20th VASCULAR SOCIETY OF EGYPT
INTERNATIONAL ANNUAL CONFERENCE

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EVIDENCE BASED
VASCULAR PRACTICE

Management of Diabetic Charcot Foot Arthropathy

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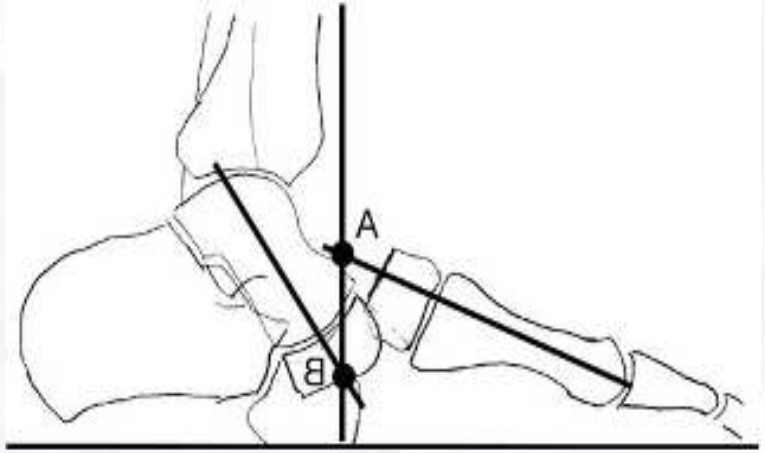
Charcot Neuroarthropathy

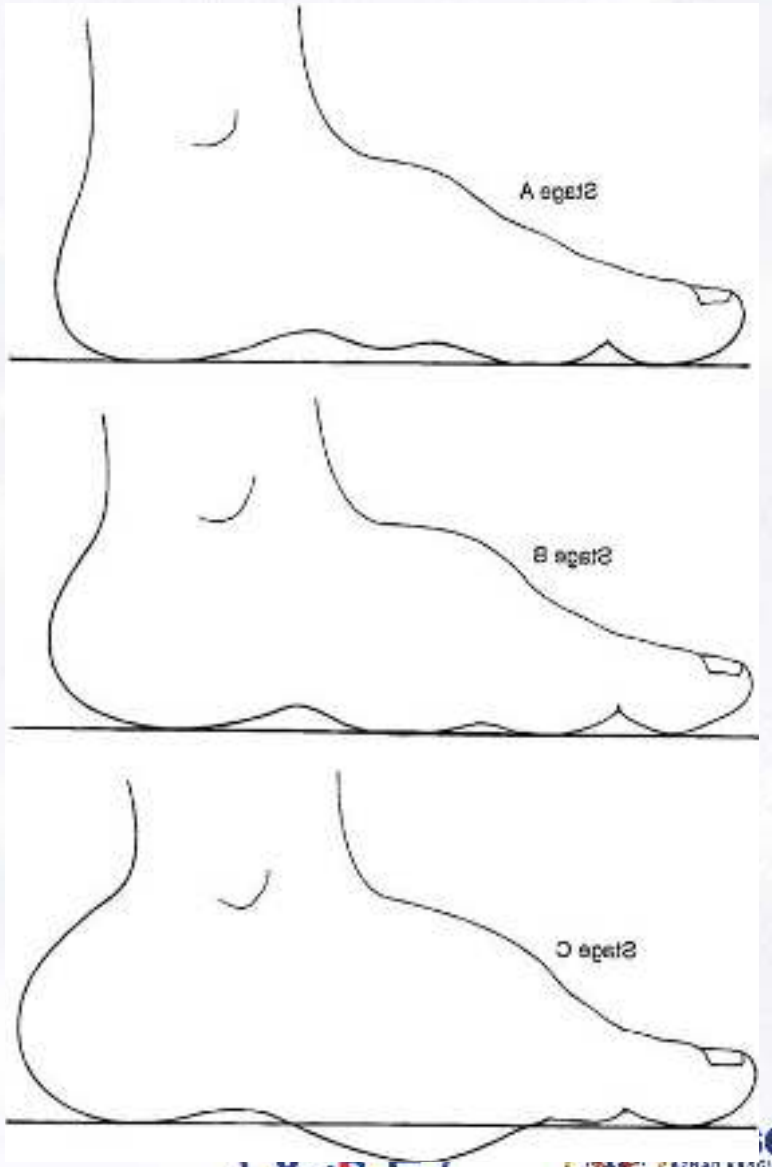
Chronic, progressive, destructive process affecting bone architecture and joint alignment in people lacking protective sensation

