Atrium Health Musculoskeletal Institute

Carolina NeuroSurgery & Spine Associates

OrthoCarolina

Challenging Ankle ORIF: Elderly & Neuropathic

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What makes standard ankle fractures challenging?

- Fracture Pattern
  - Segmental Fibula
  - Comminution
  - Posterior Malleolus fractures
  - “Pilon” variants
    - Large posterior malleolus
    - Articular impaction
    - Vertical shear medial malleolus
- Ligamentous Injuries
  - Syndesmosis
  - Deltoid

Case 1: Segmental Fibula Fracture

- 26-year-old male
- Dirt bike accident
- PMH: chewing tobacco
- Injury
  - Segmental high fibula fracture
  - Syndesmosis Tear
  - Deltoid Tear
- Surgery: ORIF, Syndesmosis & Deltoid Recon

Follow-up – “No complaints”

2 Weeks

4+ Months

Case 2: Pilon Variant, Comminution

- 53 yo female
- Healthy
- Injury
  - Lateral Malleolus
  - Deltoid
  - Posterior Malleolus
- Surgery: ORIF

CT: Fibula and Posterior Malleolus Comminution

Intra-Operative

Post-Op: 4.5 Months

- Mild Soreness
- 5 degree dorsiflexion limit
- Needed PT
- Almost back to regular activities

Next Level: The Elderly

Preoperative Risk Factors

- Incidence by Age
  - 23.5% over 60
  - 4.6% over 80
- Soft Tissue
  - Friable skin
  - Less soft tissue pliability
  - Higher surgical site infection rate
- Medical
  - Osteoporosis
    - More frequently women
  - Tobacco
  - Metabolic syndrome (HTN, DM2, CHF, etc.)

R.C. Scheer et al. / The Journal of Foot & Ankle Surgery 59 (2020) 479–483

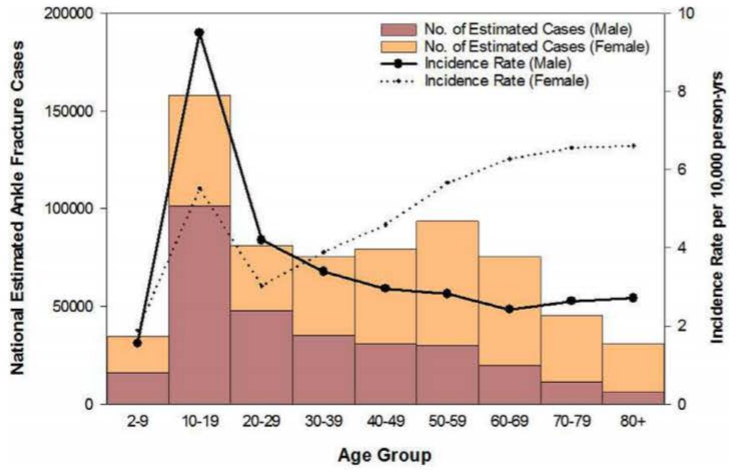


Fig. 2. Incidence rates of ankle fractures based on sex and decade of life.

Incidence and risk factors for surgical site infection after open reduction and internal fixation of ankle fracture

A retrospective multicenter study

Yaning Sun, MD[a], Huijuan Wang, MD[b], Yuchao Tang, MD[a], Haitao Zhao, MD[a], Shiji Qin, MD[a], Lihui Xu, MD[c], Zhiyong Xia, MD[d], Fengqi Zhang, MD[a,*]

Comparison of risk factors for postoperative complications across age groups in patients undergoing ORIF of the ankle

Haley M. McKissack, Gean C. Viner, Aaradhana J. Jha, John T. Wilson, Matthew C. Anderson, Gerald McGwin Jr., Ashish B. Shah*

Next Level: The Elderly

- Intraoperative
  - Comminution
  - Articular impaction
  - Poor fixation
  - Difficult syndesmotic reduction
- Postoperative
  - Poor balance
  - Less self-reliance

Case 3: Low Energy Fall

- 73-year-old female
- Tripped over her dog
- PMH: Osteoporosis
- Injury:
  - Trimalleolar Ankle Fracture-Dislocation
  - PITFL = 40-50% syndesmosis strength
- Surgery: ORIF

3 month follow-up… then lost

- Fixation
  - Andonized titanium plate
  - Distal locking screws
  - Posterior offset syndesmosis holes
  - Appropriate screw trajectory
- Post-Op
  - Motion okay at 2 weeks
  - NWB until 6 weeks

Case 4: Slip and Fall at a Gas Station

- 77-year-old female
- PMH:
  - Prior pulmonary embolism on Plavix
  - Malig hyperthermia
- Injury
  - Trimalleolar Ankle fracture
  - Comminution
  - Swelling and fracture blisters
- Surgery: ORIF
  - How to reduce fibula?

