

# Chronic Plantar Foot Ulcers:

Clinical and Surgical Offloading Tools and Techniques

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# DISCLOSURE

## Joseph Fiorito

- No relevant financial relationship reported



# Chronic Plantar Foot Ulcers

- Terrible Triad of Foot Ulcers
  - Peripheral Neuropathy
  - Musculoskeletal deformity
  - Trauma
- Chronic Foot Ulcer:
  - Not healed by 50% in 4 weeks
    - High likelihood of still being open at 12 weeks
- Causes for delayed wound healing
  - Infection
  - Ischemia
  - Pressure
    - Inadequate Offloading
      - Internal
      - External



Reiber, G.E., et al, Diabetes Care, 1999

Sheehan P, et al. Plast Reconstr Surg. 2006



# Chronic Plantar Foot Ulcer: Offloading

- External
  - Non surgical approach to reduce pressure
    - Weight bearing and non weight bearing modalities
- Internal
  - Surgical Approach
    - Pressure Reduction
      - Reducing Deformity
      - Excision of Bony Pressure Points
      - Increasing Range of Motion
- Combination



# External Offloading:

## What do I Choose?



# Ideal Offloading

(Dream On)





# External Offloading: Forced Compliance

## TCC-EZ® Cast System

- Gold Standard
  - Total Contact Casting
    - Highly effective
    - Easy Application
    - Weight Bearing
  - Post Cast Transition
    - Shoes and Inserts
    - Custom AFO



- Birk, JA. The Contact Cast: an updated case study report. *Wounds* 2000; 12(2):26-31

- Bell D: Evidence Based Rationale for Offloading Treatment Modalities. *Surg Technology Int XVII*. May 2008 113-117;



# Chronic Plantar Foot Ulcer

## Plantar Foot Ulcer

- DM II Male
- S/P:
  - Charcot foot reconstruction
  - Sesamoid removal ( Osteo )
  - Acellular graft
  - NPWT – 6 weeks
  - Failed offloading boot

## Non healing ulcer 6 weeks





# Total Contact Casting

2 Weeks



6 Weeks



# Surgical Approach to Chronic Plantar Foot Ulcers

- **Assist in healing of an open wound**
  - Pressure Offloading
  - Reduction of deformity
- **Common surgical procedures**
  - Treatment of soft tissue contractures
  - Minor Amputations
  - Bone Excision





# Chronic Plantar Foot Ulcer: Soft Tissue Contractures

- Achilles Tendon Tightness (Equinus)
  - Plantar Forefoot Ulcers
    - Sub Metatarsals
    - Great Toe
- Flexor/Extensor Tendons
  - Digital Ulcers
- Peroneal Longus Tendon
  - Plantar 1<sup>st</sup> Metatarsal Ulcers
- Surgical correction of tendon contractures
  - Improves ulcer healing rate
  - Limits ulcer recurrence
  - Reduces plantar pressure of the foot

Muller MJ et al. J Bone and Joint Surg 2003

Laborde JM Foot Ankle Int. 2008

Armstrong DG, et al J Bone and Joint Surg, 1999

Kearney TP, et al. Diabetes Res Clin Pract. 2010

# Chronic Plantar Foot Ulcer: Equinus Deformity

2 years with an open wound



Gastroc-Soleus Equinus



Equinus: Inability of the foot to achieve adequate dorsiflexion at the ankle joint past 90 degrees





# Tendon Achilles Lengthening (TAL)

## Percutaneous Technique



## 4 months Post-OP

(TAL with Metatarsal Head Excision)



