

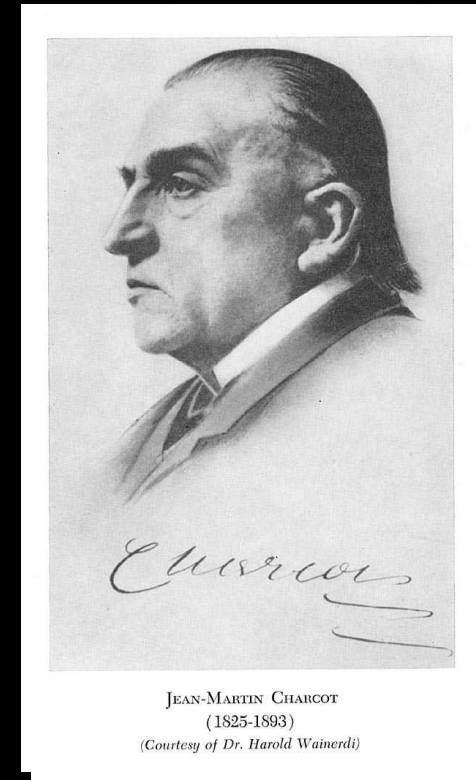
# **Charcot Foot and Ankle**

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# Diabetes II – Charcot Foot

## Charcot Arthropathy (Neuro-osteoarthropathy)

- Non-infectious destruction of bone associated with neuropathy
- Described by Charcot 1868 in patients with Tertiary Syphilis
- Now common in diabetics with neuropathy



# Pathophysiology



- Neuropathy is present
- Neurotraumatic repetitive stress reaction
  - Decreased protective sensation resulting in cumulative mechanical trauma
- Neurovascular

# Typical Patient



- 55-60 years old
- Diabetic 10+ years
- Peripheral Neuropathy
- Obesity
- Trauma?
  - As benign as an ankle sprain
- Presenting with hot swollen foot
  - Acute
- No systemic signs of infection

# Clinical Exam

- **Acute Phase**

- ✓ **Marked swelling**
- ✓ **Significant erythema**
  - **Often diagnosed as cellulitis/infection**
- ✓ **No open wounds/ulcerations**



- **Chronic**

- **Stiff deformity**
- **Often present with ulceration**
  - **May have underlying osteomyelitis**
- **Pressure changes over prominence**

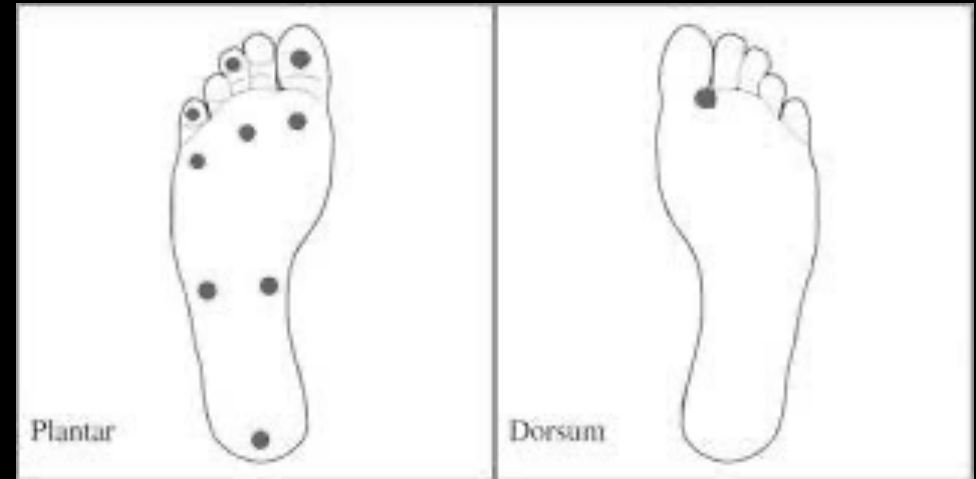
Neuropathy evaluation

Check for PAD



# Semmes-Weinstein 5.07 Monofilament

- **Touch filament to foot in the designated areas**
- **Force=bowing of the filament**
- **1-2 secs**
- **R/o neuropathy**



# Evaluate Vascular Status

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*Differs from typical arteriosclerosis:*

- More common in DM
- Younger
- Rapid progression
- Multisegmental
- Distal lesions –  
ant./post. Tib. and peroneal



# Peripheral Vascular Disease

- **Loss of blood supply**  
→ **Gangrene**
- **Difficult in wound healing**
- **Pain (especially rest pain)**
- **Thresholds for wound healing**
  - ✓ **TcpO<sub>2</sub> >30**
  - ✓ **Toe pressures >45mmHg**
  - ✓ **ABI > 0.5**
  - ✓ **Total lymph > 1500/microl**
  - ✓ **Albumin >3.0**





