GOALS

• The importance of Total Contact Casting
• Why YOU should be using TCC
• Which TCC should you use?

Conflicts of Interest Disclosure

Dr. Jeffrey Lehrman is disclosing the following financial relationships. These relationships may or may not apply to this lecture:

• Speaker Bureau, Smith & Nephew Advanced Wound Management Division
• Speaker Bureau, BSN Medical Advanced Wound Care Division
• Consultant, Musculoskeletal Transplant Foundation

Healing of Diabetic Foot Ulcers After 4 weeks

Percentage of Patients in Whom the Ulcer Healed
During the 12 Week Period

Clock is ticking!

53% Smaller in 4 weeks??!!!
3/21/2016

53% Smaller in 4 weeks??!!!!

EVIDENCE BASED MEDICINE

- Netherlands Study (Nabuurs-Franssen, et. al.)
- 98 consecutive ulcer pts with polyneuropathy
- Total Contact Cast
- **90%** of all nonischemic ulcers without infection and **87%** with infection healed in the cast.
- Average time to healing = 34 days
- 20 Patients with DFU
- Removable Cast Walker
- Steps per day with and without RCW

28%
53% Smaller in 4 weeks??
Novitas 2016 Part B Physician Fee Schedule

• CPT 29445

• Facility fee : $113.43
• Non-facility fee : $146.90

• Q4038: $12-$40

HOPPS TCC

$223.30
HHS

90% of Medicare payments transformed into value-based reimbursement by the end of 2018.

Large Wound Care Registry

6% of DFU patients received TCC

Average cost of treatment: HALF

Complications

- Guyton study
- 398 consecutive casts
- Complications occurred in 22 casts (5.5% of casts)
- Of the 22, 21 healed in 3 weeks
- 1 led to PIPJ ulcer / toe amputation
- Rate of permanent sequelae 0.25%

Contraindications

- Equinus
- Drainable abscess
- Compliance
- Unaddressed critical limb ischemia
Summary

• We can do better
• Gold standard
• Save legs
• Save lives
• Make $$

MOVIN’ FORWARD

GAIT AND THE NEUROPATHIC FOOT

Marta Ostler PT, CWS, CLT
AMERICAN PROFESSIONAL WOUND CARE ASSOCIATION

LEARNING OBJECTIVES

After completing this CME Activity, you should be better able to:

1. UNDERSTAND THE NORMAL GAIT PATTERN
2. IDENTIFY BASIC GAIT ABNORMALITIES IN DIABETIC PATIENTS
3. UNDERSTAND GAIT ABNORMALITIES AND THE RELATION TO DIABETIC FOOT ULCERS
WHAT IS GAIT?

- “THE MANNER OR STYLE OF WALKING”
- “A normal gait occurs when a person’s running or walking cycle is such that the foot properly absorbs shock”
- “Human gait is considered a walking cycle which is composed of the stance phase and swing phase”

http://medical-dictionary.thefreedictionary.com/gait
http://www.qwhatis.com/what-is-gait/
http://www.wisegeek.com/what-is-a-normal-gait.htm

WHY DO WE WALK?

- MAIN SOURCE OF FUNCTION
- TO GET AROUND
- ENERGY CONSERVATION
- RELATIONSHIPS
- FUNCTION: HOLDING, CARRYING
- THERMOREGULATION?
- ACCESS TO MORE CLIMATES: WATER, ETC


WHATS NORMAL ????

Phases of Gait

- Heel Strike
- Early Flatfoot
- Late Flatfoot (Early Push-off)
- Toe Off

STANCE PHASE

SWING PHASE

Footed.com
A NORMAL FOOT

- Dynamic mechanism for movement
- Flexible
- Accommodates
- Semi rigid
- Rigid

MOBILE AND STABLE

PURPOSE

- Forward progression
- Stability
- Conservation of energy

PROGRESSION

- Forward fall of body weight
- Contralateral limb swing

PARTS OF THE CYCLE

- Step is the length (or time) from heel contact to heel contact of the opposite foot.
- Stride is the length (or time) from heel contact to heel contact of the same foot.


Greg Schneider C.P., Gait and Alignment for Prosthetics; Otto Bock Healthcare. 2010
NORMAL GAIT STRIDE
(Right leg in color)

NORMAL
With Average Body Mass

- Average stride length is 1.41 meters.
- Velocity averages 82 meters/min.
- Average time per stride is about 1 second.

WHAT BRINGS ON “ABNORMAL”??

- **NEUROPATHY**
- **POOR MECHANICS**
- **WEAKNESS**
- **RANGE OF MOTION**
- **AWARENESS**
- **COGNITION**
- **SENSATION**

WHY

DIABETIC NEUROPATHY:
NERVE DISORDER CAUSED BY DIABETES

There remains vast truth in the statement “neuropathy causes diabetic foot pathology.”


WHY ABNORMAL??