# Chronic Foot Ulcer: Gastrocnemius Equinus



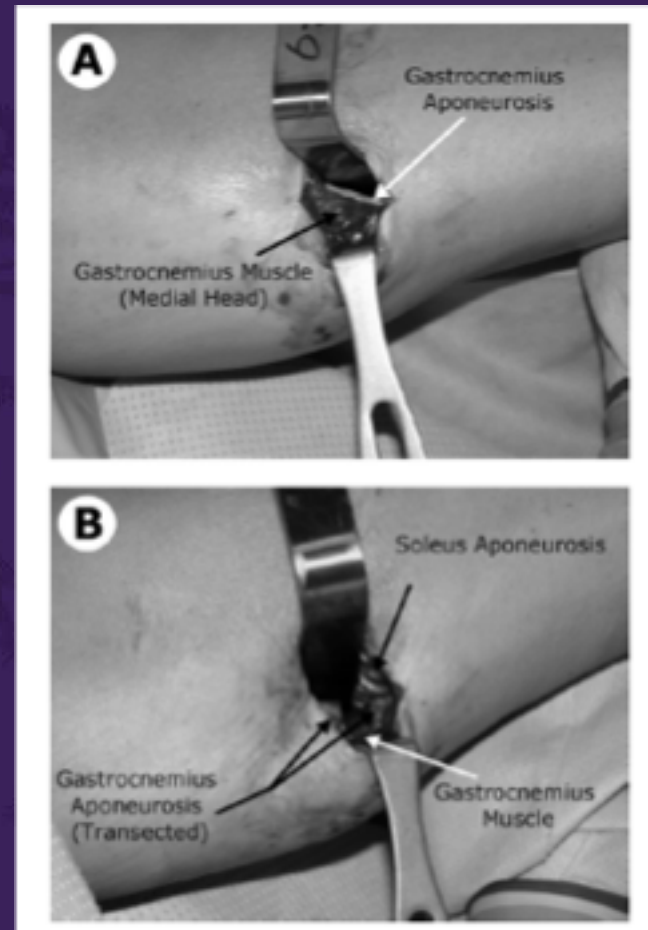
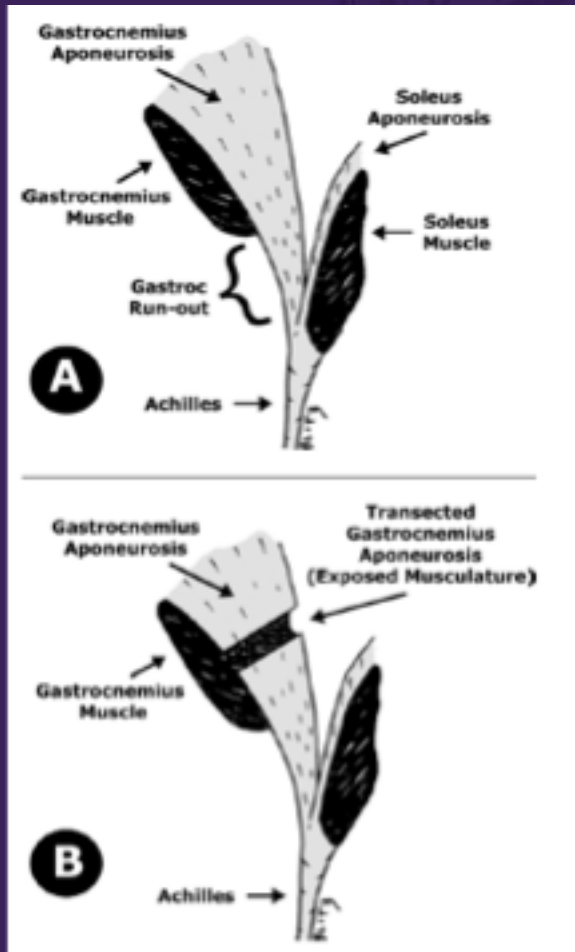
- DM II Male
- 2 years ulcer
  - Shoes
  - Boots
  - Casting
- Flexible Equinus (Gastroc)
  - AJ ROM
    - Normal with knee flexed





# Gastroc Recession

## Gastrocnemius Equinus



Blitz NM, Rush SM. The gastrocnemius intramuscular aponeurotic recession: a simplified method of gastrocnemius recession. J Foot Ankle Surg. 2007 Mar-Apr;46(2):133-8.

