Pedorthic Care After a Partial Foot Amputation

In This Session…

- Goals of treatment
- Causes of amputations
- Types of amputations
- Pedorthic and orthotic management

Goals of Pedorthic and Orthotic Treatment

- Prevent further complications
- Maintain support
- Restore stability and lost function
- Facilitate energy-efficient gait
- Return patient to normal, active and productive lifestyle

Amputation Surgery

- Oldest of all surgical procedures
- Previously a life saving, "destructive" procedure
- Now a "reconstructive" procedure

Amputation Surgery

- Amputation requires judgement, planning and meticulous handling of marginal tissues
- Amputation is *not* an admission of failure
- Amputation may be the first step t returning patient to productive life

Factors Determining the Level of Amputation

- Extent of infection
- Vascular status
- Functional considerations (amputation not successful unless the remaining parts are functional)

Transmetatarsal Amputation Indications

1. Forefoot soft tissue loss (gangrene, infection, thermal)
2. Osteomyelitis (multiple metatarsals)
3. Mutilating/crushing forefoot injury
4. Tumors confined to forefoot
5. Severe deformity

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Possible causes of indications

- Peripheral Neuropathy
  - Loss of protective sensation
  - Over 100 documented causes of peripheral neuropathy

Possible causes of indications

- Peripheral Neuropathy
- Vascular Disease

Possible causes of indications

- Peripheral Neuropathy
- Vascular Disease
- Trauma / Burn
    - May have hypersensitivity

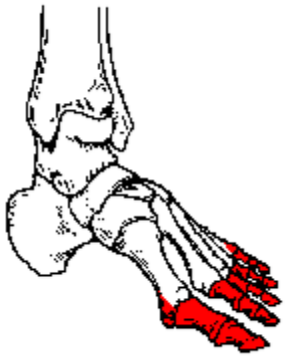
Possible causes of indications

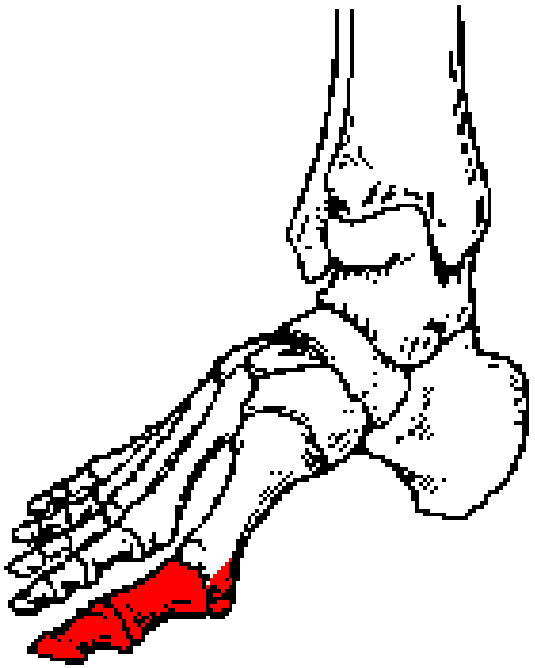
- Peripheral Neuropathy
- Vascular Disease
- Trauma / Burn
- Frostbite / Gangrene

TYPES OF AMPUTATIONS

Types of Amputations

- Metatarsophalangeal Joint
  - Hallux
  - Lesser toe (s)
  - All toes



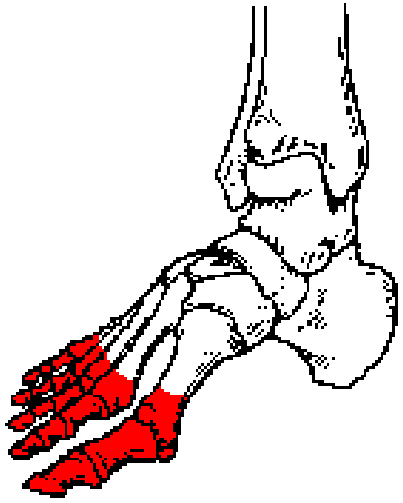


Types of Amputations

- Metatarsophalangeal Joint Amputations
  - Amp. of great toe alone often results in limp due to loss of push-off; also increases pressure under 2-3 MT heads.
  - Amp. of 2nd toe alone often causes great toe to drift into valgus.
  - Amp. of lesser toes does not usually alter gait significantly.
  - Amp. of all toes allows for normal gait.