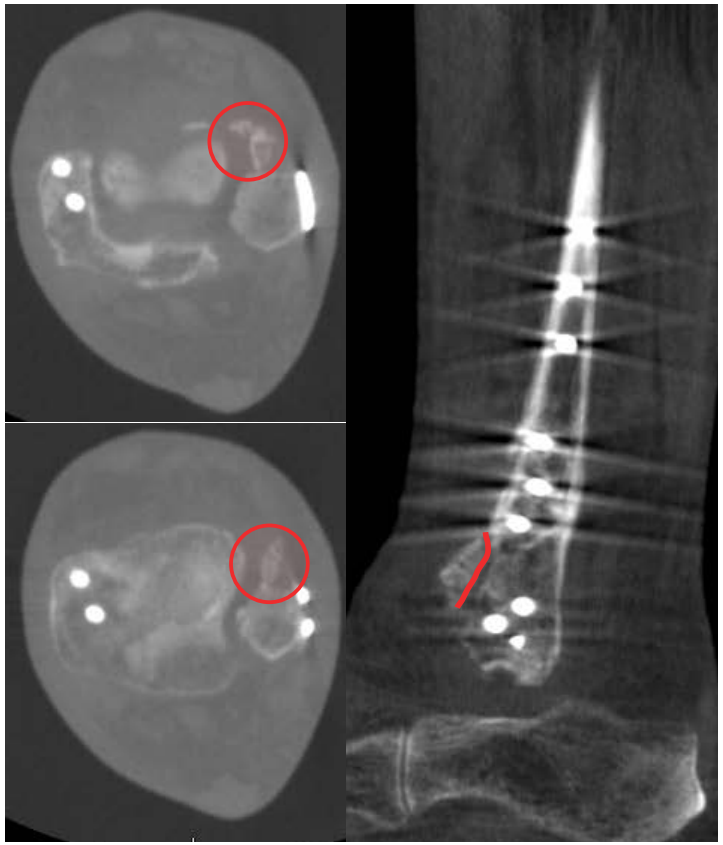
Post-Op Progression

6 Weeks

3 Months

Anterolateral Ankle Pain

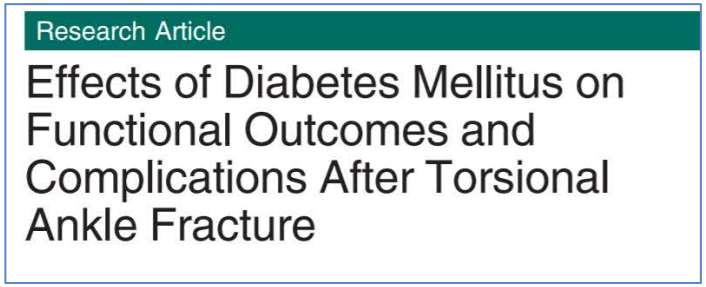
Nonunion Fragment, Healed Fibula



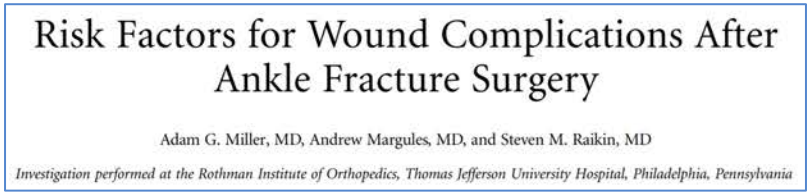
Hardware, Fragment Removal

Purgatory: The Neuropathic

- Diabetes in Ankle ORIF
  - 6x wound complications
  - 5x deep infections
  - 2x secondary procedures
  - Worse FFI activity limitation scores
- Neuropathy
  - 15x wound complications (2x that of open fractures)
  - Independent predictor of would FFI total and disability scores


Research Article

Effects of Diabetes Mellitus on Functional Outcomes and Complications After Torsional Ankle Fracture


Risk Factors for Wound Complications After Ankle Fracture Surgery

Adam G. Miller, MD, Andrew Margules, MD, and Steven M. Raikin, MD

Investigation performed at the Rothman Institute of Orthopedics, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania

Case 5: Neuropathic Ankle Fracture

- 62-year-old male
- Nov ’18 – Seizure-related fall with unstable ankle fracture
- PMH: Seizure disorder (Keppra), Asthma
- Splinted, NWB
- Lost to follow-up

