Case Study: Vestibular Migraine or Postural Orthostatic Tachycardia Syndrome?

A 14-year-old girl presents with symptoms that could indicate two different vestibular conditions. Which is it?

By Richard E. Gans, PhD

Symptoms of dizziness, lightheadedness, and headaches are common symptoms in both vestibular migraine (VM) and postural orthostatic tachycardia syndrome (POTS). Both conditions are often underdiagnosed but yet not uncommon. Complicating this diagnostic enigma is the fact that onset of both conditions is commonly seen in pre-teen and teenage females. Furthermore, both conditions may occur in individuals with familial history of either or both conditions and they may be seen as co-morbidities. Both are reported to have hormonal and familial influences. This may cause proper diagnosis and management to often be delayed and validates the need for comprehensive vestibular evaluation in patient triage and management.

This article will present a case study of a 14-year-old female referred for a vestibular evaluation based on symptoms primarily of dizziness and lightheadedness. In order to better help readers who are less familiar with these conditions, a brief description of each is included. **Table 1** provides a listing of the most common symptoms associated with both vestibular migraine (VM) and postural orthostatic tachycardia syndrome (POTS).

Definitions

Vestibular migraine is a subset of migraine, a neurological condition which may occur with or without headache defined by a variety of symptoms which may include visual disturbances, nausea, vomiting, imbalance, dizziness or vertigo, and hypersensitivity to light and/or sound.[1] It is a clinical diagnosis, the symptoms of which were jointly agreed upon by the Committee for Classification of Vestibular Disorders of the Bárány Society and the Migraine Classification Subcommittee of the International Headache Society (IHS).[2]

Postural orthostatic tachycardia syndrome (POTS) is a form of cardiovascular autonomic disorder characterized by orthostatic intolerance and a symptomatic increase in heart rate upon standing. It results in blood pooling in the lower extremities, resulting in a drop in blood pressure causing increased heart rate (tachycardia) to bring blood flow to the brain.[3]

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Case Study

History

First, let's take a look at the patient's history:

- 14-year-old female referred by ENT and cardiology specialists of local children's hospital.
- Onset of symptoms at age 12 years 10 months. Followed by pediatrician with no formal recommendations until recent referral to specialists.
- Primary complaints of dizziness, lightheadedness, brain fog and difficulty focusing, vision made worse by physical activity. There is also history of fainting and tachycardia. Symptoms exacerbated pre-monthly menstrual cycle.
- Patient is an A student, on the honor roll and on the school's soccer team. No other pre-existing medical or emotional history. Home and social life is described as excellent.
- Onset of puberty at approximately 13 years 2 months of age.

Findings

All audiological tests were unremarkable with hearing thresholds no poorer than 10dB hearing loss across all frequencies. Likewise, middle-ear function, stape-

dial reflexes, and 12-octave DPOAE testing for both ears were well within normal.

Results of comprehensive vestibular tests, as shown in **Table 2**, were found to be abnormal for computerized dynamic posturography (CDP) sensory organization test (SOT) conditions 3 and 6, which is consistent with a visual-vestibular mismatch due to visual preference. Cervical VEMP (c-VEMP) was delayed for the left ear. These two findings are often seen in individuals with a history of migraine.

Absence of static or provocable nystagmus and unremarkable findings on all other tests would suggest there was not an acute, active, or non-compensated peripheral vestibular condition at time of evaluation.

Diagnosis and Management

The patient's physician specialists, both ENT and cardiology in consultation, believed the patient was in fact experiencing both VM and POTS as comorbidities. Cardiology had well-documented the diagnosis by tilt-table test, which is considered the gold standard for diagnosis of POTS. Onset was thought to be most likely triggered by the hormonal changes of onset of puberty. There is also a maternal familial history of migraine as well as in an older female sibling.

Management of both conditions included assessment of hormonal status.[4] POTS management focus was on proper hydration and salt intake, sleep hygiene, diet, and appropriate exercise plan. Monitoring of non-pharmacologic strategies was undertaken prior to prescribing medication. There are presently no FDA-approved drugs for the treatment of POTS. Medications are used to manage rapid heart rate or circulation.[5] VM management also focuses on lifestyle changes including diet, sleep, and reducing triggers such as stress or highly processed foods.

Vestibular Migraine	Postural Orthostatic Tachycardia Syndrome
Dizziness or vertigo	Dizziness, lightheadedness
Nausea and vertigo	Fainting
Sensitivity to light and/or sound	Fatigue, exhaustion
Motion sensitivity	Headache
Headache - may or may not occur	Palpitations
Visual disturbances	Difficulty concentrating

Table 1. Common symptoms associated with VM and POTS

Vestibular Tests	Findings
Computerized Dynamic Posturography (CDP)	Abnormal: SOT conditions 3 and 6
VideoNystagmography (VNG) w/caloric	Unremarkable
Cervical Vestibular Myogenic Potential (c-VEMP)	Abnormal: left ear delayed, normal amplitude
Video Head Impulse Test (vHIT)	Normal for horizontal and vertical planes
Rotary Chair Velocity Step Test	Normal gain and phase; bi-directional

Table 2. Vestibular test findings for 14-year-old female patient

While neither condition is life-threatening, both VM and POTS are of a chronic nature and will, if left undiagnosed and untreated, have a significant deleterious impact on a patient's quality of life.

Summary

Vestibular migraine and postural orthostatic tachycardia syndrome are not uncommon conditions and may occur in tandem, as in this case, especially in young females with onset of puberty. A history of familial migraine and symptom onset approximately around the time of hormonal changes offers practitioners valuable insight.

The role and importance of ENTs and audiologists providing comprehensive vestibular testing may be invaluable in reaching a proper diagnosis, triage, and treatment. It is important to recognize that VNG alone will unlikely be effective in assisting in the assessment of these two conditions as they are of a neurological genesis and findings will typically not be consistent with acute peripheral findings.

While neither condition is life-threatening, both VM and POTS are of a chronic nature and will, if left undiagnosed and untreated, have a significant deleterious impact on a patient's quality of life. ◗

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