

Therapeutic exercise combined with Vasper cooling mechanism utilized in a patient with Multiple Sclerosis – a case study

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Purpose

- 1) To determine whether a low impact, high intensity interval therapeutic exercise combined with compression cooling system as provided by Vasper affects functional mobility and deters fatigue in a patient with Multiple Sclerosis (MS)
- 2) To assess the feasibility and tolerance of using Vasper device by a patient with MS

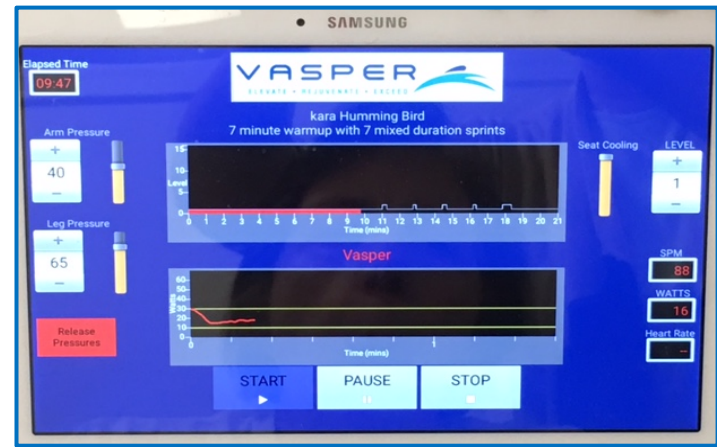
Subject

A 49 year old female diagnosed with relapsing remitting MS since 2002 presented to physical therapy (PT) with bilateral lower extremity weakness (left greater than right), resulting in two falls within the last twelve months. The patient was referred to outpatient PT by her neurologist. The patient was able to ambulate independently, however, she relied on a cane for long distance ambulation or when fatigued. The patient presented with left foot drop once fatigued as well. Three months prior to this episode of care, the patient reported being able to walk her dog for 45 minutes, but had to limit walks to 10 minutes within the last three months due to impaired endurance and imbalance.



Methods & Materials

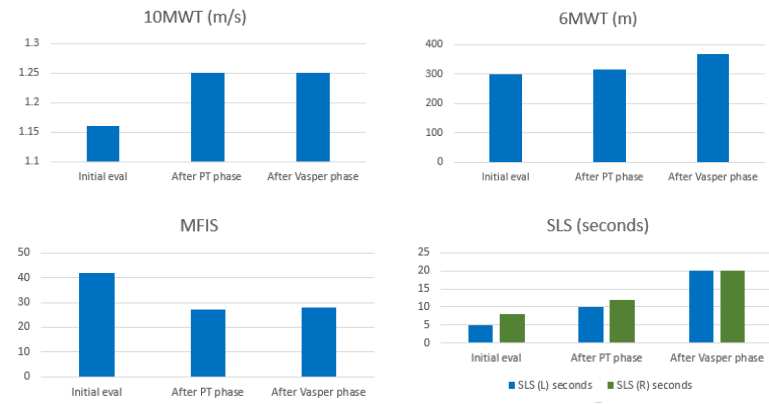
The patient participated in 26 outpatient PT visits. The first 20 visits entailed 60 minutes of traditional PT and the last 6 visits entailed 30 minutes of “traditional” PT combined with 30 minutes of Vasper training. Traditional PT consisted of lower extremity stretching, core and lower extremity strengthening, balance training and neuromuscular re-education, and gait training. Vasper training consisted of liquid-cooled compression or blood flow restriction cuffs combined with high intensity interval training via a low-impact NuStep aerobic trainer. The cooling was applied via compression cuffs secured on the arms and thighs, and set to 35 mmHg and 65 mmHg pressures, respectively. Cooling was also applied by a cooling seat pad and cooling foot pedals. The Hummingbird protocol within the Vasper program was selected, consisting of a 7 minute warm up followed by 7 minute high intensity intervals of varying intensities and durations. For Vasper training, the intensity level within the Hummingbird protocol was adjusted to ability and tolerance.



