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Diagnosis and Treatment of Benign Paroxysmal Positional Vertigo

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Benign paroxysmal positional vertigo (BPPV) is a peripheral vestibular disorder that can negatively affect quality of life and daily functioning and increase the risk of falls. BPPV is caused by dislodged otolith particles that become trapped in any of the 3 inner ear semicircular canals (anterior, posterior, or horizontal), but most commonly affects the posterior canal. Due to the posterior canal's anatomical orientation with vertical alignment and curvature, particles in this canal tend to settle in the lowest portion and are less likely to exit with natural head movements compared with the other canals. When the head moves in the plane of the involved canal, these tiny calcium particles move in response to gravitational forces, generating fluid motion within the inner ear that displaces the cupula, the vestibular system's main sensory structure. This temporary displacement of the cupula alters vestibular signaling, which causes involuntary eye deviation resulting in the characteristic transient nystagmus and dizziness typically described as vertigo.

Epidemiology

BPPV is a common condition, with age as the primary risk factor. A population-based study from Germany estimated a cumulative incidence of approximately 10% by age 80 years.¹ The prevalence increases with age likely because the particles become more friable over time. BPPV is also associated with trauma and traumatic brain injury.

Clinical Presentation

BPPV typically presents with brief (<1 minute) recurrent episodes of vertigo triggered by certain head movements—most specifically lying down or turning over in bed. Some patients with BPPV report nonspinning dizziness (eg, lightheadedness or unsteadiness without vertigo) or continuous dizziness with positional worsening instead of only isolated brief positionally triggered symptoms.² A distinguishing feature of BPPV is absence of spontaneous nystagmus when patients are seated upright and looking straight ahead (ie, prior to positional testing). Nystagmus observed before positional testing indicates a fixed lesion such as acute unilateral vestibulopathy (eg, vestibular neuritis) or, less commonly, a structural brain disorder (eg, stroke, cerebellar tumor) rather than BPPV, which is a dynamic disorder.^{3,4} Failure to confirm the absence of spontaneous nystagmus can lead to misdiagnosis and ineffective use of the Dix-Hallpike test and Epley maneuver.⁵

Diagnostic Evaluation

The **Dix-Hallpike test**, which can be performed in an **office setting**, is the criterion-standard test for diagnosis of BPPV. The test involves clinicians turning the patient's head approximately 45° toward one ear and then lowering them backward to a position with

the head extended 20° to 30° below horizontal, which can be done over pillows or over the end of a table. The test result is positive if it triggers transient nystagmus lasting generally about 10 to 20 seconds. A false-negative Dix-Hallpike test result can be caused by excessively slow movement into the lying-back position (>2 seconds from sitting to lying back), inadequate head extension, or dispersion of otolith particles within the canal; these factors impede particle movement sufficient to induce the fluid motion necessary to displace the cupula. Persistent (not transient) and downbeat nystagmus on the Dix-Hallpike test suggests a structural brain disorder.^{3,4}

Management

The **Epley maneuver**, endorsed by multidisciplinary clinical practice guidelines,⁶⁻⁸ involves specific head turns and body movements to guide particles out of the posterior semicircular canal, and is the most studied and effective treatment for BPPV. The key steps of the Epley maneuver include extending the patient's head at least 20° below the horizontal plane when in the lying-back position (the same position as the Dix-Hallpike test) and staying in each position for at least 20 seconds. In randomized clinical trials (RCTs) measuring outcomes at 1 week, the Epley maneuver led to symptom resolution in 32% to 80% of patients vs 4% to 24% of sham-treated controls.⁶ A meta-analysis of 4 RCTs (251 patients with BPPV) reported the Epley maneuver (vs sham control) was associated with higher complete resolution of vertigo at 1 week (odds ratio, 7.19 [95% CI, 1.52-33.98]; moderate certainty), with a number needed to treat of 3.⁷ The Epley maneuver was most effective in studies with an inclusion criterion of triggered and transient nystagmus on the Dix-Hallpike test and using more than 1 application of the Epley maneuver if nystagmus was subsequently present on the Dix-Hallpike test.⁶ In studies that measured a 1-month outcome based on the presence or absence of triggered and transient nystagmus on the Dix-Hallpike test, 5 RCTs (312 patients) reported that the Epley maneuver was effective in resolving BPPV in 88% to 98% of patients vs among 24% to 77% of controls treated with sham maneuvers.^{6,7} Meclizine is not an effective treatment for BPPV and may cause unnecessary sedation.⁸

A randomized trial of a strategy to increase use of the Dix-Hallpike test and Epley maneuver at 6 emergency departments using educational sessions and decision aid materials vs usual care reported that this intervention increased documented use of the Dix-Hallpike test and/or Epley maneuver for all dizziness visits in 1.5% of participants (45 of 3077) in the control group vs 3.5% (159 of 4558) in the intervention group (difference, 2.0% [95% CI, 1.3%-2.7%]).⁹ The strategy was also associated with lower use of head imaging and positive clinician experiences, without an increase in adverse events.⁹

Patients with BPPV may also perform self-treatment with the Epley maneuver,¹⁰ which can achieve comparable treatment efficacy to expert-administered therapy; however, studies of self-treatment included patients with BPPV diagnosed by a clinician and who received in-person instructions prior to self-treatment. Although

self-treatment instructions for BPPV are available online, none have been tested in clinical trials independent of expert clinician diagnosis and self-treatment instructions.

More complex approaches to BPPV management exist, including maneuvers for otolith particles in the anterior and horizontal canals. However, the Epley maneuver is reasonable to use as initial treatment. BPPV involving the anterior and horizontal canal variants often resolves spontaneously, because the otolith particles are more likely to move out of the canal with routine head movements.

Patients with refractory BPPV symptoms should be referred to a vestibular specialist, if available.

Conclusions

BPPV, which is caused by dislodged otolith particles in the posterior semicircular inner ear canal, is a common cause of vertigo and is diagnosed by identifying transient nystagmus triggered by the Dix-Hallpike test. The Epley maneuver is an effective and guideline-supported treatment for BPPV.

ARTICLE INFORMATION

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