

# Application of a Balance Training Program in a Patient with Charcot Marie Tooth Disease: A Case Report

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## Background

- Charcot Marie Tooth Disease (CMT) is the most common progressive inherited neurological disease.
- Proteins in the myelin sheath of both motor and sensory nerves become damaged, resulting in muscle atrophy and reduced sensation.
- Patients experience difficulty with gait, balance, and independence with ADLs.
- The RUSK Modified Romberg Program (MRP) is a balance program used for patients with neurological pathologies.
- There is minimal research on the effectiveness of the RUSK MRP in patients with CMT.

## Purpose

- To determine the effectiveness of the RUSK MRP in order to improve balance and reduce risk of falls in a patient with CMT.

## Patient History

- The patient was a 60-year-old male diagnosed with CMT over 40 years ago and reported more than seven falls in the last six months. The RUSK MRP intervention included variation in foot placement, surface type and visual cues as well as strengthening and mobility training twice a day for seven days over 12 weeks.

## Outcomes

- The patient improved in balance per Berg Balance Scale and Dynamic Gait Index.
- RUSK MRP balance improved from 20 seconds at six inches apart to  $\frac{3}{4}$  Romberg for 1 minute.
- Minimal improvements in manual muscle testing.

## Examination

Cardiovascular/Pulmonary	Heart rate and blood pressure within normal limits	Joint	Motion	Left	Right
Musculoskeletal	Gross strength and range of motion impaired in bilateral ankle and knee. Skeletal deformities noted in bilateral upper extremities. Pes cavus bilaterally. Bilateral UE fine motor skills absent. Trendelenburg gait.	Hip	Flexion	4-/5 at admission 4/5 at discharge	4-/5 at admission 4/5 at discharge
			Extension	Able to perform Bridge	Able to perform Bridge
			Abduction	3-/5 at admission 3/5 at discharge	3-/5 at admission 3/5 at discharge
Neuromuscular	Light touch impaired bilateral lower extremities, from great toe to knee. Proprioception impaired in bilateral great toe and ankle.	Knee	Flexion	Seated: against mod resistance	Seated: against mod resistance
			Extension	4-/5 at admission unchanged at discharge	4/5 at admission Unchanged at discharge
Integumentary	No impairments noted	Ankle	Dorsiflexion	Absent at admission Unchanged at discharge	Absent at admission Unchanged at discharge
				Plantarflexion	Initiates only (at admission) Unchanged at discharge
Communication	No impairments				
Affect, Cognition, Language, Learning Style	No impairments				

Table 1. Systems Review

Table 2. Manual Muscle Testing

Outcome Measure	At Admission	At Discharge
Berg Balance Scale	31/56	41/56
Dynamic Gait Index	9/24	19/24

Table 4 Functional outcome measures

## Intervention

	Weeks 1-3	Weeks 4-6	Weeks 7-9	Weeks 10-12
<b>Sit to stand</b>	23" mat table 3 x 10	22" mat table 3 x 10	21" mat table 3 x 10	20" mat table 3 x 10
<b>Romberg</b>	Feet shoulder width apart, firm surface, eyes open for one minute	Feet 2" apart, airex, eyes open for one minute	Romberg, airex, eyes open, for one minute	$\frac{3}{4}$ Romberg, airex, eyes open, for one minute
<b>HEP performed bilaterally (Hip Flexion, Hip Abduction, and Hip Extension)</b>	2 x 10 each Seated: Hip Flexion, Hip Abduction	Standing Hip Flexion & Hip Abduction 2 x 10 each Hip Extension 1 x 10	Standing Hip Flexion, Hip Abduction, and Hip Extension 3 x 10 each.	Standing Hip Flexion, Hip Abduction, and Hip Extension 3 x 10 each.

Table 3 Progression of interventions throughout plan of care

## Discussion

- The patient demonstrated improvement in balance per Berg Balance Scale and Dynamic Gait Index.
- Further research should focus on investigating the benefits of the RUSK MRP in patients with CMT.

