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 O_2 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 O_2 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**
    - 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
    - Operative care
        - **<u>Golden Rule:</u>** 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**
    - **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

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