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CASE REPORT

Multidomain Improvement with a Device-free SONAPS Program in Primary Progressive Multiple Sclerosis: A Case Report

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Abstract

Rapid, multidomain functional improvement is uncommon in primary progressive multiple sclerosis (PPMS). We report the case of a 44-year-old man with long-standing PPMS who completed a 15-session, device-free somatic-neuropsychological adaptive programming system program over 90-days. Global disability, assessed using the composite disability and functional status scale, improved from 20/50 to 7/50. Lower-limb strength increased (Medical Research Council scale: left, 0→1; right, 2→4). The Babinski sign normalized on the right and attenuated on the left. Multiple physical and psychological symptoms improved across 0-10 severity scales. One routine rituximab infusion occurred during the intervention period. Clinical gains persisted at 3 and 9 months without relapse or regression, despite exposure to significant psychosocial stressors. No adverse events were observed. These findings warrant further investigation in controlled, blinded studies.

Keywords: Device-free, functional gain, multiple sclerosis

Introduction

Primary progressive multiple sclerosis (PPMS) is characterized by a steady accumulation of neurological disability, with limited potential for rapid or spontaneous improvement (1). Although disease-modifying therapies may slow disease progression, reversal of established functional deficits is rare (1). From a patient-centered perspective, disability in PPMS reflects impairment across both physical-structural-functional (PSF) and psychological-behavioral-cognitive (PBC) domains, each of which contributes substantially to daily functioning and quality of life (2).

Non-pharmacological rehabilitation approaches in PPMS typically produce modest gains and often require prolonged intervention periods. Reports describing short-term, multidomain functional improvements are therefore uncommon. In this context, we present a case of PPMS demonstrating substantial improvement across PSF and PBC domains following a brief, device-free somatic-neuropsychological adaptive programming system (SONAPS) program. This report is intended to be exploratory and hypothesis-generating, documenting the clinical course and outcomes to inform future controlled investigations (2).

Case Report

A 44-year-old man from Tehran, Iran, presented in December 2023 with a 10-year history of progressively worsening neurological symptoms consistent with PPMS. The disease course was marked by continuous progression without identifiable relapses. At baseline, the patient reported severe imbalance with frequent falls, dependence on two canes for ambulation, and pronounced nocturnal muscle spasms. Additional symptoms included neuropathic pain, heat sensitivity, persistent fatigue, anxiety, intrusive memories, claustrophobia, fear of sleeping alone, insomnia, and marked social withdrawal.

Neurological examination revealed bilateral extensor plantar responses (right greater than left), an intact Romberg test,

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and significant lower-limb weakness. Dorsiflexion strength was graded as 0/5 on the left and 2/5 on the right using the Medical Research Council (MRC) scale. Upper-limb strength was relatively preserved (4/5). The baseline composite disability and functional status scale (CDFSS) score was 20/50. Severity ratings for PBC symptoms ranged from 7 to 10 on 10-point scales (Table 1).

The patient had received at least 17 lifetime rituximab infusions administered every six months, yet clinical deterioration continued. A scheduled rituximab infusion occurred during the SONAPS intervention period (3). Concomitant medications included citalopram and intermittent marijuana use for pain and sleep. Brain magnetic resonance imaging (MRI) was not performed because of severe gadolinium hypersensitivity and claustrophobia. The patient reported no prior episodes of sustained functional improvement during approximately nine years of anti-CD20 therapy.

Baseline functional performance was documented using video recordings obtained on December 19, 2023. The SONAPS program commenced on December 20, 2023.

Intervention (SONAPS)

SONAPS is a structured, non-invasive, non-pharmacological, and device-free program delivered over 15 sessions (approximately 120 minutes per session) across a 90-day period. All sessions followed a standardized entry sequence and incorporated individualized, symptom-guided content spanning both PSF and PBC domains.

