

CASE STUDY

Improving Gait
Quality in a Multiple
Sclerosis Patient

KEY WORDS:

Improving gait quality with functional strengthening and ARPwave DC current in MS patient

DIAGNOSIS:

Multiple sclerosis, c/c gait quality and walking with AD, FOF.

TREATMENT AND OUTCOME

Patient diagnosed with Secondary Progressive Multiple Sclerosis. She purchased a ARPwave with the goals of improving her gait quality and to be able to walk to her mail box independently. Patient demonstrates with weakness of her hip flexors bilaterally, bilateral foot drop, and genu recurvatum - suggestive of weakness of her quadriceps eccentrically. She walks with a rolling walker or "furniture walks". Her protocol consists of functional glute, hip, lower leg, and core strengthening, with balance and walking training. Following 3 months in this protocol, patient demonstrates with improvement of foot clearance during gait and balance - as shown by walking to her mailbox with a cane independently. The progress made in this case shows that using the ARPwave with functional strength training and an exercise program adhered to the overall goals leads to improvement in strength and overall function.

CLINICAL FINDINGS

Assessment includes gait assessment, standing marching, seated marching, seated dorsiflexion tolerance. Follow up was bi-weekly for 3 months via video visit. Challenges: Patient was evaluated via video chat due to living in a separate state.

EVALUATION: Manual Muscle Testing (MMT) & scan, AROM and PROM assessment, edema measurements

FINDINGS:

Process: observation of posture/gait

Findings: Bilateral genu recurvatum, foot drop, and hip flexion & knee flexion (foot clearance) during swing phase.

Assessment: these findings are suggestive of weakness of B hip flexors (iliopsoas, rectus femoris), glutes maximus, gluteus minimus, quadriceps, anterior tibialis, posterior tibialis, extensor hallucis.

SUBSEQUENT TREATMENT SESSIONS: 4x/week

RESULTS AFTER ALL TREATMENT COMPLETED (OR CURRENT RESULTS IF STILL BEING TREATED): Able to change AD from RW to SPC. Initially, patient noticed slight regression due to pushing her body too much. Patient educated on the importance of quality movements rather than quantity of movements. Once decreased to 4x/week with quality sets, patient noticed significant improvements.

BEFORE



Pre Swing



Swing phase



Heel strike (max DF)

AFTER



Pre Swing



Swing phase



Heel strike

PAD PLACEMENTS

CHANNEL 1

Black Right Glute Max

Red Right Hamstring

CHANNEL 2

Black Right Rectus Femoris

Red Right Rectus Abdominis (abs)

CHANNEL 3

Black Left Glute Max

Red Left Hamstring

CHANNEL 4

Black Left Rectus Femoris

Red Left Rectus Abdominis (abs)

FREQ

*Varies /

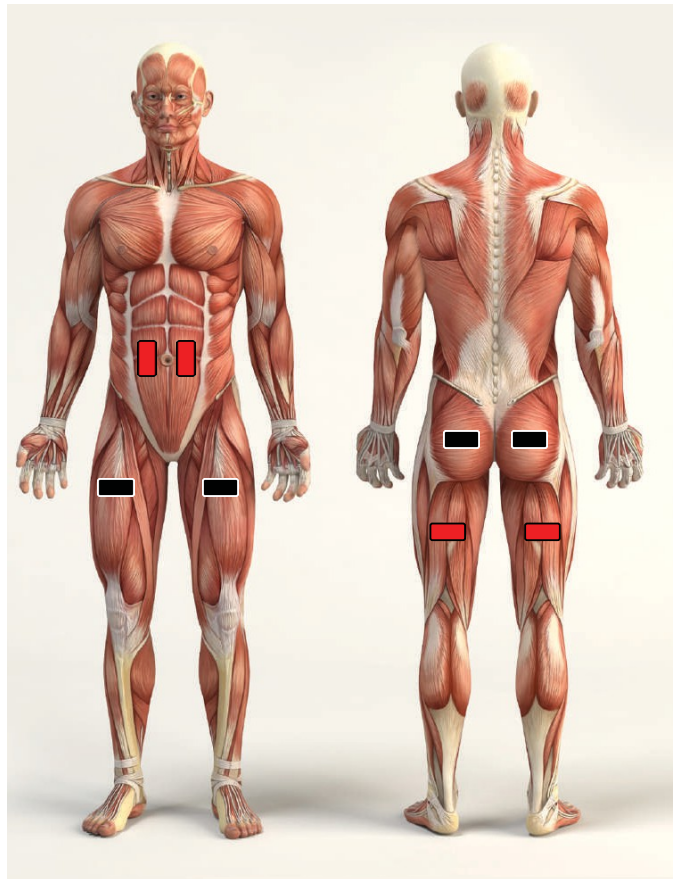
Work Time =

1 / Rest Time =

0 / Polarity =

POS /

Power = 7-8 / 10 (subjectively)



