Neutral Position Casting for Functional Orthoses

Presented by:
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Today’s Format

Part 1 – PowerPoint Presentation (30 minutes)
• Discuss techniques to identify STJ neutral position
• Explain and demonstrate the neutral position, supine casting technique

Part 2 – Live Casting Demonstration (15 minutes)

Workshop Purpose

To teach a reliable method of neutral position casting that creates an optimal foundation for the fabrication of a functional foot orthosis (or functional AFO).

Why Do We Need This Workshop?

Studies Demonstrate Wide Variability in Casting
Journal of the American Podiatric Medical Association Vol.93, No.1, Jan/Feb 2003
Variability of Neutral-Position Casting of the Foot Chuter, Payne, and Miller

Conclusion
“The results of this study show that there is wide variability in the frontal plane forefoot-to-rearfoot relationship in neutral-position casting of the foot and that there is no difference between experienced and inexperienced clinicians”

Where Do We Begin?

In order to take a neutral position cast of the foot, we must be able to consistently and reliably position the subtalar joint in the neutral position during casting. How?

What are the Primary Objectives During Neutral Position Casting?

To replicate the plantar, non-weightbearing contour of the foot with:
• The subtalar joint in the neutral position
• The midtarsal joint fully pronated (i.e. load the lateral column)
• The lesser metatarsals fully dorsiflexed
• Optional: Plantarflex the medial column or 1st ray (often called casting out forefoot supinatus)
Four Clinical Techniques to Identify STJ Neutral Position

1. Utilize the appearance of the malleolar curves laterally
2. Feel STJ neutral position within the arc of motion of the STJ
3. Palpate for talonavicular congruity
4. Or you can just guess. **Not good!**

Utilizing Malleolar Curves to Identify STJ Position

- Supinated/Pronated
- Neutral Position

Locate STJ Neutral Within Arc of Motion

- Dorsiflex the forefoot and move the STJ through the full range of motion
- You should be able to locate the neutral position visually and by feeling the arc of motion

Locate STJ Neutral by Palpating for Talonavicular Joint Congruity

Neutral Position Casting: Patient Positioning

Tibia and Ankle Position Are Important
- Tibia parallel to floor or slightly declined
- Plantarflexed ankle joint helps facilitate MTJ pronation when lifting foot vertically
Neutral Position Casting: Patient Positioning

- Place the foot vertical and rotate tibia so STJ is in neutral position.
- Dorsiflexion of foot should produce minimal or no rotation between the foot and leg at STJ.

Neutral Position Casting: Patient Positioning

- Abducted foot and leg: reposition hip to internally rotate leg to get foot vertical.

Neutral Position Casting: Midtarsal Joint Positioning

Fully pronate the MTJ by simultaneously abducting, dorsiflexing, and everting the forefoot on the rearfoot using a gentle, lifting force. Do not forcefully pronate the MTJ.

Common Casting Errors

- Heel bisection discrepancies (inconsistent reference)
- Inconsistent casting technique (inconsistent casts)
- Midtarsal joint supination
  - Inverting the forefoot (longitudinal axis)
  - Adducting and plantarflexing the forefoot (oblique axis)
- Subtalar joint position errors (also influences MTJ)
- Dorsiflexed toes: can cause plantarflexed mets
- Surface defects and irregularities

Common Error: MTJ Supination

Neutral Position Casting: Grip and Arm Position

The casting grip is likened to a salute

- Wrist straight, fingers and forearm should parallel the angle of the sulcus
- Ext. or hyperextend thumb (don’t flex)
- Chest parallel to plane of patient’s forefoot
Neutral Position Casting: Grip and Arm Position

Evaluate Plantar Fascia for Accommodation Before Casting Every Patient

Dorsiflex hallux, palpate and mark plantar fascia for accommodation (esp. when prominent and firm)

Neutral Position Casting: Plaster Application

Neutral Position Casting: Cast Removal and Check

Alternative Suspension Casting Materials/Methods: STS Resin Impregnated Slipper Sock

Casting for Functional AFO’s: Plaster-of-Paris

Mark med. and lat. malleolus and mark distal tip (ankle joint axis)
Casting for Functional AFO’s:  
**Plaster-of-Paris**

Casting for Functional AFO’s:  
**STS Resin Impregnated Ankle Sock**

Functional or Traditional AFO, Ankle Brace,  
Gauntlet Brace using STS Resin Socks

In Summary

- Casting is subject to the laws of physics
- Based on the laws of physics, consistent results are the product of consistent technique
- Any significant variability in casting is the result of inconsistent technique
- Mastering good technique requires both knowledge and practice

Conclusion

When the basic objectives of neutral position casting are clearly understood and when the casting technique acts to promote those objectives

**THEN, AND ONLY THEN**

does neutral position casting become a reliable method for creating consistent reproductions of the foot!

Thank You!

Let’s cast someone!