Management of Movement and Gait Disorders

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Clinical Decision Making

- Team approach to managing gait
  - Physical therapists
    - Therapeutic exercise
    - Motor Control and task specific training
  - Orthotists
    - Ankle Foot Orthotics
    - Walk-Aide, Bioness
  - Neurologists, physiatrists
    - Medications for spasticity management (Oral, injectables, ITB)
    - Dalfampridine
Rehabilitation Evaluation

Examine and evaluate each patient as an individual to determine:

Activity Limitations – Performance decrements in functional activities of the person (home ambulation)

Participation restrictions – Person’s restrictions in involvement in life situations in the context they live (community ambulation)

Underlying impairments that contribute to full participation in function and life roles

Impairments that limit Ambulation

• Weakness
  – MMT, Postural Alignment

• Spasticity
  – MAS

• Sensation
  – Localization, Proprioception

• Balance
  – Visual system, Vestibular- Ocular reflex, sensation, strength

• Coordination
  – Dysmetria, Dysdiadochokinesia, Intention Tremor
Gait Deviations: Spasticity and Weakness

- Common gait deviations
  - Circumduction
  - Vaulting to clear weak leg
  - Genu recurvatum
  - Foot drag
  - Shuffling feet
  - Lateral trunk flexion
  - Decrease push-off, acceleration
Gait Deviations: Balance and Coordination

- Common gait deviations:
  - Hesitant to move
  - Slow deliberate movements
  - Small range of motion used in movement
  - Stiff movements, decrease head movement
  - Slide or shuffle feet forward
  - Increased stance time bilaterally
  - Wide base of support

Balance Dysfunction
Recommendation of CMSC Consensus Conference

• Gait Measures for clinical setting:
  – Timed 25 – foot walk
  – TUG
  – DGI
  – 6 Minute walk (or 2 minute version)
  – MSWS -12

Dynamic Gait Index

- BERG Balance Scale
- Timed Up and Go (TUG)
- Dynamic Gait Index
Brain patterns of cortical activation: A, C, & E healthy controls, B, D, F CIS suggestive of MS during performance of task with clinically unimpaired hand. (Rocca et. al. 2003)

Management

- Weakness and Spasticity
  - Strengthening in functional positions that elongate shorten muscles while strengthening weaker muscles
    - Example: Tall kneel ball lift
  - Task specific training to improve motor learning and cortical reorganization
    - Example: Part task (stepping over cane), Whole task (ambulation with modification – somatosensory or visual feedback)
  - Dalfampridine to improve action potentials along axons
  - Spasticity management through medications
Core Exercises

Task Specific Training
Orthotics to Aid Ambulation

• Dictus Band or Foot-up (dorsiflexion assist, lighter than prefab AFO)
• Carbon Ankle Foot Orthotics or traditional AFO
• Hip Flexion assist orthotic
• Walk Aide, Bioness L300 and L300 PLUS

AFO and Dictus Band
Hip Flexion Assist Orthosis

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Bioness and Walk Aid
Management

• Balance and Coordination
  – If balance problem is due to:
    • Sensation limitation – Challenge the patient in functional positions while providing somatosensory feedback or visual feedback, then gradually take away environmental cues to allow brain to integrate
      – Example: Standing head turns on even surface with WBOS and (B) hand support – progressing to one hand, no hand, NBOS, on foam, eyes closed
    • VOR limitation – Must address vestibular ocular reflex retraining
      – Example: VOR in sitting, standing, on foam, ambulation
    • Visual limitation (INO, Double vision) - Visual Focus and somatosensory feedback in postural positions
  – Coordination – providing visual targets and auditory cues while practicing task specific mobility
    • Example: Target training, Ambulation with auditory cues for stepping
Progression of Somatosensory Feedback

VOR Retraining
Balance Retraining

Coordination
Safety First

- Choosing the right mobility device for the patient:
  - Canes (straight cane, quad cane)
  - Crutches (axillary, forearm)
  - Walkers (standard, 2, 3 or 4 wheeled)
  - Scooters (for energy conservation)
  - Wheelchairs (community mobility, pressure relief)
Forearm Crutches

Walkers
Scooter/Wheelchair

Assistive Device Selection
Positioning in Wheelchair

Conclusion

• Management of movement and gait disorders requires a comprehensive examination to determine underlying impairments
• A team approach should be utilized to address the needs of each individual patient to improve their functional mobility.
References


• Neurological Disabilities: Assessment and Treatment, Susan E. Bennett, James L. Karnes