A Progressive Physical Therapy Plan of Care for a Patient With Charcot-Marie-Tooth Disease Following Myocardial Infarction: A Case Report.

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Unique

- Charcot-Marie-Tooth disease (CMT) is an inherited neuromuscular disease caused by mutations in genes that produce proteins involved in the structure and function of either the myelin sheath or the peripheral nerve axon.[1]
- The slow degeneration of the nerves results in a decreased ability to communicate with their distant targets leading to symmetric distal muscle atrophy and weakness, hand and foot deformities, and sensory loss.[2-3]

Figure 1: Example of typical claw hand deformity as a result of intrinsic muscle atrophy.[4] **Figure 2:** Example of "inverted champagne bottle" presentation due to atrophy in the lower extremities.[5] **Figure 3:** Example of pes cavus deformity.[6]

- There is currently no treatment that reverses or stops the progression of the disease; however, there are physical therapy (PT) interventions that reduce the level of disability in individuals with CMT. Research has shown that interval and resistance exercise can improve functional capacity, strength and activities of daily living (ADLs) in people with CMT.[7-9]
- Myocardial infarction (MI) is often a result of coronary artery disease (CAD), which has an incidence rate of 34.6% in men over 80.[10] Immediate exercise interventions in the acute care setting following an MI have shown to positively impact a patient's functional capacity and quality of life.[11]
- While rehabilitation practices for CMT and MI have been described separately, there is a paucity of research investigating the optimal physical therapy (PT) interventions for patients who have both health conditions concurrently.

Purpose

To describe a progressive PT plan of care for a patient with CMT following an acute myocardial infarction (MI) in the acute and sub-acute care settings.

Foundation

- Bed rest remains a common treatment for managing acute illness even while its efficacy is not supported by the literature.[12] It is well documented that prolonged bed rest causes profound deconditioning of multiple body systems.[13-15]