# Charcot Arthropathy

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- **Initial Xrays**

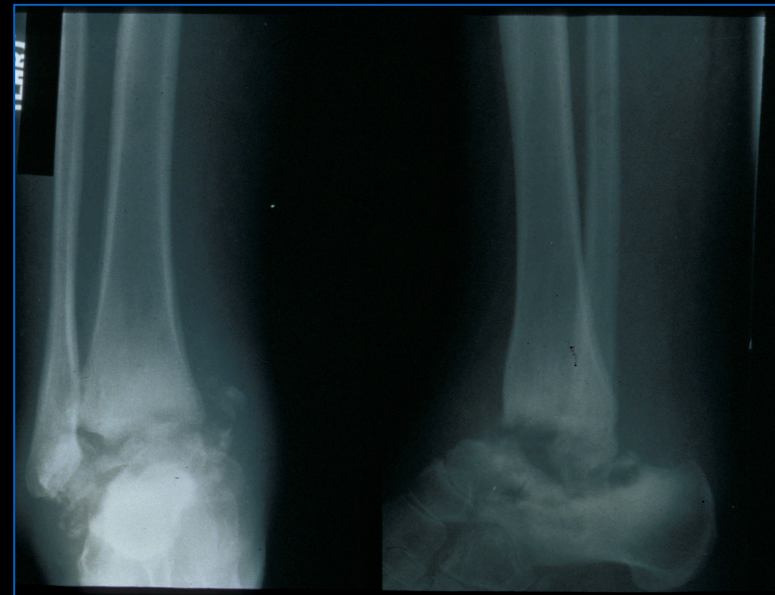
- ✓ **May be normal**

- **Don't underestimate pathology**



- **Follow-up Xrays**

- **Bony destruction**
- **Significant deformity**
- **Fracture/dislocation**



# CHARCOT ARTHROPATHY

## DIAGNOSIS: Common Locations

- Lisfranc Joint →
- (Type I)
- Transverse tarsal joint →
- (Type II)
- Ankle Joint →
- (Type III)



# Charcot Foot Stages (Eichenholtz)

## I. Inflammatory/Dissolution

- fragmentation
- fx and/or dislocation

## II. Coalescence

- absorption of debris
- organization of fragments
- sclerosis

## III. Resolution

- reformation
- fusion



# Stage I Stage of Development

Acute inflammatory process characterized by edema, hyperemia, and erythema



# Stage I – Treatment

- Stage 1:
  - Total contact Casting & Non-WB
  - Motorized scooter –very helpful!



# TCC: Why Does It Work?

- Transfer 30% of load to leg
- Transfer load to heel
- Must get ankle neutral to slight DF
- Removal of MT loads by relief built into cast  
ref. Shaw, et al, 1997
- Moist wound environment?
- Return every 1-2 wks for reapplication



# Stage II: Stage of Coalescence

Coalescing of new bone at the site of arthropathy



Note severe abduction deformity

# Stage II Treatment

- Patient Education +
- Protective footwear
- Prophylactic exostectomy or arthrodesis?
  - If ulcer present or pending



Consider correcting the abduction deformity and improving the midfoot collapse.



# Stage III: Bony Consolidation

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- Continuum of Stage II with resolution of the clinical inflammation and bony consolidation visualized radiographically



# Stage III: Treatment

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Similar to Stage II -Patient Education +

- **Protective footwear**
  - Ex. CROW Charcot Restraint Orthotic Walker
- **Prophylactic exostectomy or arthrodesis?**
  - If ulcer present or pending



# Patient Education

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- **Explain the Condition (Neuropathy)**
  - **Peripheral Neuropathy → Cerebral Neuropathy**
- **Appropriate Shoewear**
  - **Extra depth shoes**
  - **Total contact plastizote insert**
- **Always Wear Shoes**
- **Emphasize Daily Foot Checks!**
- **Provide Access to Information**
  - **Support groups, handouts, internet**



# Surgical Treatment

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- Patient's with diabetic neuropathy have higher rates of complications
  - ✓ Infection
  - ✓ Wound dehiscence
  - ✓ Non-union
- High risk but **NOT** a contraindication for surgery



# Surgical Treatment: Indications

- **Plantar ulceration (or pending ulcer) due to deformity**
  - ✓ **Ex. rocker-bottom midfoot break**
- **Charcot arthropathy leading to Unstable Foot or Ankle**



# Surgical Treatment: Exostectomy

- **Plantar ulceration (or pending ulcer) due to deformity**
  - ✓ Ex. rocker-bottom midfoot break
- **Allow extra time for wound healing**
- **Patient may be WBAT**
- **Effective if midfoot deformity is stable**
- **Resect Exostosis**
  - ✓ Lateral, Plantar, or Medial Approach



