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Case Report

Extreme Frequency of Benign Paroxysmal Positional Vertigo Recurrences Unexplained by Any Known Risk Factors: A Case Report

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Benign paroxysmal positional vertigo (BPPV) is a common vestibulopathy and involves failed dissolution and dislocation of calcium carbonate crystals into the semicircular canal. This causes short-lasting vertigo during changes in head position. Oftentimes, BPPV can be resolved within a single clinic visit, but secondary to many known risk factors, BPPV can recur. This case report follows a patient with extremely frequent recurrences despite a lack of known risk factors. A 55-year-old female experienced BPPV in December 2022, with successful canalith repositioning treatment from otolaryngology. On having a recurrence in March 2023, the patient underwent videonystagmography including caloric testing, and MRI, all of which showed normal findings besides left posterior-canal BPPV. From December 2022 to February 2024, the patient had 13 recurrences, each treated to resolution, confirmed by repeating positional tests and per subjective report for at least 2 weeks following. The incidence of BPPV recurrence is reported higher in females, however, this could not be interpreted as a causative factor. Though many other risk factors are documented in literature, this patient's history, demographics, imaging, and blood tests were all negative. This case report highlights a gap in knowledge of vestibular pathophysiology, as this patient's high rate of recurrence remains unexplained.

KEYWORDS: Benign paroxysmal positional vertigo, vestibular rehabilitation therapy, risk factors, vestibulopathy, case report

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is a common vestibulopathy and the most common cause of vertigo, but it is treatable with canalith repositioning maneuvers (CRMs) with a high rate of success.[1-3] However, even when resolved, BPPV can recur within a lifetime in up to 67% of individuals.[4] For clinicians diagnosing and/or treating BPPV, it is important to educate patients on the risk factors involved to reduce the likelihood or frequency of recurrence.[2,5] Several risk factors are unalterable, including aging or comorbidities such as Ménière's disease and vestibular migraine, while other factors, such as hyperlipidemia, can require significant lifestyle changes to manage.[1,2,5] However, some major risk factors can be abated via simple means, such as supplementing vitamin D_3 to overcome deficiency.[1,5,6]

From December 2022 to February 2024, a patient was followed by otolaryngology (ENT) and physical therapy (PT) for BPPV recurrences which were highly atypically frequent. This case report highlights a gap in knowledge of vestibular pathophysiology, as this patient's high rate of recurrence remains unexplained.

CASE PRESENTATION

In December 2022, a 55-year-old female patient visited an ENT reporting symptoms of positional vertigo. The patient's left Dix–Hallpike test was positive for up-beating torsional nystagmus and vertigo, indicating left posterior-canal BPPV, which was subsequently treated with 2 CRMs to resolution.[3] The ENT instructed the patient to begin supplementing 5000 International Units (IUs) daily of vitamin D_3 in an effort to avoid recurrence.[1,5,6] In March 2023, the patient reported that another bout of positional vertigo had occurred, so the ENT ordered a vestibular test battery, including computerized dynamic posturograpghy, electrocochleography, auditory brainstem response, rotary chair, and videonystagmography including caloric testing, and MRI, all of which were

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unremarkable besides the left Dix–Hallpike test, which was positive for up-beating torsional nystagmus and vertigo, and the patient had no migrainous features to symptoms. The patient was referred to PT for further treatment. Between December 2022 and February 2024, the patient experienced 14 individual bouts of BPPV.

For each bout, the patient's BPPV was resolved by CRMs, confirmed by repeating positional vertigo tests. Additionally, while 4 of the 14 bouts did require more than 1 PT visit within a few days to resolve completely, the 14 bouts considered for this case report were separated by at least 2 weeks of zero reported symptoms following treatment.[7] Across all bouts, the patient had positive findings in either the left posterior canal or the left horizontal canal, with 2 exceptions being positive for BPPV in the right posterior canal. When resolved, the patient reported being able to sleep comfortably in supine and both side-lying positions, and participate in an active lifestyle including frequent hikes and recreational sports, and the patient did not experience any vestibular complaints, including dizziness, imbalance, or vertigo. The patient was not given post-maneuver positional limitation precautions, as this additional measure holds no significant bearing on treatment success or recurrence rate.[8]

In August 2023, the patient had further tests ordered for potential risk factors to explain and/or reduce this high recurrence rate. Below are the patient's relevant demographics, history, and test results with the reference intervals taken from the patient's own lab work:

