

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

Spasticity and Weakness



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

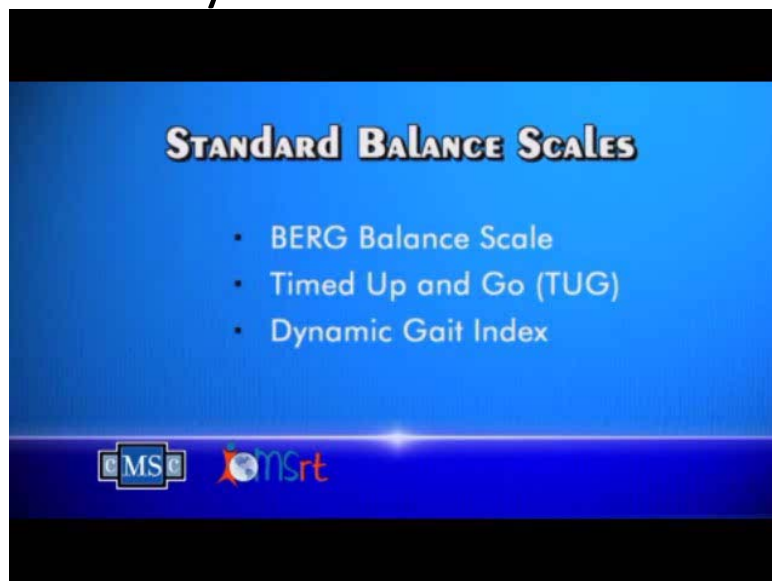
Balance Dysfunction



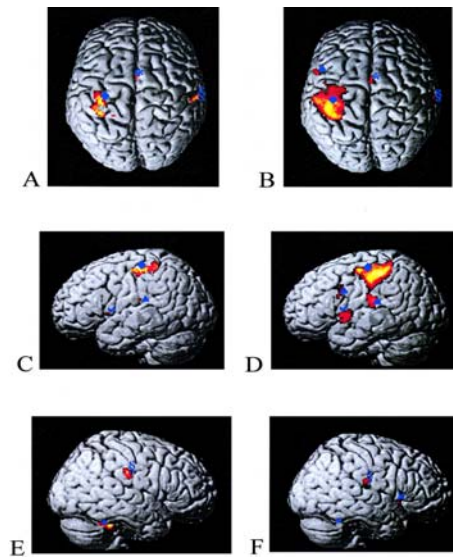
Recommendation of CMSC Consensus Conference