Analysis

The patient was assessed for single limb stance (SLS), 10 meter walk test (10MWT), 6 min walk test (6MWT), and Modified Fatigue Impact Scale (MFIS) at initial evaluation, after completion of the traditional physical therapy and again on the last day of the Vasper training sessions.

Results



Conclusions

The patient showed significant improvements both during the traditional PT and Vasper training sessions. The most notable significant gains during the Vasper assisted endurance training was in the 6 MWT and SLS. The patient required modifications for intensity and duration, however for this patient, Vasper has shown to be a feasible new rehabilitation technology. Further studies are warranted to further determine clinical applicability and parameters for using Vasper assisted endurance training in patients with MS. Additionally, further studies to re-evaluate the long term benefits of Vasper assisted training and benefit of Vasper assisted training independently of traditional PT, are warranted.

Safety and Efficacy of Multiple Sclerosis Rehabilitation Therapy in Combination with Cooled Blood Flow Restriction Technology: A Case Series

Naseem Chatiwala, Kara Lammerding, Chloe Wernecke

Abstract— Although studies have determined that exercise is helpful in managing many multiple sclerosis (MS) symptoms, detrimental effects such as fatigue pose a challenge with traditional forms of continuous exercise in the MS population. Exercise methodologies of high intensity interval training (HIIT), blood flow restriction, and application of core cooling have been studied in individuals with MS to mitigate these effects; however, they have not been examined in combination through means of a novel rehabilitative technology, Vasper™. The combined exercise methodology of Vasper™ should be a more tolerable and effective means of exercise for individuals with MS to address restoring function, repairing tissue, and improving psychosocial wellbeing. The purpose of this study was to assess the feasibility and tolerance of using Vasper™ as a safe and effective treatment modality for clients with MS and examine potential effects on fatigue, gait speed, endurance, and balance.

This case series examined three women. Subject 1 (age 49, EDSS 5.0) completed 20 sessions of physical therapy (PT), followed by 6 of Vasper™. Subject 2 (age 43, EDSS 2.5) completed 12 PT sessions, followed by 10 of Vasper™. Subject 3 (age 61, EDSS 6.5) completed 13 sessions of Vasper™, followed by 8 sessions of PT. PT was customized to the client's needs but incorporated strengthening, neuromuscular re-education, and gait training. The 21-minute Vasper™ HIIT protocol was adjusted to the client's ability and tolerance.

The combination of PT and Vasper™ resulted in increased endurance (6mWT), improved balance (BERG and SLS), and improved (lessened) fatigue impact (MFIS). The effect of the individual stages, Vasper™ alone and PT alone, were also compared. Vasper™ was more effective in increasing endurance (6mWT), with one subject displaying loss of endurance after PT alone. Both Vasper™ and PT were comparably effective in improving balance. The difference in mobility (EDSS) between subjects appeared to impact speed (10MWT) and fatigue (MFIS). The least mobile and most mobile subjects displayed the largest reduction in fatigue, and in speed the largest improvement was made in the least mobile subject. In two subjects a one-month follow-up was performed, which overall showed expected declines. The area of greatest impact in one subject was fatigue, which increased by 1000% after stoppage of rehabilitation therapies (not above baseline). For the other subject, the most significant change was the decline in balance and endurance, with their endurance falling below baseline.

The combination of PT and Vasper™ increased endurance and balance, and decreased fatigue impact in three subjects with MS. The Vasper™ intervention stage showed an increased impact on endurance improvement compared to the physical therapy stage. The PT stage alone did not demonstrate an increased effectivity compared to the Vasper™ stage.

This case series demonstrates Vasper™ is a safe and feasible novel rehabilitation technology that can contribute to functional gains in people with MS in a range of mobility. Further studies are needed to understand the effectivity of Vasper™ in comparison to traditional programs and the effectivity response in different functional ability levels.

Keywords— Blood flow restriction, core cooling, high intensity interval training, multiple sclerosis.

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