- Metabolic:
  - Glycolization of collagen
  - Poor immunity
- Peripheral neuropathy:
  - Neurologic sensory and motor loss distal to proximal
- Vascular:
  - Microangiopathy
  - Accelerated atherosclerosis

Charcot Neuroarthropathy

- Progressive instability of joints
- Progressive Deformity
- Progressive bony destruction





Charcot Neuroarthropathy

Table 6-4 Stages of Charcot Arthropathy (Eichenholtz)*

Stage	Signs and Symptoms	Radiographs
0: Clinical (prefragmentation)	Acute inflammation; confused with infection	Regional bone demineralization
1: Dissolution (fragmentation)	Acute inflammation, swelling, erythema, warmth; confused with infection	Regional bone demineralization, periarticular fragmentation, joint dislocation
2: Coalescence	Less inflammation, less swelling, less erythema	Absorption of bone debris; early bone healing and periosteal new bone formation
3: Resolution	Resolved erythema, swelling, and warmth; consolidation of healing	Smoothed bone edges, bony/fibrous ankylosis

*Based on the signs, symptoms, and radiographic changes that occur with the neuropathic joint/fracture over time.

The long-term goals for operative and non-operative treatment

- to achieve a stable, plantigrade functional foot that is resistant to ulceration
- to prevent amputation
- to improve performance in activities of daily living
- to allow the use of nonprescription footwear
- recent studies have confirmed that limb salvage is less costly than amputation over a lifetime when prosthetic costs are factored in

Ref : Waters RL, Perry J, Antonelli D, et al. Energy cost of walking amputees: the influence of level of amputation. JBJS 1996;58A:42 – 6.

Non operative treatment

- Total contact Cast
  - Proven to be effective in stabilizing the foot and allow the bones to coalesce
  - Time consuming
  - Difficult to control bony stability and position
  - Cannot realign deformity already present
  - Extremely useful for reducing edema.

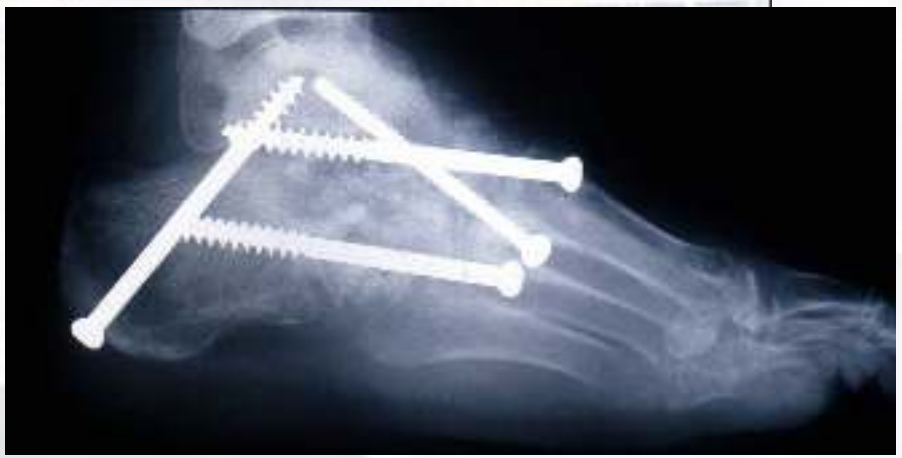
- Used to reduce swelling for surgery
- Non weight bearing to reduce bony shift

Potential Surgical Candidates

- Has adequate vascular supply
  - Palpable pulse
  - A/B index > 0.45%
  - Toe pressures or TcpO2 >40mmHg
- Controlled diabetes
- Nutritional status
  - Albumin >3.5g/dl
  - Total lymphocyte count >1500
- Understanding of the care needed
  - Absolutely no weight bearing till healed

