Posterior tibial tendon transfer: Biomechanical evaluation of circumtibial, above-retinaculum and below retinaculum transmembranous transfer

Emilio Wagner, Pablo Wagner, Diego Zanolli, Cristian Ortiz, Andres Keller, Ruben Radkievich, Gunther Redenz, Rodrigo Guzmán
Disclosure

- No conflicts to disclose
- Posterior tibial tendon transfer: Biomechanical evaluation of circumtibial, above-retinaculum and below retinaculum transmembranous transfer
  - Emilio Wagner, MD
  - Pablo Wagner, MD
  - Diego Zanolli, MD
  - Cristian Ortiz, MD
  - Andres Keller, MD
  - Ruben Radkievich, MD
  - Gunther Redenz, PT
  - Rodrigo Guzmán, PT, PHD

- Our disclosures are in the AOFAS mobile App.
- We have no potential conflicts with this presentation
Introduction

- Posterior tibial tendon transfer
  - Compensate loss of dorsiflexion
  - Cavus foot
  - Dropfoot
  - Equinovarus
  - CMT
  - etc
Introduction

• Tendon transfer routes

  – Circumtibial
    • Subcutaneous surrounding the medial malleolus

  – Transmembranous
    • Above extensor retinaculum
    • Below extensor retinaculum
Objective

• Compare tendon transfers regarding
  – Tendon gliding resistance
  – Foot kinematics

– Tendon transfers evaluated
  • circumtibial transfer
  • Transmembranous above retinaculum
  • Transmembranous below retinaculum
Methods

• 8 cadaveric specimens
• Luminous skin markers
  – Oxford foot model
• Dead weight on all tendons (50% stance phase)
• Posterior tibial tendon (PTT) transferred to intermediate cuneiform
Methods

• Tension-tensile machine (Kinetecnics®, Santiago, Chile)
• 10 Dorsiflexion / plantarflexion cycles pulling the transferred PTT
  • Circumtibial
  • Transmembrane Above retinaculum
  • Transmembrane Below retinaculum

—Outcomes
  • Foot kinetics: 8 HD cameras
  • Tendon gliding resistance
Results

• Gliding resistance
  – Circumtibial: highest gliding resistance (p<0.05)
  – Transmembranous: No difference between above and below retinaculum (p>0.05)
Results

• Ankle Kinematics
  – All transfers have less ankle ROM than control group
  – Circumtibial:
    • lowest ROM of all transfers (p<0.05)
    • significant supination (p<0.05)
  – Transmembranous
    • No difference between above and below retinaculum
Discussion

• Circumtibial transfer
  – Highest gliding resistance
  – Lowest ankle ROM (dorsiflexion)
  – Significant supination

• Transmembranous transfer
  – No difference between above and below retinaculum
  – Above retinaculum: bowstring effect, not cosmetic
Conclusion

• Transmembranous transfer
  – Mechanically better than circumtibial transfer
  – Below retinaculum: option to be considered
References


