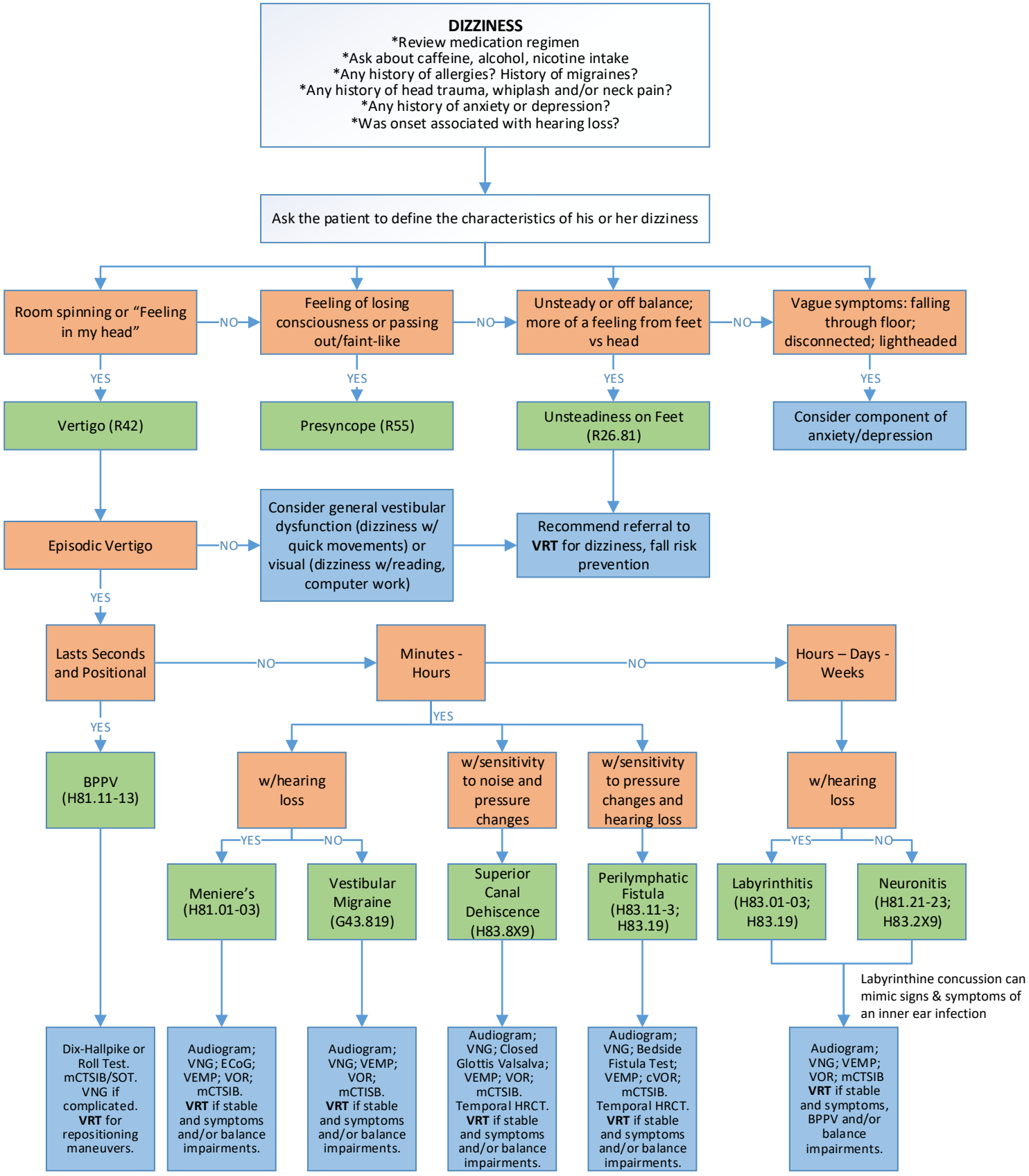
DIZZINESS DIFFERENTIAL DIAGNOSIS: CLUES FROM THE PATIENT'S HISTORY



Key for Abbreviations: Electrocochleography (ECoG); High Resolution CT Scan (HRCT); mCTSIB (romberg firm & foam); Vestibular Evoked Potentials (VEMP); Vestibular Ocular Reflex (VOR); Vestibular Rehab Therapy (VRT); Videonystagmography (VNG)