Surgical treatment of mid-foot charcot

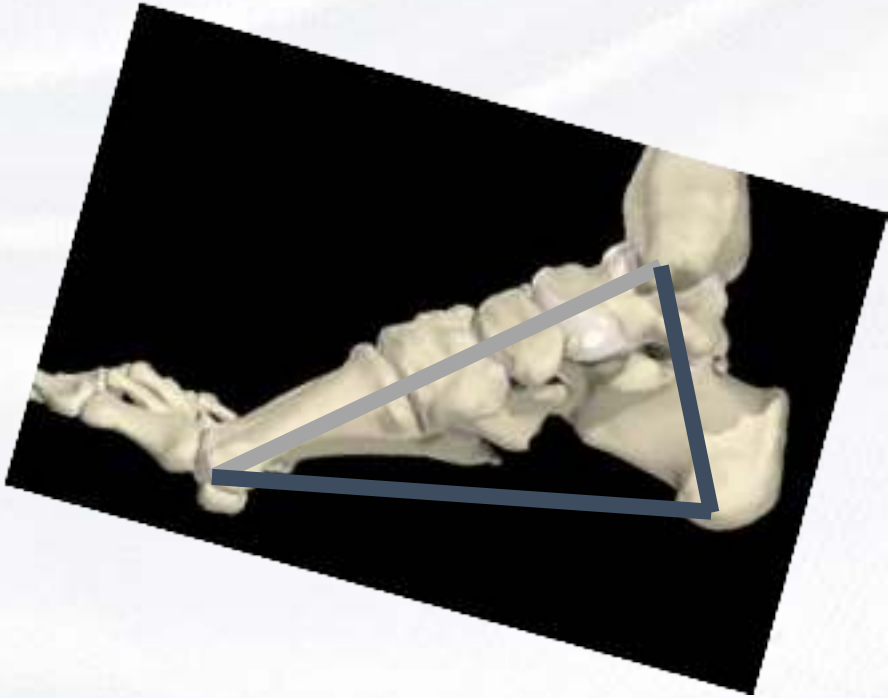
- Early JS, Hansen ST.: “Surgical Reconstruction of the Diabetic Foot: A Salvage Approach for Midfoot Collapse”. Foot Ankle Intl. Vol 17 (6), pp.325 - 330, 1996.



Superconstruct for Charcot

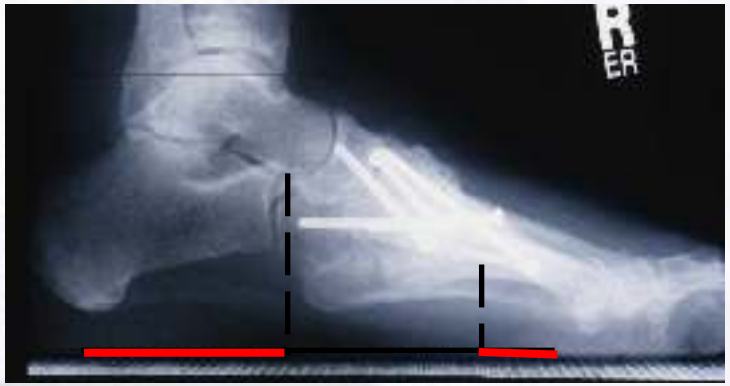
- Progression to Superconstruct concept
  - Implants required to be bigger and stronger than those for trauma
  - Initial concept was more is better
  - Expand fixation beyond zone of injury

- The foot is mechanically an oblique pyramid
  - Ground contacts are
    - 1st metatarsal head
    - 5th metatarsal
    - Calcaneal tuberosity
  - Apex is talar dome



Superconstruct for charcot Biomechanics

- Move fixation stress points closer to ground
- Reducing weight bearing moment arm reduces bone stress
  - Moment arm = distance from ground contact to point of fixation



Superconstruct

- bone resection is performed to shorten the extremity to allow for adequate reduction of deformity without undue tension on the soft tissue envelope
- The strongest device is used that can be tolerated by the soft tissue envelope

3 evolving superconstruct methods

- Planter plating
- Locked plating
- Axial screws

What About This !!

Take Home message

- Management of Charcot deformity of the foot and ankle continues to challenge physicians.

1. **Prevention**
2. **Early intervention**

- These challenges have led physicians to develop **superconstruct** techniques whereby fusion is extended beyond the zone of injury to include joints that are not affected to improve fixation.

- The strongest device is used that can be tolerated by the soft tissue envelope.

- Bony dissolution represents an unsolvable solution at this time

Thank You