BRIEF REPORT

IMPROVING DIAGNOSIS AND TREATMENT OF BENIGN PAROXYSMAL POSITIONAL VERTIGO

Larry D. McIntire, DO, FAOCO[1]; Kindall Martin, DO[1]; Gregory Motzkus, OMS-IV[2]; Kunal Shah, OMS-IV[2]; Lauren Malinowski, OMS-IV[2]; John Paulson, DO, PhD, FAAFP[2]

[1]Kansas City University – Freeman Health, Otolaryngology, Joplin, MO
[2]Kansas City University, Joplin, MO

KEYWORDS:

BPPV

Dix-Hallpike

Dizziness

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ABSTRACT:

Background: Vertigo is defined as an illusion of motion caused by a mismatch of information between the visual, vestibular and somatosensory systems. The most common diagnosis associated with whirling vertigo is benign paroxysmal positional vertigo (BPPV), which affects approximately 3.4% of patients older than 60 years of age.

Objective: This paper aims to educate primary care providers on how to diagnose BPPV by performing canalith repositioning maneuvers at the initial point of care. Timely treatment of BPPV in the primary care office is believed to reduce healthcare costs by way of limiting unnecessary diagnostic testing and lowering referrals for specialty care. Immediate treatment is also believed to improve the quality of healthcare delivery for the vertigo patient by reducing morbidity and resolving the condition without the need for referrals or imaging.

Population Health: A review of the literature finds that delayed diagnosis and treatment of BPPV is associated with a host of deleterious effects on patients. Population health impacts include increased rates of anxiety and depression; loss of work and/or change of career paths; inappropriate use of medications or emergency care resources; decreased access to healthcare services; increased healthcare costs; and reduced quality of care.

Diagnosis: A history of positional vertigo and evidence of nystagmus with Dix-Hallpike positioning confirms the diagnosis. A detailed description of the performance of this test is elucidated.

Treatment: The observed nystagmus is analyzed and classified based on directionality. Treatment can be initiated immediately with canalith repositioning maneuvers.

INTRODUCTION

Vertigo is an illusion of motion caused by a mismatch of information among the visual, vestibular and somatosensory systems. The most common cause of whirling vertigo is benign paroxysmal positional vertigo (BPPV), with a lifetime prevalence of 2.4%.[1] BPPV results from the displacement of calcium-carbonate crystals, called otoliths, from the otolithic membrane; they then drift into the lumen of a semicircular canal (Figure 1).[1,2] Subsequently, head movements result in shifting of the otoliths within the semicircular canal resulting in a sudden—and often violent—onset of whirling vertigo accompanied by nystagmus, which often subsides within 10–15 seconds following onset.

The treatment of BPPV was revolutionized in 1992 when John Epley, MD, made public his concept of canalith repositioning maneuvers (CRMs), which have been shown to resolve symptoms of BPPV, often on the first treatment.[2] Of interest, recent studies and trials have validated the effectiveness of treating BPPV by general practitioners trained in CRMs, or Epley maneuvers.[3] These new findings present an opportunity to improve population health by decreasing the health care costs associated with BPPV, improving the quality of treatment by avoiding common delays in care due to referrals or unnecessary diagnostic tests, and increasing public access to services. To achieve this, it is the position of the authors that BPPV should often be diagnosed and treated on initial presentation.

To that end, we provide a method of diagnosing and treating BPPV and encourage its use by primary care physicians, emergency

CORRESPONDENCE:
Larry D. McIntire, DO, FAOCO | ldmcintire@gmail.com

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medicine physicians and midlevel providers who encounter this problem frequently. We begin with a discussion on the population health implications of BPPV with respect to the cost of, access to and quality of care.

POPULATION HEALTH: COST, ACCESS AND QUALITY

The prevalence of BPPV as a diagnosis in the primary care setting has increased in recent years, likely due to increased awareness, increased accuracy in diagnosis and the growing elderly population.[3] Despite the rise in screening and diagnosis by general practitioners, evidence suggests there is a need to improve adherence to the recommended guidelines in this setting.[3,4] As few as 10%–20% of patients are being treated with CRM techniques during the initial visit for BPPV.[1] It is often months or years before the diagnosis is made. The reason for this is likely multifactorial and merits further study.

