



HAV Complications: Non-unions

Nonunion: A fracture that is a minimum of 9 months post occurrence and is not healed and has not shown radiographic progression for 3 months

Orthopaedic Advisory Panel:
Food & Drug Administration, 1986

“The designation of a delayed union or nonunion is currently made when the surgeon believes the fracture has little or no potential to heal.”

Donald Wiss M.D. & William Stetson M.D.
Journal American and Orthopedic Surgery 1996

Nonunion: How to Stabilize the Situation

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When do they happen?

- ✦ Not often!!!
- ✦ 75 patients (109 feet) with crescentic osteotomy...0 non-unions reported
 - Easley, et al. FAI 17(6), 1996
- ✦ Least common of HAV post op complications
 - ✦ Shortening
 - ✦ Elevatus
 - ✦ Lesser Metatarsalgia
 - ✦ Hallux Limitus
 - ✦ Recurrent Hallux Valgus
 - ✦ Delayed Union
 - ✦ Non-Union




Where do they happen?

- ✦ Lapidus
 - ✦ 5.3% (12 of 227)
 - Patel, et al. JFAS 43(1): 2004
 - ✦ 8% (8 of 201)
 - Thompson, Bohay, Anderson. FAI 26(9): 1995
 - ✦ 6.4% (3 of 47)
 - Catanzariti, et al. JFAS 38: 1999
 - ✦ 9.5% (7 of 65)
 - Myerson. FAI 1992
 - ✦ 10%
 - Hansen. FAI 1989

Pre-Op Factors Influencing Nonunion

- Medical history
 - ✦ DM
 - ✦ Anemia
 - ✦ Vitamin Deficiency
 - ✦ Nutrition
 - ✦ Steroid Tx
- Unrecognized pre-op pathology
 - ✦ Hypermobility




Operative Decision Factors Influencing Nonunion

- Surgical Technique
- ✦ Overzealous soft tissue dissection/periosteal stripping
 - ✦ Wrong procedure...“Let’s just push the Austin”
 - As one approaches the upper limits of a procedure’s ability to correct a deformity, the frequency of postoperative recurrence increases significantly.
 - F. Thompson Orthopedics-1990
 - ✦ Transverse osteotomy in diaphyseal bone
 - ✦ Inadequate fixation
 - Increased motion



Post-Op Factors Influencing Nonunion

- Patient
 - ❖ Noncompliance
 - ❖ Smoking
- Local Factors
 - ❖ Infection

Patient Evaluation

- FIRST RAY EVALUATION
- ❖ METATARSAL CUNEIFORM JOINT
 - MOBILE OR FIXED
 - ❖ Overall Alignment
 - ❖ Associated Pathology
 - SESAMOIDS (SYMPTOMATIC)
 - SOFT TISSUE REALIGNMENT (POSSIBLE?)
 - Equinus
 - Lesser met pathology



Radiographic Assessment

In majority of cases, this is all that is required to confirm nonunion
Examination under fluoroscopy to check for motion may be helpful



Can it be Salvaged?

- ◆ 17 Revisional Lapidus Arthrodesis
- ◆ 82% Union Rate after revision
- ◆ Smoking in all failures
 - ◆ Hamilton GA, et al. JFAS. Vol 46 (6), 2007
- ◆ Most 1ST Met Non-unions Require Preservation of bone and repair of non-union site
 - YU, G. COMP. HAV. MCGLAMRY

Surgical Considerations

- ◆ Must restore alignment in all planes to assure pain relief and function
- ◆ Assess quality, quantity and shape of bone graft required
- ◆ Upfront with Patient (probably upset)
 - ❖ Was ELECTIVE....Not Now
- ◆ Postoperative Regimen
 - ❖ Bone Stimulator
 - ❖ NWB
 - ❖ Smoking Cessation

