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PRECISION IN FIXATION

CASE STUDY

Medartis Ankle Fracture Case Study

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Introduction: Ankle fractures are amongst the most commonly encountered lower extremity injuries having a significant impact on quality of life and years lived with disability (YLD).
Reducing disability and increasing function are pillars of surgical treatment.

The Case

Patient Profile

The patient was a 60-year-old female who presented to the emergency department with an ankle and foot injury after a misstep over a door threshold while taking out the trash at home. She reported falling onto a twisted ankle with all of her weight and an inability to ambulate. Her pre-injury ambulatory status was excellent and without limitation. Her past medical history is consistent with breast cancer in remission post-mastectomy, chemotherapy-induced peripheral neuropathy with subtle left lower extremity foot drop, and depression. She was splinted and brought to the ED via EMS, where plain film radiographs revealed a significant ankle injury, including a trimalleolar ankle fracture and concurrent Lisfranc complex diastasis with intra-articular tarsometatarsal comminution. Non-contrast CT scans of the foot and ankle were ordered, and she was then admitted to our institution for formal workup and fracture management.

Examination

Upon examination, the patient was noted to have unstable injuries to the left foot and ankle. The soft tissue integument was severely swollen with ecchymosis. The integument remained closed without skin tenting or abrasion. The apparent injury was noted to the ankle joint, and positive piano key sign was noted to the Lisfranc joints. Her neuroprotective sensation was diminished, bilateral and symmetrical. Vascular checks were within normal limits with palpable pedal pulses, brisk capillary fill time, and 1+ non-pitting edema. A jones type compression splint was applied and icing, elevation, and edema control measures were taken to optimize the patient for reconstructive efforts pending CT scan evaluation.

Imaging and Diagnosis

AP, oblique, and lateral ankle and foot X-rays display a trimalleolar ankle fracture (supination external rotation SER-IV) and a Hardcastle partially incongruent Lisfranc injury variant. Additionally, advanced imaging identified intra-articular comminution at the tarsometatarsal joints and a posterior malleolar injury significant for a Haraguchi type 1 fracture.

Case Assessment

This patient had a remote history of foot drop with weakness in dorsiflexion and suffered an unstable ankle fracture with concurrent Lisfranc trauma. Therefore, advanced imaging was paramount in the preoperative planning and definitive fixation placement. Surgical considerations included staged procedures, open reduction with internal fixation of the ankle and the foot fractures or primary arthrodesis of the tarsometatarsal joint. Given the patient's health and independence, pre-injury activity level, and recent literature regarding Lisfranc fractures, we agreed for joint preserving open reduction with internal fixation of both ankle and foot fractures with a goal of early weight-bearing.

Surgery

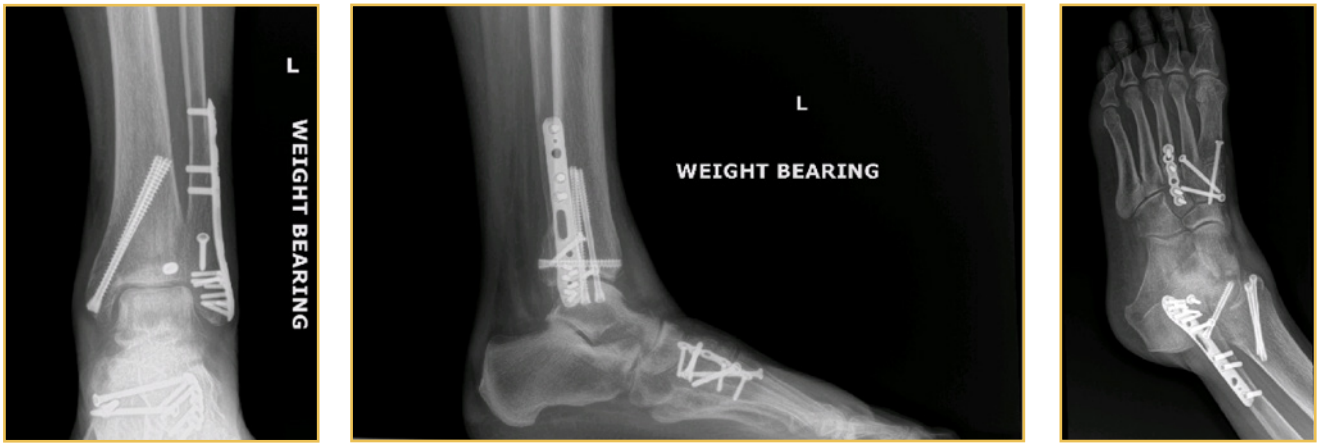
Following regional block administration and supine positioning, the Medartis Ankle Trauma System 2.8/3.5, Foot 2.8 set and 5.0 mm CCS screws were verified sterile. The lateral malleolar fracture was first reduced, length restored, and fixated with a 3.5 mm interfragmentary screw and neutralization plate construct using a contoured distal fibula plate with flap for Wagstaff fixation. The medial malleolar fragment was then bi-cortically fixated using a 5.0 mm partially threaded CCS screw, and then a de-rotation screw was placed, a 5.0 mm fully threaded CCS screw. Finally, a 5.0 mm fully threaded CCS screw fixed the posterior malleolus fracture in a posterior to anterior direction. The lisfranc complex was fixated last in a percutaneous fashion following manual clamp reduction. This was achieved with three 3.5 mm cortical screws to restore the keystone of the arch and a 2.8 mm bridge plate at the 3rd TMTJ due to comminution. Layered closure was performed with subcuticular stiches, and a padded below-knee jones compression splint was applied.

