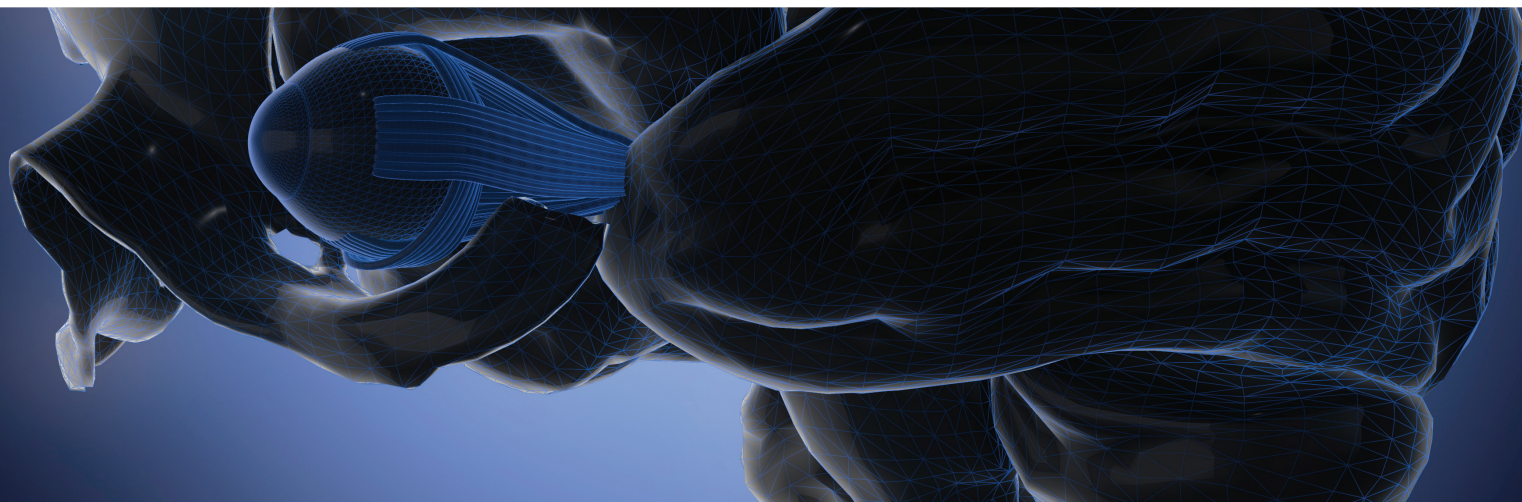




VESTIBULAR DISORDERS AND VISUAL DYSFUNCTIONS



Here's how the two work together to create a more seamless process.

BY JACQUELINE THEIS, OD, FAAO

We spend all day every day thinking and talking about the eyes, but when was the last time you thought about the ears as an underlying cause of your patient's visual complaints?

The interconnected vestibular and visual systems play a crucial role in maintaining visual stability, spatial awareness, and overall balance while the head and body are in motion or at rest. When either of these two systems malfunctions or moves out of sync with the other, it can lead to a range of nonspecific symptoms, such as dizziness, fatigue, and blurry vision that can have a significant effect on a patient's quality of life.

VESTIBULAR ANATOMY

The vestibular system is divided into two parts: the central vestibular system, which contains the brain and the brainstem, and the peripheral vestibular system, which contains the inner ear

and the neural pathways connecting the inner ear to the brainstem. The inner ear contains the cochlea, which is responsible for hearing, and the vestibular apparatus, which helps us maintain balance. The vestibular apparatus contains the otolithic organs, including the utricle and saccule, both of

which contain otoconia that help sense gravity. The utricle detects linear motion in the horizontal plane, while the saccule detects linear motion in the vertical plane. The semicircular canals, on the other hand, detect angular motion of the head and body irrelevant to changes in gravity. Together, these organs allow the inner ear, in combination with our eyes and our proprioceptive musculoskeletal system, to sense motion, gravity, and equilibrium and contribute to our overall spatial awareness.

Vestibular Symptoms

The most common symptom tied to the vestibular system is dizziness/vertigo, which can be an umbrella descriptor that improperly categorizes the sensation that a patient is feeling. Does the patient have a true sense of vertigo, where they perceive themselves or objects around them as moving?

AT A GLANCE

- ▶ The vestibular and visual systems are interconnected and play a crucial role in maintaining visual stability, spatial awareness, and overall balance while the head and body are in motion or at rest.
- ▶ The vestibular system consists of two parts: the central vestibular system and the peripheral vestibular system.
- ▶ Patients with vestibular disorders may rely on their visual system more to maintain balance and for spatial orientation, which can strain the visual system and lead to fatigue, eyestrain, and headaches.

