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)

Shibuya N, et. Al. J Foot Ankle Surg.
Liu J, et. Al. Orthop Surg. 2013
SooHoo NF, et al. JBJSAm. 2009
- Discharge database - 57,183

Costigan W., et. Al. FAI. 2007
White CB, et al. COOR. 2003

Complicated Diabetes
3 to 5 fold Increase in Complications

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

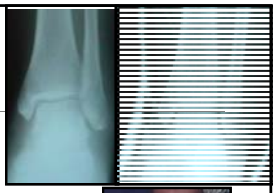
Flynn JM, et al. Foot Ankle Int. 2000

- **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

Perry MD, et al. J Surg Orthop Adv. 2005
- 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"

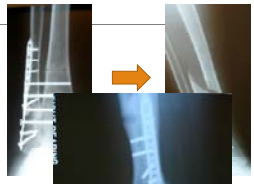
All weight is transmitted from floor to tibia

Own set of complications

Increased Risks with External Fixation In Diabetics

Jones, CP, et. Al. FAI 2014

- Tibial stress fractures 10 pts.
  - (16.7%) - ½ pins
  - (1.5%) - tensioned fine wires



Wukich DK, et al. FAI. 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

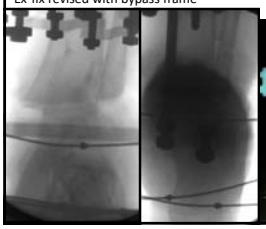
Back to work as Mayor (after her tibial fracture)

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
- ABX spacer
- Delayed fusion
- Patient walked/fell into severe valgus
- Ex-fix revised with bypass frame



Case - Failed ORIF

Case - Failed ORIF

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

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
- Immobilize 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