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

Dynamic Gait Index



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



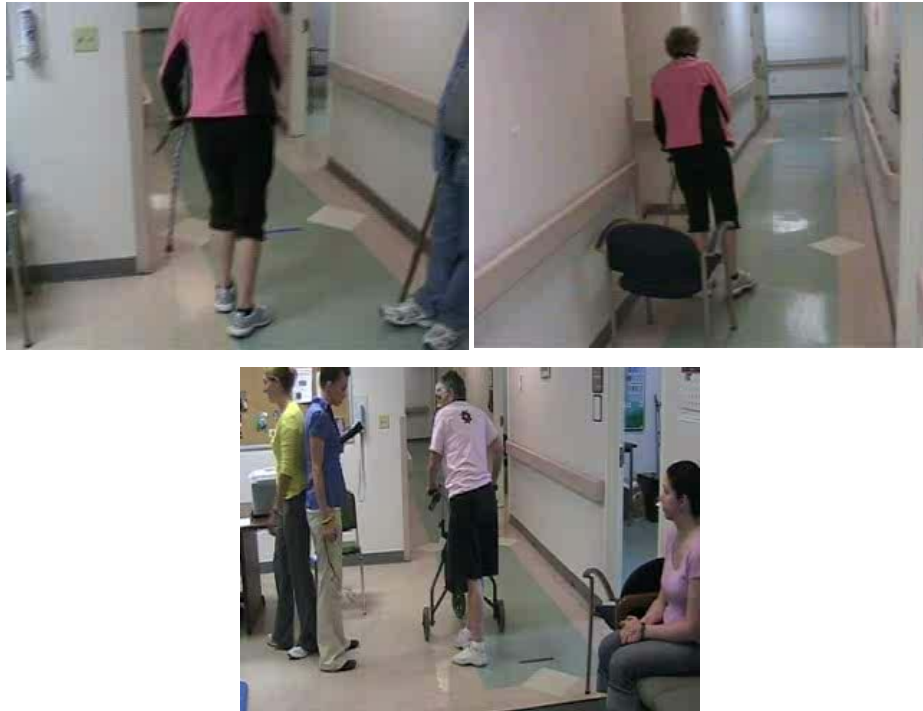
Hip Flexion Assist Orthosis

Cleveland Clinic Mellen Center



Bioness and Walk Aid

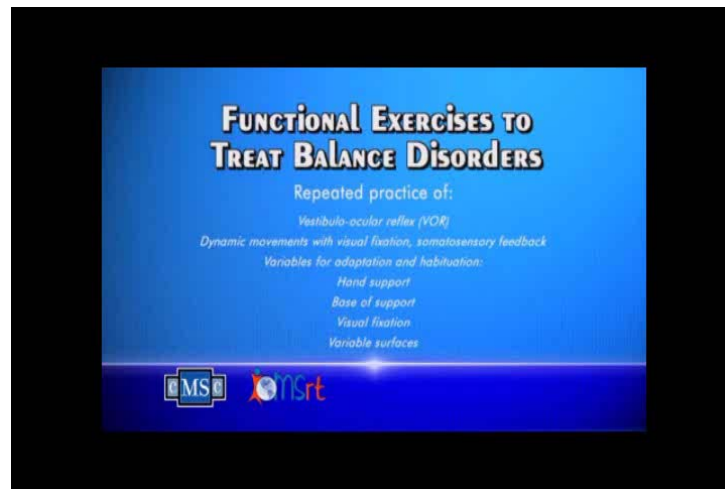




Management

- 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

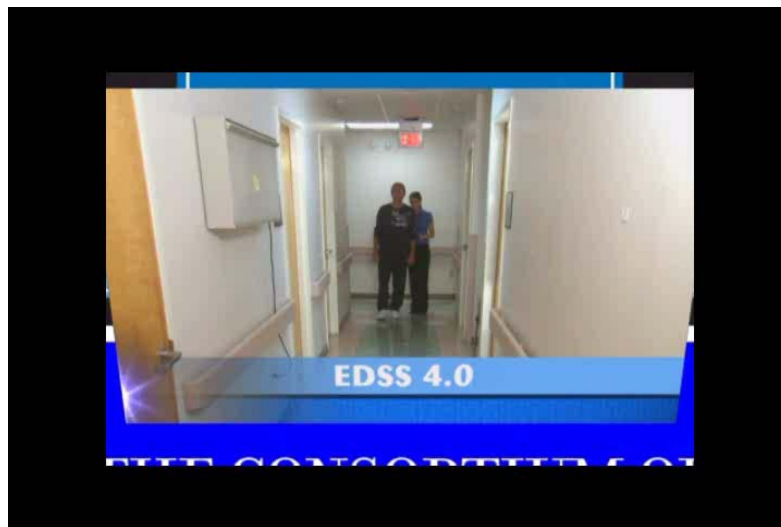
Progression of Somatosensory Feedback



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)

Canes



Forearm Crutches



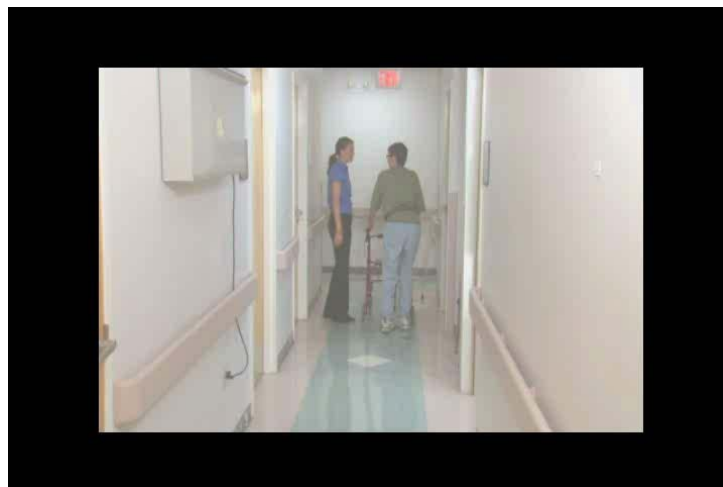
Walkers



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

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