IS ANXIETY MAKING MY DIZZINESS WORSE? THE ROLE OF ANXIETY & STRESS IN VESTIBULAR/BALANCE DIAGNOSIS & MANAGEMENT

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LEARNING OBJECTIVES

1. Discuss the relationship between anxiety and vestibular disorders.

2. Identify the impact of anxiety on diagnostic assessment.

3. Explore strategies for managing anxiety in vestibular patients.

PRESENTATION OUTLINE

I. Anxiety's role in vestibular function & balance

I. Anatomic & physiologic connections between anxiety & vestibular function

I. Effects of anxiety/stress on diagnostic outcomes

I. Recommendations for managing anxiety in patients with dizziness

What is anxiety?

"Anxiety is a negative…emotion elicited by worried thoughts and tension, notably *when the source of threat is uncertain* or not imminent.

Anxiety elicits defensive behavioral responses-such as enhanced vigilance-*to anticipate perceived and potential threats that are uncertain or distant*."

Calhoon & Tye (2015)

ANXIETY & BALANCE

- Does anxiety affect dizziness?
- Does anxiety affect balance?
- Does anxiety affect vestibular function?

RESEARCH SUGGESTS…

- Objective vestibular test outcomes outside of the acute phase have very little association with patient perceptions of dizziness handicap (DHI) or symptom severity (VSS). (Herdman et al, 2020)

- However, psychological aspects, such as anxiety, depression, symptom focusing, & avoidance behaviors DO have significant correlations with dizziness handicap & symptom severity perceptions.

RESEARCH SUGGESTS…

- Vestibular impairment is associated with increased risk of psychiatric (& cognitive!) comorbidity, especially in aging adults (Bigelow et al, 2016; Semenov et al, 2016)

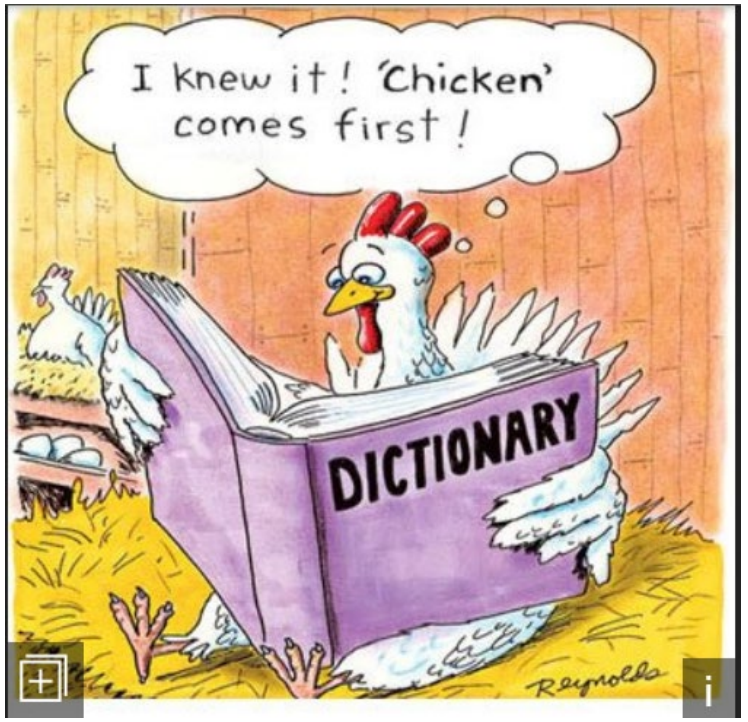
- Vestibular dysfunction leads to significantly higher ADL difficulty (Semenov et al, 2016)

RESEARCH SUGGESTS…

- Individuals reporting dizziness have 3x greater prevalence of self-reported anxiety or panic-related symptoms compared to those who don't complain of dizziness (Yardley et al, 1998)
- More than half of individuals with anxiety also report dizziness (Mira, 2008)
- Disorders with "unpredictable" episodes of dizziness seem to have a more heightened stress response and increased anxiety (Eckhardt-Henn et al., 2008; Kitazawa et al., 2021; Saman et al, 2012)

THE ANXIETY/VESTIBULAR CONNECTION

Which comes first:
the dizziness or the anxiety?