# Chronic Foot Ulcer: Gastroc Equinus

**2 months post-op**



**Post-Op Recommendations**

- 2 weeks weight bearing
  - Offloading boot
  - Return to Diabetic Shoe
- Night Splint
  - 6 weeks
  - Maintain 90 degree angle







# Chronic Plantar Toe Ulcers

- Distal Toe
- Flexible vs Rigid contracture
- High tendency for Bone infection
- Surgical Approach
  - Percutaneous Flexor Tenotomy
    - Outpatient
    - High Healing Rate (3 weeks)
    - Minimal Complications



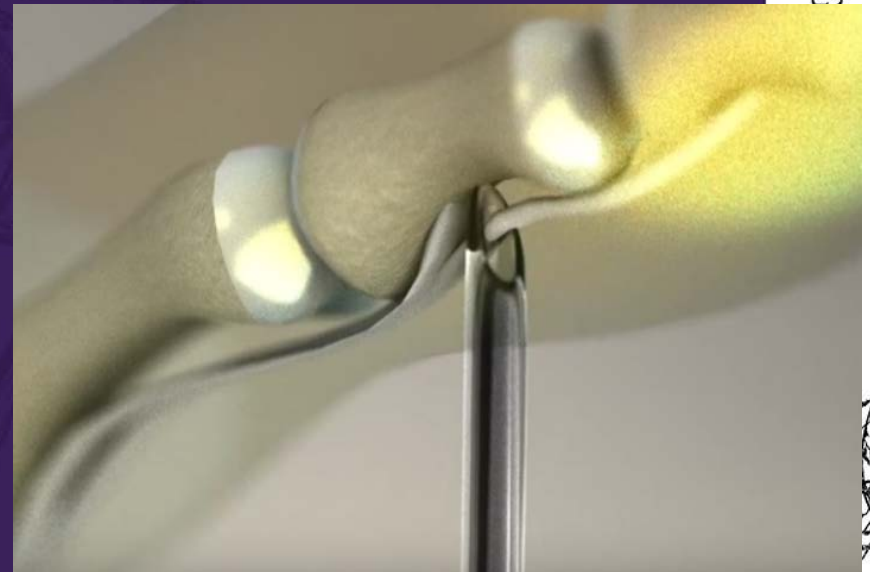
Tamir et al. Outpatient percutaneous flexor tenotomies for management of diabetic claw toe deformities with ulcers: a preliminary report. *Can J Surg.* 2008 Feb;51(1): 41-4.

# Percutaneous Flexor Tenotomy

18g Needle



Flexor Digitorum Longus Tendon



# Chronic Plantar Foot Ulcer: Flexor Tenotomy



Chronic reoccurring digit ulcer



Percutaneous tenotomy of the long flexor tendon



# Chronic Plantar Foot Ulcer: Flexor Tenotomy

2 weeks post op





# Chronic Plantar Foot Ulcer: 5<sup>th</sup> Metatarsal Head

- High area of pressure
  - Gastroc vs Soleus Equinus
- Offloading
  - Difficult to keep healed
- Surgical Approach
  - 5<sup>th</sup> metatarsal Head Excision
    - Faster healing
    - Fewer infections
    - Fewer Reulcerations
  - Consider Equinus Procedure



# Chronic Foot Ulcer: 5<sup>th</sup> Metatarsal Head Excision

## Lateral Incision



## Post op Recommendation

- Weight Bearing
  - TCC
  - Offloading Boot
- Shoes
  - When wound has healed
    - 3-4 weeks avg



# Summary:

## Chronic Plantar Foot Ulcers

- Treatment
  - External Offloading
    - Total Contact Casting (Gold Standard)
  - Internal Offloading (Surgical)
    - Identify the deformity ( Soft tissue or Bony)
    - Procedures:
      - Reduce Pressure
      - Eliminate deformity
  - **Best Scenario**
    - **Combine them All!**



# Thank You

