Complications following Upper Extremity Trauma

Benjamin Rogozinski, MD
Wellstar Atlanta Medical Center

Disclosures

• No relevant disclosures

The Patient

• 34 yo male presents to the Emergency Department with an open forearm fracture after hopping a fence and falling onto his right arm
• No other injuries
• 2pm
The Patient

- Past Medical History: right forearm fracture as child
- Social History: no tobacco
- Current Medications: none

The Patient

- Exam:
  - 5mm volar wound at distal third of forearm
  - “Mild contamination”
  - Doesn’t appear to have tendinous injury
  - Sensory intact, motor intact, vascular supply intact

Injury X-rays
Immediate Plan

• Tetanus and IV antibiotics in ED
• Splint for comfort
• I&D, ORIF in the morning
• IV Ancef 2g q8h

Review

• Healthy young man sustains an open forearm fracture, GA I
• Contamination of fracture with flecks of dirt, not caked in “Georgia clay”
• Healthy host, doesn’t smoke
• Plan to washout and fix in the morning, interim antibiotics

Surgical Planning

• Open fracture management
  Timing of surgery
  Timing of antibiotics
• Surgical approach
• Fixation
  Plate, nail, external fixator
Open Fracture Management

Surgical Approach

Post-traumatic radiocapitellar synostosis after forearm fracture osteosynthesis.

Fixation
Surgical Goals

• Adequate debridement of skin, soft tissues, bone
• Restoration of radial bow, forearm length, and rotation; cortical opposition; compression
• Anatomic reduction and fixation

Next Morning

Postoperative Imaging
3 Months Post Op

- WBC: 13.4, 75% Neutrophils
- CRP 0.4
- ESR 8

Reconstruction – 2 Weeks Later

- WBC: 13.4 → 8.6, 50% Neutrophils
- CRP 0.4 → 0.8
- ESR 8 → 17
Surgical Planning

- Revision of nonunion vs infected nonunion
- Hardware failure
  - Restoration of radial length and bow
  - Allograft cortical/cancellous
  - Bridge plating with cancellous autograft
  - Compression plating of tricortical iliac crest autograft
  - Acute shortening
  - Vascularized graft
  - Bone graft augments?
- Infected nonunion
  - Antibiotics in interim?
  - Staged procedure?
  - External fixation?
  - Multiple debridements?
  - Local antibiotic delivery?

Reconstructive Options

- Allograft cortical/cancellous
- Bridge plating with cancellous autograft
- Compression plating of tricortical iliac crest autograft
- Acute shortening
- Masquelet
- Vascularized graft
- External fixation with bone transport
- Bone graft augments?
- Plate fixation
- Nail fixation
Reconstructive Options

Reconstruction – 2nd Look

Infectious Disease Consultation

- Surgical culture positive for *Enterobacter cloacae*, pan-sensitive except for cefazolin
- Surgical pathology consistent with inflammation and granulation tissue
- Patient refused home intravenous antibiotic therapy, prescribed oral Levaquin and Rifampin for 6 weeks
Pearls and Pitfalls

Don’t be afraid of the initial debridement of open fractures
Don’t forget about local antibiotic delivery
Don’t forget about the Masquelet technique for segmental bone defects
Understand the radiographic signs of osteomyelitis vs normal bone healing