ANXIETY VESTIBULAR DIFFICULTIES⇨

- A history of psychiatric disorders leads to a reported increase in vertigo symptoms, dizziness-related handicap, and emotional distress at the onset of a vestibular disorder (Best et al., 2009)

- The development of somatoform dizziness and vertigo is significantly related to a history of mental disorders and stressful life events at the onset of an initial vestibular insult (Tschan et al., 2010)

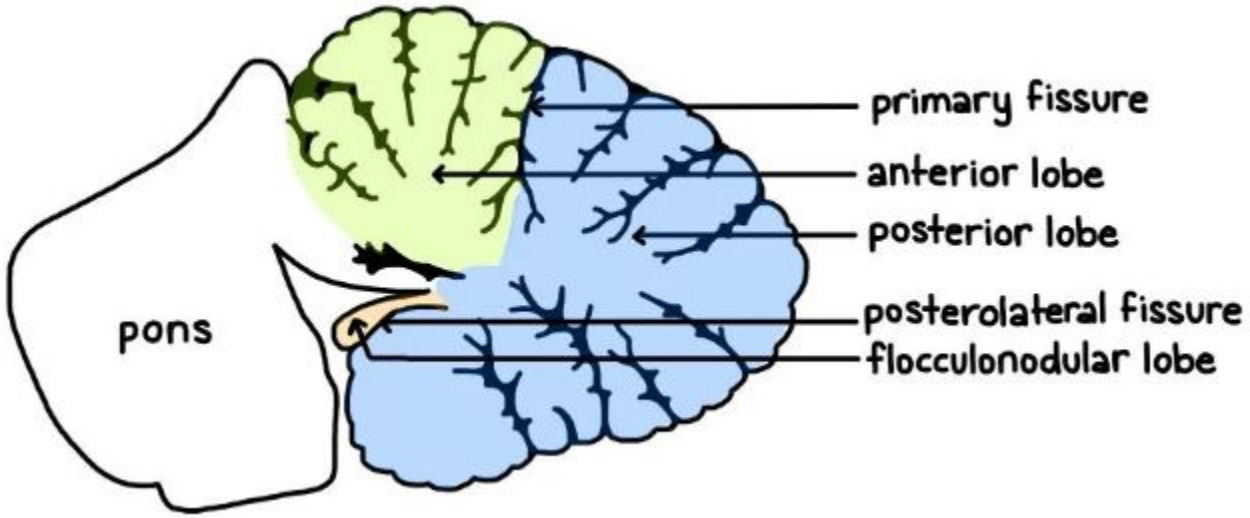
- Patients with BPPV + anxiety show lower success rates than those without anxiety (Wei et al., 2018)
  - BPPV + anxiety more likely to have recurrent BPPV

VESTIBULAR DIFFICULTIES ANXIETY ⟹

- 85% of vestibular neuritis patients present with acute anxiety following the attack (Godemann et al., 2004)
- Unilateral peripheral vestibular lesions observed via caloric irrigations in individuals with panic disorder suggest that reported dizziness is not due to anxiety, but is due to a truly dysfunctional peripheral vestibular system (Jacob et al., 2009; Tecer et al., 2004; Teggi et al., 2010)
- Eager et al. (1992)
  - 24% of vestibular patients presented with psychiatric illness at time of vestibular insult
  - At follow-up, 67% of patients met criteria for psychiatric illness

