

GENTAMICIN OTOTOXICITY

CASE STUDY

INTRODUCTION

Gentamicin is a commonly used aminoglycoside antibiotic that can exhibit the side effect of ototoxicity. Damage specific to the vestibule and semicircular canals is referred to as "vestibulotoxicity". Pathological studies suggest that gentamicin destroys the inner ear hair cells, typically in both ears simultaneously.

Not all patients who receive gentamicin therapy develop ototoxicity. Various factors may intensify the ototoxic effect, including 1) the dose and delivery time, 2) the concurrent use of other ototoxic medication, 3) the age of the patient receiving the medication, and 4) genetics.

When a bacteria is so virulent that the disease is life threatening to the patient, gentamicin may become the drug of choice for treatment. However, if there is an alternative medication available, discretion should be used before administering the ototoxic drug.

CLINICAL EXAMINATION


- Neurological exam essentially normal
- Hx of Gentamicin medication IV
- Audiometric testing: WNL
- ENG: No response to Ice Water
- CDP: Fall on conditions 2 – 5
- Fakuda step testing: Unable to perform
- VAT® testing:
 - Horizontal Gain: Low
 - Horizontal Phase: High
 - Vertical Gain: Low
 - Vertical Phase: High
 - Asymmetry: None noted

HISTORY

Mr. J. J., a 25-year-old male, was referred to the USC Center for Balance Disorders post sinus surgery. Following surgery, the patient developed an infection in the sinus cavities and was treated with IV Gentamicin for 3 weeks. Mr. J. J. was accompanied to the clinic by his mother because he could no longer drive a car or could not walk without holding on to a wall or another person.

His chief complaint at the time of the first visit was "Oscillopsia" (movement of the visual field) with all head and eye movements. Oscillopsia is the most common complaint in patients with a bilateral vestibular loss. Patients experiencing oscillopsia are unable to walk and read signs or walk and recognize faces because of the apparent blurring of the visual field.

Mr. J.J. complains of a constant feeling of "unbalance". Situations such as uneven sidewalks that interfere with the proprioception of his feet or attempting to walk in the dark exacerbate the symptoms.



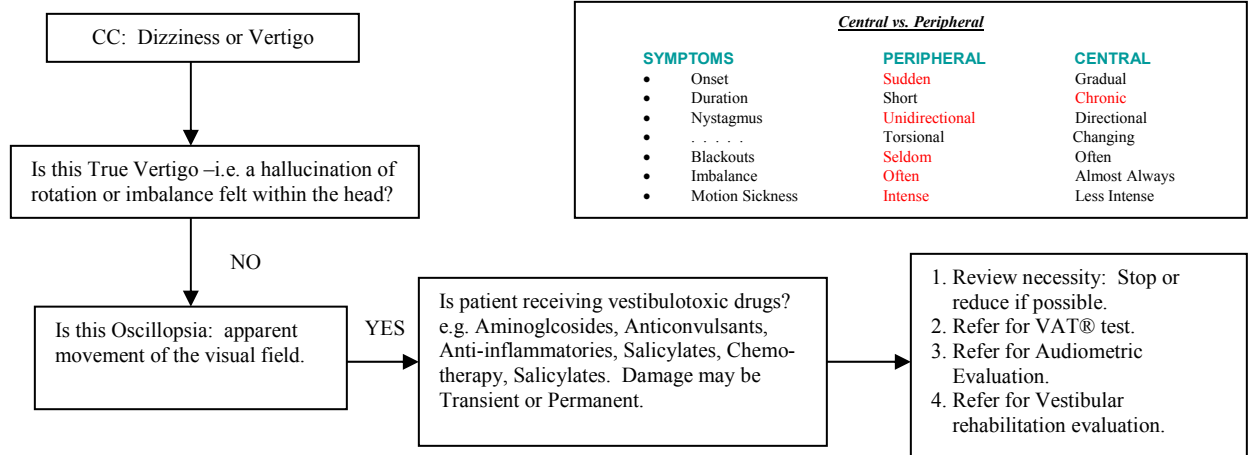
TYPICAL OTOTOXICITY TEST RESULTS

A Consistent VAT pattern of **LOW** horizontal & vertical gains and enhanced or **HIGH** horizontal & vertical phases.