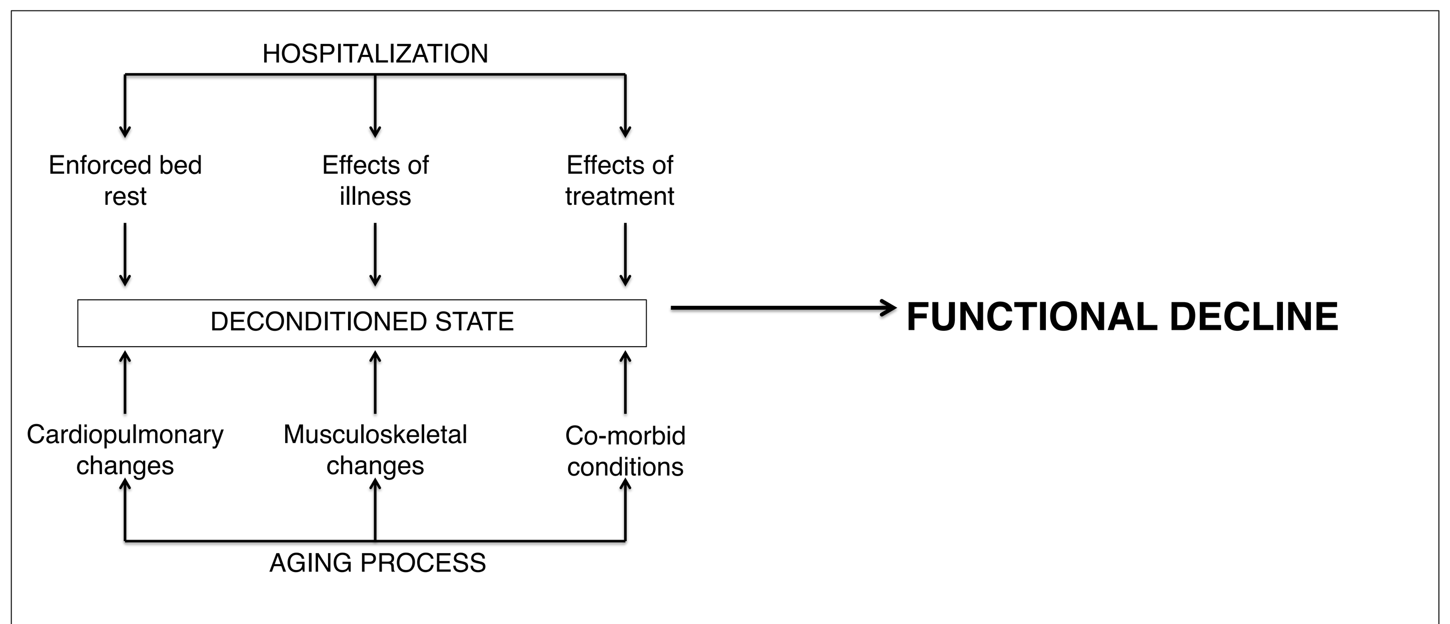

Figure 4: Interaction between hospitalization and the aging process.[16]

- Research has suggested that physical exercise and early mobilization may help reduce the consequences of bed rest and improve long-term outcomes.[13, 15, 17-18]
- An immediate and progressive PT plan of care for a person with CMT following a complicated MI was hypothesized to improve function and long-term outcomes.

Case Description

- 80-year-old male with past medical history CMT, CAD status-post three-vessel coronary artery bypass grafting 10 years prior, hypertension, hypothyroidism, dyslipidemia.
- Admitted to the ER with an MI that required emergent left heart catheterization.
- During the procedure, the patient went into acute respiratory failure requiring intubation.
- He spent 6 days on complete bed rest while intubated in the ICU.
- Initial PT evaluation on day 7 revealed significantly decreased strength, endurance, balance and chronically impaired hand and foot function.
- He received ~30 minutes/day of acute care PT for four days, as well as OT and SLP.
- He was discharged to the hospital's Inpatient Rehab facility and received two daily one-hour sessions of PT for five days, as well as daily OT and SLP.
- Prior to admission, the patient was independent with functional mobility using bilateral ankle-foot orthoses and two trekking poles for long-distance ambulation and was independent with all ADLs.

Examination		
Measure	**Initial**	**Discharge**
Bed Mobility	Minimum Assistance	Independent
Transfers	Maximum Assistance	Modified Independent
Ambulation	2' with FWW, Maximum Assistance	200' x 2 with FWW or trekking poles, Modified Independent
Sitting Balance	Fair	Good
Standing Balance	Poor	Fair

Interventions	
Acute Care	**Inpatient Rehab**
Gait Training	Advanced Gait Training (Even/Unevens)
Transfer Training	Functional Mobility Training
Bed Mobility Training	Stair Training
LE Strengthening	Therapeutic Exercise for Strengthening
Progressive Sitting/Standing Balance	

