Review Article

Repositioning maneuvers in benign paroxysmal positional vertigo: how do we improve outcomes?

Tapas Kumar Banerjee*

National Neurosciences Centre Calcutta, Kolkata, West Bengal, India

Received: 11 October 2021
Accepted: 10 November 2021

*Correspondence:
Dr. Tapas Kumar Banerjee,
E-mail: tapaskumarb@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disorder. A series of meetings with clinicians treating BPPV were conducted to seek their views on improving outcomes in patients with BPPV. BPPV is primarily treated by Otolith repositioning maneuvers (ORM) to help to move the otoconia out of the canal and lead it back to the vestibule. Although repositioning maneuvers are effective in BPPV management, some patients experience residual dizziness, postural instability, recurrences, and psycho-emotional consequences after about 1 month after repositioning. An important and useful non-pharmacological intervention for patients with balance disturbances is Vestibular rehabilitation (VR), which includes vestibular adaptation, habituation and substitution, and patient education. Repositioning devices and mastoid vibration could help a subgroup of patients with BPPV who do not respond to conventional management. Betahistine dihydrochloride accelerates the recovery of function of vestibular system by improving blood flow in the inner ear, and normalization of the function of motion sensitive hair cells is faster. Betahistine-treated patients may have faster recovery, lesser recurrence, and longer relief of symptoms. The use of betahistine in combination with maneuvers can help prevent the development of residual dizziness.

Keywords: Vestibular rehabilitation, repositioning devices, Betahistine, Residual dizziness, Otolith

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disorder. An increasing number of people in the elderly age group with associated age-related comorbidities and the presence of deficits in physiological, cognitive, and social functions contribute to the development of various diseases.

BPPV is the most common type of vestibular vertigo in the elderly population; it has an adverse impact on functioning and quality of life of affected individuals. The prevalence of BPPV is about 25% in elderly people over 70 years with complaints of dizziness, and this symptom persists for more than one year. The chief complaint of patients with BPPV is vertigo, and it may be associated with hearing loss, tinnitus, poor balance, gait disturbance, and an increase in the risk of falls. Patients with BPPV restrict their activities in order to avoid crises due to vertiginous symptomatology resulting in a compromised quality of life, functional loss, loss of postural balance and risk of falls, fractures, hospitalizations, depression, and disability.

CAUSE OF BPPV

The trigger for vertigo and other associated symptoms is believed to be the displacement of statocone (otoconia) fragments from the utricle macula. The statoconia freely float in the endolymph of one or more semicircular canals that become sensitive to changes in head position. The brief period of vertigo occurs due to abnormal stimulation of the dependent semicircular canal. In most patients,
BPPV is caused by canalolithiasis where free debris float within the long arms of the semicircular canals.\textsuperscript{20}

**TREATMENT OF BPPV**

BPPV is primarily treated by ORM to help to move the otoconia out of the canal and relocate this back to the vestibule.\textsuperscript{20}

Current data indicates that the Epley maneuver is effective for the treatment of BPPV of posterior canal. Fife et al classified the Epley maneuver for otolith repositioning as ‘recommendation level A’. The Epley maneuver is effective and safe and must be offered to patients with BPPV of the posterior canal of all ages.\textsuperscript{21} The Epley maneuver improves patients’ Dizziness handicap index (DHI) score and decreases the impact of the vertiginous symptoms.\textsuperscript{22} Other positional exercises include the Brandt-Daroff exercises. Brandt-Daroff exercises are often impractical because patients do not tolerate repeated provocation of symptoms. Semont’s liberatory maneuver (SLM) is the treatment for cupulolithiasis of anterior and posterior canals.\textsuperscript{23,24} The apogeotropic variant of the Horizontal semicircular canal (h-SCC) BPPV is attributed to canalithiasis of the anterior arm or cupulolithiasis. The Gufoni maneuver seems to be effective in all pathophysiologic types of apogeotropic h-SCC BPPV. Barbeque rotation techniques such as Vannucchi-Asprella maneuvers mainly target lithiasis of the anterior ampullary arm.\textsuperscript{25} The affected-ear-up 90° maneuver is effective against lateral canalolithiasis.\textsuperscript{26}

The number of maneuvers used varies in different studies (usually from 1 to 3 maneuvers). Hence, it is not possible to propose a standard number of maneuvers, or if they should be performed in the same session or in different ones. Patients with BPPV not located in a single posterior semicircular canal are more likely to require multiple visits for canalith repositioning.\textsuperscript{27,28}

A series of meetings with clinicians treating BPPV were conducted to seek their views on improving outcomes in patients with BPPV.

