Balance and Strength Interventions for an Older Individual with Peripheral Polyneuropathy: A Case Report

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Background

- Peripheral polyneuropathy (PPN) is a condition resulting from damage to the peripheral nervous system.\(^1\)
- PPN occurs in a distal and symmetrical pattern, often affecting the toes and the soles of the feet.\(^2\)
- Numbness, tingling, paresthesias, or burning are common symptoms of PPN.\(^1\)
- 20-25% of cases are idiopathic.\(^1\)
- Can affect functional mobility due to proprioceptive sensory losses and general weakness of extensor muscles, which then results in unsteadiness of gait and impaired balance.\(^3\)
- Treatment can consist of pharmacological and physical therapy interventions in order to manage symptoms.\(^1\)
- Recent literature demonstrated that following participation in a strength and balance training program, individuals with PPN experienced significantly fewer falling episodes.\(^2\)

Purpose

The purpose of this case report is to describe the Physical Therapy management of an elderly community-dwelling patient with idiopathic PPN, elevated fall-risk, deconditioning, and a history of bilateral total knee and hip arthroplasties.

Case Description

- An 81-year-old male with chief complaints of bilateral foot sensation, unsteadiness in gait, and bilateral lower extremity weakness secondary to a diagnosis of bilateral LE PPN two years prior to episode of care.
- Received Physical Therapy (PT) twice a week for 9 weeks & a total of 18 visits.
- PMH: pre-diabetes mellitus, cardiomyopathy, atrial fibrillation, morbid obesity, and bilateral total hip and total knee arthroplasties.
- Primary goal for PT was to improve his balance and strength in his legs, and reduce his risk for future falls.
- Community ambulation with the use of a straight cane and a history of bilateral total knee and hip arthroplasties.
- Patient with idiopathic PPN, elevated fall-risk, deconditioning, and a history of bilateral total knee and hip arthroplasties.

Interventions

- An 81-year-old male with chief complaints of bilateral PPN, elevated fall-risk, deconditioning, and a history of bilateral total knee and hip arthroplasties.
- Patient performing lateral taps with a 3" rocker board in the parallel bars.
- Patient performing 4" lateral "hurdles" with ankle cuff weights in the parallel bars.
- Patient performing standing hip abduction exercises in the parallel bars.
- Patient performing lateral taps with a 3" rocker board in the parallel bars with hands hovering.

Timeline

Day 0

- Initial Evaluation
- Fractured Olecranon Bursa-Timed Up & Go (TUG), Five Times Sit to Stand (5xSTS), and Lower Extremity Functional Scale (LEFS) administered.
- Gait Speed and Lower Extremity Manual Muscle Testing (MMT) and Range of Motion (ROM) measured and recorded.

Visit 2 through 9:

- Interventions
  - Aerobic Conditioning
  - Balance Training
  - Strengthening

Day 13-21

- Visit 10 and Progress Notes: Outcomes
  - Retesting:
    - TUG, 5xSTS, LEFS, and Gait Speed.
  - Administration of:
    - Activities-Specific Balance Confidence (ABC) Scale and Timed Tandem Stance Balance.

Visit 11 through 17:

- Interventions
  - Progression of Aerobic Conditioning, Lower Extremity Strengthening Exercises, and Balance Training.

Day 30-39

- Visit 10 and Discharge from Physical Therapy:
  - Retesting of Tests and Measures:
    - TUG, 5xSTS, LEFS, and ABC Scale, Timed Tandem Stance Balance, and Gait Speed.
  - Lower extremity MMT and Range of Motion (ROM) measured and recorded.
  - Discharge to Community-Based balance maintenance exercise classes offered at the Department of Veterans Affairs.

Day 39

- Initial Evaluation
  - Timed Up & Go
  - Five Times Sit to Stand
  - Timed Tandem Stance
  - Discharge

Outcomes

- Patient Reported Functional Outcomes
  - Activities-Specific Balance Confidence Scale
  - Lower Extremity Functional Scale

Figure 1. Key

- A. Patient performing Sit to Stand Exercises with use of UEs.
- B. Patient performing 4° forward "hurdles" with ankle cuff weights in the parallel bars.
- C. Patient performing 4° lateral "hurdles" with ankle cuff weights in the parallel bars.
- D. Patient performing standing hip abduction exercises in the parallel bars.
- E. Patient performing lateral taps with a 3" rocker board in the parallel bars with hands hovering.
- F. Patient performing forward and backward taps with a 3" rocker board in the parallel bars with hands hovering.

Discussion & Conclusion

- The patient demonstrated significant subjective and functional improvements.
- Improvements seen in Timed Up & Go (TUG), Five Times Sit to Stand (5xSTS), & Timed Tandem Stance.
- Patient-reported scores improved significantly in the Lower Extremity Functional Scale (LEFS) and Activities-Specific Balance Confidence (ABC) Scale.
- The patient’s gait speed decreased by 0.15 m/s.
- The outcome measures at discharge suggested that the combined lower extremity strengthening, aerobic conditioning, and balance training program might have contributed to the patient’s functional improvements and decreased fall risk, as indicated by the improved TUG and 5xSTS scores.
- Could be suggested that the plan of care may have been beneficial to the patient, improving his functional mobility and a self-reported balance confidence despite his unchanging PPN.

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