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The intent of the algorithm is to create a working diagnosis from the patient's symptom of dizziness, which is considered a vague term. A more differential diagnosis can be narrowed with a thorough intake, review of medical history and review of systems combined with the physical examination and comprehensive vestibular/balance tests. Imaging does not yield a high level of sensitivity to identifying the etiology of dizziness[1]. Vestibular diagnostics are helpful to identify site of lesion but not functional balance impairments, thus both vestibular diagnostics and balance testing should be used in conjunction. Additional positional testing may be warranted for atypical BPPV.

Recent studies find a series of bedside tests are superior to brain imaging in a portion of patients with acute spontaneous dizziness (e.g., sudden with no prior illness and/or stressful event). This includes a series of tests referred to as Head-Impulse-Nystagmus-Test-of-Skew (HINTS). The presence of a negative head thrust test, but presence of direction changing nystagmus and vertical skew deviation predicted stroke with 100% sensitivity and 96% specificity in patients with acute vertigo and at least one vascular risk factor after excluding those with a history of recurrent vertigo. However, HINTS is not sufficient to detect AICA strokes[2].

A *comprehensive* audiogram can play a critical role in the diagnosis even in the absence of reported hearing loss for both peripheral vestibular and central lesions. In addition, **any** patient presenting with an asymmetrical hearing loss needs a comprehensive audiogram immediately. As for treatment of dizziness, **customized vestibular rehabilitation shows >85% efficacy in peripheral vestibular disorders**[3] yet meclizine is prescribed as high as 89% of the time but results in <50% improvement[4]. The median time between the initial visit and receiving a vestibular disorder diagnosis is 1 month when the physician initially suggested the dizziness might be inner ear related versus 8 months when not considered[5]. Identifying the cause(s) of dizziness can be complex and time consuming. Hopefully, this tool proves helpful as a clinical guide. However, it is not intended to serve as a tool for confirming a medical diagnosis or treatment protocol.

[References: (1) Post RE and Dickerson LM. *Am Fam Physician*, 2010. (2) Kattah JC et al. *Stroke*, 2009. (3) Horak et al. *J Otolaryngol Head Neck Surg*, 1992. (4) Kroenke. *Arch Int Med*, 1990. (5) Haven L. VEDA *On the Level*, 2011.]

TYPES OF VESTIBULAR RELATED DISORDERS

Acoustic Neuroma is a serious but nonmalignant tumor on the VIIIth cranial nerve. Symptoms usually start with unilateral tinnitus and/or hearing loss then progress to dizziness/unsteadiness. Unilateral tinnitus or hearing loss warrants an immediate referral for a comprehensive audiogram. Other beneficial testing includes a videonystagmography (VNG) and Acoustic Brainstem Response (ABR) while imaging of the internal auditory canal confirms the diagnosis. Treatment options include monitoring, radiation or surgical removal. With radiation or surgery, referral for vestibular rehabilitation to address the residual effects of dizziness, unsteadiness and, in some cases, facial paralysis is beneficial.

Benign Paroxysmal Positional Vertigo (BPPV) is the most common cause of brief spells of vertigo (< 40 seconds) related to position changes (e.g., lying down, rolling over, etc). It is caused by erosion of the otoconia, or the otoconia being dislodged into one or more of the semicircular canals. The triggering event and direction of the nystagmus varies depending on the canal involvement. It is treated successfully >95% of the time in <3 visits. BPPV has a high recurrence rate, especially in women or persons who suffer from allergies, migraines and/or fluid problems of the inner ear.

General Vestibular Dysfunction is a non-specific type of dizziness most commonly described as a movement-related dizziness/unsteadiness. Symptoms are typically exacerbated by quick head movements, turns and/or busy visual environments. Such symptoms may be related to allergies, post-concussion syndrome (PCS), hormonal changes, barometric pressure changes, poor sleep patterns, poor nutrition (especially B12 <400), stress, anxiety, other illness (e.g., auto-immune) and/or age-related factors. Customized vestibular therapy with patient education is found to be beneficial.