**RESIDUAL DIZZINESS AND RECURRENCE OF VERTIGO AFTER ORM**

Although repositioning maneuvers are effective in BPPV management, some patients experience residual dizziness, postural instability, recurrences, and psycho-emotional consequences for about 1 month after repositioning. Older adults have less improvements in dynamic balance and self-perceived handicap rating in comparison to younger people.\textsuperscript{20}

Ganança et al observed a BPPV recurrence rate of 21.5% in the elderly. Forty percent of patients treated successfully with the canalith repositioning procedure redevelop BPPV within the first 2 years.\textsuperscript{20} Thus, ORM may not be sufficient to completely restore postural stability in elderly subjects with BPPV.\textsuperscript{28-30}

**VESTIBULAR REHABILITATION**

An important and useful non-pharmacological intervention for patients with balance disturbances is vestibular rehabilitation, which includes vestibular adaptation, habituation and substitution exercises, and patient education.\textsuperscript{31-33} Ribeiro et al showed the effects of VR in maintaining postural balance in elderly subjects with BPPV.\textsuperscript{34} The exercises included oculomotor exercises, habituation exercises (repeated head and trunk movements), standing and dynamic balance training, and lower-limb muscles strengthening. For each exercise prescription, a universal set of 10 modifiers and progression patterns were followed to make the exercises more challenging.\textsuperscript{35}

Angeli et al also used VR exercises in elderly people with BPPV. These maneuvers were more effective compared to no treatment, and VR exercises can be added to ORM to improve results in the treatment of BPPV in elderly people.\textsuperscript{28} Angeli et al further reported a considerable rate of symptoms recurrence in the elderly who only underwent ORM and suggest that VR exercises could decrease recurrence rate of BPPV. The protective effect was more evident in elderly people.\textsuperscript{28}

The updated evidence-based clinical guidelines of the American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAO-HNSF) recommend that clinicians should offer VR as treatment for BPPV. Although movement/habituation based VR should not be the first-line treatment modality for BPPV, it is recommended in patients who experience persistent disability following Canalith repositioning procedure (CRP).\textsuperscript{29} VR is particularly indicated in subjects with additional impairments, such as non-specific dizziness and increased risk of falls.

A Cochrane review was conducted to assess the efficacy of VR in patients with symptomatic unilateral peripheral vestibular dysfunction; this included eight studies investigating VR in BPPV specifically. This review supported the contention that the primary intervention for BPPV should be CRP that directly treats the condition, but movement/habituation-based VR may further aid and benefit long-term functional recovery.\textsuperscript{36}

**REPOSITIONING DEVICES**

Repositioning devices were developed to overcome the limitations in conventional repositioning treatment of BPPV. The Thomas Richard Vitton (TRV) reposition chair is a mechanical diagnostic and repositioning device developed for the management of BPPV. The key advantages of the TRV chair include improved analytical feasibility, accurate navigation, and treatment of people unfit for manual treatments. Patients with refractory BPPV
showed significant improvement by reposition chair management. The repositioning device could significantly reduce disease burden in the group of patients with BPPV who did not respond to conventional management.37

**Persistent recalcitrant positional vertigo (PRPV) after Posterior semicircular canal occlusion (PSCO)**

PSCO is a safe and effective option for recalcitrant BPPV. However, 30.8% of patients had recalcitrant positional vertigo postoperatively, ascribed commonly to contralateral BPPV. Patients considering PSCO should be counselled regarding this risk to ensure realistic expectations.38

**Mastoid vibration**

Mastoid vibration may be used to assist in treatment of persistent cases of BPPV, where a simple CRP may fail to improve symptoms. Introducing mastoid oscillation via vibration to the CRP in persistent cases of semi-circular canalithiasis BPPV may produce positive patient outcomes.39

**Use of betahistine**

Betahistine is a widely used drug to ameliorate dizziness.36 Betahistine decreases labyrinthine microcirculation and suppresses the increased neuronal activity in vestibular receptor cells, afferent neurons.36 Betahistine dihydrochloride accelerates the recovery of function of vestibular system by improving blood flow in the inner ear, and normalization of the function of motion sensitive hair cells is faster. In more than 40 years of clinical use, betahistine has shown an excellent safety profile with the usual dose range from 8-48 mg daily.

According to clinical studies, betahistine 48 mg daily for 3 months is an effective and safe option for the treatment of peripheral vertigo.40 The use of betahistine has been demonstrated to resolve Residual dizziness (RD) symptoms. In a placebo-controlled study, patients with RD after Epley’s maneuver were treated with either betahistine or placebo. Patients receiving betahistine were 3.18 times more likely to have no residual dizziness than the placebo group. Increasing age was associated with a decreased likelihood of improving residual dizziness.41 The expert group agreed that betahistine does have a role to play in helping resolve residual symptoms after Epley’s maneuver.

