

CASE STUDY

MULTIPLE SCLEROSIS

INTRODUCTION

Multiple Sclerosis (MS) affects the central nervous system (brain and spinal cord), by destroying the myelin sheath that covers the neurons or cell tissue. When the myelin is destroyed, communication between neurons is reduced. Symptoms of multiple sclerosis depends upon the area of myelin sheath invasion within the CNS. The most common early symptoms of MS are numbness, tingling or weakness in the face or limbs, loss of balance and visual disturbances such as blurred or double vision.

The exact cause of MS is not known. Researchers are investigating the possibility of autoimmune disease, viral infection, diet and genetics. Studies show that MS appears between the ages of 20 to 40 years and is twice as likely to affect women than men. MS developing in temperate climates is more likely than tropical climates. At this time there is not cure for MS. However medication is available to reduce the frequency and intensity of attacks and to lessen the disease progression.

The following table describes the types and stages of MS.

TYPE	ATTACKS	DISABILITY	RECOVERY	DISEASE PROGRESSION
Benign MS	1 to 2	No permanent	Complete	None
Relapsing/Remitting	Sporadic	Process ongoing	Partial or Total	Within 10 – 15 years
Secondary/Progressive	Less pronounced	Cumulative	Less remissions	CNS tissue destroyed
Primary/Progressive	Slow Onset	Process ongoing	Complete or Total	Months or years
Progressive/Relapsing	Sporadic	Permanent	None	Months or years

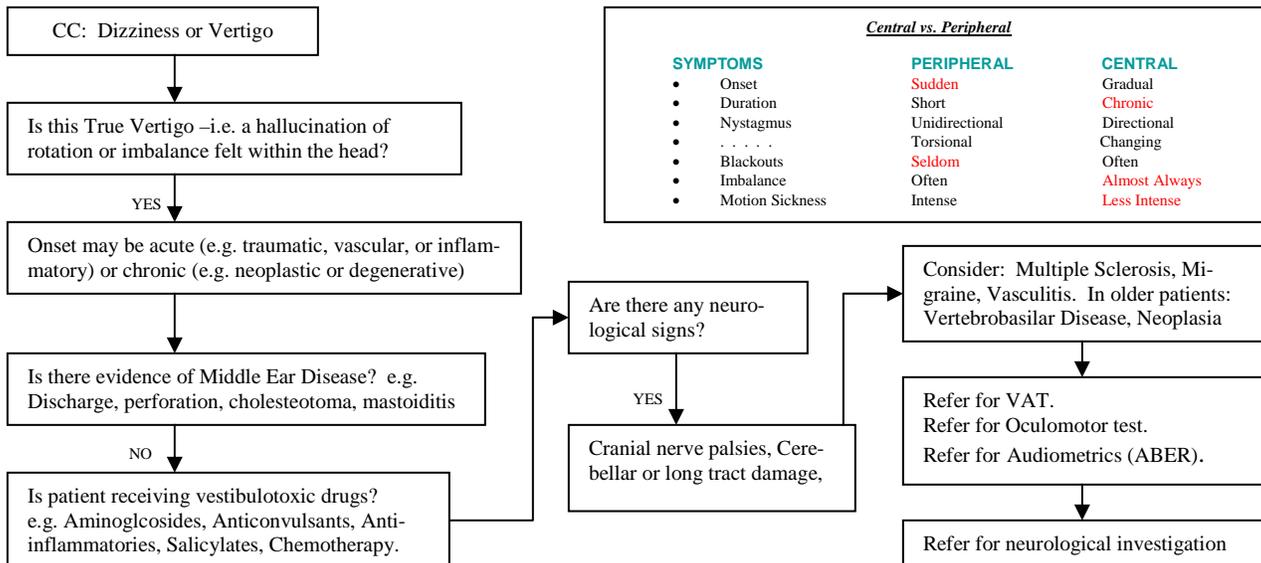
HISTORY

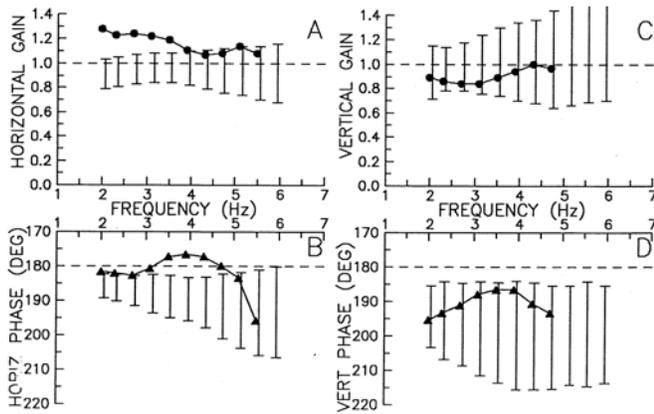
Ms.G.R., age 30 years was enrolled in a clinical research trial (Copolymer 1) through the Department of Neurology because of her diagnosis of Relapsing/Remitting Multiple Sclerosis. The diagnosis and eligibility for the study was determined through her medical history, neurological examination and confirmed with an MRI and spinal tap. As part of the study, subjects were sent to the USC Center for Balance Disorders for monthly evaluations of the VOR and auditory brainstem response.