One recent study surveyed 50 practicing emergency medicine physicians on their use of CRMs for dizzy patients. Some of the reported reasons for not performing CRMs include prior experiences of patient intolerability and forgetting how to correctly perform the technique.[5] During this delay, patients experience deleterious effects on their quality of life. Sixty-seven percent of patients report feeling depressed due to their condition, 86% suffer interrupted daily activities and lost days at work, 68% reduce their workload, 4% change their job, and 6% quit their job because of the disabling effects of BPPV.[4,6] In addition to the lost or reduced income, patients also accumulate unnecessary and often extensive medical costs before diagnosis and treatment. One study found that 70% of BPPV patients managed in the primary care setting undergo magnetic resonance imaging studies and 45% have computed tomography scans.[7]

The same study reported that 53% of vertigo patients received medication for BPPV. While medications that suppress the vestibular system may provide some temporary relief, they are not recommended, as they are likely to further delay more effective treatment.[8] These unnecessary studies and medications lead to increased hospital admissions and expenses for patients. The need to reduce hospitalizations for manageable conditions, such as BPPV, is greater now than ever. When delayed, a diagnosis of BPPV costs a patient an estimated $2000. The overall health care cost per year for the diagnosis of BPPV is $2 billion.[7,8] As the nation's population continues to age, these costs are projected to increase.

Over 50% of patients complaining of dizziness are seen by primary care physicians, compared to 13.3% seen by otolaryngologists.[8] We recommend that primary care providers implement point-of-care CRM techniques, thus providing optimal care while avoiding unnecessary costs and delays in treatment.[8]

DIAGNOSIS

Dizziness is a term commonly used by patients and providers, describing a sensation of spatial disorientation. A thorough history starts with asking the patient to further characterize their balance disorder. Generally, a patient complaining of fainting or feeling as if they are going to "pass out" suggests a cardiovascular or central nervous system etiology. Alternatively, a sensation of room spinning implies vertigo, which suggests a vestibular etiology. History involves the onset, duration, severity and eliciting factors. Patient symptoms are often described as recurrent and brief, and sudden episodes of whirling vertigo related to positional changes (eg, turning over in bed) are often associated with nausea and vomiting.[8] The initial evaluation of a patient complaining of whirling vertigo requires an ear exam, a tuning-fork test and possibly an audiogram. If warranted, a neurological exam should test cranial nerves, coordination, gait and balance to consider the central causes of vertigo. In some cases, the carotid arteries should be auscultated for bruits, as carotid artery stenosis can cause near-syncopal episodes mimicking vertigo. A thorough review of current medications should be performed to rule out potential side effects of therapeutic agents. The most encountered medications causing dizziness and disequilibrium include certain antipsychotics, antihypertensives, sedatives and ototoxic medications.[7,8] Dix-Hallpike positioning, accompanied by a history of positional vertigo, may directly lead to canalith repositioning and preclude the need for in-depth analysis of central, neurologic, vascular and pharmacological causes of dizziness.

The diagnosis of posterior semicircular canalithiasis BPPV—the most common form of BPPV—is made based on a history of recurrent sudden-onset positional vertigo and evidence of rotary nystagmus elicited by the Dix-Hallpike test (or Dix-Hallpike maneuver) with the affected ear down. Rarely, the condition may be present bilaterally. To perform the Dix-Hallpike test[8,9] (Table 1), have the patient begin in the seated position (Figure 2). Have the patient turn their head 45 degrees toward the ear being evaluated. Next, assist the patient in assuming the supine position with their head extended 20 degrees from the horizontal plane, unless contraindicated (Figure 3). Contraindications include cervical spine immobility, vascular insufficiency and intolerability of other neck extension.[10] Canalith movement and associated nystagmus may still be elicited without extension of the neck due to steepening of the slope of the semicircular canal in the supine position. Lastly, instruct the patient to keep the eyes fixed and open, allowing for observation of nystagmus. If nystagmus does not occur, proceed with testing of the other ear by turning the head 90 degrees toward the opposite side. The observed nystagmus is typically described as having a latency period of 10–15 seconds, reaching its peak and then disappearing within 10–20 seconds for rotary and often longer for horizontal nystagmus.[11]

