INTRODUCTION

Parkinson’s Disease (PD) is a neurodegenerative brain disorder that affects over 1 million people in the United States alone. As the disease progresses, patients exhibit short stride length, slow, shuffling gait, and a stooped posture. Motor-cognitive demands also increase (Fritz, 2015) and dual tasks such as walking while talking become difficult. Bradykinesia and postural instability negatively affect ambulation.

Physical activity tends to decline with disease progression (Cavanaugh, 2012), but moderate-to-vigorous exercise during the mid-stages of progression may slow the rate of functional decline (Goodwin, 2008).

Functional Electrical Stimulation (FES) via the WalkAide® FES System (WA) stimulates the peroneal nerve to activate the dorsiflexor muscles, decrease muscle atrophy, and improve voluntary motor control. Use of the WA has been shown to improve gait speed, perceived walking ability, and quality of life for patients with other neurologic disorders (Mayer 2014) but little literature can be found to address the use of FES in PD.

The object of this single case study is to document the effects of FES on the gait and quality of life of one such patient.

METHOD

Subject: A 63 year old male with PD diagnosed 6 years prior to this study and no other comorbidities.

Apparatus: ROM, MMT, 6 Minute Walk Test, TUG Test, Timed 10-Meter Walk Test, OPUS Functional Status Measure, OPUS Health Quality of Life Index, Neuro-QOL Fatigue Survey

Procedures: Subject was evaluated by clinician for ROM and MMT, completed walking tests with no assistive devices, and completed surveys. Subject was then fitted with the WA and used it for 2 months with appropriate follow-up care and adjustment.

2 months after initial fitting, subject was re-evaluated with ROM & MMT, completed all walking tests using the WA, and completed the surveys.

Data Analysis: Walking was quantified using speed. Impact on the subject’s ADLs and QOL was quantified by the various surveys.

RESULTS

At the initial evaluation, all ROM was WNL as was the right leg MMT. The left leg showed knee flexion and extension as 4/5, ankle plantarflexion 4/5, and ankle dorsiflexion 3/5. At the 2 month evaluation, all ROM and MMT were WNL.

The subject showed improvement on all measures of walking speed, as shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>BEFORE WA</th>
<th>AFTER 2 MONTHS WITH WA</th>
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<tbody>
<tr>
<td>6 MWT</td>
<td>201.2 m</td>
<td>448.1 m</td>
</tr>
<tr>
<td>TUG</td>
<td>14.1 s</td>
<td>10.7 s</td>
</tr>
<tr>
<td>10 MWT</td>
<td>0.7 m/s</td>
<td>1.3 m/s</td>
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</tbody>
</table>

Table 1. Changes in gait speed

On the various surveys, the subject reported improvement in ability to ambulate on varied terrain and a decrease in fatigue.

The subject also reported perceptions of having better balance, feeling that he walked with a more normal, upright posture, being able to ambulate without having to look at or concentrate on his feet, and having much better endurance after 2 months of using the WA. He stated that he notices these improvements even when he is not wearing the device. He was observed to be more able to maintain a conversation while walking at the 2 month evaluation.

DISCUSSION

The data indicate a strong clinical benefit of the WA for this patient. The improvement in gait speed and decrease in fatigue indicate that the WA enables the subject to maintain a vigorous level of physical activity, which positively impacts his quality of life and may slow the progression of some of his symptoms. The subject also expressed a high level of satisfaction with the device. He continues to use the WA at this time to improve the longevity of this case study. Further research with a much larger cohort should be pursued.

CONCLUSION

The improvements noted in gait and patient perception show the WA to be an excellent therapy for this particular patient, and encourage further study to include PD as one which is routinely treated with FES.

CLINICAL APPLICATIONS

FES shows promise as a clinically applicable therapy for patients with PD, with potential to improve a user’s mobility, safety, and quality of life.

REFERENCES

Mayer, L. Int J MS Care 17(1), 35-41, 2015.