

Diabetic Ankle Fractures: Surgery or No Surgery

The "Not-So-Straightforward" Ankle Fracture

Trauma 101: Fracture Care for the
Community Orthopedist, 2018

Ryan Finnan, MD



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- No financial disclosures
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Diabetic Ankle Fractures

"The Rule of 2s"

- Double Everything regardless of treatment choice
 - Fixation, time of nonweightbearing, frequency of follow-up, frequency of cast changes, etc.

Epidemiologic Problem

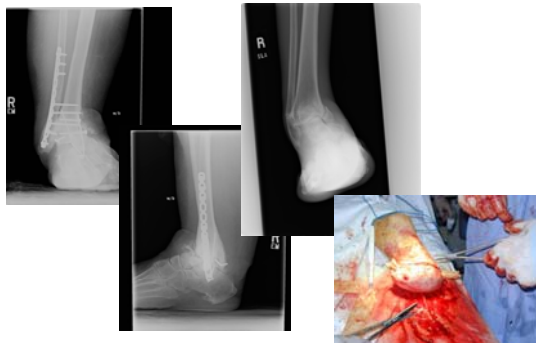
- Ankle fractures among the most common injuries we treat



- Aging population + Increasing prevalence of diabetes = challenging problem
 - We all see them, and they see us



What We Want to Avoid



Why We Should Care About It

- 2005 CDC
 - 20.8 million Americans with diabetes mellitus
 - 7% of the population
 - Over 60 years old, 10.3 million Americans
 - 20.2% of the population
 - 1.5 million new cases diagnosed in 2005
 - Prevalance increased 61% between 1990 & 2001
 - Expect 165% increase over next 40 years
 - Fastest in older and minority subpopulations

We All See It & We'll Continue to

- Narayan et al. JAMA 2003
 - Individual born in 2000, lifetime risk...
 - 32.5% males
 - 38.5% females
 - Hispanic males 45.4% & females 52.5%
 - Type II diagnosis at age 40
 - Decreased life expectancy of 11.6 yrs for males & 14.3 yrs for females

Diabetes Mellitus

- Type I
 - Autoimmune destruction of β - cells
 - Absolute decrease in circulating insulin
 - Requires exogenous insulin
- Type II
 - AKA Adult-onset DM
 - Peripheral insulin resistance
 - Secretory insulin defect
 - 90% of DM patients
 - 90% clinically obese




Hyperglycemia

- Common manifestation
 - Systemic hyperglycemia \rightarrow protein glycosylation
 - End product \rightarrow end organ damage
 - Immune dysfunction
 - Peripheral neuropathy \rightarrow
 - Nephropathy
 - Retinopathy
 - Arthropathy
 - Delayed fracture healing
 - Impaired wound healing
 - Vasculopathy
 - Neuropathy

Diabetic Neuropathy

- 10% neuropathic at diagnosis
- 40% within first 10 years
- >50% in patients over 60 years old
- Loss of protective sensation signifies profound neuropathy
 - 7-fold increased risk of ulceration



- 5.07 (10g) Semmes-Weinstein monofilament
- 91% sensitive, 86% specific at 4 plantar locations
 - Hallux tip, 1, 3, 5 MT heads

Diabetic Neuropathy

- Severity of neuropathic complications directly related to lack of glucose control & chronicity
- 1% reduction in A1C = 25% reduction in rate of complications
 - Hoogwerf et al. *Foot Ankle Clin* 2006
- Neuropathy is consistently reported as the comorbidity most predictive of complications

Healing in Diabetes

It is Delayed

Loder et al CORR 1988
Macey et al JBJS 1989
Follack et al DMRR 2005
Beam et al J Orthop Res 2007

However, tight glucose control does “reverse” this problem

Diabetic Vasculopathy

- Small-vessel angiopathy & large-vessel arteriosclerosis
 - impaired oxygen delivery & local tissue ischemia

Poor Wound Healing Capacity

Diabetic Vasculopathy

- Palpate for pulses, if absent consider further evaluation
 - ABIs: in general if <0.90 → vascular disease
 - Can be falsely elevated due to calcinosis
 - If >1.1 → vascular disease?
 - $T_cPO_2 > 30$ mmHg = adequate healing potential

Diabetics Are Poor Surgical Candidates

- 18% diabetics smoke
- 82% diabetics are obese
- 37% are sedentary
- 67% of all diabetics are hypertensive

“Often bad operative candidates are even worse non-operative candidates”

Nonoperative versus Operative

- Diabetics have higher rates of post-operative infections, development of Charcot arthropathy & delayed healing
 - 29% overall complications, 25% infections for operative cases
- 83% overall rate of complications in neuropathics treated **non-operatively**
 - 60% malunion & 40% infection

Management

- Seek evidence of neuropathy & document it
- Timing of Injury: If they've been walking on it, neuropathy inferred
- Mechanism of injury: comminution from low energy, osteopenia or osteoporosis inferred
- Diabetic history & other risks (smoking, etc)
- Ambulatory status

Non-Operative Management

- For **stable fractures only**
- Typically NWB cast
 - Well-done cast
 - If neuropathic need to change first case at 1 week
 - Check cast for signs of WB
 - Frequent xrays
 - Surgical fixation at first sign of loss of reduction

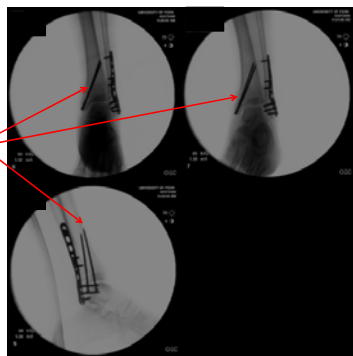
Operative Management

- Should be the rule for unstable ankle fractures
- Respect the Soft Tissues
- Double your fixation
 - More rigid, longer plates
 - Fibular nails may have a role
 - longer screws
 - multiple syndesmotic screws (even if syndesmosis not disrupted)
 - consider supplemental external fixation

