Midfoot Injuries: Just Fuse Them!

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32yo M with flag football injury

Fix or Fuse?

1/21/12 ORIF

5/8/12 pain, can't run

12/16/12 still can’t run, painful to walk

2/10/13 Fusion

Failure!

24yo male MCC

Oh yeah, and his foot hurts

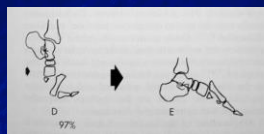
Fix or Fuse?

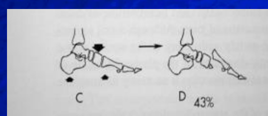
Primary Arthrodesis

I don't want to be back here!

Mechanisms of Injury

- Indirect
  - More common
  - MVC or athletic injury
  - Rarely associated with open injury or vascular compromise
- Direct
  - Less common (crush)
  - Compartment syndrome and vascular compromise more common than with indirect
  - Associated forefoot fractures





Radiographic Evaluation

- Plain Films
  - Displacement >2mm = instability
  - "Fleck sign" is ligament avulsion
- CT
  - Visualize fracture pattern
  - Static images cannot assess stability
- Stress Radiographs
  - Weight bearing best for foot and ankle
  - A single standing AP with both feet on same image is ideal
  - Manual stress
- MRI
  - Correlates rupture of plantar Lisfranc with instability
  - Static image cannot assess stability

Radiographic Evaluation

Gap between 1 and 2

On the lateral view, the metatarsal should not be dorsal to the cuneiform.

Acute Lisfranct joint injuries are often attributed to mechnisms resulting from either high or low energy

	High	Low
Number	33	49
Age	27	28
Tobacco	13, 39%	18, 37%
Missed	7, 21%	9, 18%
Ave time to present	2 days	19, 39% - 6 w/outliers removed
Presented < 24H	28, 85%	25, 51%
Surgery > 6 wk	9, 27%	14, 29%
Mechanism	C 5, MVC 2, MCC 12, HE Fall 8	Sport 33, LE Fall 16
CN Fx	15, 45%	23, 47%
Cub Fx	13, 39%	3, 6%
MTB fx	27, 82%	19, 39%
TMT fleck	13, 39%	30, 61%
Sig IA fx	22, 70%	10, 20%
Prim Lig	4, 12%	28, 57%
All 5 rays involved	12, 23%	3, 6%
Ave # rays	3.8	2.6
Fusion	16, 48%	20, 41%
Anatomic Reduction	31, 94%	47, 96%
Complications	11, 33%	19, 39%
HWR	14, 42%	26, 53%
Revision Surgery	7, 20%	4, 10%
RTD	71%	86%
VAS Ave	2.3	1.6
Painless	24%	43%

Nav Fx High – 5, 15% , Low – 3, 6%

High other foot injuries: 18/33 (55%)
Toe fracture, mt head/neck, calcaneus, talus, compartment sx,
High other injuries: 10/33 (30%)
Bilateral calc, chopart, femur, patella, tibia, plateau, ankle fx

Low other foot injuries: 5/49 (10%)
Toes, mt neck
Low other injuries: 2/49 (4%)
MM, Trimal

Treatment Principles

- Early recognition
- Obtain/Maintain anatomic reduction
  - Displacement >1mm is unacceptable
  - Bones heal, ligaments scar
- Non-operative treatment
  - Stable fractures without ligament disruption
  - NWB in short leg cast for 4-6 weeks
  - Progressive weight bearing afterwards
  - Repeat X-rays periodically
  - Operate if unstable

Treatment Principles

- Essential joints
  - 4^{th} and 5^{th} TMT
  - Motion must be preserved
- Non-essential joints
  - Everything else
  - Rigid fixation or fusion acceptable

- Operative treatment
  - Anatomic reduction and rigid fixation or fusion of the medial and intermediate columns (1^{st}, 2^{nd}, 3^{rd})
  - Lateral column stabilization must be temporary

Outcomes

- 48 patients followed 52 months (13-114)
- AOFAS midfoot score 77 (90/100=normal)
- Musculoskeletal Function Assessment (MFA) score 19 (0/100=perfect)
- 12 with arthrosis, 6 required arthrodesis
- Ligamentous injuries did worse

Kuo RS, Tejwani NC, Digiovanni CW, Holt SK, Benirschke SK, Hansen ST Jr, Sangeorzan BJ. Outcome after open reduction and internal fixation of Lisfranc joint injuries. JBJS-A 2000.

Fusion Vs. ORIF

- Fusion
  - Prospective trial 41 patients, 2 groups
  - 'primarily ligamentous' injury
  - Fused only medial rays (1,2,3)
  - Significantly better outcomes in arthrodesis group using AOFAS scale at 42 months
  - Pre injury function 92% and 65%
  - 5 patients in ORIF group went on to arthrodesis

Ly TV, Coetzee JC. Treatment of primarily ligamentous Lisfranc joint injuries: primary arthrodesis compared with open reduction and internal fixation. A prospective, randomized study. JBJS-A 2006.

Arthrodesis Data

- Fusion
  - Prospective trial 32 patients, 2 groups
  - 'primarily ligamentous' injury
  - Fused only medial rays (1,2,3)
  - Arthrodesis significantly improved bother & dysfunction than ORIF at 2 years (MFA)
  - PA & ORIF both satisfied with surg
  - 12/14 patients in ORIF revision
    - 1/14 arthrodesis
    - 11/14 HWR

Henning JA, Jones CB, Sietsema DL, Anderson JG, Bohay DR. Open Reduction Internal Fixation vs. Primary Arthrodesis for Lisfranc Injuries: A Prospective Randomized Study. *Foot Ankle Int.* 2009:30;913-922

NMCSD Experience

- Arthrodesis versus ORIF or ligamentous Lis Franc Injuries
- MOI: athletics, twisting or fall < 3 feet
- 33 patients: 15 arthrodesis 18 ORIF
- Avg age : 28
- 31 of 33 able to RTFD
- HWR in 13/18 ORIF and 2/15 Fusion
- RTFD 2 months faster in fusion group (4.7 versus 6.7 months)

Summary of Data

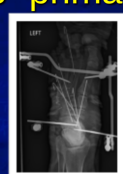
- At 4 years one quarter of all ORIF patient with Lis Franc injuries will have radiographic signs of arthrosis with ½ going onto fusion
- Ligamentous injuries do worse
- Fusion provides equivalent results with fewer secondary surgeries
- Possibly faster return to sport with fusion

My Current Practice

- Primarily ligamentous or delayed presentation-primary arthrodesis

Complex articular fractures/chondral injuries- primary arthrodesis

Bad soft tissues- primary arthrodesis



Thank you

Questions?