CHANNEL 1

Black Right Distal Anterior Tibialis (lower inside leg)

Red Right Proximal Anterior Tibialis (upper shin)

CHANNEL 2

Black Left Distal Anterior Tibialis (lower inside leg)

Red Left Proximal Anterior Tibialis (upper shin)

CHANNEL 3

Black Right Gastrocnemius Heads

Red Right Achilles

CHANNEL 4

Black Left Upper Gastrocnemius heads

Red Right Achilles

FREQ

500pps /

Work Time =

1 / Rest Time =

0 / Polarity =

POS /

Power = 7-8 / 10 (subjectively)



CHANNEL 1

Black Right Glute Med (outer butt)

Red Right Abs

CHANNEL 2

Black Left Glute Med (outer butt)

Red Left Abs

CHANNEL 3

Black Right Bottom of Foot

Red Right ADDuctors (inner thigh)

CHANNEL 4

Black Left Bottom of Foot

Red Left ADDuctors (inner thigh)

FREQ

500pps /

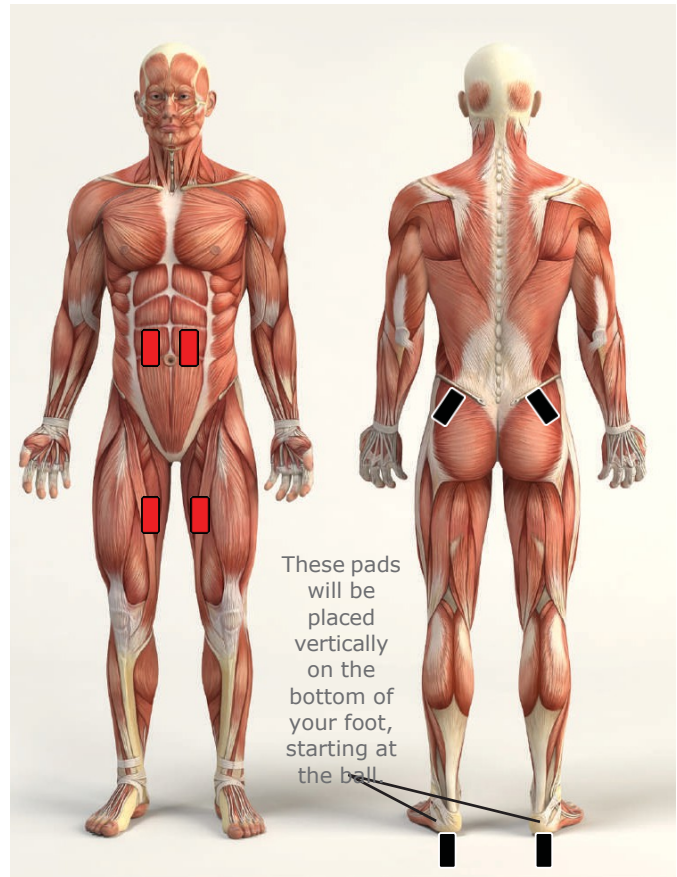
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CHANNEL 1