Operative Management

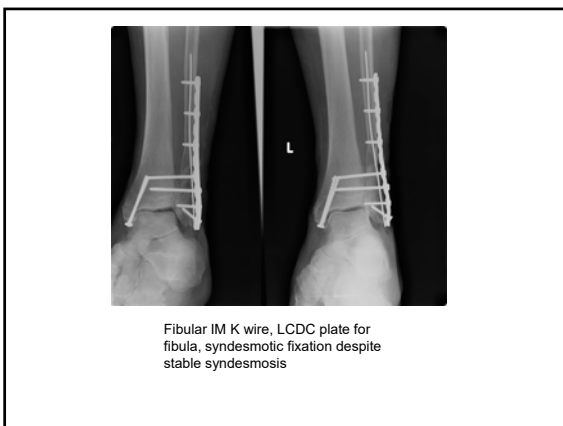
- Long full-thickness incisions minimizing scissor dissection & undermining – or – utilize percutaneous techniques
- Heel cord contractures can contribute to loss of reduction
 - Some advocate prophylactic heel cord lengthening
 - Equinus forces external rotation/relative flatfoot gait which stresses your lateral fixation

- Long medial malleol screws to engage lateral cortex.
- Need to have pelvic screws

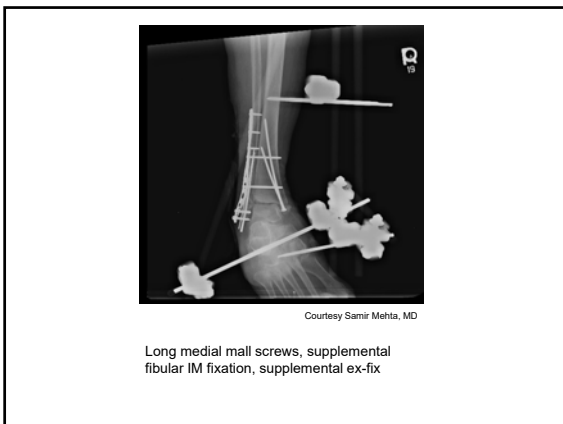


Courtesy Samir Mehta, MD

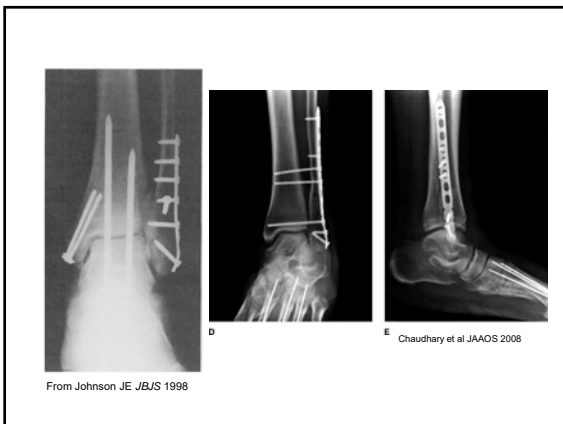




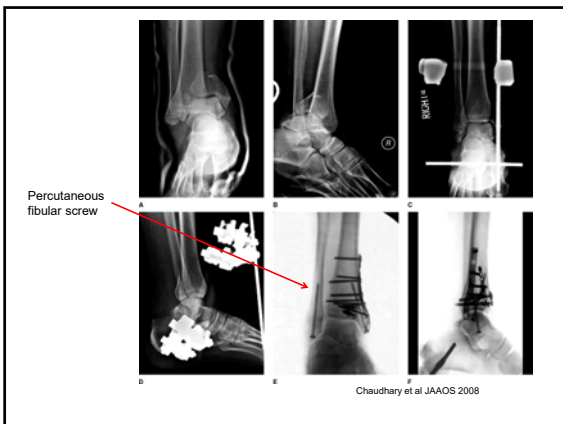
Fibular IM K wire, LCDC plate for fibula, syndesmotic fixation despite stable syndesmosis

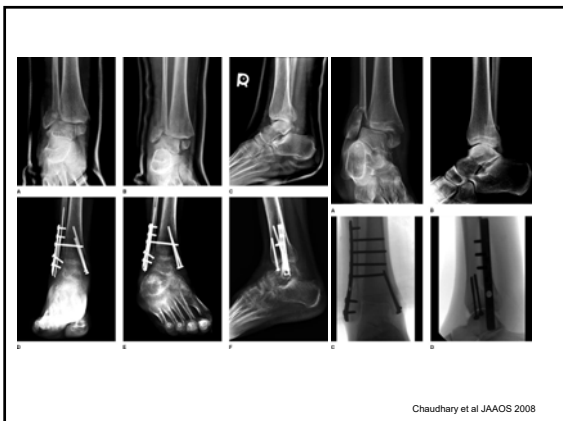


Long medial malleolus screws, supplemental fibular IM fixation, supplemental ex-fix










Post-Operative Management

- Be Cautious
 - Well-applied immediate post-op dressings
 - Post-op Boots (CAM, etc) do not always fit patients properly
- Frequent Surveillance
- Leave sutures in longer



Managing Complications

- Be aggressive with hospital admission for complications
- Be willing to washout wound dehiscence
- Retain stable hardware
- Remove loose hardware and consider external fixation
- Engage your infectious disease specialists

Concepts to Success

- Be vigilant for neuropathy
- Discuss & Document risks
- “The Rule of 2s”
- Operatively fix unstable fractures with highly rigid constructs
- Admit & aggressively treat complications



Good Luck & Thank you

Questions & Comments

rfinnan@orthocincy.com
