

The Dizzy Patient

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Persistent Dizziness

- When patients are referred to us with persistent dizziness, they frequently ask:
 - *“Why am I dizzy?”*
 - *“Why won’t it go away?”*
 - *“How can rehab help me?”*

PPPD

Persistent postural-perceptual dizziness

- New Designation (Barany Society, 2014, included in the International Classification of Vestibular Disorders (ICVD)).
- The term PPPD is new, but the disorder is not.
- Diagnostic criteria were derived by expert consensus from an exhaustive review of 30 years of research on phobic postural vertigo, space-motion discomfort, visual vertigo, and chronic subjective dizziness.

PPPD

Persistent postural-perceptual dizziness

- Manifests with one or more symptoms of dizziness, unsteadiness, or non-spinning vertigo that are present on most days for three months or more and are exacerbated by upright posture, active or passive movement, and exposure to moving or complex visual stimuli.
- May be precipitated by conditions that disrupt balance or cause vertigo, unsteadiness, or dizziness, including peripheral or central vestibular disorders, other medical illnesses, or psychological distress.
- May be present alone or co-exist with other conditions.

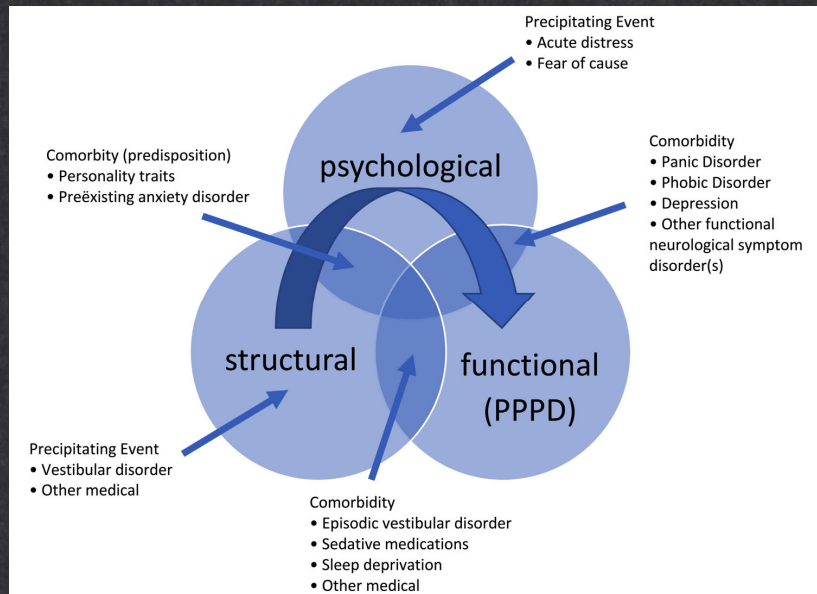
PPPD

Persistent postural-perceptual dizziness

- Possible subtypes await future identification and validation.
- Pathophysiologic processes underlying the disorder are not fully known.
- Research suggests that it may arise from functional changes in postural control mechanisms, multi-sensory information processing, or cortical integration of spatial orientation and threat assessment.
- Classified as a chronic functional vestibular disorder.
- It is not a structural or psychiatric condition.

PPPD

Persistent postural-perceptual dizziness



Symptoms

Dizziness as a symptom of vestibular dysfunction can be derived from many different sources

- the 5 organs of each ear - otolith/semicircular canals
- spinal proprioception – head position is important; posture is important
- central processing brain pathways that integrate binocular vision, proprioception, and posture
- The parabrachial complex (surrounds the superior cerebellar peduncle) where the convergence of vestibular, somatic and visceral sensory information that are involved in avoidance conditioning, anxiety, and conditioned fear
- Brain visuospatial regions (cortex)