# Surgical Treatment: Midfoot Reconstruction

- Midfoot Charcot arthropathy leading to:
  - ✓ Ulcer / Pending Ulcer
  - ✓ +Unstable Foot
- Prolonged healing time to obtain union (3+month)
- Rigid fixation required



# Surgical Treatment: Ankle Reconstruction

- Ankle Charcot arthropathy (usually following ankle trauma) leading to:
  - ✓ Ulcer / Pending Ulcer
  - ✓ +Unstable Ankle
- Prolonged healing time to obtain union (3+month)
- Rigid fixation required
  - ✓ Compression screws
  - ✓ Blade plate
  - ✓ IM Nail





# “Double or Nothing” Protocol:

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## Goals

- ✓ Obtain stable ankle that is aligned well enough to be braceable
- ✓ Prevent complications that lead to amputation/infection/death (sepsis)
- Rationale
  - Neuropathic patients need more rigid fixation to withstand the increased stresses that patients unknowingly apply to their fractured extremity
  - Prolonged immobilization required to optimize wound and fracture healing before allowing unprotected weightbearing
  - ***Double Everything !***
    - Fixation
    - Number of office visits
    - Time to full WB
    - Time in cast
    - Vigilance for problems

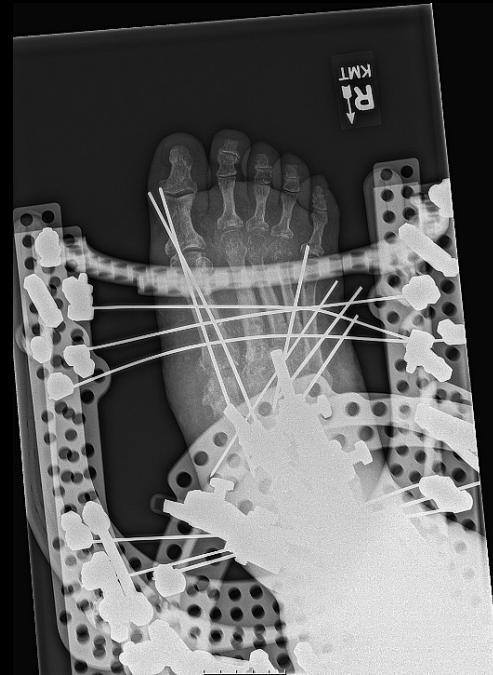


# Treatment of Charcot Fractures

- Immobilization/rest = cast  
(weeks to months)
- Early Reduction with internal fixation in select few
- Special footwear and/or bracing once fracture inflammation resolved
- Once fractured – must always protect

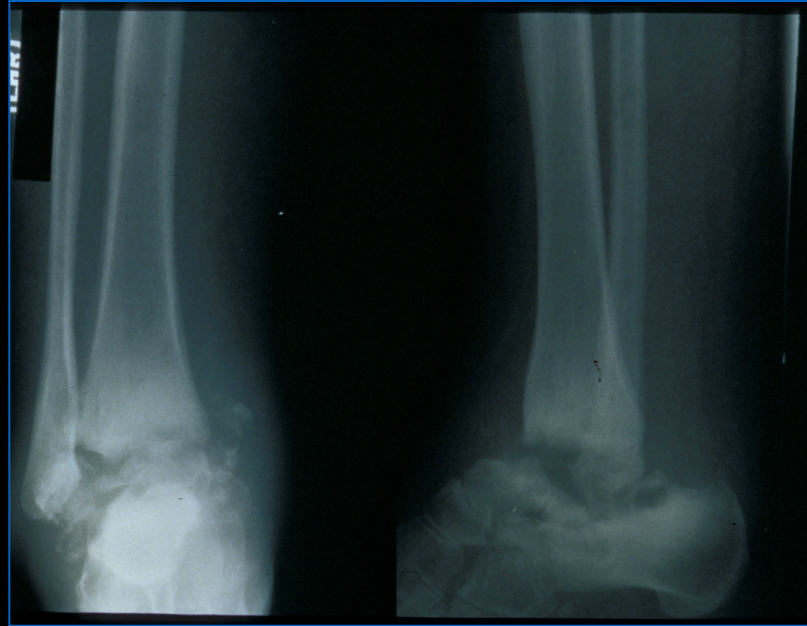


# The Gift that Keeps on Giving



# Could this be prevented?

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- **Must recognize the presence of peripheral neuropathy in injured patients**
- **Sprains and fractures in a patient with neuropathy require aggressive conservative treatment (casting)**
- **Protection/ immobilization until resolution of inflammation and edema**

# Amputation

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- **Diabetes accounts for 50% of all extremity amputations**
- **30% risk of requiring a contralateral amputation within 3 years**
- **60% of diabetics die within 5 years of the first amputation**



# THANK YOU

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