Ankle Fractures in Diabetic Patients

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Goals
1. Explain Why Diabetes Poses Unique Challenges
2. Demonstrate the Proper Workup
3. Discuss Treatment Options
4. Teach Technical Tricks
5. Present solutions to complications

Patients with complicated diabetes present the real problem

Major Risk Factors ("complicated diabetes")
- Peripheral neuropathy
- Nephropathy
- Surgery duration
- Hemoglobin A1c levels >6.5 / 7%
- Peripheral vascular disease

Open fractures – add further complexity and risk (high rate of BKA)

White CB, et. Al. COOR. 2008
Costigan W, et. Al. JBI. 2008

Discharge database - 57,183
Complicated Diabetes: 3 to 5 fold Increase in Complications

Wukich DK, et al. FAI 2011
- Complicated –
  - 3.8X – overall complications
  - 3.4X – (malunion, nonunion or Charcot arthropathy)
  - 5X – revision surgery/arthrodesis
  - Open ankle fractures – 3.7X rate of infection.

Jones KB, et al. JBJS Br. 2005
- 47% vs. 14%

Therefore – Think Differently

Work-up - History

Be thorough
Multiple medical comorbidities
Are glucose levels optimal
- (Better wound healing and lower risk of infection) (Check HgA1C)
Can you modify anything to improve results (Smoking)

Work-up – Physical Exam

PHYSICAL EXAM
- Is blood flow adequate (Vascular consult)
- Is the patient neuropathic (PW Monofilaments)
- Skin condition?
- Is Upper Body Strength Adequate for crutches or a walker?
- Living Arrangements i.e. stairs
Multidisciplinary Approach

- Close coordination with the medical team
  Endocrinology
  Vascular Surgeon
  Physical Therapy – preop
  Rehab / Physiatrist
  Nutritionist
  Plastic Surgeon
  Infectious Disease

Choose treatment based on the fracture. Non operative treatment should only be used for stable fractures.

Plynn JM, et al. Foot Ankle Int. 2000

- Nonop Tx.
  - 4/6 with casts infected vs. 0/5

McCormack RG, et al. JBJS Br. 1998

- Nonop Tx.
  - High incidence of loss of reduction and malunion

Treatment

Same indications for nonoperative and operative treatment

- Stable fractures do not require surgery
- Casting must be meticulous (TCC technique)
- Prolonged immobilization (2X)
Treatment

- Unstable fractures require surgery

Thought Process

Non-neuropathic –
- Similar treatment to non-diabetic patients
- Still increased risks
- Longer healing times (double immobilization and weight bearing precautions)

Neuropathic –
- Much higher risk for failure
- Think out of the box
- Extra fixation
- Simple trauma becomes a limb threatening injury

Adjunct Fixation – “Spike Pins”

Jani MM, et. Al. FAI 2003
- Prolonged immob and NWB
- Pins removed at 12 – 16 wks
- 25% major comps
- 2/16 amputations
Adjunct Fixation - Multiple Syndesmotic Screws

- Post-op – NWB / cast – min. 3 mos.

Better Fixation Techniques

LOCKING PLATE TECHNOLOGY

MIPO
Likely better for the soft tissue and osseous healing

Adjunct External Fixation

Advantages –
- Very Stable
- In theory
  - patient can be WBAT
- In Reality
  - Patients can still walk and displace their fractures
Advantages of External Fixation

Can construct "bypass frames"
All weight is transmitted from floor to tibia
Own set of complications

Increased Risks with External Fixation in Diabetics

Jones, CP, et al. FAJ 2014
- Tibial stress fractures 10 pts.
  - (16.7%) - ½ pins
  - (1.5%) - tensioned fine wires

Wukich DK, et al. FAJ 2008
- Diabetics - 7-fold risk for any wire complication

What Do You Do When Presented With Failed Treatment?
Define the Reason for Failure

- Infection – Treat until healed then remove hardware
- Dehiscense - VAC, plastics, etc.
- Failed Fixation – Revise ORIF vs. Fusion (joint destruction)
- Complex failure – Infected and failed fixation – treat both as above or consider amputation

Case

62 y.o. woman s/p fall
Standard treatment for an unstable ankle fracture
- However fracture displaced
- Asensate!!!

Case

Revision ORIF – Multiple syndesmotic screws
Supplemental Ex-fix
Case

Healed with some valgus
Functional
Back to work as Mayor (after her tibial fracture)

Case - Failed ORIF

• 48 y.o woman s/p fall at work
• Walked on it "for a while"
• Closed injury
• Treated with ORIF –
  • Failed fixation
  • Early Charcot
  • Wound dehiscence and deep infection

Case - Failed ORIF

• Debridement
• AMK spacer
• Delayed fusion
• Patient walked/fell into severe valgus
• Fix revised with bypass frame
Case - Failed ORIF

- Healed with valgus
- Ambulatory in shoes with AFO
- Has returned to previous job

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Case

65 yo woman
Neuropathic
Fell on Friday, walk difficulty, came to...
Summary

The Real risk is in pts with “complicated diabetes”
These are limb threatening problems in some patients
Treat the same as you would patients without diabetes, but
    - Immobilise and keep non-weight bearing 2X as long
    - Think out of the box surgically
Understand the major risk factors and modify what you can
Deal with complications immediately
Team Approach

Thank You