Treatment of patients with less than 60-days duration of BPPV with betahistine dihydrochloride after Epley’s maneuver was effective, and ten days after treatment postural stability of patients was normalized. Patients had faster recovery, decreased recurrence and longer relief of symptoms. Treatment with Epley’s maneuver and betahistine demonstrated better improvement in the mean visual analog score at follow-up at 1 and 4 weeks.42,43

**CONCLUSION**

Dizziness associated with BPPV may respond to repositioning maneuvers but even after successful maneuvers, some patients report residual dizziness.

Appropriate CRPs can provide rapid and long-lasting relief of symptoms in patients with BPPV. The experts concurred with this finding. Early recognition and treatment might decrease the incidence of residual dizziness in patients with BPPV, especially in those patients with psychiatric comorbidities and in the elderly, thereby lowering the risk of falls. Residual dizziness may be resolved by vestibular rehabilitation and repositioning devices.

The use of betahistine in combination with maneuvers can help prevent the development of residual dizziness. Use of betahistine improved vestibular recovery and has been demonstrated to resolve residual dizziness symptoms.

**ACKNOWLEDGEMENTS**

Author would like to thank Dr. Manjusha Patankar, Dr. Dyotona Sen and Dr. Swapnil Chube for assisting with the statistical work.

**Funding:** The experts participating in the meeting received honoraria from Abbott India Ltd. Abbott India Ltd paid for the medical writing assistance

