Jones Fractures
How to Fix Them the First Time and When Fixation Fails

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Wukich, DK., Et. AL

Goals

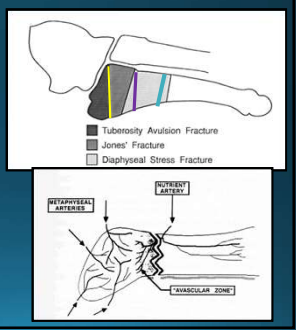
- To define Jone's fractures
- To explain why they are at high risk for nonunion
- To learn how to treat nonunions after nonoperative treatment
- To learn how to treat nonunions after operative treatment

Nonunion Is a Real Problem - Especially for Nonoperative Treatment

- Systematic Literature Reviews
  - Yates J., et. Al., Foot (Edinb). 2015
    - Non-operative(29/122) VS. operative (3/115)
  - Dean BJ., et. Al. Foot Ankle Spec. 2012
    - Non-op:
      - Nonunion (OR 5.74)
      - Slower healing - 16 wks vs. 7 wks.

Definition of "Jones Fracture"

- Sir Robert Jones 1902
- 4-5 articulation
- **Poor blood supply** (Distal zone 2 and zone 3)
- Difference between proximal and distal zone 2 fractures?
- Difference between zone 2 and 3?
  - NO
    - Chuckpaiwong B., et. Al., CORR, 2008
    - Clinical outcomes – no different



Defining the "Jone's Fracture"

- Is the fracture acute or chronic?
- Is it a stress fracture?
- Is there sclerosis?
- Torg classification I, II, III

History

- Acute Fracture:
  - Pain - lateral midfoot
  - No premorbid symptoms

- Chronic / stress fracture:
  - Pain - lateral midfoot
  - Prodromal pain
  - Eventual completion of fracture with increase in pain

Physical Exam

- Tenderness at base of fifth
- Must evaluate for mild or significant cavus
  - Peek-a-boo sign
  - Coleman block test

Imaging

- Look for cortical Thickening
- Look for IM sclerosis
- Look for signs of cavus
- If uncertain use CT

Conservative Treatment (Acute Fracture)

- Cast Vs. Cam Boot
- 4-6 week period of non-weight bearing
- Continue protection until healed or until surgery is chosen
- Bone growth stimulator?

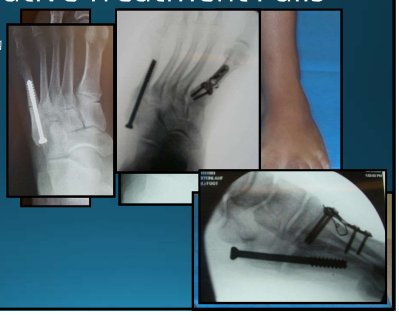
- 60 y.o. man s/p "trip off of curb"
- Sedentary life style

Predisposing Factors to Nonunion

- Hindfoot Varus
- O'Malley M., et. Al., FAI, 2016 Jan
  - 3 of 10 - refracture after surgery
  - Metatarsus adductus
  - Fifth metatarsal that was curved with a prominent base

When Conservative Treatment Fails

- Define failure:
  - 6 weeks vs. 12 weeks without healing
- Define etiology for failure:
  - Mild or significant varus
  - Walked to soon without protection
- Treatment options (Nonsurgical):
  - Bone growth stimulator
  - Non weight bearing cast
  - High Intensity Ultrasound
- Treatment options (Surgical):
  - Intramedullary screw
  - Correct varus
  - Additional biologic stimulus ???



Conservative Option for Varus?

- Orthotics:
  - Raikin SM, et. Al. AJSM 2008
    - 4.5-mm cannulated screw
    - 18/21 - varus
    - Postoperatively - posted orthotics
    - 100% - union, return to activity level, no refractures

What To Do When Surgery Fails

- Define reason for failure:
  - Mild or significant varus
  - Technical issues
  - Hardware issues
    - Small screw
    - Cannulated screw
  - Systemic Issues
    - Metabolic (DM, Vit D deficiency)

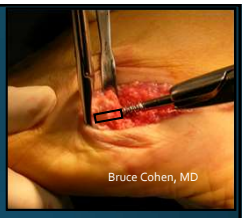
- Glasgow MT., FAI 1996
  - 11 - (3-DU, 1-NU, 7 – refracture)
  - Etiology –
    - Small screws,
    - Poor preparation of the bone
    - Early return to vigorous activity
- Granata JD, et. Al., Foot Ankle Spec. 2015
  - 4/55 second surgery (refracture)
  - Failures - small screws