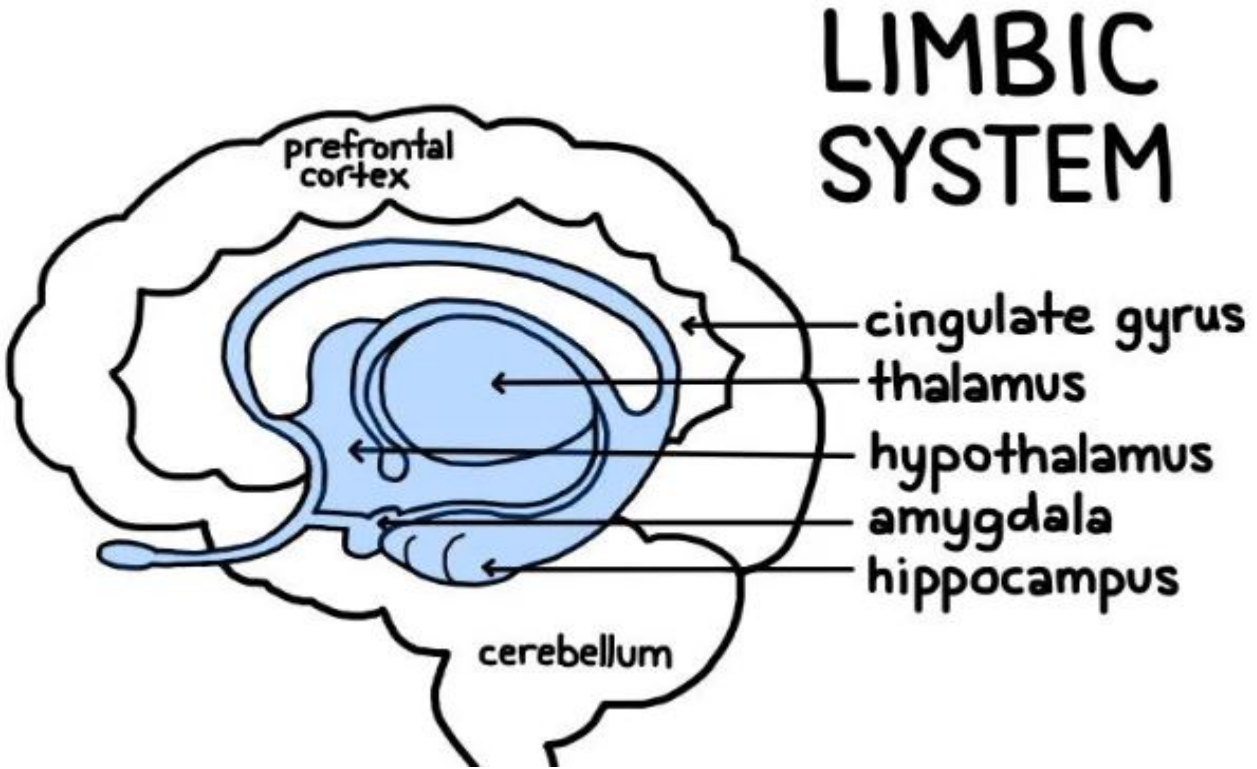
THE ANXIETY/VESTIBULAR CONNECTION

THE CEREBELLUM: PURELY A MOTOR STRUCTURE?



THE ANXIETY/VESTIBULAR CONNECTION

- The Limbic System (Rajagopalan et al, 2017; Gamba, 2018)
  - Hypothalamus?
  - Amygdala?
  - Hippocampus?



THE ANXIETY/VESTIBULAR CONNECTION

- Research suggests that anxiety/balance connections involve integrated activity in the:
  - Parabrachial nucleus network
  - Raphe nuclear-vestibular network
  - Coeruleo-vestibular network

(Balaban et al, 2011)

HOW DOES ANXIETY AFFECT DIAGNOSTIC ASSESSMENT?

WHAT DOES THE LITERATURE SHOW?

- Systematic Review conducted in December 2022
  - Three databases (PubMed, Scopus, CINAHL)
  - Search Terms: "vestibular" OR "cervical vestibular evoked myogenic potential" OR "cVEMP" OR "ocular vestibular evoked myogenic potential" OR "oVEMP" OR "video head impulse test" OR "vHIT" OR "posturography" OR "sway" OR "balance" OR "videonystagmography" OR "VNG" OR "electronystagmography" OR "ENG" OR "calorics" OR "rotary chair" AND "panic disorder."
  - Total articles included after screening: n=12

PANIC DISORDER & BALANCE ASSESSMENT

What diagnostic measure *seems* to be most affected by high levels of reported anxiety?

PANIC DISORDER & POSTUROGRAPHY

- N = 10 articles examining posturography
  - Static (n = 7)
  - Dynamic (n = 4)
- Static posturography: significant differences in all 7 articles between PwPD and controls
  - N = 2 showed decreased sway in PwPD
    - Amiaz et al., 2021; Lopes et al., 2009
  - N = 5 showed increased sway in PwPD/NPA
    - Angov et al., 2019; Caldirola et al., 2011; Jacob et al., 1996; Jacob et al., 1997; Jacob et al., 2009; Perna et al., 2001; Redfern et al., 2007; Stambolieva & Angov, 2010

