

Management of Benign Paroxysmal Positional Vertigo Not Attributed to the Posterior Semicircular Canal: A Case Series

Sir,

Benign paroxysmal positional vertigo (BPPV) is generally attributed to dysfunction of the semicircular canals (SCs), which become abnormally sensitive to gravity or linear acceleration. BPPV is considered the most frequent cause of vertigo, especially in the elderly, with a prevalence of 10.7–140/100,000 population.^[1] Diagnosis and treatment of BPPV may involve a spectrum of clinical disciplines, resulting in considerable practice variations in the related management.^[2] These variations may bear cost and

quality-of-life implications for patients, rendering the impact of BPPV far from benign.^[3]

A total of 175 patients, who presented in the Accident and Emergency Department of a Private Hospital complaining of acute or chronic vertigo within one calendar-year, were reviewed. Among them, 96 patients were diagnosed with suffering from BPPV. While the problem affected the posterior SC (PSC) in 87 cases, eight patients suffered from horizontal SC-BPPV (HSC-BPPV) and one from anterior

SC-BPPV (ASC-BPPV) [Table 1]. All patients were treated with appropriate repositioning maneuvers (RMs), and reviewed 4 days later, to ensure symptom resolution. An open appointment for the next 6 months, should the symptoms recur, was also given. All patients treated for a noncommon BPPV variant made full recovery, following the appropriate RMs, and no case made use of the open appointment. Case number two experienced more intense dizziness, following the initial RM, indicative of a potential canalith jam. The patient was further managed with forced prolonged left lateral decubitus for 12 h, and head-shaking, resulting in complete symptom resolution.

While PSC-BPPV is the most common clinical BPPV variant, HSC-BPPV is not that uncommon, accounting for 5%–15% of cases (8.3% in the present case series).^[4] It can be differentiated from PSC-BPPV by two specific characteristics. Not only are the dizziness and related nystagmus elicited during a head turn at the horizontal level, instead of the Dix position (45° head rotation, 30° head extension) but also the nystagmus is predominantly horizontal and not torsional up-beating.

Canalithiasis (i.e., free-floating otoconial debris) of the HSC results in geotropic nystagmus both in the right and left head movement, during the Pagnini-McClure supine roll test. The nystagmus intensity is greater toward the affected side. RMs are initiated toward the nonaffected canal, i.e., the canal with the lesser nystagmus intensity. The simplest one is the Vanucchi maneuver, during which the patient is lying on the nonaffected side for 10 min. Hence, the impaired canal ascends higher than the vestibule, and the debris, which floats in the nonamplified canal end, drops back inside the vestibule.

Lempert’s maneuver (cases 2, 3, 6, and 8) consists in rotating the head from the affected side to the supine position by 90°, and consequently toward the nonaffected side by another 90°, in 15–20 s intervals. The patient is then rotated by 90° to the prone position, and consequently by 90° to assume the initial position, in similar time-intervals (270° total rotation). Finally, the patient is placed in the sitting position. Conversion of the geotropic horizontal nystagmus into direction-fixed spontaneous nystagmus has been reported to follow a canalith RM and could be attributed to potential canalith jam.^[5] This pathology, which seemed to have occurred in case number two of the present series, may be successfully managed, by forced prolonged decubitus toward the direction of nystagmus, and frequent head shaking.^[5]

Cupulolithiasis of the HSC (i.e., detached otoconia from the utricle becoming adherent to the canal cupula) is even rarer, and consists in ageotropic nystagmus on both sides, during the Pagnini-McClure test. The affected canal is the one with the lesser nystagmus. RMs aim at directly detaching the otoconial debris, thereby treating the patient, or converting the pathology to canalithiasis, and then proceeding to one of the maneuvers which treat the latter. Appiani’s maneuver (cases 1, 5, 7, and 9) consists in placing the patient from a sitting position toward the affected side, and consequently rotating the patient’s head by 45° upward, in 2 min intervals. Finally, the patient is placed in the sitting position.

ASC-BPPV is considered rare, and it may, in fact, be doubted by some researchers, due to the related SC anatomy. Indeed, the ASC is higher than the other two SCs, whereas its posterior arm ends directly into the common crus, thereby resulting