- Age: 55.
- Sex: female.
  - Patient was consistently menstruating through to authorship.
- Vitamin D_3: 58.7 ng/mL (30-100 reference).
- Serum calcium: 9.1 mg/dL (8.7-110.2 reference).
- Thyroid-stimulating hormone: 4.460 µIU/mL (0.450-4.500 reference).
- Cholesterol ratio: 2.6 : 1 (optimal ratio of 3.5 : 1 or lower).[9]
- Triglycerides: 64 mg/dL (0-149 reference).
- Red cell distribution width (RDW): 11.5% (11.7%-15.4% reference).
- Hemoglobin A1C: 5.2 (4.8-5.6 normal, 5.7-6.4 prediabetes, >6.4 diabetes).
- Estrogens, total: 239 pg/mL (40-244).
- Negative history for diabetes, hyperlipidemia, migraine, Ménière's, goiter, hypertension, otitis media, osteoporosis, depression, cervical spondylosis, family history of BPPV, and no head impacts throughout 2022 and beyond.[1,2,5,9,10]

After this testing showed a healthy serum vitamin D_3 value, the patient's primary care physician instructed the patient to increase supplementation from 5000 IUs/day to 7000 IUs/day to potentially reduce the frequency of recurrence. Even with increased intake, the patient then had 5 bouts of BPPV between September 2023 and February 2024. The patient would tolerate BPPV treatment fairly well but would occasionally experience nausea after treatment and would need to rest in a seated position for up to an hour before driving home from the PT clinic. After the 11th recurrence, the patient gave informed consent to be included in a case report.

DISCUSSION

This case report demonstrates that even common disorders can have unknown elements in pathophysiology. BPPV recurrence can be attributed to disturbance of otoconia metabolism within 1 or more of the stages of biomineralization, adherence, and demineralization.[11] However, discovering what disturbance could apply to an individual, such as this patient, is not yet established. A typical recurrence rate for BPPV can be expected up to 26% within a 1-year period, and 54.5% of patients may have a single recurrence within a 5-year period, highlighting the atypical presentation of this patient's 14 bouts within 1 year.[4,12] Of patients who experience BPPV, 57.2% will have 1 or more of these common comorbidities: hypertension, diabetes, osteoarthritis, osteoporosis, and/or depression, while the subject of this case report had none.[10] With this patient's collected data from testing, history, and demographics, the only significant positive finding was female sex.[14] While there is a female-to-male ratio of 2.4:1 in regards to BPPV occurrence, this cannot be interpreted as causative toward what was occurring abnormally within this patient's vestibular organs.[13] Resultingly, a treatment plan could not be created for overcoming a high recurrence rate based on this risk factor alone.

The patient's age is not within the most common age group for BPPV: 71-80 years.[13] The patient was at a common age for menopause, which is associated with BPPV, but the patient has regularly menstruated to the time of the most recent recurrence and has tested at normal estrogen values.[5,6,14] Though this patient's RDW was abnormal in testing, a heightened value is associated with increased recurrence of BPPV, while this patient's value was slightly below the reference interval, not above.[15]

Considering that the formation of the calcium carbonate otoconia requires sufficient serum vitamin D_3 and calcium, it was suspected that low values in these tests could explain this patient's circumstance.[1,5,6,13] Once the serum vitamin D_3 value was found to be within a healthy range, the patient's primary care physician prescribed an even higher supplementation to attempt to reduce frequency. However, in the following months, BPPV was still recurring frequently despite this increased dosage.

At the time of writing, this patient's case is still ongoing, wherein any recurrences will be treated at PT via CRMs, and any additional discovered risk factors will be discussed.

CONCLUSION

Though BPPV is common, recurrence rates are associated with many known risk factors. Considering that several of these risk factors are readily treatable, a clinician's assessment for these is important for long-term relief of this highly symptomatic condition. Risk factors with a major impact on recurrence rates can involve simple treatments, such as vitamin D_3 supplementation, while some require major lifestyle changes, including type II diabetes mellitus, and others are unalterable but allow for the identification of those at high risk. This case report demonstrates that there is room for greater knowledge on the pathophysiology and risk factors of BPPV considering the extreme recurrences for the otherwise healthy subject of this case report.

Informed Consent: Informed consent was obtained from the patient who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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