Biomechanical Offloading

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Disclosures

Speaker’s Bureau:
• Smith & Nephew Advanced Wound Management Division
• BSN Medical Advanced Wound Care Division
Recurrence and prevention of diabetic foot ulcers after total contact casting

- 28 patients treated with TCC
- 85% healed
- 57% had recurrence

Foot Ankle Int. 2007 Jan;28(1):64-9

Frigg A1, Pagenstert G, Schäfer D, Valderrabano V, Hintermann B.
FOOT ANKLE SPECIALISTS OF DELAWARE COUNTY

DEA #

NAME: TCROW

ADDRESS:

DATE:

AGE:

R

WALKER

REFILL - 0 - 1 - 2 - 3 - 4 - PRN

IN ORDER FOR A BRAND NAME PRODUCT TO BE DISPENSED, THE PRESCRIBER MUST HANDWRITE "BRAND NECESSARY" OR "BRAND MEDICALLY NECESSARY" IN THE SPACE BELOW.
Preventing Recurrence: Things to Consider

- Is the foot quiescent?
- If not need immobilization and optimally NWB

- What is the plane of the deformity?
- Sagittal plane deformities respond more positively than transverse plane or combinations
Sagittal plane deformity
Transverse plane deformities
Frontal plane deformity
Three Deforming Forces

• Shearing
  • May control with accommodative insoles, orthotics, and AFO

• Bending
  • Seen with Equinus
  • May address with heel lift (1 inch)

• Vertical Load
Preventing Recurrence: Things to Consider

- Understanding of the Disease Process
- Footcare Knowledge
- Compliance History
- Complexity of the Treatment or Therapy
- Beliefs and Perceptions of Benefits
- Family Support
- Practitioner Reinforcement
Custom Shoe

Shoe Composition

- Seamless Inner Liner
- Extended Heel Counter
- Soft Leather Padded with Foam
- Firm Rearfoot Board
- Custom Orthotic
- Spacer
- Cushioning Outsole
- Hidden Depth Design
- Hidden Depth Design
Effect of custom-made footwear on foot ulcer recurrence in diabetes: a multicenter randomized controlled trial.

- 171 neuropathic diabetic patients with recently healed plantar foot ulcer
- Custom-made footwear
- Recurrence at 18 months: 42%

Bus SA1, Waaijman R, Arts M, de Haart M, Busch-Westbroek T, van Baal J, Nollet F.
• Reduces stress to foot and ankle
• 72-90 % more reduction of peak pressure to ulcer sites versus shoes with Plastizote liners
• Limit mobility in all 3 planes of rearfoot and midfoot
• Light weight, inconspicuous
• Cant adapt to deformity at foot level

• Hard plastic
• Not much help with equinus
Double Upright Brace
Double Upright Brace

• Similar to AFO but brace is fixed to heel of shoe
• Still need work inside shoe to accommodate foot deformity
• Combining 1-inch heel raise and a rocker sole may help to reduce bending forces within the foot during gait.
• This combo disperses mechanical stress
• Articulation either locked at neutral or only allows plantarflexion.
Double Upright Patellar Bearing Brace

• More restrictive
• More difficult to fit
• Attempts to direct vertical WB forces through the knee
• More effective at reducing load to the rearfoot
• Can combine with extra depth custom molded shoes
CROW

- Charcot Restraint Orthotic Walker
- Fully enclosed AFO with rocker bottom
- 2 plastic or fiberglass clam shell pieces with custom, removable foam insole
- Attempts to distribute pressure evenly throughout foot and leg
- Uneven
- Fall risk
- Good fit??
TORCH Walker
TORCH Walker

- Total contact Orthotic Restraining Custom Hybrid
- Custom Insert
- Rocker Bottom
- Integrated solid AFO
- Adjustable for edema
Ambulatory Aides
Often Forgotten Addition to Offloading Devices

- Cane - Increases base of support, No off-loading

- Crutches - NWB to PWB
  - REALISTIC?
  - SAFE?

- Walker - Greater stability,
  NWB to PWB

- Wheel Chair
A stretching program can significantly reduce peak plantar pressures in diabetic subjects.
Gait Alterations in Diabetes

- Individuals with diabetes:
  - slower
  - shorter step lengths
  - longer stance phase
  - wider base of support
  - greater step time variability on irregular surfaces
  - improper pressure distribution
  - decreased ankle mobility, ankle moment, and ankle power during walking

Gait Modifications We Can Teach to Reduce Plantar Pressures

- Lengthen stride
- Faster cadence
- Alter foot placement
- More Propulsive
- Hip strategy

Diabetic gait

With improved stride length
Smart Sox

- Socks with fiber-optics that can measure temperature, pressure.

- Communicate that information via bluetooth or wifi to smart phone or doctor.

- “Prescribe activity””
Closing Remarks / Thank You
References


• Raikin SM, Parks GBG, Noll KH, Schon LC. Biomechanical evaluation of the ability of casts and braces to immobilize the ankle and hindfoot. *Foot Ankle Int.* 2001; 22(3):214-219. - See more at: http://www.podiatrytoday.com/can-bracing-have-impact-charcot-foot#sthash.Y5x2cYE7.dpuf
References