Table 1: Demographic data, diagnostic characteristics, and repositioning maneuvers in the presented case - series

| Patient | Age | Gender | Onset | Diagnostic test | Diagnosis | Type of nystagmus | Manoeuvre | Remarks |
|---------|-----|--------|---------|-----------------|-----------------------------------|------------------------------|---------------|---|
| 1 | 34 | Male | Acute | Pagnini-McClure | Right-sided HSC-BPPV [†] | Ageotropic left | Appiani | n.r. |
| 2 | 58 | Male | Acute | Pagnini-McClure | Right-sided HSC-BPPV [‡] | Geotropic right | Lempert | Intense vomiting was observed during the Pagnini-McClure diagnostic test The patient experienced more intense dizziness, following the Lempert’s test, indicative of a potential canalith jam, and was further managed with forced prolonged LLD for 12 h, and HSM |
| 3 | 69 | Female | Chronic | Pagnini-McClure | Right-sided HSC-BPPV [‡] | Geotropic right | Lempert | The patient’s history of paroxysmal vertigo had lasted for 48 years |
| 4 | 20 | Male | Acute | Dix-Hallpike | Right-sided ASC-BPPV | Down-beating torsional right | Reverse Epley | n.r. |
| 5 | 79 | Female | Chronic | Pagnini-McClure | Right-sided HSC-BPPV [†] | Ageotropic left | Appiani | n.r. |
| 6 | 55 | Female | Acute | Pagnini-McClure | left-sided HSC-BPPV [‡] | Geotropic left | Lempert | n.r. |
| 7 | 39 | female | Chronic | Pagnini-McClure | Left-sided HSC-BPPV [†] | Ageotropic right | Appiani | n.r. |
| 8 | 43 | Female | Acute | Pagnini-McClure | Left-sided HSC-BPPV [‡] | Geotropic left | Lempert | Intense vomiting was observed during the Lempert’s test |
| 9 | 69 | Male | Acute | Pagnini-McClure | Right-sided HSC-BPPV [†] | Ageotropic left | Appiani | Intense vomiting was observed during the Pagnini-McClure diagnostic test |

[†]Cupulolithiasis, [‡]Canalithiasis. n.r.=None reported, RM=Repositioning manoeuvre, LLD=Left lateral decubitus, HSM=Head shaking manoeuvre, BPPV=Benign paroxysmal positional vertigo, HSC=Horizontal semicircular canal

in a continuous self-clearing of the otoliths.^[6] The presence of ASC-BPPV is manifested through an intensity-variable vertical down-beating paroxysmal nystagmus, evoked during the Dix-Hallpike test.^[7] The nystagmus is not inverted when returning to the sitting position. A less clear torsional component is also present, clockwise regarding the left ASC, and counter-clockwise in the right ASC.^[7] Exclusion of cerebellar pathology is necessary before commencing treatment. Although the natural course in most cases of peripheral down-beating nystagmus is toward spontaneous resolution,^[8] which may further explain the rarity of ASC-BPPV, the easiest RM for this type of positional vertigo is the reverse Epley. The maneuver consists in rotating the head from the contralesional to the contralateral Dix position, with subsequent upward chin-tilting, while the body is rotated by 90° to assume a semi-prone position, with the affected ear at a lower level, in 30 s intervals. The patient is then placed in the sitting position. Deep-hanging, followed by an upward chin-tilting above the bed level, in 30 s intervals, and return to the sitting position, is also reportedly successful in 85% of cases.^[9]

RMs performed for BPPV at the bedside are cost-effective, require minimal equipment, are relatively easy to perform, highly successful, and as such, highly satisfying for both the patient and the clinician.^[10] However, despite the high prevalence of PSC-BPPV, caution should be paid to the characteristic patterns of nystagmus and symptoms. Indeed, uncommon BPPV variants may be present, whereas a concealed central positional vertigo, when the duration of symptoms, the pattern of nystagmus, or the triggering positions are not be entirely typical for BPPV should be kept in mind. Familiarity with Ewald's three laws is a prerequisite for the clinician to identify the peripheral nature of the lesion, and subsequently localize the side and canal involved, based on the pattern of nystagmus alone [Table 2].

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Conflicts of interest

There are no conflicts of interest.

**Petros V. Vlastarakos, John Plioutas, Nikolaos S. Tsilis,
Thomas P. Nikolopoulos¹**

Department of ENT, MITERA Infirmary, ¹Department of ENT, Attikon University Hospital, Athens, Greece

Address for correspondence: Dr. Petros V. Vlastarakos,
85 Ethn., Antistaseos Str., Athens 17236, Greece.
E-mail: pevlast@hotmail.com

Table 2: Ewald's laws regarding the stimulation of the peripheral balance system

| Number | Ewald's law |
|--------|--|
| 1 | The vector of the nystagmic movement is within the plane of the stimulated semicircular canal |
| 2 | Ampullopetal flow of the endolymph causes more stimulation in the HSC than ampullofugal flow |
| 3 | Ampullopetal flow of the endolymph is inhibitory and ampullofugal flow excitatory in the vertical canals (ASC and PSC) |

HSC=Horizontal (lateral) semicircular canal, ASC=Anterior (superior) semicircular canal, PSC=Posterior semicircular canal

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