Session Structure

Each session included:

1. Interval symptom review, including motor function, balance, pain, sleep, and psychological symptoms.
2. Structured clinical assessment using predefined anchors, such as PSF and PBC ratings, functional task performance, and sensory-motor checks.
3. Individualized, multimodal intervention, targeting:

- Posture, coordination, balance, and muscle activation;
- Fatigue modulation;
- Emotional reactivity, anxiety-related themes, and intrusive memories (addressed through brief, focused tasks without psychotherapeutic dialogue);
- Autonomic-related complaints, including sleep disturbance and stress regulation.

4. Post-intervention reassessment, with documentation of both perceived and clinically observable changes.
5. Video documentation, when consent was provided, to capture objective functional findings when consented, of clinically observable findings.

Two sessions were extended to approximately four hours to allow evaluation of suspected food-related intolerances within the same device-free therapeutic framework.

Personnel and Fidelity

All sessions were conducted by a single treating physician with more than 20 years of clinical experience in managing complex neurological and psychological conditions. Treatment fidelity was ensured through strict adherence to a standardized session checklist, consistent use of PSF and PBC assessment anchors, and pre- and post-session video documentation.

No changes to the patient's medication regimen occurred during the intervention period, aside from the scheduled rituximab infusion.

Outcomes

1. Global Disability (CDFSS)

The CDFSS score improved from 20/50 at baseline to 7/50 following the program, representing an absolute reduction of 13 points. Improvements were observed across all subscales, as detailed below:

- Physical disability: 10/20→3/20
- Cognitive/psychological: 7/20→3/20
- Functional status: 3/10→1/10

Table 1. Prespecified outcomes before and after SONAPS (male, 44-year-old; PPMS)

Outcome/measure	Pre	Post	Delta/notes
CDFSS (global disability)	20/50	7/50	~65% reduction
Physical disability (CDFSS)	10/20	3/20	Subscale change
Cognitive/psychological (CDFSS)	7/20	3/20	Subscale change
Functional status (CDFSS)	3/10	1/10	Subscale change
Left dorsiflexion (MRC)	0/5	1/5	Gain of 1 grade
Right dorsiflexion (MRC)	2/5	4/5	Gain of 2 grades

SONAPS: Somatic-neuropsychological adaptive programming system, PPMS: Primary progressive multiple sclerosis, CDFSS: Clinical disability functional status scale; MRC: Medical Research Council scale

2. Neurological Examination

Neurological assessment demonstrated objective motor and reflex improvements:

- **Left ankle dorsiflexion:** 0/5→1/5
- **Right ankle dorsiflexion:** 2/5→4/5
- **Babinski sign:** Right converted to downward; left markedly attenuated
- **Romberg test:** Unchanged (negative).

3. PSF and PBC Symptoms

Marked improvements were observed across multiple patient-reported symptoms, as assessed on a 0-10 scale, with large absolute reductions:

- Muscle weakness: 8→5
- Spasticity: 10→6
- Coordination impairment: 10→4
- Neuropathic pain: 5→3
- Fatigue: 10→5
- Loss of balance: 8→2
- Anxiety: 8→1
- Claustrophobia: 8→1
- Stress: 10→1
- Negative parental memories: 10→1.

These changes are illustrated in Figure 1 and summarized in Table 1.

4. Durability of the Effect

At the 3-month follow-up (Tir 1404), both the patient and his father—who is also diagnosed with multiple sclerosis and received SONAPS independently—reported no recurrence of prior symptoms. At the 9-month follow-up (October 2025), functional improvements remained stable without evidence of regression.

Notably, during the 90-day program, the patient experienced several significant stressors, including a severe upper respiratory infection, the death of a close friend, and a traumatic accident involving a yet relative. Despite these events, no symptom exacerbation was observed.

No adverse events were recorded throughout the study period.

Discussion

Rapid, multidomain improvement in PPMS is uncommon. In this case, substantial gains were observed across motor, sensory, functional, and psychological domains following a short, device-free intervention. The magnitude and breadth of improvement—including increases in MRC strength scores, conversion of the Babinski response, and marked reductions in PSF and PBC symptom scores—are unexpected within the natural course of PPMS (1,2).