Types of Amputations

- Metatarsophalangeal Joint
- Transmetatarsal Amputation



TMA Pitfalls

- Inadequate resection of diseased tissue
- Uneven “cascade” of metatarsals
- Unrecognized preoperative equinus contracture
- Inadequate pedorthic management

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Types of Amputations

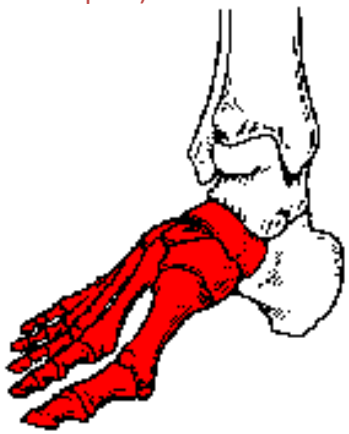
- Metatarsophalangeal Joint
- Transmetatarsal Amputation
- Tarsometatarsal (Lisfranc)

(Jacques Lisfranc de St. Martin)

Types of Amputations

- Metatarsophalangeal Joint
- Transmetatarsal Amputation
- Tarsometatarsal (Lisfranc)
- Midfoot (Chopart)

(Francois Chopart)

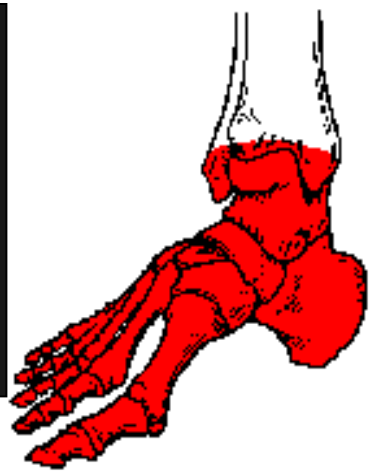


Types of Amputations

- Boyd Amputation
  - Chopart amp plus talus is removed
  - Tibiocalcaneal arthrodesis is performed
  - Described by H.B. Boyd, MD in 1939

Types of Amputations

- Metatarsophalangeal Joint
- Transmetatarsal Amputation
- Tarsometatarsal (Lisfranc)
- Midfoot (Chopart)
- Through-ankle (Syme)



Types of Amputations

- Metatarsophalangeal Joint
- Transmetatarsal Amputation
- Tarsometatarsal (Lisfranc)
- Midfoot (Chopart)
- Through-ankle (Syme)
- Below-knee amputation

Pedorthic Objectives

- Facilitate energy-efficient gait
- Restore stability and function
- Maintain support
- Provide filler for amputated foot
- Equalize weight-bearing pressures
- Protect and accommodate residual foot
- Contain foot in shoe
- Decrease shear

