Orthotic Management of the Hemiplegic Foot and Ankle

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Aim of today

- Hemiplegia
  - Main Causes
  - Classification
- Orthotics
  - Appropriate Treatment
- Biomechanics overview
  - Stance phase biomechanics
  - Orthotic Influences
Hemiplegia Overview

- Etiology
  - Neuromuscular Disorder
  - Upper or lower nervous system?
  - Location affected relates to nerves damaged

- Types
  - Spastic, Cerebral, Spinal, Facial
  - Congenital and Acquired
Hemiplegia Causes

- Cerebral Palsy
- CVA
- Brain Trauma
- Spinal/brain tumour
- MS
- Polio
- GBS
Cerebral Palsy

- Non Progressive
- Prevent further deformity
- Accommodate current presentation
- Provides stability
- Long term treatment plan
CVA

- Opportunity to promote change
- Correction of position
- Challenge stability to alter gait pattern by preventing movement
- Aim for set goals within a time frame
Winters Classification

• Hemiplegic Gait Pattern Classification (1987)- Widely Used
• Sagittal Plane- Foot and Ankle
• Winters Type 1
• Winters Type 2
Winters Type 1

- Presentation
  - Foot drop in swing
  - Adequate dorsiflexion range
- Consequences
  - Reduced ground clearance
  - Initial contact at toes
- Compensations
Winters Type 2

• Presentation
  – Plantarflexion throughout Gait Cycle

• Consequences
  – Reduced tibial progression
  – Increased lever arm

• Compensations
Orthotics
Orthotic Aims

• To improve the efficiency of gait
• To accommodate or correct deformity
• To improve function/independency
• Reduce pain
Orthotic Assessment

- Fixed/Correctable position (ROMs)
- Muscle Power
- Tone/Spasticity
- Gastrocnemius Length/Soleus Length
- Weight
- Oedema
- Sensation
- Patient Compliance
PLS/Stock
Ankle Brace

Hinged AFO
Callipere
Rigid AFO

- Maximum Control- Stance and Swing
- Challenge Stability- Proximal
- Prevent further deformity
- Individual tuning.
- Consider Cast Position
Rigid AFOs
Orthotic Options

• Insole
• Corrective or accommodative
• Secondary deformity
• Types
  – moulded, flatbed, stock, raises
Biomechanics
Biomechanics

- Use orthoses to correct
- Forces generated in the lower limb and opposing ground reaction force.
Initial heel strike
Loading response
Biomechanics

Mid stance
Biomechanics

Terminal Stance

Moseley, 1993
Hemi Presentation

• Hyperextension or flexion of the hip and/or knee
• Normalising ankle DF
• Improve coronal plane alignment
AFO Influences

Tuning
Setting Angle

- Determine Gastrocnemius Length
- Add Raise if plantargrade not achievable
- Better fit
- Better Biomechanics
- Better Stretch

Owen, 2010
Interacting with other interventions

- Physiotherapy
- Occupational therapy
- Podiatry
- Orthopaedic Surgery
- Pharmaceutically
Conclusion

• Treatment goals differ with different hemiplegia causes
• Careful orthoses selection to maintain best DF range
• Tuning to incorporate all ranges
• Close MDT contact
Thank you for listening,

QUESTIONS?
References


• Elaine Owen (2010) Importance of Being Earnest about Shank and Thigh Kinematics Especially when using ankle - foot orthoses. Prosthetics and orthotics international. 34/3. 254-269