## References

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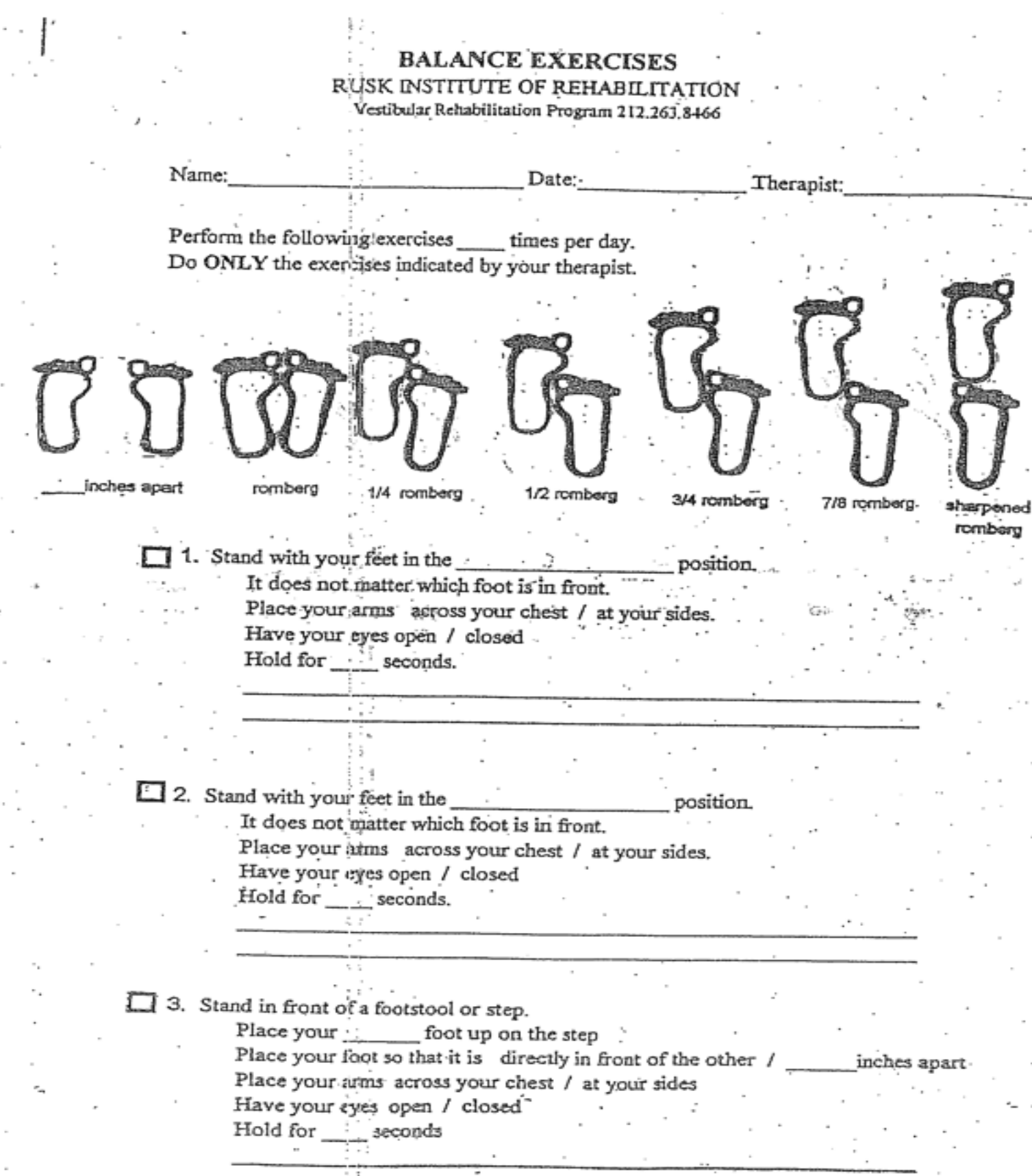


Figure 1. RUSK MRP Program