DIABETIC NEUROPATHY:
NERVE DISORDER CAUSED BY DIABETES

- metabolic factors, such as high blood glucose, long duration of diabetes, abnormal blood fat levels, possibly low levels of insulin
- neurovascular factors, leading to damage to the blood vessels
- autoimmune factors that cause inflammation in nerves
- mechanical injury to nerves, such as carpal tunnel syndrome
- inherited traits that increase susceptibility to nerve disease
- lifestyle factors, such as smoking or alcohol use

Neuropathy: Multifaceted

- **MOTOR NEUROPATHY**
- **SENSORY NEUROPATHY**
- **AUTONOMIC NEUROPATHY**
ABNORMAL GAIT

- POOR POSTURE
- SLOWER GAIT
- SHORTER STEP AND STRIDE LENGTHS
  - LONGER STANCE PHASE
- WIDER BASE OF SUPPORT
- DECREASED MOBILITY AND STRENGTH
- IMPAIRED STATIC AND BALANCE
- ABNORMAL PLANTAR PRESSURES
FACTORS THAT CONTRIBUTE TO GAIT DYSFUNCTION

- GENERAL HEALTH STATUS
- COGNITION
- MOOD
- LOWER EXTREMITY CIRCULATION
- NEUROPATHY
- VISION
- LOWER EXTREMITY STRENGTH
- PHYSICAL ACTIVITY
- BODY MASS INDEX

WHEN THE FOOT HITS THE GROUND... WHAT DO YOU GET??

- INCREASED FOREFOOT LOADING
- RESTRICTED DORSIFLEXION MOBILITY
- INCREASED PLANTARFLEXION MOBILITY
- DECREASED STRENGTH IN BOTH DORSIFLEXORS AND PLANTARFLEXORS
- HALLUX VALGUS
- HALLUX RIGIDUS
- STIFFER PLANTAR SOFT TISSUE

A Dangerous Equation

REPETITIVE ABNORMAL FOOT MECHANICS AND GAIT PATTERN

+ PEAK PLANTAR PRESSURES

= ULCERATION

ULCERS

Majority come from severe pronation and severe supination

Typical Ulcer Area
- Toes
- 3rd Met Head
- 5th base
- Navicular
Causes of Stubborn Ulcers

- **POOR GLYCEMIC CONTROL**
- **INFECTION**: Impaired leukocyte function
- **HYPOXIA**: Micro and Macro vascularity
- **PROTEIN GLYCOSYLATION**: Deformities

BIG PLAYERS!!

- **CONSTANT PES EQUINUS**
- **PRONATION**
- **PREVIOUS AMPUTATION**
WATCH YOUR PATIENTS WALK!!!

DO A COMPLETE FOOT EXAM

- SKIN:
  - ALL SIDES OF THE FOOT: TOP AND BOTTOM
  - BETWEEN TOES
  - TOENAILS
  - PRESENCE OF HAIR/SHINY SKIN/WARMTH/DRY
  - TEXTURE
  - COLOR
  - CALLUSES....beware


- PEDAL PULSES
- PREVIOUS AMPUTATION
- BLISTERS
- FISSURES
- ABNORMAL AREAS OF COLOR:
  - NECROBIOsis LIPOIDICA DIABETICORUM: HYPERPIGMENTED PIAQUES ON SHIN; YELLOW TO RED
  - BOLLOSUM DIABETICORUM: FLUID FILLED BULLAE
  - GRANULOMA ANNULARE: SELF LIMITED POPULAR ERUPTION; FLESH COLORED TO ERYTHEMATOUS

- MONOFILAMENT TESTING: 10 gram
- FIRST AND THIRD TOES TO METHEADS
MUSCULOSKELETAL
- RANGE OF MOTION
- STRENGTH
- CHARCOT
- HAMMERTOES

SHOES
- CAT TOYS
- SHARP OBJECTS
- OLD SOCKS
- POP/SODA TOPS
- SOCKS

IF ITS PHYSICAL ITS THERAPY 😊
- CONSERVATIVE SHARP DEBRIDEMENT
- GAIT/BALANCE
- THERAPEUTIC EXERCISE
- ELECTRICAL STIMULATION
- ULTRASOUND
- DRESSING MANAGEMENT
- ORTHOTIC
- ASSISTIVE DEVICES
- PATIENT EDUCATION
- COMPRESSION WRAPPING
- TOTAL CONTACT CASTING
- ULTRAVIOLET THERAPY
- MONOCHROMATIC INFRARED ENERGY
- SCAR MANAGEMENT/MASSAGE
- MOBILITY: FUNCTIONAL TRAINING
- SEATING POSITIONING
- CONTRACTURES/SENSATION

BENEFITS OF PHYSICAL THERAPY
- GAIT TRAINING
  - SHORTEN STRIDE LENGTH
  - SLOW CADANCE
- STRENGTHENING
- STRETCHING
  - IMPROVE HIP STRENGTH
  - IMPROVE ANKLE RANGE OF MOTION AND STRENGTH

TAKE HOME PEARLS
- WATCH YOUR PATIENTS WALK
- BECOME FAMILIAR WITH GAIT
- DO A FOOT ASSESSMENT
- CONSIDER FUNCTION AND WOUND CLOSURE
- CONSIDER REFERRAL TO PHYSICAL THERAPY

HOW DO WE ASSESS THIS?
- √ ASSESS GAIT
- √ ASSESS STRENGTH
- √ ASSESS RANGE OF MOTION
- √ ASSESS FUNCTIONAL MOVEMENT
- √ REFER TO PHYSICAL THERAPY

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