

CASE STUDY

HEAD TRAUMA

INTRODUCTION

Head trauma often affects multiple vestibular sites within a patient. Any significant trauma may affect the central nervous system and disrupt oculomotor functions. This type of lesion is typically Cerebellar in origin and may cause difficulties in tracking objects or stabilizing gaze when in motion.

Some instances of head trauma, especially to the side of the head, may also cause labyrinthine disturbances in the vestibular and/or cochlear processes. Lesions of this type are typically unilateral in nature and will often cause vertigo in patients, as well as hearing loss.

Head trauma is treated in various ways, depending on the site of lesion and the symptoms experienced. CNS lesions are typically treated through vestibular therapy focusing on the processes most affected. Peripheral vestibular lesions, or otologic concerns, will typically require the involvement of an otologist/neurologist and may involve any indicated combination of surgery, medication, and/or vestibular therapy.

CLINICAL EXAMINATION

Neurological exam revealed nothing.
MRI was negative.

Reported dysequilibrium during transitional postures. Many head movements, including flexion, extension, and torsion induced symptoms of dysequilibrium.

Gait analysis: Increased base of support
Decreased truncal rotation
Moderate weaving.

Balance testing: Positive Romberg
Positive unilateral standing
Positive Fukuda step testing
Positive tandem gait with eyes open.

Audiometric testing: Unilateral mild to moderate mixed high frequency hearing loss in the left ear.

Caloric irrigation testing: 41% weakness of left ear.

VAT Results: Horizontal Gain: high
Horizontal Phase: high
Vertical Gain: WNL
Vertical Phase: WNL
Asymmetry: to left

HISTORY

Patient HT is a 51 year-old male who was referred following a diagnosis of labyrinthine dysfunction. The patient complained of dysequilibrium when walking and blurred vision with head motion (clinically called oscillopsia). The patient reported that his symptoms were worsened by car lights at night, jogging, and rapid head movements.

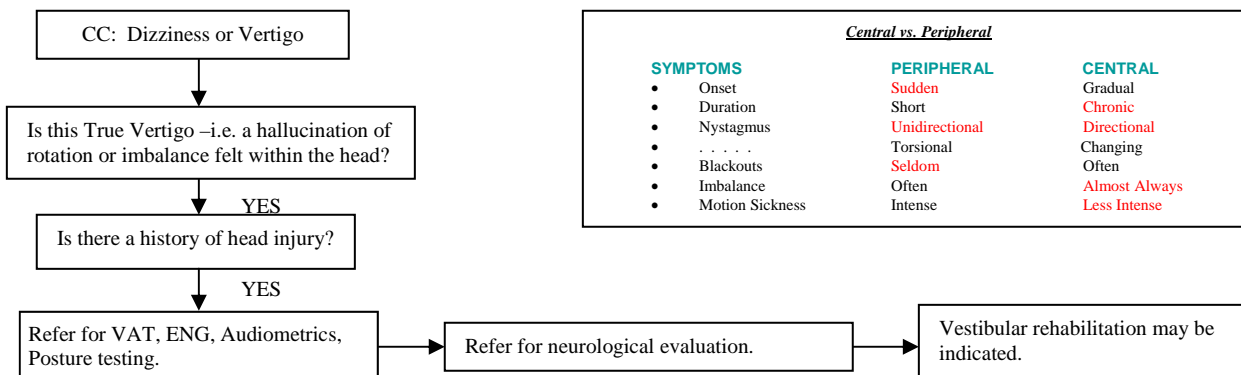
Medical history included a concussion following a blow to his head with a basketball. A neurological examination had been performed and revealed nothing further. The MRI was unremarkable.

TREATMENT PLAN:

The patient was referred for vestibular rehabilitation. Using the results from the VAT® test, the therapist tailored a treatment program to specifically improve eye/head coordination stressing the horizontal VOR. Initially the patient was asked to perform side to side head motions (with and without visual fixation) that would cause him to experience dizziness. He performed the exercises while seated in a chair with eyes open. As he was able to tolerate the head motions with a reduction in the severity of the symptoms, the therapist made the exercises more difficult by asking the patient to perform the head motions while standing, with eyes closed, and on a non firm surface. Gait (substitution exercises) and dynamic equilibrium exercises were gradually added to the program.

The patient was asked to perform the treatment plan twice a day at home. Re-assessment and exercise progression were performed during weekly follow-up visits during a two-month period.