Shoes

- Soft, moldable upper material
- High top shoe(?)
- Blucher opening

Balmoral Opening

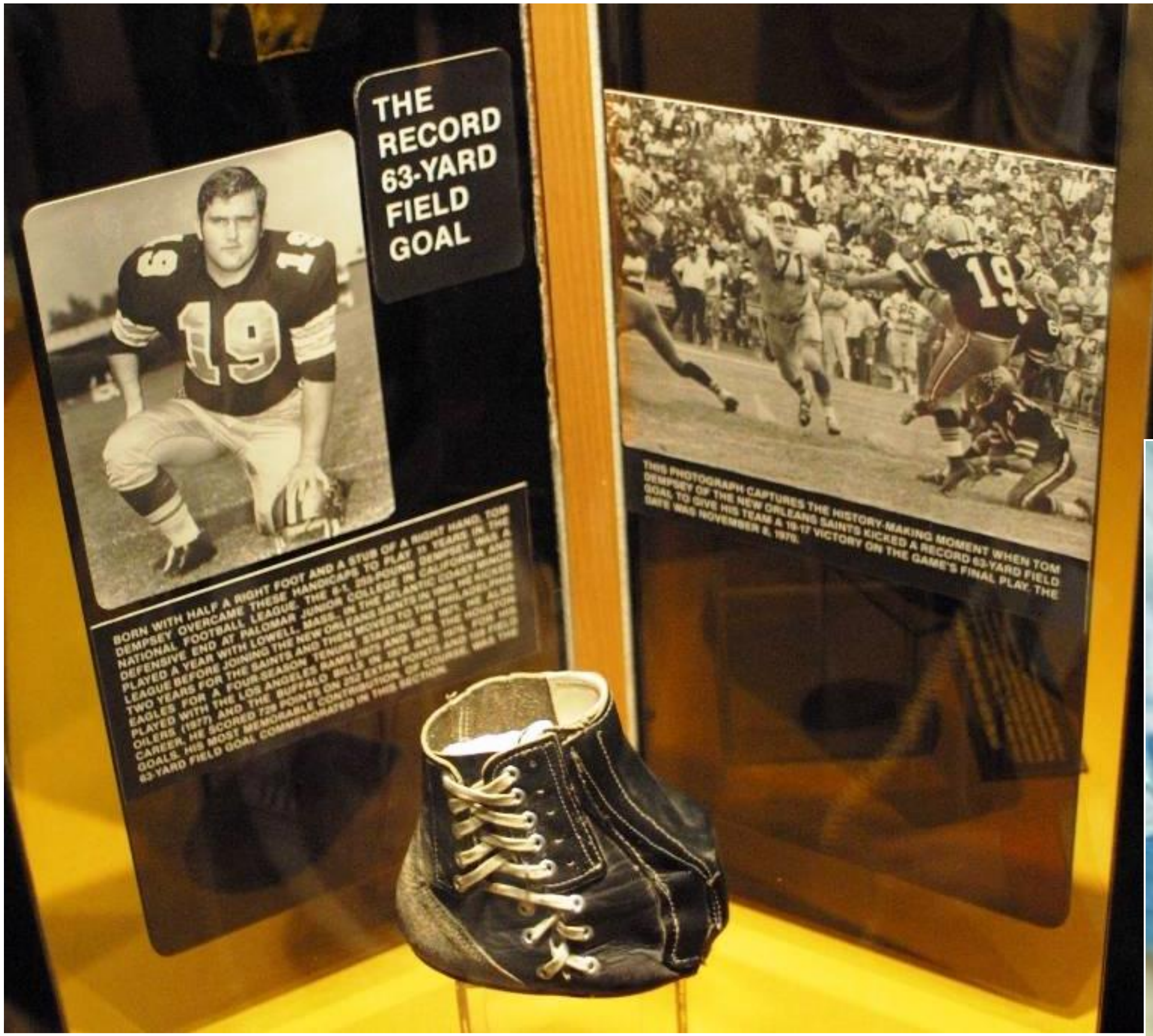
Blucher Opening

Shoes

- Wedge sole
- Long medial counter

Shoe Considerations

- Will patient be using AFO?
- Custom shoe, if necessary
- Short shoe Vs. Regular shoe


THE RECORD 63-YARD FIELD GOAL
THIS PHOTOGRAPH CAPTURES THE HISTORY-MAKING MOMENT WHEN TOM DEMPSEY OF THE NEW ORLEANS SAINTS KICKED A RECORD 63-YARD FIELD GOAL TO GIVE HIS TEAM A 19-17 VICTORY ON THE GAME'S FINAL PLAY. THE DATE WAS NOVEMBER 8, 1970.

Archives of Physical Medicine and Rehabilitation
Volume 78, Issue 9 , Pages 952-956, September 1997

- **Therapeutic footwear: Enhanced function in people with diabetes and transmetatarsal amputation**
- Michael J. Mueller, PhD, PT, Michael J Strube, PhD

- **Abstract**

- **Objective:** Patients with diabetes mellitus (DM) and a trans-metatarsal amputation (TMA) have considerable deficits in function compared with age-matched controls. The purpose of this study was to determine if therapeutic footwear could improve the functional mobility of patients with DM and TMA.
- **Study Design:** Repeated-measures design.
- **Setting:** Academic medical center.
- **Patients:** Thirty subjects (10 women, 20 men) with DM and a TMA, with a mean age of 61.7 = 4.0yrs.
- **Interventions:** Six types of footwear evaluating the following components: length of shoe (full-length or short shoe), a rigid rocker-bottom sole, and an ankle-foot-orthosis.
- **Outcome Measures:** Physical Performance Test (PPT), functional reach, and walking speed. Measurements in each footwear condition occurred after a 1-month adjustment period.
- **Results:** Patients wearing full-length custom-made shoes with a total-contact insert, a rigid rocker-bottom sole or a short shoe with a rigid rocker-bottom sole (with or without an ankle-foot-orthosis) had similar and significantly higher scores in the PPT and faster walking speed than when wearing regular shoes with a toe filler ($p < .05$). The short shoe and the ankle-foot-orthosis, however, generated many patient complaints about cosmesis and restriction at the ankle, respectively. There were no differences in any of the measures of functional reach.