Three Weeks Postoperative

At three weeks postoperative, the splint and sutures were removed. A controlled ankle motion boot was dispensed, and the patient was instructed to begin self directed physical therapy including passive and active ROM exercises outside of the boot. Non-weight-bearing was maintained until seven weeks post-injury.

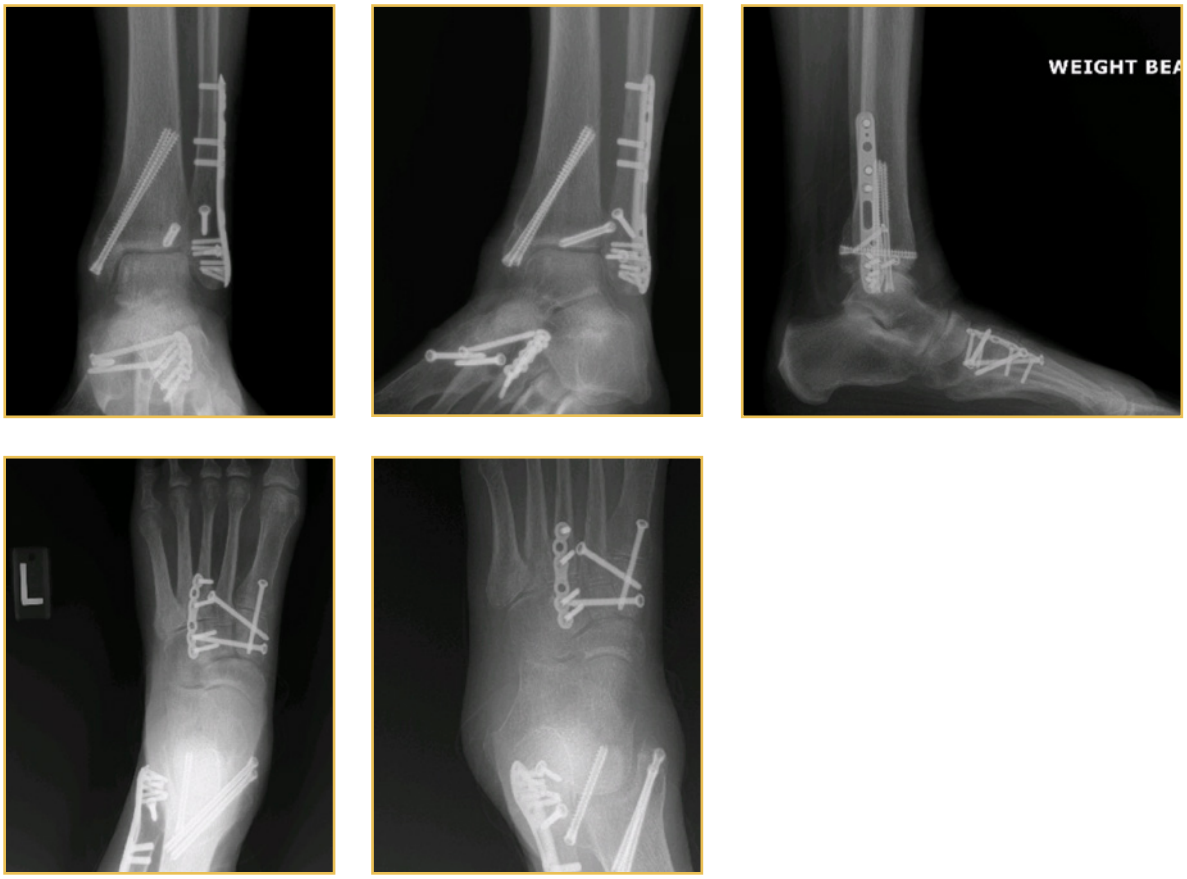
Seven Weeks Postoperative

The X-Rays taken at seven weeks postoperative showed excellent alignment and adequate trabeculation and bone healing to begin partial weight-bearing in the boot. Continued ROM was encouraged and formal physical therapy was initiated the following week.



Eleven Weeks Postoperative

The eleven-week postoperative x-rays showed sufficient healing to transition to full weight-bearing to the patient's tolerance. The patient was then allowed to gradually transition to full weight-bearing with a lace-up ankle brace in a supportive shoe. A plan for Lisfranc joint hardware removal was discussed to be performed at the 16-week mark. All normal activities of daily living were resumed at this time.



Sixteen Weeks postoperative

The patient underwent midfoot hardware removal as an outpatient, which healed uneventfully. She has been transitioned to an ankle foot orthosis (AFO) to assist with foot drop.

Lisfranc hardware was removed at 16 weeks.

Surgeon's Notes

Complications due to traumatic injury, particularly periarticular, segmented, or fragility fractures in a weight-bearing limb, require important treatment considerations to return the injured to early weight-bearing.

The Medartis ankle and foot fracture systems in conjunction with the CCS cannulated screws allow for a versatile combination of internal fixation in scenarios where precise screw placement is required and multi-joint preservation is critical. With all plate holes providing axial variability, locking potential, and low profile grade 4 titanium, the system allows confident implantation of hardware and empowers the surgeon with freedom from fixed screw orientations. This is paramount when bone quality is of concern and when early weight-bearing is planned. The system allows for accurate and precise hardware placement , immediate stability, and reduction of the fracture fragments while allowing biologic preservation to allow healing due to soft tissue sparing, anatomic hardware design. This patient consented to this publication and continues to do well at 11 months post-injury.