Key clinical features distinguishing peripheral from central vertigo include the sudden onset of positionally induced severe whirling vertigo of short duration.[8] The nystagmus is fatigable.

Although rotary nystagmus is typically observed due to the high prevalence of posterior semicircular canalithiasis (85%), horizontal nystagmus may be observed in the case of horizontal semicircular canalithiasis. Superior semicircular canalithiasis is seldom identified.[2] In some cases, with positive history, the Dix-Hallpike maneuver fails to elicit any form of nystagmus, and it may be detected at another visit.

TREATMENT

The Epley maneuver is one of the most effective canalith repositioning procedures and is considered the gold standard for treatment of posterior semicircular canalithiasis. According to one study, 80% of cases of posterior canal BPPV were asymptomatic after one treatment and 92% were asymptomatic after multiple treatments. Less than 1% of cases showed no response to treatment.[12,13] Treatment of posterior canal BPPV can be initiated immediately upon diagnosis (Table 2). Head position 1 corresponds with the position of the patient during the Dix-Hallpike maneuver, which may result in the generation of vertigo and associated nystagmus (Figure 3). Position 2 is obtained by rotating the head 90 degrees toward the opposite side, away from the initial position, and monitoring for 30–60 seconds (Figure 4). This allows time for the dislodged otoliths to float through the posterior canal, and if that happens a new sensation of whirling vertigo will occur. Successful treatment requires ample time, 20–30 seconds, for particle repositioning. Another 90-degree rotation of the head will require the patient to move onto their shoulder in the lateral recumbent posture (Figure 5). Position 3 is commonly the position for a second bout of whirling vertigo to manifest, suggesting that the posterior semicircular canal has been cleared (Figure 6). In the lateral recumbent posture, if no nystagmus is elicited, the head can be rotated between positions 2 and 3 several times attempting to clear the canal. The patient is then assisted to a seated position with the head slightly inclined to complete the treatment.

Repeat Dix-Hallpike testing is then performed to confirm resolution of BPPV. Optimal results are likely when the patient does not demonstrate nystagmus upon repeat Dix-Hallpike positioning 2 or 3 times.[2] If rotary nystagmus is again identified, CRMs may be repeated until symptoms and nystagmus have resolved if the patient can tolerate additional positioning at the current visit. Treatment can be stopped if patient comfort is compromised.

Occasionally, a canal switch occurs during treatment of posterior canal BPPV. As otoliths exit the posterior canal, they fall into the horizontal canal. Horizontal canalithiasis is recognized by the development of violent horizontal nystagmus on Dix-Hallpike recumbent positioning with the head rotated to the right or left. It does not fatigue as quickly as rotary nystagmus. The dependent ear closest to the examination table or bed is responsible for the abnormal inner ear stimulation and resultant vertigo. Treatment consists of 4 90-degree turns of the head away from the initial position, resulting in a complete 360-degree "log roll" of the patient. The intensity of vertigo often reduces with the next 90-degree turn of the head. This may be noted in two or more positions, but turning through 360 degrees is the typical treatment (Table 3).

Current guidelines strongly recommend against postprocedural postural restrictions for posterior canal BPPV.[8] With instructions, the patient may repeat the CRMs at home. Reasons a patient may need to treat themselves at home may include recurrence of symptoms, patient discomfort during CRMs before resolution of BPPV is achieved or strong clinical suspicion of BPPV without positive nystagmus seen in clinic. Follow up within 1–2 weeks if symptoms persist, as residual symptoms are common during this period.[8] A virtual visit could be implemented as a follow-up, especially if patient education has already been provided in-office and the patient has someone to assist them at home.

