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A Case of Moderately Advanced Multiple Sclerosis

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MS STEP UP Program

We are the current MS Scholars of the third year students!

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What is MS?

-Chronic, immune-mediated neurodegenerative disease[1]

-Damages the myelin, nerves, and oligodendrocytes of the central nervous system[1]

-Nearly 1 million adults in the United States live with MS[2]

Diagnosis:

McDonald 2017 Criteria:[3]

Dissemination in Space and Time

- **Space**:
    - One T2 or more lesions in at least two MS typical anatomical locations
- **Time**:
    - Different signs and symptoms separated by at least 30 days

Types of MS[3]

Clinically Isolated Syndrome

Primary Progressive

Relapsing Remitting

Secondary Progressive

time

increasing disability

Clinically Isolated Syndrome (CIS)

time

Primary Progressive
Multiple Sclerosis (PPMS)

remission

relapse

Relapsing Remitting
Multiple Sclerosis (RRMS)

Secondary Progressive
Multiple Sclerosis (SPMS)

Epidemiology and Pathophysiology[1]

Combination of genetic and environmental factors

- Family history; Living in Northern regions with less temperate weather; Caucasian; Low Vitamin D; Female

Autoimmune dysfunction —> immune cells in CNS cause inflammation and myelin degeneration

Common Signs & Symptoms[3]

- Fatigue (83%)
- Heat sensitivity (80%)
- Gait impairment (67%)
- Stiffness/Spasticity (63%)
- Bowel/Bladder Dysfunction (60%)
- Cognitive/Memory Impairment (56%)
- Pain (54%)

Additional Signs & Symptoms[3]

- Anxiety/Depression (38%)
- Visual changes (37%)
- Dizziness (36%)
- Tremors (30%)
- Sexual Dysfunction (30%)
- UE weakness (24%)
- Speech/Swallowing Dysfunction (21%)
- Seizures (2%)

EDSS[3]

Common Medical Treatments

Disease-Modifying[2,3]

Infusions: Ocrevus, Tysabri, Rituxan

Oral: Tecfidera, Gilenya, Aubagio

Injections: Copaxone, Betaseron, Rebif

Symptomatic:

- Gabapentin — Nerve pain[3]
- Baclofen — Spasticity[3]
- Ampyra — Gait[2]
- Amantadine — Fatigue[3]
- Meclizine — Dizziness[2]

Special Considerations for PT[3]

Thermosensitivity

Fatigue

Managing Secondary Symptoms

Preventative - Rehabilitative - Compensatory

Chronicity and lifelong management[11]

A multidisciplinary clinic for patients with MS and an attached research lab; Patients are seen annually, biannually, or more frequently as requested: a one-stop-shop

CASE

Meet “Steve”…

- 55 years old
- Retired from finance on Wall Street at 53 years old
- Relapsing Remitting MS → Secondary Progressive MS

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Annual Evaluation for MS:

What questions do we ask in our subjective?

- Course of disease: date of diagnosis, last relapse, changes in past year, current medical team
- Current medications
- Home environment and social support
- Currently working? Driving? ADLs?
- Recreational activities, current exercise/stretching routine
- Symptom changes (vision, dizziness, fatigue, cognition, mood, spasticity, pain, sensation, bowel/bladder, speech/swallowing, sleep)
- Falls?
- Ambulation ability and safety
- Functional limitations
- Patient goals and priorities

Steve's Subjective:

Diagnosed with MS at age 40, symptom onset at 35

Steady symptom progression, no recent exacerbations

Currently taking Rituxan

Independent, lives at home with wife, retired 2 years prior

Golfs and started exercising with personal trainer (walking, cycling, lifting, stretching regimen)

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Steve’s Subjective (cont.):

2 falls in previous year, frequent tripping/near falls

Decreased balance

Decreased ambulation endurance

Frequent, significant fatigue

“Feel old and weak”

UTI 4 weeks ago → unable to walk because of LE weakness and intense fatigue

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Annual Evaluation after having MS for 15 Years:

What do we want to analyze/prioritize in this assessment?