Vertigo is a common symptom of MS and is usually caused by demyelination to the pons region of the brainstem (area of the VIII cranial nerve) or the cerebellum.

The dizziness questionnaire revealed that ataxia was her primary symptom at the time of onset 13 months prior, followed by numbness and tingling in her right hand and foot. Four months later she developed a continuous hearing loss and tinnitus in her left ear. At the time of testing, Ms. G.R. complained of both episodic vertigo and disequilibrium.

DIAGNOSTIC PATH FINDER





BASELINE TEST

Error bars represent the normative data of 100 subjects. The patient's horizontal gain (Figure A ●) is above the graph from 2 – 3.5 Hz. The horizontal gain data returns to WNL at frequencies 4 – 5 Hz. The horizontal phase points (Figure B ▲) are above the graph at 3 – 4.5 Hz. Both the vertical gain (Figure C ●) and vertical phase (Figure D ▲) were WNL. At the time of testing, Ms G.R. reported episodic vertigo and dysequilibrium but was able to continue working as a film editor.

Treatment goals for Ms.G.R. were to stop or slow the immune system's attack on the myelin sheath, and to relieve her symptoms as much as possible. Goals need to be tailored for each patient's needs.



MS TREATMENT PLAN for Ms. G.R.

Medication

- Anti-viral medication
- Corticosteroids PRN flare-ups

Physical Therapy

- Improve muscle strength, flexibility & range of motion
- Coordination & Balance techniques

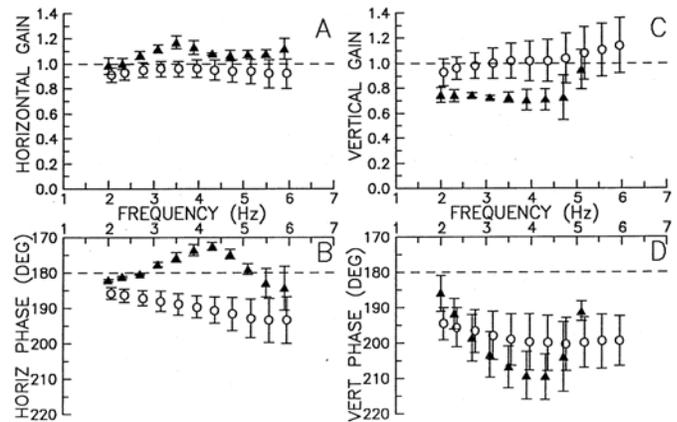
Lifestyle adjustments

- Reduce stress
- Reduce fatigue
- Avoid excessive heat

CONCLUSION

Ms. G.R. subsequently accepted the job position, dropped out of the study and was lost to follow-up.

Multiple Sclerosis becomes a chronic disease that requires patient and family education and a team approach by the healthcare management personnel to improve the patient's quality of life. Although the benefits of treatment are temporary, medication, changes in lifestyle, a good diet, and physical therapy can help preserve remaining function.



TEST 4 Four months post baseline test

Error bars with open circles (○) represent the normative data of 100 subjects. Dramatic changes as *described in italics* are seen on testing. The horizontal gain (Figure A ▲) remains above the graph similar to the baseline test. The *horizontal phase* points (Figure B ▲) are now *above the graph at all frequencies*. The *vertical gain* (Figure C ▲) is *low throughout all frequencies*. The *vertical phase* (Figure D ▲) is *low from 3 – 3.5 Hz*.

The frequency and intensity of symptoms appear to correlate well with the VAT® test results. At the time of testing, Ms. G.R. arrived walking with the aid of a cane because of constant gait ataxia. She reported that the episodes of true vertigo were more frequent. She complained of extreme fatigue and depression. Blurring of the left eye was a new symptom.

Compounding her physical symptoms was stress related to a job offer she received. This career opportunity would require her to work on location for 6 months in Australia during the summer months. She wanted to accept the position although she realized that this would cause significant lifestyle changes that could exacerbate her symptoms.



TYPICAL VESTIBULAR TESTS
for Multiple Sclerosis

Depends upon the site of lesion

- Brainstem
- Cerebellum

VAT®
Audiometrics
ABER
Oculomotor Testing