Vestibular Symptoms in PPPD

A sensation of self-motion or distorted sense of motion with head movements

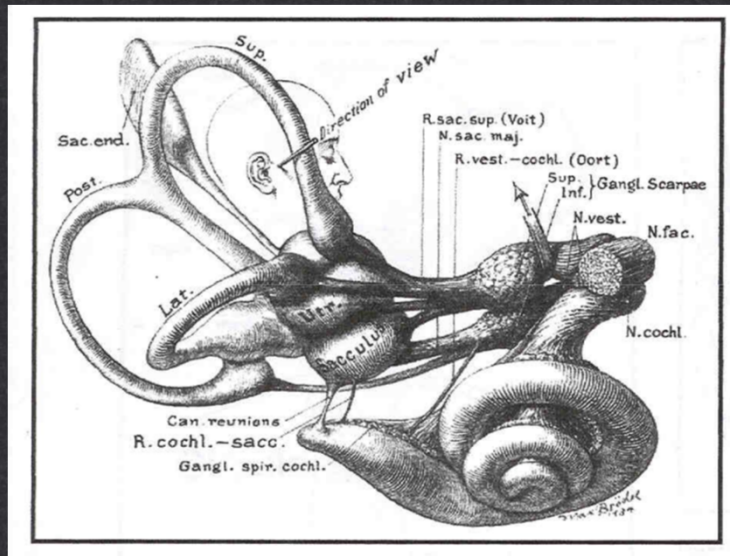
A false sensation the world is moving or a distortion of the motion with or without movements

A sensation of an impaired spatial orientation without a false or distorted sense of motion

Vestibular System Anatomy

- Otolith organs: sacculus and utricle - sense gravity and linear acceleration of head movements
- Semicircular canals: superior, posterior, and lateral - sense head movements in pitch (nodding), yaw (horizontal) and roll (tilting)
- Vestibular nerve (CNVIII) ganglia (superior and inferior) - reside within the labyrinth (the site of vestibular ganglionitis and site of a unilateral peripheral vestibular loss)

Vestibular System Anatomy



Drawing by Max Brödel (ca 1934) of the vestibular labyrinth

Vestibular System Physiology

- Vestibular organs transform head movements into nerve impulses
- Semicircular canals sense head velocity in 3 different planes of motion – roll, pitch, yaw
- Each vestibular nerve produces an equal and opposite firing rate to each head movement
- Disruption in one ear (loss) produces a response identical to a head movement – and generates nystagmus
- Head movements during a unilateral vestibular loss magnify the difference

Vestibular System Physiology

- Upper cervical spine proprioceptive sensory nerves (C1-C2) - provide input to the vestibular system regarding head position
- Neck muscles that stabilize the head (upper cervical spine) receive input from the vestibular system
- Changes in upper cervical spine biomechanics, not disc disease, can generate a mismatch between sensory inputs from the neck and the inner ear
- Abnormal head postures (dystonia or tilt) can lead to neck stiffness, restriction of head movements, cervicogenic headache – thought to be a cervically mediated dizziness

Vestibular disorders in PPPD

Benign paroxysmal positional vertigo (BPPV)

- Easily identified as a paroxysmal positioning nystagmus (Dix-Hallpike test)
- Easily treated with otoconial repositioning therapy (Epley, and others) that places the otoconia back into the utricular sac where they are resorbed
- Can trigger persistent dizziness from either the otolith dysfunction, or the changes in the upper cervical spine

Vestibular disorders in PPPD

Acute vestibular syndrome (vestibular ganglionitis of Gacek)

- Defined as the acute loss of peripheral vestibular function from one ear, once stroke is excluded
- Follows an adaptation/recovery over days to weeks
- Can result in persistent dizziness from either the residual loss, or the changes in the upper cervical spine

Vestibular disorders in PPPD

Cervically mediated dizziness

- Coupled with upper cervical spine symptoms – neck stiffness, pain, restricted movement, odd head postures
- Exam shows asymmetry of posture (head tilt or twist), asymmetry of tone (palpable tight bands, myofascial pain), asymmetry of neck strength
- Resistant to the repetitive head movement exercises of adaptation
- Requires special manual methods of physical therapy
- May require onabotulinum toxin chemodenervation to end the asymmetry in tone in cases of cervical dystonia