PANIC DISORDER & POSTUROGRAPHY

- Dynamic posturography: significant differences in all 4 articles between PwPD and controls
  - Significantly decreased recovery time for corrective step following perturbation in PwPD (Amiaz et al., 2021)
  - Significantly higher instances of multiple corrective steps in response to perturbation in PwPD (Amiaz et al., 2021)
  - Significantly increased abnormalities in PwPD + mod/severe agoraphobia compared to other groups combined (non-panic anxiety, depression, PD + mild to no agoraphobia, controls) (Jacob et al., 1996; Jacob et al., 1997)
  - Significantly increased abnormalities in DP for individuals with anxiety disorder (but not specific to panic disorder) compared to controls (Jacob et al., 2009)

PANIC DISORDER & POSTUROGRAPHY

- Dependence: Surface or visual?
  - PwPD exhibit **surface** dependence (n = 2)
    - Jacob et al., 1997; Jacob et al., 2009
  - PwPD exhibit **visual** dependence (n = 3)
    - Caldirola et al., 2011; Perna et al., 2001; Redfern et al., 2007

ANXIETY & POSTUROGRAPHY

- Individuals with high ***state*** anxiety…
  - Sway more than those with lower state anxiety when eyes are open, but not when eyes are closed (Ohno et al, 2004)
  - Employ stiffer postural control strategies with more corrections in response to rotational perturbations (Carpenter et al, 2004)
  - Show greater age-related degeneration of balance reflexes (Carpenter et al, 2006)

…compared to individuals with lower state anxiety

ANXIETY & POSTUROGRAPHY

- Individuals with high ***trait*** anxiety…
  - Reduce sway while standing with eyes closed after completing a demanding mental task (Hainaut et al, 2011)
  - Rely more on visual cues, even when they are misleading (Viaud-Delmon et al, 2000)

…compared to individuals with lower trait anxiety

ANXIETY & POSTUROGRAPHY

- CONCLUSION
  - Posturography is affected by high levels of both state and trait anxiety
  - Adoption of "postural rigidity" in the face of increased anxiety may reflect insecure compensatory behaviors that are reflected in dynamic conditions
  - May have an over-reliance on visual cues (even when misleading)

WHAT ABOUT VESTIBULAR ASSESSMENTS?

VNG/ENG

- N = 5 articles
  - No significant differences in oculomotor or positional testing noted in any articles
  - Significantly higher incidence of abnormal caloric results in PwPD (n=3) (Jacob et al., 1996; Jacob et al., 2009; Tecer et al., 2004)
    - Suggesting peripheral vestibular dysfunction

ROTARY CHAIR

- N = 3 articles
  - Significantly increased linear gain values at multiple rotational frequencies in PwPD compared to controls (Swinson et al., 1993)
  - Increased percentage of abnormal rotational outcomes in PwPD + mod-severe agoraphobia compared to controls and PwPD + mild or no agoraphobia (Jacob et al., 1996)
  - No significant differences between PwPD & controls (Jacob et al., 2009)

VEMPs & VHIT

- VEMPs: n = 1
  - Nonsignificant differences between groups for latency and amplitude for cVEMP and oVEMP (Angov et al.,2019)

- vHIT: n = 1
  - Nonsignificant differences between groups for VOR gain (not saccades)(Angov et al., 2019)
    - PwPD group showed increased VOR gain values (27% with gains above 1.2 compared to 0% of controls)

SO…WHAT'S THE ANSWER?

- Patients with anxiety disorders are likely to demonstrate "*nonspecific, nondiagnostic abnormalities*" on functional tests…but the cause of these abnormalities remains unclear.
  - Do findings reflect subtle vestibular deficits?
  - Is anxiety causing abnormalities in testing?

PERSISTENT POSTURAL PERCEPTUAL DIZZINESS (PPPD)

- "The disorder is precipitated by conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurological or medical illnesses, or psychological distress."