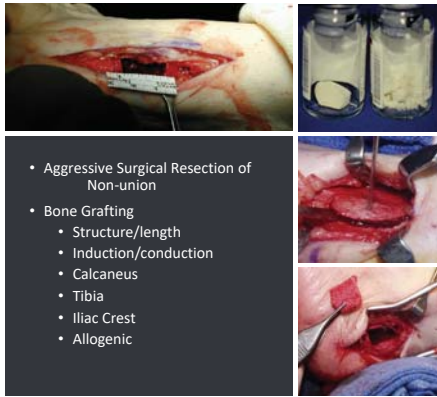


Salvage of HAV Nonunion

- BE AGGRESSIVE
 - Don't be fancy be scientific
 - Goal of One procedure
 - Don't be afraid to Fuse
 - Joint distal
 - Joint Proximal
- DON'T BE IN DENIAL
- INSTITUTE TX UPON IMMEDIATE SUSPICION
- Be Versatile



Surgical Management

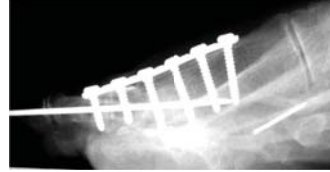


- Aggressive Surgical Resection of Non-union
- Bone Grafting
 - Structure/length
 - Induction/conduction
 - Calcaneus
 - Tibia
 - Iliac Crest
 - Allogenic



Surgical Management

- ◆ Fusion Enhancers
 - ◆ Growth factors
- ◆ Fixation

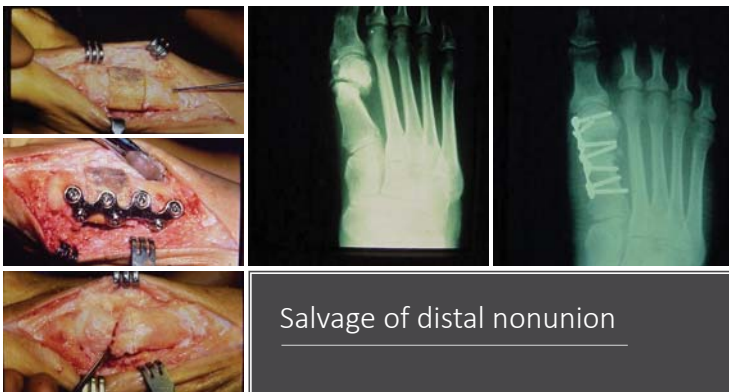


Does Dead Bone + Dead Bone = Failure Autogenic vs. Allogenic

- ◆ Myerson 2000
 - ◆ 24 1st MPI fusions: 8 allografts, 16 autografts
 - ◆ 5 non-unions – all from the autografts
- ◆ Myerson 2005 (IBIS 87A 1)
 - ◆ 75 procedures with structural fresh frozen allograft
 - ◆ 8 first ray cases...1 nonunion...6 non-unions overall
 - ◆ Supports use of allogenic bone
- ◆ Weinraub and Cheung, JFAS 2006
 - ◆ 38/39 fusion sites with screw fixation and allograft and/or DMB healed.
 - ◆ Only 1 site went to nonunion
 - Patient smoked throughout perioperative period
 - Was the only fusion to use DMB only

Salvage of distal nonunion

- Fusion vs. Joint Salvage
 - O'Malley, et al (FAI 1997)
 - 3 nonunion Mitchell
 - All successfully treated with iliac crest graft
 - Grimes and Coughlin (FAI 2006)
 - 33 feet following "failed HAV surgery"
 - 1st MPI fusion for salvage
 - Reliable as salvage procedure
- Depends on amount and quality of distal bone