DIAGNOSTIC PATH FINDER



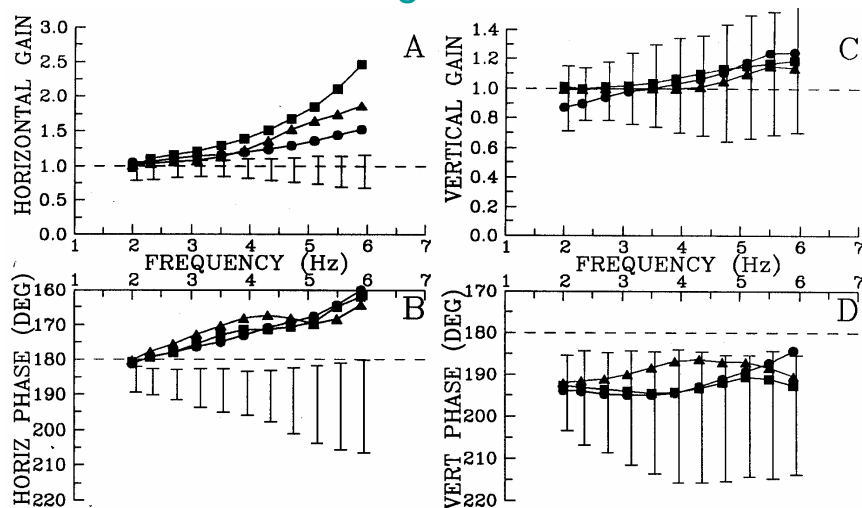
<i>Central vs. Peripheral</i>		
SYMPTOMS	PERIPHERAL	CENTRAL
• Onset	Sudden	Gradual
• Duration	Short	Chronic
• Nystagmus	Unidirectional	Directional
•	Torsional	Changing
• Blackouts	Seldom	Often
• Imbalance	Often	Almost Always
• Motion Sickness	Intense	Less Intense



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Figure 1



Error bars on the VAT® test represent the normal data. Figure A shows 3 tests of the horizontal gain that are all above the graph (from 3.5 – 6 Hz) as compared to the normal error bars. Figure B shows 3 tests of the horizontal phase that are all above the graph at each frequency as compared to the normal error bars. The 3 vertical gains (Figure C) and the 3 vertical phases (Figure D) were within normal limits. This data pattern is typically seen in patients with head trauma.



**TYPICAL HEAD TRAUMA TREATMENT PLAN
VRT Program**

Head movements with and without visual fixation
Substitution Exercises
Maintenance Program

Subjective Report:

Patient reports an 80% improvement during daily activities

OUTCOME:

Length of time in Vestibular Rehabilitation: 8 weeks

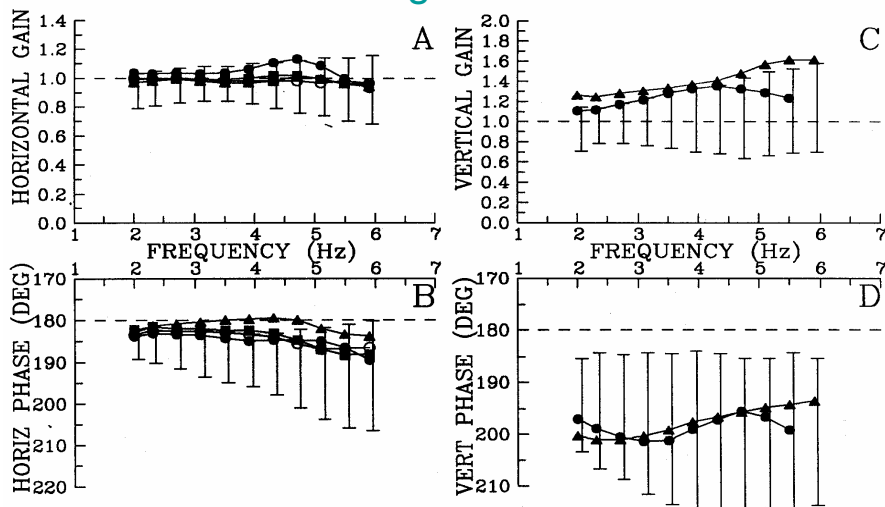
Level of Difficulty of treatment plan: High

- Age
- Excellent general health
- Above average strength prior to the accident
- Highly motivated

Objective Report:

VAT® results showed marked improvement. At the 2 month reassessment, the horizontal gain and phase were within normal limits.

Figure 2



The patient was re-tested at the end of the two months vestibular rehabilitation program. Figure A (horizontal gain) and Figure B (horizontal phase) are now within the normal data error bars. The vertical gain (Figure C) and the vertical phase (Figure D) continue to be within normal limits.