plaster is overwrapped with more Webril, then bias-cut stockinet, and then finally, tape.

Final clip

The final clip shows patient positioning, sequential compression device on the unaffected leg to minimize the risk of DVT, and the blankets used to elevate the right leg to make the use of C-arm fluoroscopy easier.