SHOE MODIFICATIONS

Shoe Modifications

- Rocker Soles

Shoe Modifications

- Rocker Soles
- Extended Steel Shank

Shoe Modifications

- Rocker Soles
- Extended Steel Shank
- Medial / Lateral Flares

Shoe Modifications

- Rocker Soles
- Extended Steel Shank
- Medial / Lateral Flares
- SACH Heel

Shoe Modifications

- Rocker Soles
- Extended Steel Shank
- Medial / Lateral Flares
- SACH Heel
- Extended Padded Collar

Shoe Modifications

- Rocker Soles
- Extended Steel Shank
- Medial / Lateral Flares
- SACH Heel
- Extended Padded Collar
- Re-last

TOTAL CONTACT FOOT ORTHOSES

Total Contact Foot Orthoses

- Carbon-fiber plate Vs. Ext. Steel Shank

Total Contact Foot Orthoses

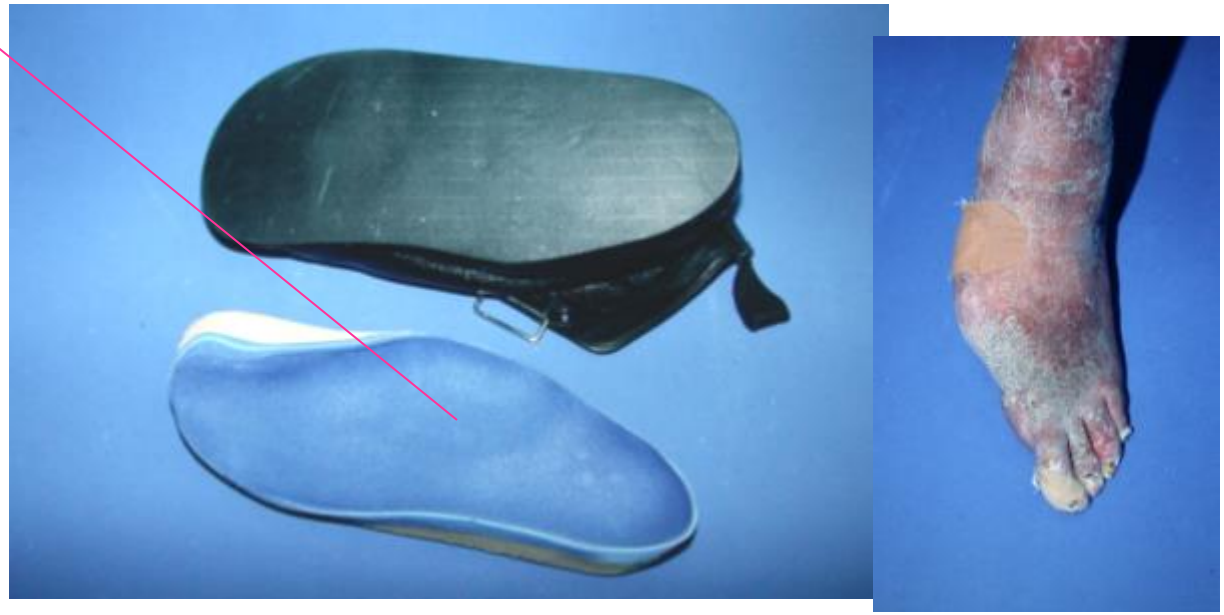
- Soft, accommodating top layer
  - #1 Plastazote®, P-Cell®

Total Contact Foot Orthoses

- Soft, accommodating top layer
- Filler itself should be semi-rigid
  - Polyethylene Foam
  - Ethylene Vinyl Acetate

Total Contact Foot Orthoses

- Soft, accommodating top layer
- Filler itself should be semi-rigid
- Relief for plantar prominences
  - Intrinsic



