ANKLE FRACTURES: OSTEOPOROTIC and NEUROPATHIC

- **INTRODUCTION**
  - Osteoporotic Fractures
    - 3rd most common fracture in elderly patients
    - Among the most common fractures sustained by women
    - Peak incidence is in females 75 – 84 yrs.
    - Incidence rose from 369 in 1970 to 1545 in 2000
  - Neuropathic Fractures
    - One in 10 Americans are afflicted with diabetes
    - Each year 260,000 Americans sustain ankle fractures, 25% require surgery
    - 6% of these patients are diabetics
  - Medical co-morbidities of patients
    - Neuropathy (more often in diabetics)
      - 40% will develop this within first decade of onset
      - 10% have it at time of initial diagnosis
      - >50% of patients over 60 years of age have some form
      - Leads to delay in diagnosis and noncompliance of treatment
    - Arthropathy
      - Osteopenia
      - Abnormal osteoclastic activity
    - Angiopathy
      - ABI may be helpful but may be falsely elevated due to arterial calcinosis making vessel less compressible by the cuff
      - May need toe pressures or transcutaneous O2 measurements to evaluate flow
    - Delayed fracture and wound healing
      - Hyperglycemia produces nonenzymatic glycosylation of proteins
      - This alters the mechanics of wound healing
    - Immune dysfunction
- Infection rate is higher in diabetics vs. nondiabetics
  - Malnutrition
  - Precarious soft tissues
  - Non-compliance
  - Surgical treatment of ankle fractures in diabetics is associated with major complications (amputation, infection, nonunion) in 30-43% of patients

### PATIENT EVALUATION

- **History**
  - Mechanism of injury
    - High or low energy
  - Timing of injury
    - If fracture identified > 24 hours after injury need to check for neuropathy

- **Physical Exam**
  - Check skin for any lesions or wounds
  - Check circulation: may need to obtain toe pressure readings, transcutaneous O2 or TBI levels
  - Check for neuropathy using Semmes-Weinstein monofilaments- most often this is very obvious
  - May need a vascular consultation

- **Laboratory**
  - Check for malnutrition
  - Evaluate hemoglobin A1C levels
    - Levels $\geq 6.5\%$ higher rates produce more complications, poor outcomes and the need for more revisions
    - Post operative glucose < 200 is essential to minimize infection risk

- **Radiographs**
  - Standard AP, Lateral, mortise of ankle or films of foot

- **Check circulation**

### TREATMENT

- **Goals**
• Stable bony anatomy of the foot or ankle
• Restore function
• Prevent complications leading to loss of limb or death
• Patient fits easily in accommodative shoes
• Able to stand or weight bear for long periods

o Non-operative care
  • Indicated for non-displaced stable ankle fractures that can tolerate WBAT
  • Beware of casting if neuropathic- skin checks essential
  • May need weekly or biweekly radiographs to document reduction
  • Protective braces may be needed for additional 2-3 months

o Operative care
  • **Golden Rule:** Double the amount of fixation, the time of non-weight bearing, the number of office visits and period of immobilization
  • Shortening acceptable in Diabetics, avoids Starling’s principle
    • Neuropathic Patients
    • Poorly controlled DM
  • Fusion
    • May be best option in some patients
  • **Extend beyond zone of injury**
    • Use of strongest device tolerated by soft tissue envelope

o Fixation of the Ankle
  • Standard small fragment fixation can be used on non-osteoporotic, non-neuropathic, palpable pulses, BMI < 25 with good sugar control.
    Otherwise think about locking systems
  • Additional treatment may be necessary
    • Transarticular fixation through the heel with Steinman pins
    • Trans-syndesmotic fixation of the tibia and fibula – FIBPROTIB
    • Neutralization ex fix may be necessary – **beware of pin loosening in neuropathic patients**
Intramedullary devices in the foot or ankle may be needed to obtain adequate fixation and alignment of the joints.

- Sometimes shortening bone may be necessary to obtain adequate contact
  - Post-operative care
    - Immobilize and maintain touch down weight bearing longer than usual

REFERENCES