The persistence of clinical improvement over a 9-month follow-up period further supports the potential clinical relevance of these findings (2). However, causal inference is not possible in this single-case observation. Confounding effects from long-term anti-CD20 therapy, including a routine infusion administered during the intervention period, cannot be exclude. In addition, placebo effects, increased clinical attention, and regression to the mean may have contributed to the observed changes.

Despite these limitations, the temporally clustered and harmonized pattern of physical and psychological improvement—occurring within a 90-day intervention window after approximately nine years of steady disease progression—

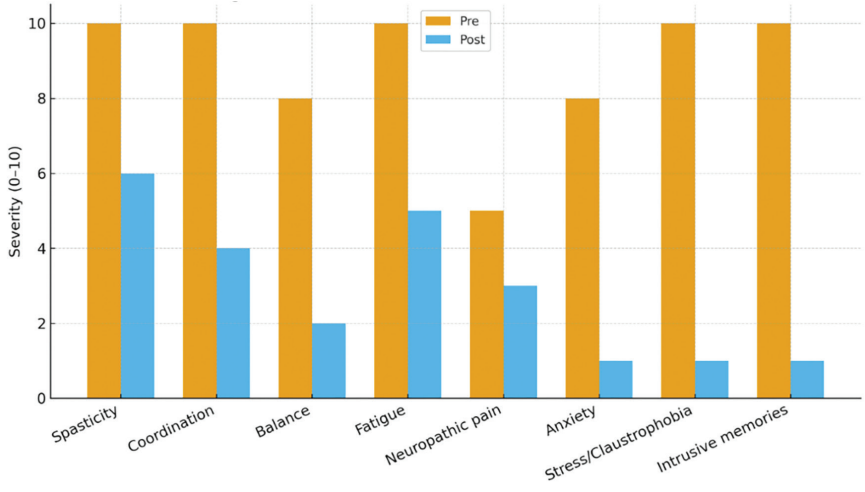

Figure 1. Graphical representation of symptom changes across PSF and PBC domains following the SONAPS intervention

PSF: Physical-structural-functional, PBC: Psychological-behavioral-cognitive, SONAPS: Somatic-neuropsychological adaptive programming system

suggests a potential therapeutic signal that warrants further investigation in controlled clinical trials (2).

The mechanisms underlying such broad improvement are unclear but may involve modulation of maladaptive neural circuits (4-9) and stress response systems, areas accessible to non-invasive intervention such as transcranial stimulation (10,11). While other physical modalities like pulsed electromagnetic field therapy have been studied in MS (12,13), the device-free, multi-domain approach of SONAPS appears distinct.

Patient Perspective

The patient reported meaningful improvements in mobility, emotional stability, sleep quality, confidence while walking outdoors, and a reduced fear of sleeping alone. He emphasized that these changes were "unlike any improvement" experienced during the preceding nine years of treatment.

Study Limitations

This report has several important limitations:

- Single-patient, non-blinded case.
- Routine rituximab infusion occurred within interval (potential confounder) (3).
- Use of self-reported symptom scales (4,5).
- No MRI was performed due to gadolinium reaction and claustrophobia.
- No blinded assessment or objective gait metrics (e.g., T25FW) were obtained (6).

Future controlled studies should incorporate blinded evaluators, standardized functional outcome measures, and objective physiological endpoints to better characterize efficacy and underlying mechanisms.

Conclusion

In a patient with advanced PPMS, a brief, device-free SONAPS program was associated with substantial improvement across multiple clinical domains, sustained for up to 9 months and without reported adverse events. Controlled and blinded studies are needed to evaluate reproducibility and to elucidate potential mechanisms of action (2,7-13).

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of this case report.

Footnotes

Authorship Contributions

Surgical and Medical Practices: H.N., A.R., Concept: H.N., Design: H.N., A.R., Data Collection or Processing: H.N., Analysis or Interpretation: H.N., Literature Search: H.N., A.R., Writing: H.N., A.R.

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