Fracture Calcaneus: Exposure and fixation tips

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Preoperative Planning:

Get ankle & foot series x-rays plus axial views and CT scan

Clinical analysis:

- Permissible skin condition: blisters, oedema
- Wrinkle test: Dorsiflexion plus eversion of ankle and foot should produce wrinkles at the junction of dorsal and plantar skin

Radiological analysis:

- Extra-articular or intra-articular
- Position of sustantacular tali fragment: Whether it needs reduction or it is in normal position. First step of surgery would be to reduce this fragment if it is not in position

- Medial wall: Whether it is comminuted or not and whether it needs reduction or not
- Articular fragment: How many fragments are there? Two fragments will need compression while more than two fragments would need to be fixed with position screw
- Heel position: Varus or valgus
- Heel shortening: Amount of heel shortening needs to be determined
- Calcaneo-cuboid joint: Assessment of calcaneo-cuboid joint involvement will change not only the approach but also the plan of management

At surgery:

Positioning:

- Lateral position with affected limb up
- Surgeon stands at heel end and assistant stands at the toe end
- Image intensifier is positioned diagonally in such a manner that AP projection would show lateral image of heel and LAT projection would show axial image of heel
- Assistant needs to dorsiflex the foot for clear axial imaging of the heel

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- A bump formed out of folded towels is placed under the heel which could be moved inwards and outwards during surgical procedure to get desired positions of heel.
- Heel should be hanging out of bump during exposure to facilitate inversion & easy flap lifting
- Bump should be moved outwards to give eversion while putting retraction wires
- Bump should be moved outwards to help maintain heel valgus while fixation of posterior tuberosity fragment during later surgical procedure

Exposure:

- Incision: A more posterior vertical limb connected with horizontal limb with gentle apical curve is desirable as this approach avoids sural nerve

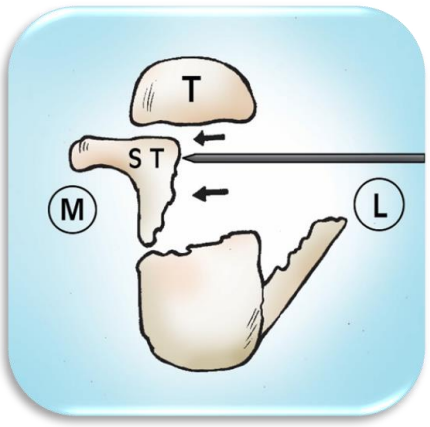
- Incision needs to be taken distally and dorsally in cases where calcaneo-cuboid joint is involved

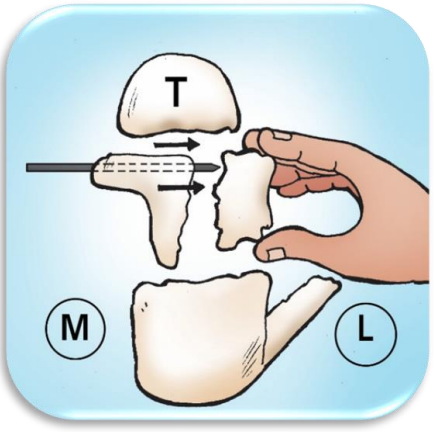
- Flap is lifted with gentle no touch technique & is held with plain forceps

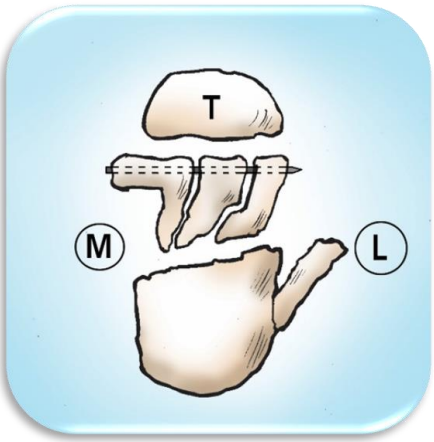
- Flap needs to be with sufficient vertical and horizontal limbs to prevent healing issues
- Flap is retracted with bent k wires pushed in anterior and posterior talus and in cuboid
- Flap needs to be kept wet
- Take care of peronei tendons while lifting the flap & peroneal tendon sheath if gets opened up inadvertently, it needs to be repaired before closure
- Flap closure should be started distally towards ends to then move towards apex to avoid tension at the apex
- At closure all knots should come outside the flap

Fixation tips:

- ST pin pushed from lateral to medial would help as an aid to manipulate posterior tuberosity fragment downwards, outwards and in to valgus
- Lateral wall needs to be sharply cut and hinged downwards
- Articular reduction is started from inside out, medial to lateral
- A use of freer, haemostat or bone spike from lateral side for manipulation will facilitate medial sided reduction
- For two fragments of posterior articular facet principle of compression is adopted while for more than two fragments of posterior articular facet principle of position screw is adopted
- More than two pieces of articular fragments are threaded from medial to lateral







- Order of surgical procedure is as under

  Correct positioning of medial sustantacular fragement(if needed) --- lateral wall hinging – removal of articular fragment --- restoration of heel height – correction of heel valgus – articular reduction – reduction of tuberosity fragment with anterolateral fragment & restoration of Gissane angle --- temporary fixation with K-wires --- image check --- final fixation with plate
- Temporary fixation maintaining k-wires may be pushed either in to talus or in to cuboid for getting better stability
- Periodic image check is done in form of lateral, axial and broden images
- Articular screw may be passed outside or through the plate

Post-operative protocol:

- Below knee plaster slab for 3 weeks
- Elevation
- Drain removal after 48-72 hours
- Suture removal at 10 days
- Non weight bearing mobilization after 3 weeks
- Periodic x-rays at the end of every 4 weeks
- Weight bearing at final union, never before 12 weeks