Total Contact Foot Orthoses

- Soft, accommodating top layer
- Filler itself should be semi-rigid
- Relief for plantar prominences
  - Intrinsic
  - Extrinsic

Total Contact Foot Orthoses

- Soft, accommodating top layer
- Filler itself should be semi-rigid
- Relief for plantar prominences
- Cushion distal to stump
  - Viscoelastic polymer
  - Polyurethane foam

Total Contact Foot Orthoses

- Low friction interface

Courtesy of Charlie Kuffel CPO, FAAOP

Arise Orthotics and Prosthetics

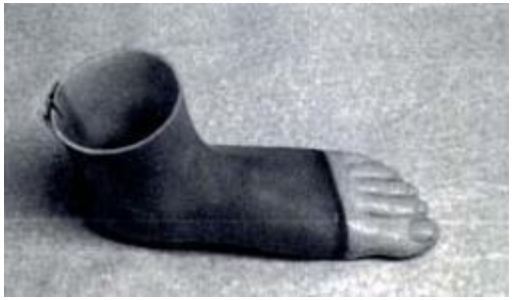
Silicone Prosthesis

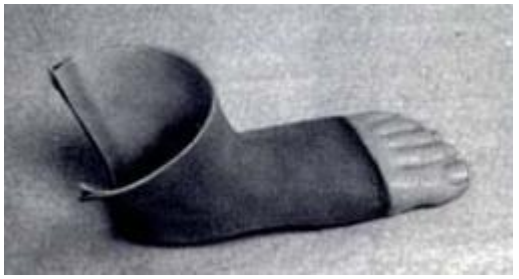
- Chopart / Lisfranc

Silicone Prosthesis

- Chopart / Lisfranc Easy Step Prosthesis

- Chopart / Lisfranc Lange Prosthesis





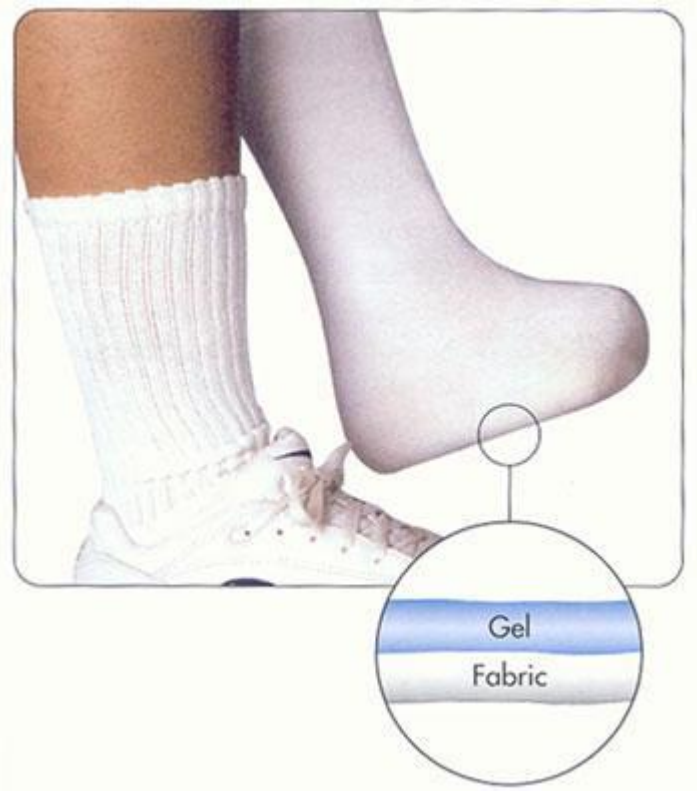
Prosthesis-Orthosis Hybrid

- Aid in forward propulsion
- Replace lost lever arm
- Reduce stress on residual foot

Prosthesis-Orthosis Hybrid

Hosiery

- Partial foot sock



Follow-up

- Diabetic / Neuropathic
  - *At least* every six months
  - Designated shoe and appliance

Follow-up

- Traumatic
  - Annually, or as needed
  - More freedom with shoes

Follow-up

- Fillers can be re-covered periodically instead of replacement

Conclusion

- Amputations in patients with diabetes is a far too common outcome
- Roles of pedorthist, orthotist and prosthetist can not be undervalued
- Foot amputation is not an admission of failure, but rather it is a chance to start anew

THE END