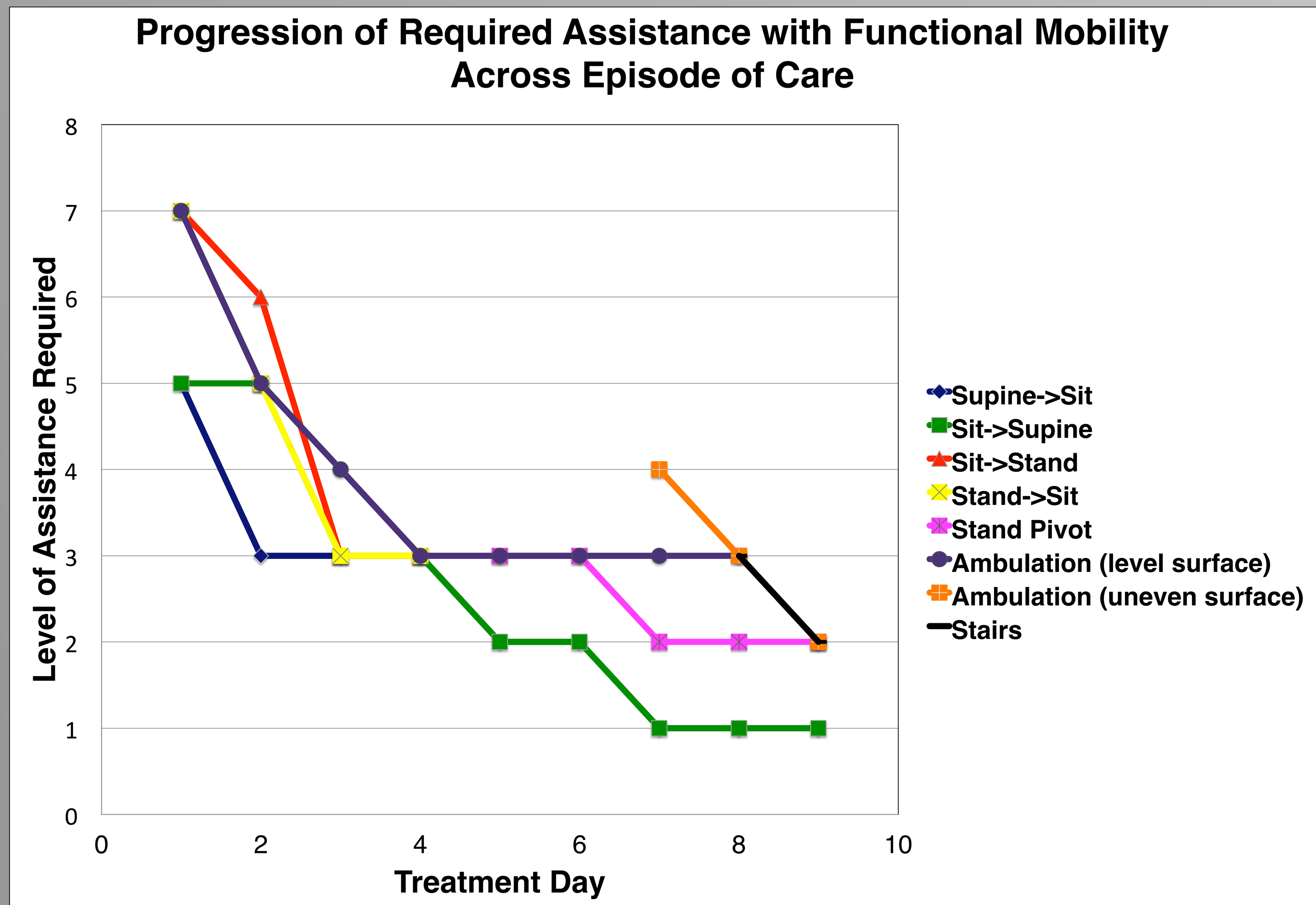

Figure 5: Level of assistance required by patient throughout Physical Therapy Episodes of Care. 1 is defined as Independent; 2 is defined as Modified Independent; 3 is defined as Supervision; 4 is defined as Contact Guard Assist; 5 is defined as Minimal Assistance; 6 is defined as Moderate Assistance; 7 is defined as Maximal Assistance; 8 is defined as Total Assistance

Observations

- Patient was successfully discharged home after 9 days of progressive PT despite the fact that the patient initially required minimal assistance for bed mobility, maximal assistance for transfers, and maximal assistance to ambulate 2 feet using a walker.
- He increased his strength, activity tolerance, balance, and independence with all functional mobility.
- Gait improvements were demonstrated and included more upright posture, increased step length, faster gait speed and improved stability, as demonstrated by graduation from front-wheeled walker to bilateral trekking poles.