Operative Treatment

- Surgical Approach:
  - Minimally Invasive – Fine for acute fractures and some stress fractures
  - Open approach (Direct lateral) – Better for Nonunions, Refractures, Stress fractures with gapping

Operative Technique

- Remove Broken hardware (Cortical window if needed)
- Prepare the nonunion site (get to bleeding bone)
- Realign the fracture
- New hardware (larger / stronger screw)
- Screws are better than plates
  - Huh J, et. Al. FAI 2015
- Biologic stimulus (BMAC, autograft, Allograft)



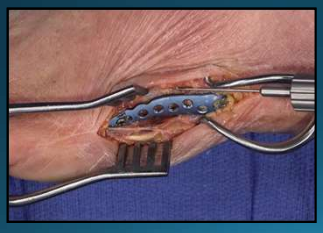
Lareau, CR and Anderson, RB,
JBJS Reviews 2015

Screws

- Solid is better
- Bigger is better
- Long enough to cross fracture
- Short enough to avoid:
  - Penetration of cortex
  - Unintentional straightening of curved metatarsal (fracture gapping)

- Metzl J., et. Al. FAI 2013
  - Indication specific screw versus traditional screw (solid 4.5 to 6.5mm screws?)
  - Both –
    - union above 95%
    - similar good outcomes
  - Traditional (2 implant failures)

Plates are an Option if Needed



Plates are an Option if Needed

- Bernstein DT, et. al. FAI 2018
  - **8 Fractures and Refractures in Elite Athletes**
  - calcaneal bone grafting and plantar plate
  - minimum 2-year follow-up
  - Asymptomatic radiographic union - 100% (6.5 wks), full release - 12.3 wks
  - No hardware issues
- Seidenstricker CL, et. al. JFAS 2017
- 4th and 5th MT fxs
- Evacuation of sclerotic bone, packing with compact cancellous bone, and plate fixation
- 4 patients displayed 100% radiographic union
- F/U – 3.5 yrs.

Postoperative Care

- 4-6 weeks non-weight bearing (Cam boot)
- Allow ankle motion
- Bone Growth Stimulator
- For athletes – Limited weight bearing exercise (pool, alter G)
- After 6 weeks WBAT (Protective shoe wear – steel shank in cleats)
- No sports until pain free and if needed CT confirmation of healing

Results of the Current "State of the Art"

- Screws of appropriate "strength" work for:
  - Acute Fractures
  - Nonunions / refracture

- **Good Results**
  - Thomas JL., et. Al. JFAS, 2011
    - 7 patients, All - healed by 11 wks.
  - Nagao M., et. Al. AJSM, 2012
    - Running – 6 wks., Full – 11 wks.
    - 1 – DU, 1- NU
    - No refracture
  - Lareau CR., et. al. FAI 2016
    - 25 NFL players, acute Jones fracture fixation
    - (12.0%) refractured and required revision surgery
  - Hunt KJ, Anderson RB., AJSM 2011
    - 21 elite athletes with NU or refracture
    - Previous activity level - 12.3 weeks.
    - 1 refracture

Summary

- Prevent the nonunion
  - Surgery – faster more predictable healing
- Look for a predisposing etiology and correct it
  - Mild varus
  - Low Vitamin D?
- Larger / stronger screw of appropriate length
- Be prepared to remove broken hardware
- Additional biologic stimulus

Thank you

Case Study 1 - What is The Diagnosis?

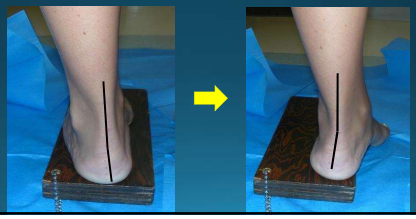
- 30 y.o. woman
- Chronic Anterior lateral ankle pain with recurrent instability
- Lateral hindfoot pain for 3 months


- What is the source of the varus?
  - Hindfoot versus forefoot?



Coleman Block Test

- Does the Coleman Block Test Tell the truth?



- Is there a way to tell if we have corrected the forefoot driven hindfoot varus adequately?
- Is an intraop axial adeqaute?


- At follow up:
  - Still some residual varus



What Did I DO Wrong?

- Should I have
  - Taken a larger wedge out of the first Metatarsal
  - Performed a calcaneal osteotomy?
  - Peroneus longus to brevis transfer, plantar fascia release, etc.?
- She is pain free, hopefully she will stay that way.



Case Study 2

- 18 yo High school football player
- Pain over the lateral border of the foot for "months"
- Severe acute pain at practice 2 days ago
- Getting ready to play college football in a few months
- Options?

Case Study 2