Salvage of distal nonunion

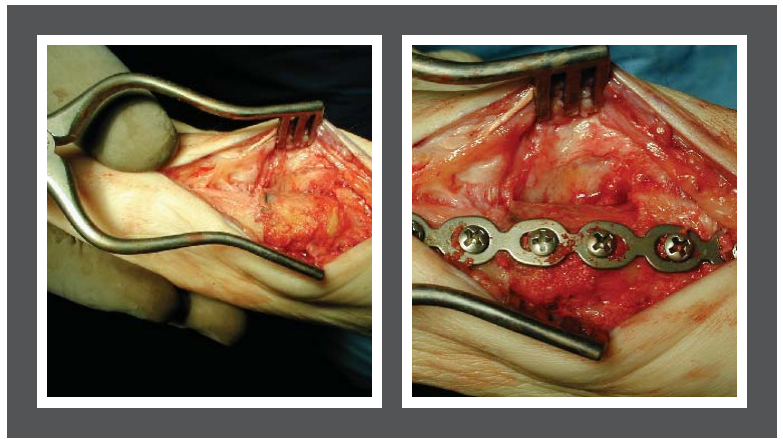
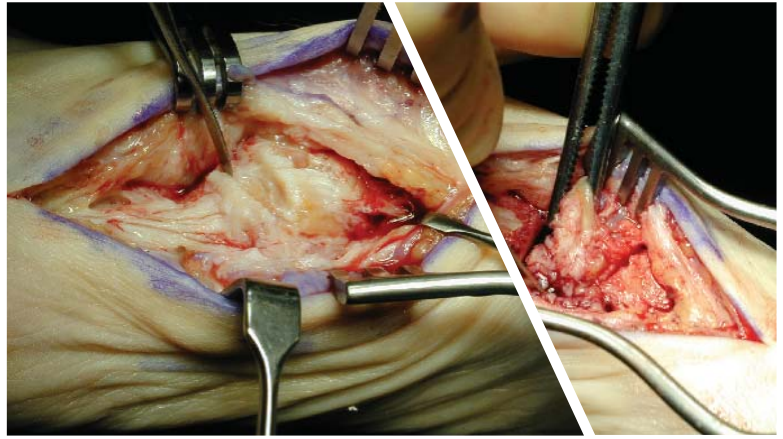
Fusion for Salvage of Distal Nonunion

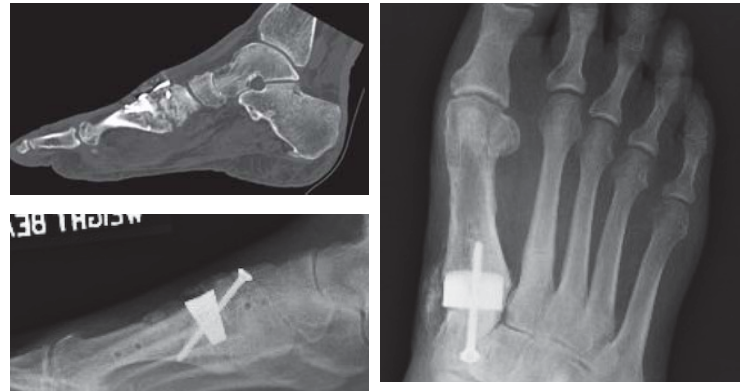
- ◆ Salvage frequently accomplished via 1st MTP arthrodesis
 - ◆ Restores wt bearing to 1st ray
 - ◆ May help improve lesser metatarsalgia
- ◆ In Situ Fusion
 - ◆ Technically easier
 - ◆ Avoid donor site morbidity
 - ◆ More reliable fusion rate (one fusion site)
 - ◆ Toe shortened but acceptable
 - ◆ Tough to get good viable bleeding bone surfaces





6 months S/P Crescentic





General Rule of Thumb

The more complex the surgical procedure initially performed, the more complex the recurrence, and typically the more complex the salvage procedure.

M.
Coughlin Contemp. Ortho.-1991

HAV correction not in initial category but latter is true
elective case gone bad = complex salvage procedure

Nonunion Management

The designation of a delayed union or nonunion is currently made when the surgeon believes the fracture has little or no potential to heal

Definition of nonunion should not limit or prevent appropriate and timely intervention

The best treatment for non-union is prevention"

- Charnley

FASST 

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