TABLE 1:

Steps of the Dix-Hallpike Maneuver[8]

Start with patient in seated position.
Rotate patient's head 45 degrees toward suspected ear.
Assist patient in assuming the supine posture, maintaining head rotation.
Instruct patient to keep the eyes open, allowing observation of nystagmus.
Repeat test on the other side for comparison.

TABLE 2:

Epley Maneuver for Canalith Repositioning of Posterior Canalithiasis[7]

Left Ear		Right Ear
	*Position 1: The patient is assisted in assuming the supine posture while the head is rotated 45 degrees toward the affected ear (the position corresponding to a positive Dix-Hallpike maneuver).*	
	*Position 2: The patient's head is rotated 90 degrees away from position 1, toward the opposite side. The patient's eyes are monitored for 30–60 seconds for evidence of nystagmus indicating canalith repositioning.*	
	*Position 3: The patient is assisted in assuming a lateral recumbent posture and the patient's head is rotated further by another 90 degrees. The patient's eyes are monitored for 30–60 seconds for evidence of nystagmus indicating canalith repositioning and held for an additional 20–30 seconds for repositioning to complete. The patient is then assisted to a seated position with the head slightly inclined briefly before repeating Dix-Hallpike testing to confirm resolution.*	

TABLE 3:

360 Degree "Log Roll" Canalith Repositioning of Horizontal Canalithiasis[7]

Left Ear		Right Ear
	*Position 1: The patient is assisted in assuming the supine posture while the head is rotated 45 degrees toward the affected ear.*	
	*Position 2: The patient's head is rotated 90 degrees away from position 1, toward the opposite side. The patient's eyes are monitored for 30–60 seconds for evidence of nystagmus.*	
	*Position 3: The patient is assisted in assuming the prone posture and the patient's head is rotated further by another 90 degrees and held for 30-60 seconds for evidence of vertiginous symptoms.*	
	*Position 4: The patient's head is rotated further by another 90 degrees and held for 30–60 seconds for evidence of vertiginous symptoms and held for an additional 20–30 seconds for repositioning to complete.*	
	*Position 5: The patient is assisted in returning to the starting position (a full 360 degrees of rotation) to complete the treatment. Then, repeat Dix-Hallpike testing is performed to confirm resolution of horizontal nystagmus and vertiginous symptoms.*	

FIGURE 1:

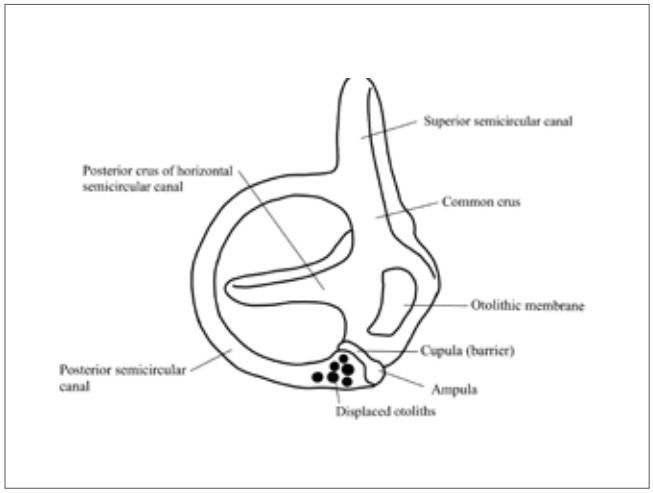


FIGURE 2:

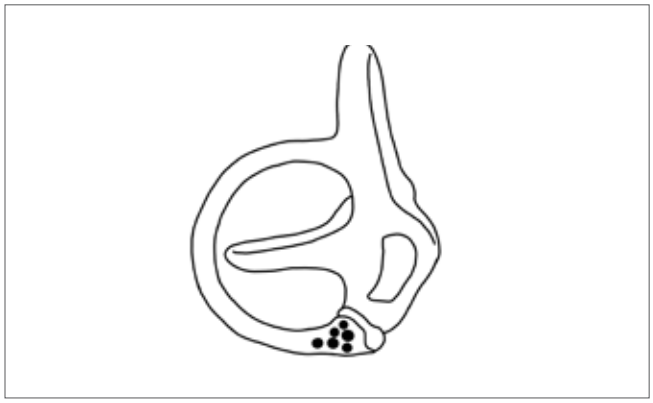


FIGURE 3:

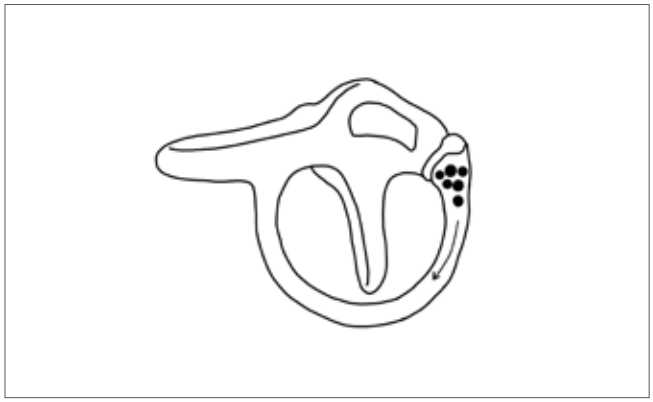


FIGURE 4:

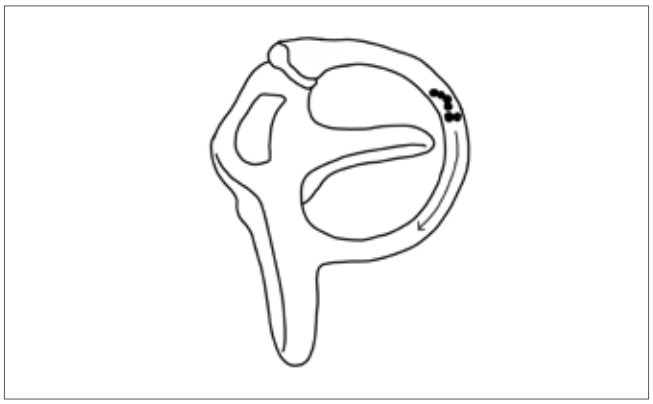


FIGURE 5:

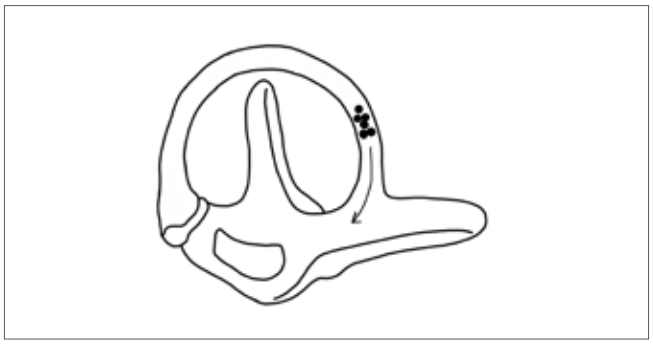
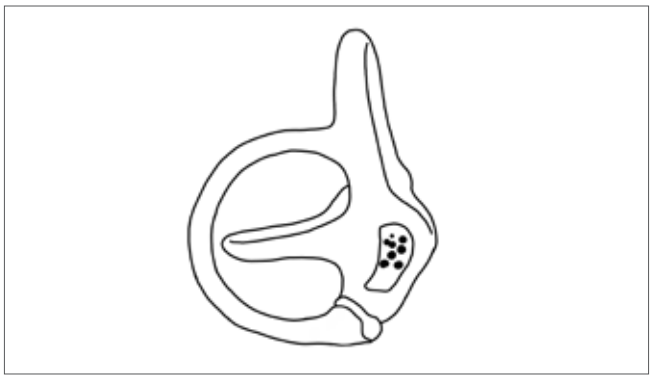


FIGURE 6:



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