Black Right Low Back

Red Left Upper Back

CHANNEL 2

Black Left Low Back

Red Right Upper Back

CHANNEL 3

Black Right Rectus Abdominis

Red Right Oblique

CHANNEL 4

Black Left Rectus Abdominis

Red Left Oblique

FREQ

*Varies /

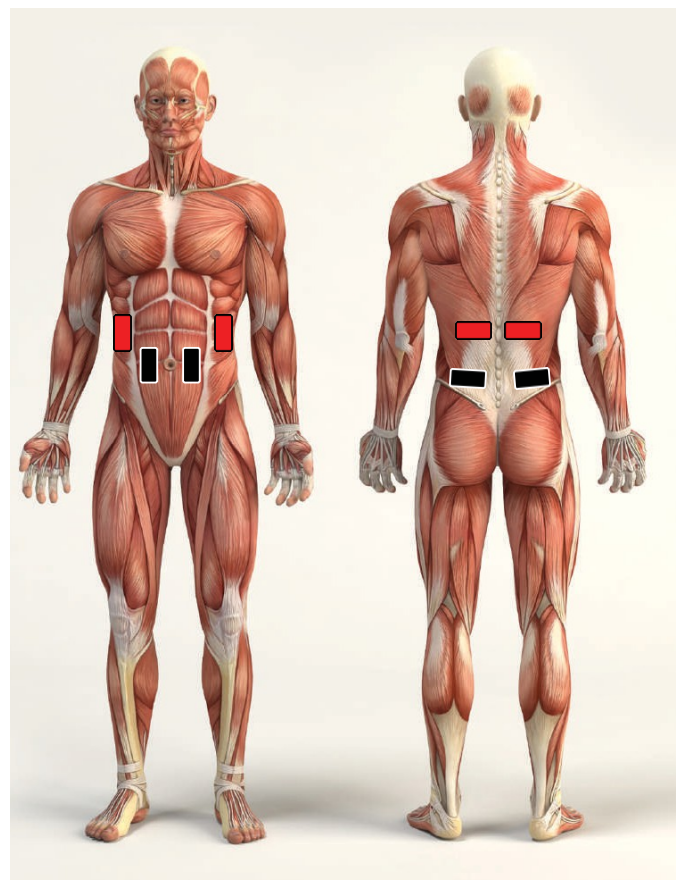
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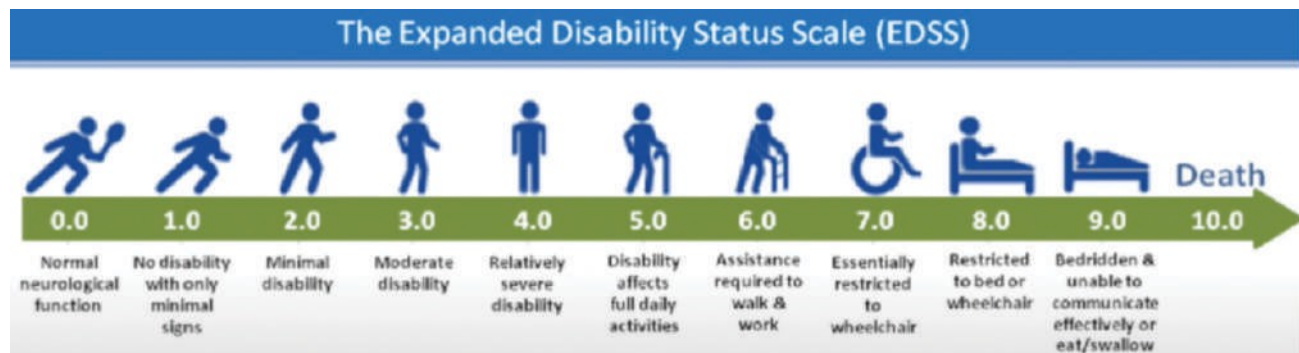
Power = 7-8 / 10 (subjectively)



DISCUSSION

The strengths of this case report include patient compliance and understanding of the device through education including onboarding course and bi-weekly visits. Limitations include that sessions were done via video visit and there was not a “hands-on” approach due to patient living in a different state.

Results show a significant improvement in gait quality as shown during swing phase. Following the ARPwave exercise program, the patient’s foot is now able to clear the floor bilaterally. The patient is also using less assistance during gait. Prior to the study she was ambulating with bilateral assist with furniture/walls and a RW in the community. Following the study, the patient is able to ambulate with a SPC. This demonstrates an improvement in Expanded Disability Status Scale (EDSS) score from 6 to 5 (see diagram for details). More therapy will be needed to continue to improve foot clearance as the patient is still not getting full AROM DF during swing phase.



PATIENT PERSPECTIVE

“Working with a ARPwave physical therapist over zoom has enabled me to be more confident in my recovery. I’m able to make tiny gains that continue to give me hope for my future. I love that I am able to do this all in the comfort of my home.”

EXERCISES

1. [Donkey Kicks/Fire Hydrants](#)
2. [Sitting to Tall Kneeling](#)
3. [Squats](#)
4. [Supine Marching](#)
5. [Hip Abduction/Adduction](#)
6. [Weight Shifting to Marching](#)
7. [Standing Gastrocnemius Stretch](#)
8. [Standing Soleus Stretch](#)
9. [Ankle Alphabet x1 time through the alphabet on each leg](#)
10. [Seated Dorsiflexion](#)
11. [SLS \(Single Leg Stance\) RLE](#)
12. [SLS \(Single Leg Stance\) LLE](#)
13. [Step Overs \(RLE\)](#)
14. [Step Overs \(LLE\)](#)
15. [Mini Crunch](#)
16. [Crunch with Rotation](#)
17. [Dead Bug](#)
18. [Bird Dog](#)
19. [Step Ups](#)