Criteria for the diagnosis of PPPD as outlined by the Committee for the Classification of Vestibular Disorders of the Barany Society (2017)

PSYCHOLOGICAL FACTORS IN CHRONIC DIZZINESS

FACTOR	ROLE	EFFECT
Neurotic temperament	Predisposing	Potentially a risk factor for developing PPPD. May increase risk for patients with vestibular disorders to develop co-existing depression or anxiety.
Pre-existing anxiety disorder	Predisposing	May increase the likelihood of developing chronic dizziness after an acute vestibular insult
Panic attacks	Precipitating	The most common psychiatric cause of episodic vertigo (by far)
Acute anxiety at the time of vestibular illness	Promoting	Anxiety & excessive body vigilance is associated with the development of persistent dizziness following acute vestibular insults
Classical conditioning	Perpetuating	Responsible for hypervigilance & increased autonomic responses to motion stimuli
Operant conditioning	Perpetuating	Responsible for behavioral changes associated with dizziness (e.g., needing a travel companion, holding the cart while shopping, needing assistance to walk)
Cognitive processes	Perpetuating	Catastrophic thoughts about dizziness and its potential adverse consequences maintain a pre-occupation with illness.

TO SUM UP…

- Assessment findings in individuals with high anxiety vary, but are often abnormal, to at least some extent
- Psychiatric morbidity, NOT neurotologic function, may better determine symptomatic outcomes (Eagger et al, 1992; Kammerlind et al, 2005)
- Improving outcomes depends on adequate treatment of any coexisting anxiety & depression

HOW CAN WE BEST DIAGNOSE & TREAT PATIENTS WITH CO-EXISTING ANXIETY?

DETECTING CLINICALLY SIGNIFICANT ANXIETY

- Important questions during your case history:
  1. Does the patient have an active otologic or neurotologic condition?

  2. Does the condition explain ALL of the symptoms?

  3. Does the patient have behavioral symptoms indicative of psychiatric morbidity?

DETECTING CLINICALLY SIGNIFICANT ANXIETY

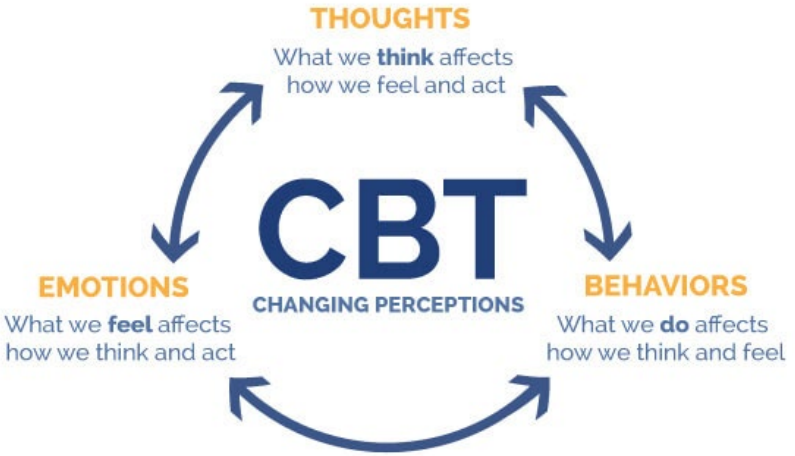
- Use of self-report questionnaires:
  - Dizziness Handicap Inventory (DHI)
  - Patient Health Questionnaire-9 (PHQ-9)
  - Generalized Anxiety Disorder-7 (GAD-7)
  - HADS (Hospital Anxiety and Depression Scale)
  - BVS (Body Vigilance Scale)

MANAGING CLINICALLY SIGNIFICANT ANXIETY AS A COMORBIDITY

- Management options:
  - Pharmacological intervention
  - Vestibular rehabilitation
  - Cognitive Behavioral Therapy
    - Mindfulness training

MANAGING CLINICALLY SIGNIFICANT ANXIETY AS A COMORBIDITY

- What works best?
  - Research suggests combinations of pharmacologic, VRT, & variations of CBT, although the balance of these is dependent on the diagnosis (& still requires more large scale, randomized controlled trial research to confirm)



IN CONCLUSION

- Anxiety DOES affect vestibular and balance function, although the effects are variable
- Vestibular/balance disorders CAN trigger anxiety, especially in people that have higher anxiety-related temperaments (e.g., neuroticism)
- Anxiety & other psychiatric co-morbidities are often missed because of a single-minded focus on the vestibular system

IN CONCLUSION: WHERE DO WE GO FROM HERE?

- Authors across the globe have recommended *incorporating psychiatric screening protocols as part of the routine evaluation* for patients presenting with acute or chronic vestibular symptoms (Best et al, 2006; Horii et al, 2007; Staab, 2006a, 2006b)

REFERENCES