Mal de Debarquement Syndrome (MdDS) is typically described as a rocking sensation after being on a boat, automobile, airplane or train. Symptoms are usually worse when being still and improve with movement. MdDS is typically related to a sensory organization mis-match between the visual and vestibular systems. Conservative treatment is vestibular therapy, although some patients require pharmaceutical management. Benzodiazepines (e.g., clonazepam) appear to provide the most benefit although SSRI type antidepressants are also suggested. There are also anecdotal reports of good responses to gabapentin, amitriptyline, and venlafaxine.

Meniere's Disease is characterized by recurrent spontaneous attacks of vertigo usually lasting 20 minutes to 24 hours but may take 1-3 days for recovery. The vertigo is often accompanied by unilateral low frequency sensorineural nausea, hearing loss, ear fullness and/or tinnitus. The events can be days, months or years apart. Medical management is critical and usually begins with a mild diuretic and, if needed, a potassium supplement. Steroids can be helpful especially with acute hearing loss and betahistine has also shown to be beneficial although the mechanism is unknown. Lifestyle management is equally as important: a low sodium diet (<2,000 mg although be cautious if on a diuretic); minimize caffeine; adequate sleep; manage allergies, and minimize stress. If the intense spells are well controlled but the patient has residual dizziness and/or balance problems, then referral to vestibular therapy is recommended. If the spells cannot be controlled, then more aggressive treatments such as gentamicin injections, endolymphatic shunt or (in more severe cases) a vestibular neurectomy or labyrinthectomy.

Migraine Associated Vertigo (MAV) or Vestibular Migraine mimics that of Meniere's Disease but in the absence of low frequency hearing loss. The patient also has a history of migraines although headaches may not be present with the spells of dizziness and nausea. Treatment includes pharmaceutical management with consideration of vestibular rehabilitation to manage residual symptoms once more intense spells are stabilized.

Perilymphatic Fistula (PLF) is an abnormal connection in the oval window and/or round window that separates the air filled middle ear and fluid filled perilymphatic space of the inner ear. This opening allows perilymph to leak into the middle ear. Symptoms of PLF typically include ear fullness, dizziness, fluctuations in hearing and, at times, sudden hearing loss. Symptoms usually worsen with barometric pressure changes or increased CSF pressure (e.g., heaving lifting, coughing, etc). Conservative treatment is warranted if there is no significant hearing loss and consists of pharmaceutical management similar to Meniere's Disease and vestibular therapy to address dizziness and/or balance problems. Surgery may be indicated as well as a referral to vestibular therapy for residual symptoms post-op.

Persistent Postural Perceptual Dizziness (3PD) is a diagnostic syndrome described as a common chronic dysfunction of the vestibular system and brain that produces persistent dizziness, non-spinning vertigo and/or unsteadiness. The disorder constitutes a long-term maladaptation to a neuro-otological, medical or psychological event that triggered vestibular symptoms. While diagnostic tests and conventional imaging usually remain negative, patients with 3PD present in a characteristic way that maps on to positive diagnostic criteria. Patients often develop secondary functional gait disorder, anxiety, avoidance behavior and severe disability. Once recognized, 3PD can be managed with effective communication and tailored treatment strategies, including vestibular rehabilitation, serotonergic medications and cognitive-behavioral therapy.

Superior Canal Dehiscence (SCD) Syndrome is caused by an abnormal opening in the thin bony roof of the superior (anterior) semicircular canal. This opening causes the membranous labyrinth to be susceptible to changes in sound and pressure. Risk factors associated with SCD are head trauma, barometric trauma and/or a history of sleep apnea. Conservative or surgical treatment is the same as mentioned for PLF.

Vestibular Labyrinthitis is characterized by the onset of acute vertigo often accompanied by hearing loss, unsteadiness, nausea and even vomiting. It typically lasts for hours to days and, at times, even weeks. The onset is typically associated with other illnesses, trauma or stressful events. In the acute phases, pharmaceutical intervention is often needed (vestibular suppressants and anti-nausea medication). Steroids can be helpful especially with acute hearing loss. Symptoms typically improve with time and can resolve on their own. If symptoms are residual after a few days then a referral to vestibular rehabilitation is recommended and is optimal to discontinue vestibular suppressants to optimize recovery. Inner ear infections are single events >95% of the time.

Vestibular Neuritis is the same as Vestibular Labyrinthitis but without hearing loss.