Or does the patient simply feel lightheaded, faint, or unsteady?

Patients with underlying vestibular symptoms often have secondary complaints similar to patients who have oculomotor dysfunction, including difficulty with concentration and attention, anxiety in visually crowded or noisy areas, hypersensitivity to visual motion, and nausea. Due to the possible presence of nystagmus, these patients may also complain of blurry vision and oscillopsia while they are in motion or when they look in extreme gazes.

Patients may also notice increased peripheral motion, which can cause progressive lens intolerance. Many of my patients who develop vestibular disorders notice that their symptoms improve when they switch from progressive to single-vision glasses or contact lenses. Impact-resistant frames and lens materials are an important consideration for patients with dizziness, vertigo, and balance disorders, who are at a high risk for falls.

Vestibular Disorders

One of the most common peripheral vestibulopathies is benign paroxysmal positional vertigo (BPPV). The condition occurs when one of the calcium crystals in the inner ear dislodges and moves into a semicircular canal. Although BPPV is benign and not life-threatening, it can be debilitating for patients who experience sudden-onset intense spells of vertigo that are triggered by certain head positions or head/body movements. Tasks that may trigger symptoms include turning over in bed, loading the dishwasher or laundry machine, or turning the head while driving to check a blind spot. Often diagnosed by ear, nose, and throat specialists, otolaryngologists, or vestibular physical therapists, optometrists can screen for BPPV in the office using questionnaires that have been shown to have overall high accuracy and sensitivity with moderate specificity.¹ If suspicions for BPPV arise, a patient can be referred for ear, nose, and throat evaluation and/or vestibular physical therapy.

Meniere disease is another peripheral vestibulopathy to be aware of, as it is a multifactorial, complicated, chronic illness without a cure. It is often referred to as “glaucoma of the inner ear” due to abnormalities in either endolymph fluid absorption or excess secretion, causing increased inner ear fluid pressure, which can lead to endolymphatic hydrops in the inner ear. Similar to glaucoma, there are multiple subtypes of Meniere disease with different genetic, autoimmune, allergic, hormonal, and infectious pathophysiology.² Symptoms of Meniere disease include: episodic vertigo, tinnitus, hearing loss, nausea, blurred vision, light sensitivity, and headache.² Lifestyle modifications, medications, and surgical interventions can improve symptoms and quality of life for patients if referred appropriately.

The vestibulocochlear or vestibular cranial nerve (CN VIII) connects the peripheral vestibular system to the brainstem, where neural tracts lead to the brain, making up the central vestibular system. The central vestibular system includes the vestibular nuclei in the brainstem, pons, midbrain, cerebellum, thalamus, and visual cortex. It functions to coordinate communication with the eyes through the vestibular-ocular reflex and with the neck/proprioceptive systems through the vestibulospinal reflex. Central vestibular disorders, such as mal-de-embarquement syndrome and vestibular migraine, occur when there is a lesion in the brain or brainstem and affect 25% of patients in outpatient dizziness clinics.³

Central vestibular or vestibular-ocular reflex dysfunction is common in patients with TBI and/or concussion and can cause intermittent blurred vision and dizziness when the patient is in motion or in a vehicle. Although the symptom descriptors of dizziness, disequilibrium, and lightheadedness are similar for central and peripheral vestibulopathies, the temporal onset of symptoms, intensity, triggers, and frequency can help to differentiate the etiology. Central vestibulopathies can be difficult to treat and may require transdisciplinary care.

Visual Impact

Patients with vestibular disorders may rely on their visual system more to maintain balance and for spatial orientation. Although this may be helpful compensation for ambulation, it can strain the visual system and lead to fatigue, eyestrain, and headaches. It may also make patients hyper-sensitive to their visual environment and to changes in their refractive corrections. Many patients benefit from vestibular or oculomotor rehabilitation with vestibular/neuro-physical therapists and neuro-optometrists. As discussed, sometimes patients need to change their eyeglasses modality or add prism to compensate for small heterophorias that are decompensating due to their underlying vestibular disorder. This can help alleviate symptoms related to visual disturbances in vestibular disorders and improve overall visual comfort.

TAKEAWAYS

Understanding the connection between vestibular disorders and vision allows the development of effective treatment strategies that address both aspects of the sensory system. Patients may require the care of a multidisciplinary team, including physical therapy, otolaryngology, audiology, neurology, and optometry. By combining targeted exercises, visual interventions, and other management techniques, patients with vestibular disorders can regain their balance, reduce symptoms, and improve their overall well-being. ■

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