5 months later…

- Apr ‘19 – presents to our clinic
- Has been walking for 5 months
- Neuropathy?
  - Recent A1c 5.3
  - Alcohol abuse/ dependence history
  - No chemo history
  - 62-years-old
  - No autoimmune disease
- Plan?
  - Ankle +/- Subtalar Fusion

TTC Arthrodesis, Fibula Resection

Post-Op Recovery

Restrictions

- NWB until 6 weeks
- Allowed to advance to WBAT based on radiographs
- Cast until 6 weeks, then boot
- Back to regular shoes @ 3 months
  - Rocker bottom
- Lost to follow-up…

3 month x-rays

Case 6: Neuropathy, Dislocation, Infection

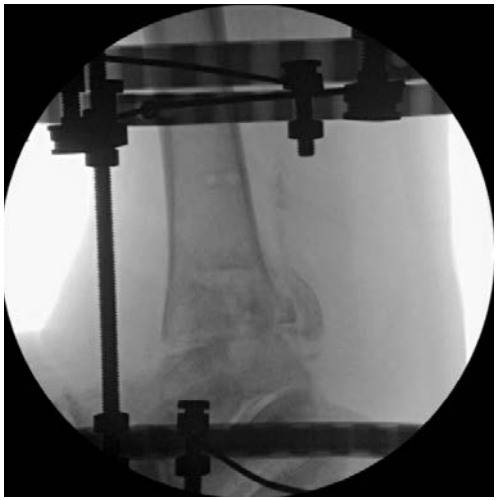
- 63-year-old female
- PMH: Lupus, RA, Phospholipid Antibody Syndrome, BMI 40
  - Actemra (Tocilizumab)
  - Arava (Leflunomide)
- Problems
  - ORIF x 2 by another surgeon
  - Dislocation
  - Draining lateral wound
  - Cultures @ 2nd Surgery: Proteus, Enterobacter
  - Vanc → Acute Kidney Injury
- Salvage vs. BKA?

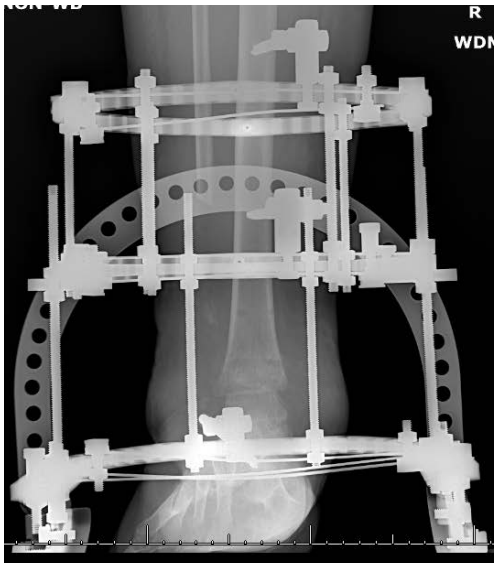
Why did this fail?

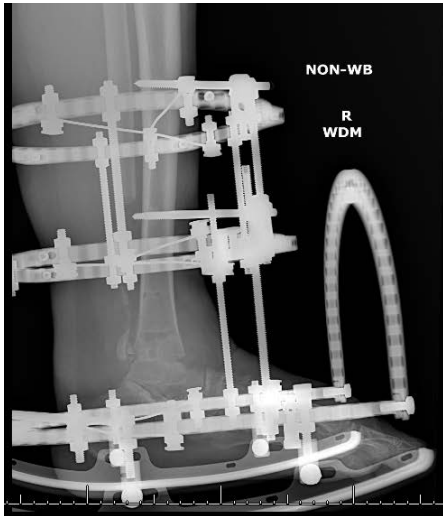
- Combination of Factors!
- Patient Factors
  - Neuropathy
  - Osteoporosis
  - Infection from the beginning!
- Technical
  - Posterior malleolus impaction, not addressed
  - Okay to get a pre-op CT, especially in the elderly and neuropathic!