Medications in PPPD

Symptomatic medications

- The FDA has found no medication effective for the treatment of vertigo/dizziness
- Motion sickness medications – dimenhydrinate (Dramamine I®), meclizine (Bonine®, Antivert®, Dramamine II®), and transdermal scopolamine **impair** the rehabilitation of dizziness
- Anxiolytic benzodiazepines (alprazolam, lorazepam, diazepam, clonazepam, and others) **impair** the rehabilitation of dizziness

Medications in PPPD

Symptomatic medications

- Symptomatic medications should only be used in the short term, to enable more activities prior to the process of adaptation
- Patients with persistent dizziness should be encouraged to taper off all symptomatic medications, especially when taken as needed during the process of rehabilitation

Rehabilitation of PPPD

Multidisciplinary team approach

- No single therapy is sufficient in successful rehabilitation (PT alone, for instance)
- The medical team often needs to explain the cause to reassure it's time to begin the restorative/rehabilitative process
- Persistent concerns about the symptom as a sign of something life threatening need to be thoroughly addressed during rehabilitation
- Communication between rehabilitation team members is critical in moving progress forward to a successful conclusion

The Dizzy Patient

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Vestibular Rehabilitation

When to refer to Vestibular Rehabilitation?

- Subjective clues
 - Positional vertigo
 - Dizziness or imbalance with head or body movement
 - Disconnect b/w head & body esp with concurrent neck pain or impairment
 - Avoidance behavior d/t imbalance/FOF or dizziness
 - Hx consistent with common vestibular disorder
 - Motion sensitivity, esp of know onset or recent worsening
 - Visual triggers of dizziness (crowds, busy patterns, scrolling on phone, moving images on TV)

Vestibular Rehabilitation

When to refer to Vestibular Rehabilitation?

- Objective screening tools
 - Smooth pursuit & saccades can help rule out or confirm a central source of dizziness. A referral to vestibular rehab to treat a known central cause is appropriate.
 - Head Impulse Test: Excellent test for a unilateral or bilateral vestibular hypofunction.
 - Positional assessment
 - Imbalance/veering when walking while turning head
 - Change in dizziness during active or resisted neck movement

Vestibular Rehabilitation

Goals of Vestibular Rehabilitation

- There are 3 main systems of balance. We attempt to determine which is/are impaired.
 - Vestibular
 - Visual
 - Somatosensory
- Vestibular compensation: Retrain the brain (neural plasticity) to rely on accurate sensory feedback regarding static position in space, head/body movement & balance.
- Improve visual tracking & perception: Oculomotor retraining (OT or optometrist)
- Improve body movement control & proprioception

Vestibular Rehabilitation

Importance of patient education

- Increased confidence & function starts with patient education.
 - Roles of the systems of balance
 - Dysfunction & why dizziness is being experienced
 - Purpose & expected improvement
 - Reassure & empower
 - Posture & movement control
- CBT (Rehab psychology)

Vestibular Rehabilitation

What disorders are commonly treated with Vestibular Rehabilitation?

- Vestibular Neuritis
- BPPV
- Vestibular Migraine
- Persistent Postural Perceptual Dizziness (3PD)
- Concussion/TBI
- Cervically Mediated Dizziness

VR: Vestibular Neuritis

- Typical subjective clues:
 - Vestibular crisis
 - Dizziness or oscillopsia provoked by head movement
- VR treatment:
 - Adaptation exercises
 - Habituation, Balance retraining, Cervical treatment