Gait

Flexibility & Spasticity

Aerobic capacity & endurance

Balance & postural stability

Transfers

Lower/Upper extremity strength

Annual Evaluation after having MS for 15 Years:

Outcome Measures[12]

Timed 25 Foot Walk Test or 10m Walk Test[5]

Berg Balance Scale

TUG

6-Minute Walk Test[5]

Dynamic Gait Index

MSQOL-54

Objective Examination

EDSS: 5.5

Ambulatory w/o AD

ROM:

Lower Extremities:

- Moderately decreased active and passive ROM R DF
- ROM WFL rest of R LE

Upper Extremities:

- Mildly decreased ROM R UE
- Fx ROM L UE

Pain/Sensation:

- Numbness and tingling in R foot

Strength:

- RUE: 4/5
- LUE: 5/5
- RLE: 5/5*
- LLE: 5/5

*R DF = 3-/5

Gait:

- Touching walls to maintain balance
- R toe drag → tripping, falls

Problem List and Goals

Problem	Goal
Ambulation Endurance	Improve walking endurance to 30 minutes with rest breaks as needed without over-fatiguing
Tripping/Near Falls	Reduce toe drag during ambulation to decrease tripping and risk of falls
Imbalance, touching walls/furniture walking	Improve balance strategies (ankle and hip) to reduce premature step strategy and risk of falls
Decreased DF ROM	Achieve 10 degrees of dorsiflexion[13] in order to normalize terminal stance of gait cycle

Intervention Priorities?

Stretch:

Balance:

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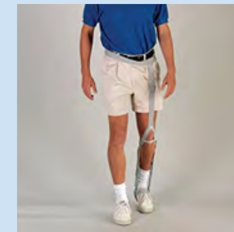
Functional Electrical Stimulation[5,9] vs. Ankle-Foot Orthoses[10]

Bioness[6]

Dorsi Lite[8]

Ossur Carbon Graphite Lightweight AFO

NewGait[7] Hip/Knee Flexion Assist Device



Triple Flex

Ossur Foot Up

➤➤Fast Forward ➤➤

Steve Returns 8 Years Later:

Steve is now 63 years old:

- **Stem Cell Treatment** 3 yrs ago
- Taking **Ampyra** and Rituxan
- Increased **fatigue**
- **Dizziness**/Vertigo
- **↓ R hand dexterity**
- **Vision loss**

Current Exercise Regimen:

- 2x/wk with athletic trainer
- Walks 15 min/day
- Local PT 1x every other week

Activity/Participation Restrictions: No driving, cycling, elliptical, playing piano. Golfing less frequently.

Evaluation Updates

EDSS: 6.5

Ambulatory w/ 2 ADs

Gait:

- ↓ ambulatory endurance
- Uses R Bioness (4 yrs) and cane (5 yrs)
- 3 falls in past year

Balance:

- Premature step strategy
- Impaired postural stability

Strength:

- RLE: 3/5*
- LLE: 4/5
- RUE: 4/5
- LUE: 5/5

*R DF: 2/5

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Gait: Balance:

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Using the ICF Model[4]

Health Condition:
Multiple Sclerosis,
R UE dysfunction (MSK)

Body function/ structures:
Vision changes, dizziness, R UE weakness/ discoordination, decreased endurance, LE weakness

Activities:
Unable to play piano; unable to walk long distances; unable to workout on elliptical

Participation:
Unable to golf with buddies; relies on wife for transportation

Environmental Factors:
Lives in house with stairs; lives in NYC → very hilly, requires a lot of walking

Personal Factors:
Very motivated; enjoys being physically active; affluent; financially stable

Problem List	Goals
Falls	Improve dynamic balance, postural stability, and safety with mobility to achieve 0 falls in year.
Ambulation Endurance	Independently ambulate for 20 min total with LRAD, rest as needed, with no loss of balance
Activity Intolerance/Fatigue	Incorporate fatigue management strategies to increase total amount of daily activity
Bilat LE weakness	Achieve 5xSTS <15 sec[14] to demonstrate increased functional LE strength and reduced falls risk
Dizziness	Assess vestibular function, sensory organization

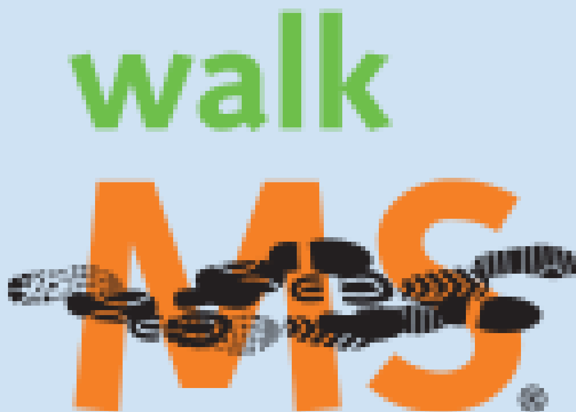
Intervention Priorities:

- Continue and progress **balance training**
- Assess **assistive devices** for ambulation
- Assess and modify **exercise/stretch regimen** w/ AT
- **Strength training**--functional movements
- **Energy conservation** strategies, use intervals
- Communicate with his local ortho PT--R shoulder
- Vestibular intervention PRN
- Referrals PRN--OT?

Now what?

What does “successful” rehab look like in patients with progressive neuro diagnoses?

Steve’s prognosis and future goals?



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Thank You!
Questions?