Plan: Make a Problem List

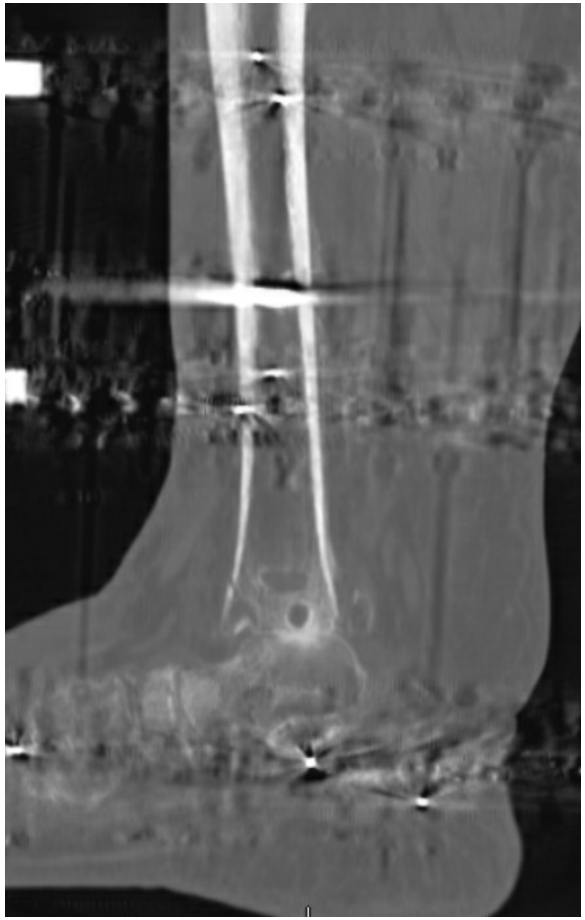
- Problems
  - Ankle Dislocation → Reduction
  - Distal Tibia Degeneration → Arthrodesis
  - Infection → Debridement, Cultures, Antibiotics
  - Contaminated Hardware → Removal
  - Fixation → Frame

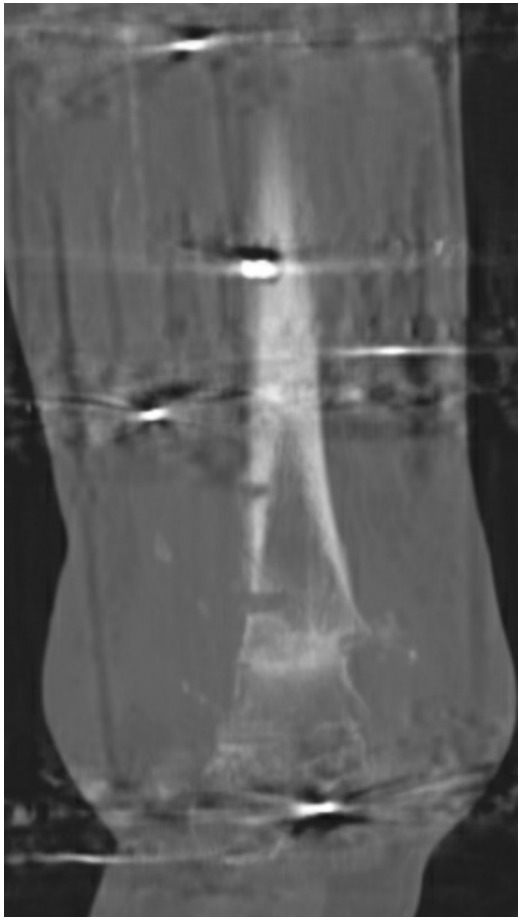






3 month CT Scan → Frame Off





Always Expect the Complications with Neuropaths!