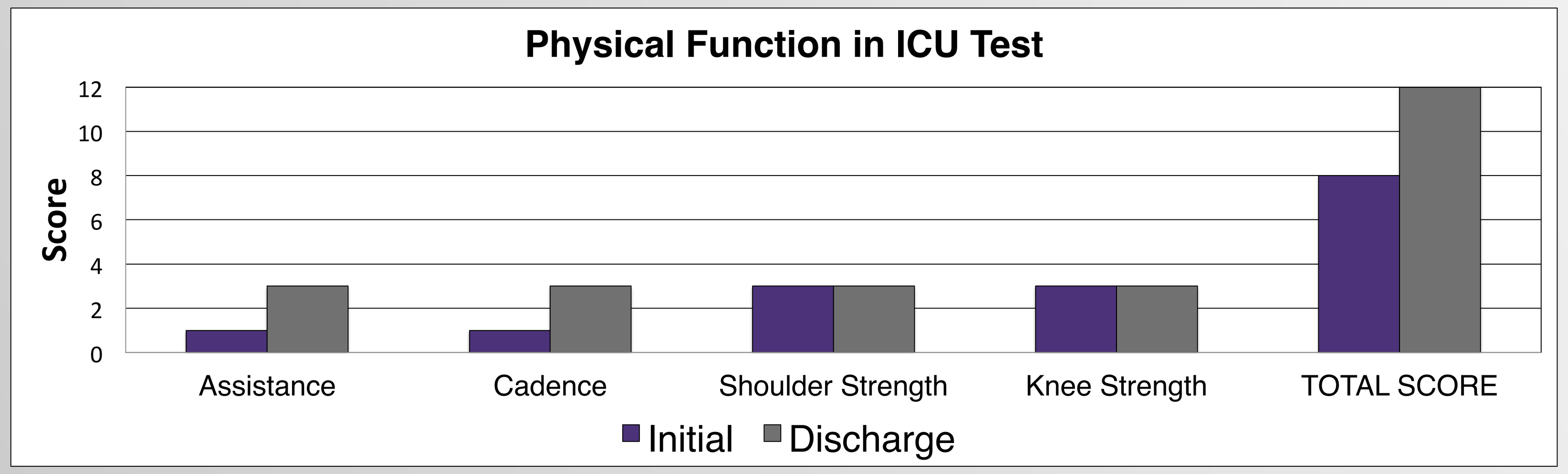

Figure 6: PFIT scores at initial evaluation and discharge from acute care. Higher score denotes improved physical function.