Adaptation Exercises

X1 viewing



Adaptation Exercises

X1 checkerboard



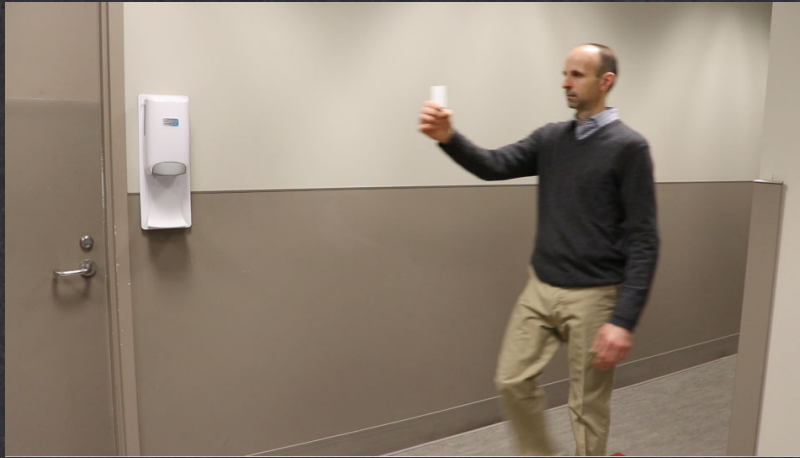
Adaptation Exercises

X1 standing



Adaptation Exercises

X1 walking

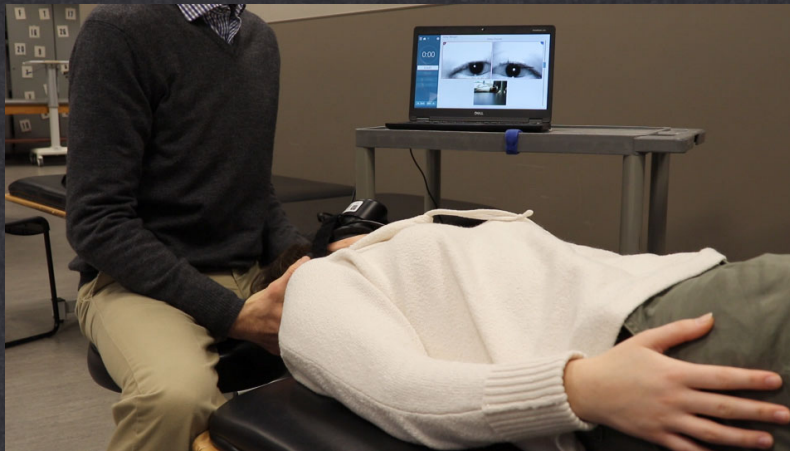


VR: BPPV

- Typical subjective clues:
 - Positional vertigo
- VR treatment:
 - Canalith repositioning maneuver

Positional Assessment & Canalith Repositioning Maneuver

BPPV



VR: Persistent Postural Perceptual Dizziness

- Typical subjective clues:
 - Dizziness
 - >50% of the time
 - >3 months
 - Initial event caused dizziness
 - Triggers: Upright posture, movement, visual stimulation
- VR treatment:
 - Habituation
 - Balance retraining/grounding techniques, posture/stabilization exercise
 - Education!, CBT

Habituation & Balance Retraining

Seated bounce



Habituation & Balance Retraining

Walk with half turn



Habituation & Balance Retraining

Walk with head turn



Habituation & Balance Retraining

Walk with ball bounce



Habituation & Balance Retraining

Ball toss BOSU



VR: Cervically Mediated Dizziness

- Typical subjective clues:
 - Dizziness during active head movement
 - Neck pain or stiffness
 - Improves with passive support
- VR treatment:
 - Stabilization exercises to improve movement control
 - Posture, stretching/manual therapy, proprioceptive retraining

Stabilization & Proprioception

DNF hold



Stabilization & Proprioception

Scapular stabilization



Stabilization & Proprioception

JPE



VR Summary

- Multidisciplinary approach
- Address impairments of 3 systems of balance
- Tailored to address individual's deficits & goals
- Often involves reproducing or increasing dizziness
- Education & CBT are essential

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Rehabilitation of PPPD

- While the purely mental symptoms can respond to the use of psychiatric medications combined with psychotherapy, the somatic manifestations (persistent dizziness) most likely will *never* subside (much like tinnitus).
- A vestibular home exercise program combined with the psychotherapy offers the best chance of lessening the impact on activities of daily living.

Summary

- **The persistently dizzy (PPPD) patient can be a challenge, but a multidisciplinary rehabilitation team offers the best treatment course.**
- **Resources may be available locally, but in selected cases more comprehensive rehab teams are required, including rehabilitation psychology.**