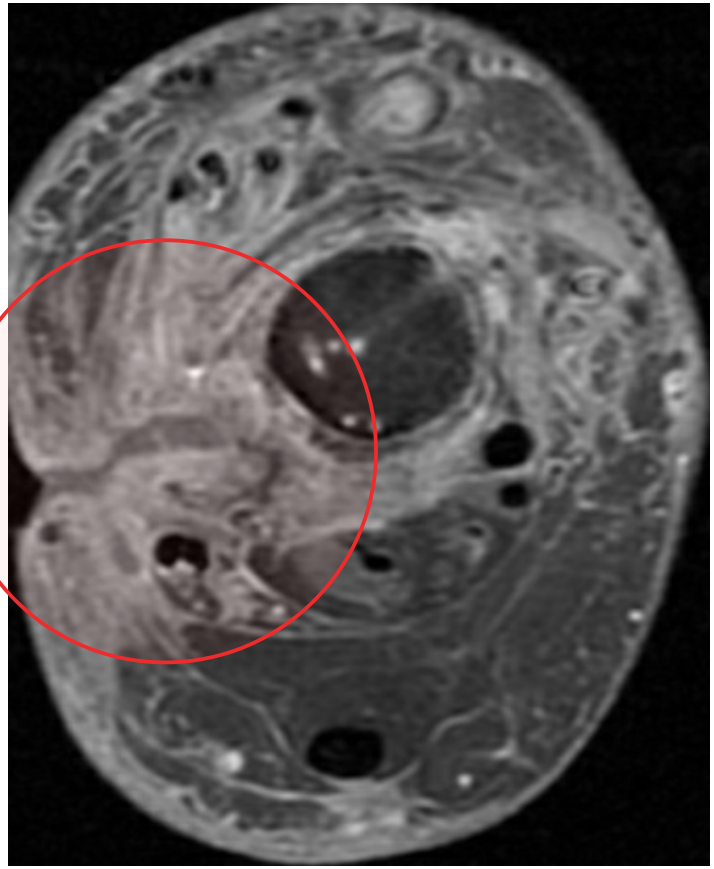
2 weeks post-frame removal

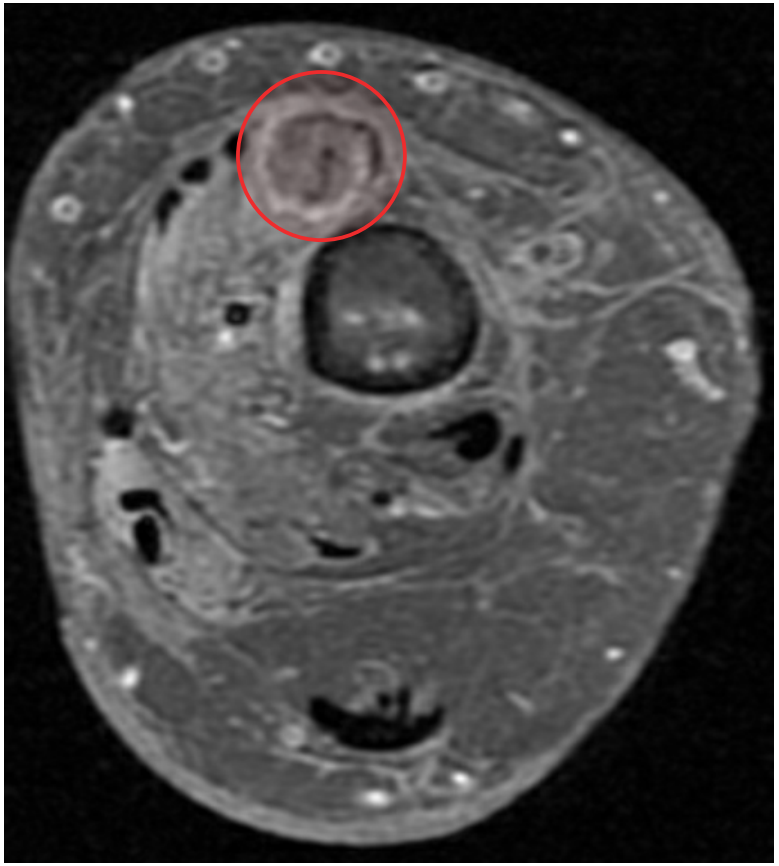
- Persistently painful with weight-bearing
- Scant anterior pin tract drainage
- Plan: Keep in a cast, WBAT, 2 week follow-up

4 weeks post-frame removal

- Cast removed
- Lateral wound, which had previously healed, is now dehisced and draining! (1.5 x 3 cm)
- Anterior pin site draining more
- Medial pin site abscess
- Plan: MRI
  - Eval for osteo
  - Eval for abscesses
  - Debridement vs. BKA

T1 + C: Multifocal deep infection; no obvious osteomyelitis





6+ months out, doing well

- Underwent I&D, cultures for deep infection
- Culture-specific antibiotics
  - Cultures from first surgery were negative!
- Remains on oral antibiotics
- Treatments:
  - Compression socks
  - Cane
  - PT for gait training and strength
- Finally able to walk without much pain
- Underwent 5 total surgeries, including 3 for salvage!

Take Home Points: What can you do?

Elderly

- Evaluation:
  - Mind the soft tissue envelop!
  - When in doubt, get a CT scan
- Intra-Op:
  - Fix the simpler fractures first
  - Reduce the fibula using the plate
  - Use stiffer locked constructs and syndesmotic screws!

Neuropathic

- The highest risk group for wound complication and deep infection
- Why are they neuropathic?
  1. Diabetes
  2. Alcoholism
  3. Chemotherapy
  4. Age-Related (Idiopathic)
  5. Autoimmune Disease and DMARDs
- Go big with fixation, consider TTC and/or fusion

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