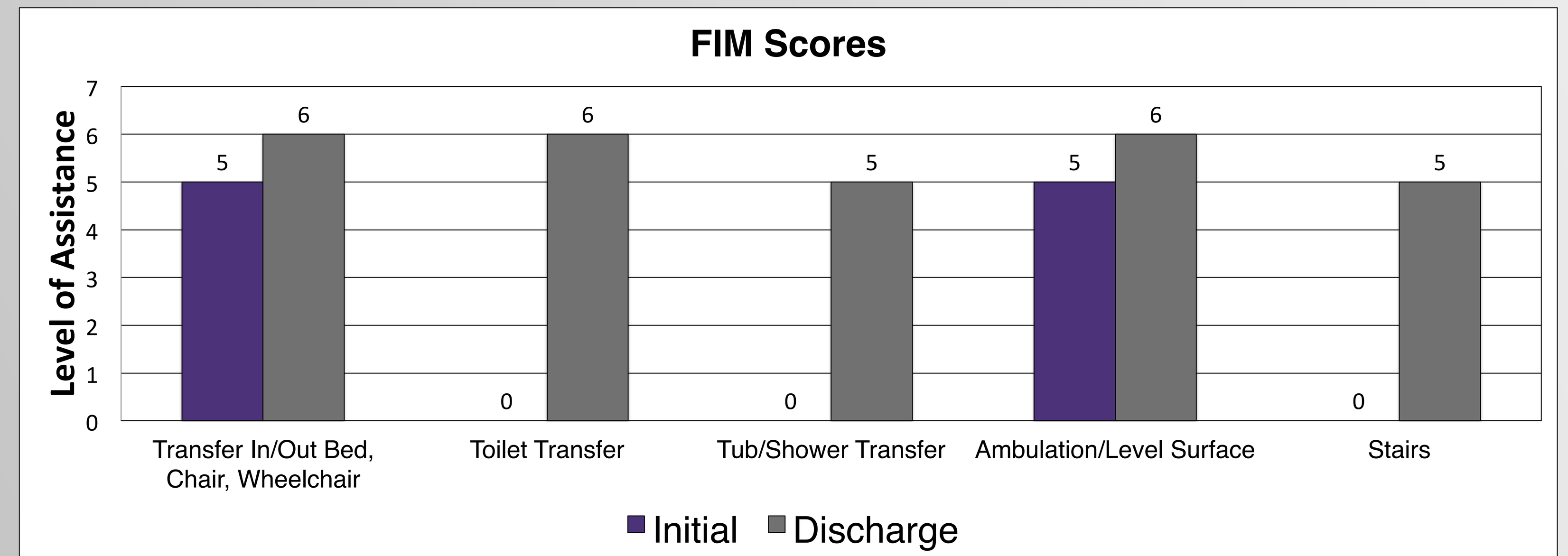

Figure 7: FIM scores from initial evaluation and discharge from Inpatient Rehab. Higher score denotes improved functional ability. 0=Activity Does Not Occur; 5=Supervision/Setup; 6=Modified Independent

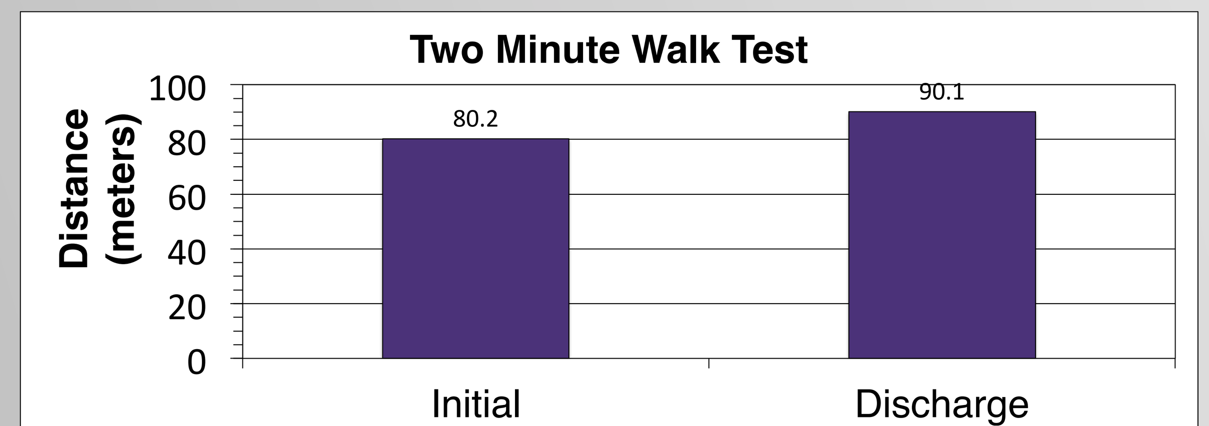

Figure 8: 2MWT values at initial evaluation and discharge from Inpatient Rehab. Value denotes distance patient was able to ambulate in 2 minutes.

Conclusions

CMT and MI in combination can be especially debilitating. An aggressive rehabilitation course that promoted balance, functional mobility and progressive gait training appeared to substantially benefit an 80-year-old patient's physical function and contribute to his potential for independent living in the community. Future studies should be conducted to further examine optimal interventions for patients with overlapping conditions such as CMT and MI.

Acknowledgements

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