ENG caloric response is typically **ABSENT** in severe cases

Audiometric testing may exhibit bilateral sensori-neural loss in the **HIGH FREQUENCIES**

DIAGNOSTIC PATH FINDER



TREATMENT PLAN: Good prognosis

Based upon the diagnosis, the decision was made to proceed with vestibular rehabilitation to facilitate better use of visual and proprioceptive information and to improve eye/head coordination.

Initially, Gaze stabilization and fixation exercises were used to induce compensatory CNS responses. Over time, these visual exercises were added to balance, postural and gait exercises (substitution exercises) that increased with complexity and intensity. The purpose was to gradually decrease dependency on visual inputs and increase effective use of somatosensory cues.

OUTCOME:

Length of time in Vestibular Rehabilitation: 10 weeks
 Level of Difficulty of treatment plan: High

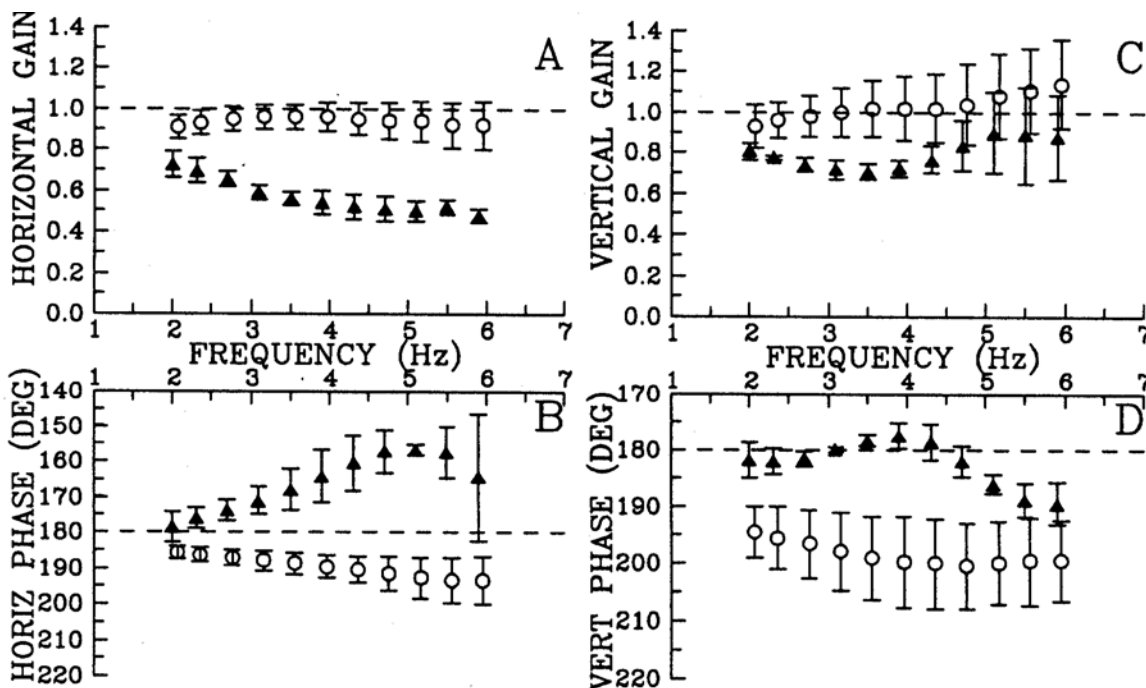
- Normal strength prior to the ototoxic medication
- Excellent general health prior to ototoxic medication
- Age

SUBJECTIVE REPORT


Mr. J.J. states he can walk without assistance, drive a car, and is able to return to work.

RESTRICTIONS:

Situations such as walking in the dark or on uneven surfaces continue to be a problem. Rather than have Mr. J.J. avoid these activities, he was taught adaptive motor control strategies and safety techniques to help him cope.



Error bars with open circles (o) represent the normative data of 100 subjects. The patient's means and standard deviations (horizontal and vertical gains figure A ▲ and figure C ▲) are below the graph, while his horizontal and vertical phases (figure B ▲ and figure D ▲) are dramatically high on the graph. This VAT® data pattern is typically seen in gentamicin patients.



TYPICAL OTOTOXIC TREATMENT PLAN

VRT Program

Gaze Stabilization exercises

Substitution exercises

Long-term maintenance program