**Conflict of interest:** None declared

**Ethical approval:** Not approved

**REFERENCES**

1. Brevern M, Lezius F, Wilck K, Radtke A, Lempert T. Benign paroxysmal positional vertigo: current status of medical management. Otolaryngol Head Neck Surg. 2004;130(3):381-2.
2. Zappia JJ. Benign paroxysmal positional vertigo. Curr Opin Otolaryngol Head Neck Surg. 2013;21(5):480-6.
3. Hansen S, Karlberg M. Benign paroxysmal positional vertigo--the most common form of otogenic vertigo. Ugeskr Laeger. 2007;169(21):1996-2002.
4. Lança SM, Gazzola JM, Kasse CA, Barreiro FC, Vaz DP, Scharlach RC. Body balance in elderly patients, 12 months after treatment for BPPV. Braz J Otorhinolaryngol. 2013;79(1):39-46.
5. Tinetti ME, Williams CS, Gill TM. Dizziness among older adults: a possible geriatric syndrome. Ann Intern Med. 2000;132(5):337-44.
6. Dorigueto RS, Ganança MM, Ganança FF. The number of procedures required to eliminate positioning nystagmus in benign paroxysmal positional vertigo. Braz J Otorhinolaryngol. 2005;71(6):769-75.
7. Ganança FF, Simas R, Ganança MM, Korn GP, Dorigueto RS. Is it important to restrict head
movement after Epley maneuver? Braz J Otorhinolaryngol. 2005;71(6):764-8.
8. Vaz DP, Gazzola JM, Lança SM, Dorigueto RS, Kasse CA. Clinical and functional aspects of body balance in elderly subjects with benign paroxysmal positional vertigo. Braz J Otorhinolaryngol. 2013;79(2):150-7.
9. Brevern M, Radtke A, Lezius F, Feldmann M, Ziese T, Lempert T, et al. Epidemiology of benign paroxysmal positional vertigo: a population based study. J Neurol Neurosurg Psychiatry. 2007;78(7):710-5.
10. Marchetti GF, Whitney SL, Redfern MS, Furman JM. Factors associated with balance confidence in older adults with health conditions affecting the balance and vestibular system. Arch Phys Med Rehabil. 2011;92(11):1884-91.
11. Gazzola JM, Ganañca FF, Aratani MC, Ferracini MR, Ganañca MM. Circumstances and consequences of falls in elderly people with vestibular disorder. Braz J Otorhinolaryngol. 2006;72(3):388-92.
12. Calbertio A, Ruiz G, Zschaecck C, Dios JC, Gil L, Sanchez V, Sanz E. Benign paroxysmal positional vertigo in the elderly. Gerontology. 2013;59(4):508-12.
13. Kasse CA, Santana GG, Barreiro FC, Scharlach RC, Gazzola JM, Ganañca FF, et al. Postural control in older patients with benign paroxysmal positional vertigo. Otolaryngol Head Neck Surg. 2012;146(5):809-15.
14. Pollak L, Davies RA, Luxon LL. Effectiveness of the particle repositioning maneuver in benign paroxysmal positional vertigo with and without additional vestibular pathology. Otol Neurotol. 2002;23(1):79-83.
15. Herdman SJ, Blatt P, Schubert MC, Tusa RJ. Falls in patients with vestibular deficits. Am J Otol. 2000;21(6):847-51.
16. Prasansuk S, Siriyananda C, Nakorn AN, Atipas S, Chongvisal S. Balance disorders in the elderly and the benefit of balance exercise. J Med Assoc Thai. 2004;87(10):1225-33.
17. Kanashiro AM, Pereira CB, Melo AC, Scaff M. Diagnosis and treatment of the most frequent vestibular syndromes. Arq Neuropsiquiatr. 2005;63(1):140-4.
18. Ganañca FF, Gazzola JM, Ganañca CF, Caovilla HH, Ganañca MM, Cruz OL. Elderly falls associated with benign paroxysmal positional vertigo. Braz J Otorhinolaryngol. 2010;76(1):113-20.
19. Pereira CB, Scaff M. Benign paroxysmal positional vertigo. Arq Neuropsiquiatr. 2001;59(2):466-70.
20. Sim E, Tan D, Hill K. Poor Treatment Outcomes Following Repositioning Maneuvers in Younger and Older Adults With Benign Paroxysmal Positional Vertigo: A Systematic Review and Meta-analysis. J Am Med Dir Assoc. 2019;20(2):224.
21. Fife TD, Iverson DJ, Lempert T, Furman JM, Baloh RW, Tusa RJ, et al. Practice parameter: therapies for benign paroxysmal positional vertigo (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology. 2008;70(22):2067-74.
22. Pereira AB, Santos JN, Volpe FM. Effect of Epley's maneuver on the quality of life of paroxysmal positional benign vertigo patients. Braz J Otorhinolaryngol. 2010;76(6):704-8.
23. Resende CR, Taguchi CK, Almeida JG, Fujita R. Vestibular rehabilitation in elderly patients with benign paroxysmal positional vertigo. Braz J Otorhinolaryngol. 2003;69:34-8.
24. Parnes LS, Agrawal SK, Atlas J. Diagnosis and management of benign paroxysmal positional vertigo (BPPV). CMAJ. 2003;169(7):681-93.
25. Riga M, Korres S, Korres G, Danielides V. Apogeotropic variant of lateral semicircular canal benign paroxysmal positional vertigo: is there a correlation between clinical findings, underlying pathophysiologic mechanisms and the effectiveness of repositioning maneuvers?. Otol Neurotol. 2013;34(6):1155-64.
26. Ichijo H. Recurrence in patients with benign paroxysmal positional vertigo of the lateral semicircular canal. Auris Nasus Larynx. 2020;47(3):353-8.
27. Macias JD, Lambitt KM, Massingale S, Ellensohn A, Fritz JA. Variables affecting treatment in benign paroxysmal positional vertigo. Laryngoscope. 2000;110(11):1921-4.
28. Angeli SI, Hawley R, Gomez O. Systematic approach to benign paroxysmal positional vertigo in the elderly. Otolaryngol Head Neck Surg. 2003;128(5):719-25.
29. Blatt PJ, Georgakakis GA, Herdman SJ, Clendaniel RA, Tusa RJ. The effect of the canalith repositioning maneuver on resolving postural instability in patients with benign paroxysmal positional vertigo. Am J Otol. 2000;21(3):356-63.
30. Chang WC, Yang YR, Hsu LC, Chern CM, Wang RY. Balance improvement in patients with benign paroxysmal positional vertigo. Clin Rehabil. 2008;22(4):338-47.
31. Alrwaile M, Whitney SL. Vestibular rehabilitation of older adults with dizziness. Otolaryngol Clin North Am. 2011;44(2):473-96.
32. Silva AL, Marinho MR, Gouveia FM, Silva JG, Ferreira AS, Cal R. Benign Paroxysmal Positional Vertigo: comparison of two recent international guidelines. Braz J Otorhinolaryngol. 2011;77(2):191-200.
33. Whitney SL, Sparto PJ. Principles of vestibular physical therapy rehabilitation. NeuroRehabilitation. 2011;29(2):157-66.
34. Ribeiro KM, Freitas RV, Ferreira LM, Deshpande N, Guerra RO. Effects of balance Vestibular Rehabilitation Therapy in elderly with Benign Paroxysmal Positional Vertigo: a randomized controlled trial. Disabil Rehabil. 2017;39(12):1198-206.
35. Alsalaheen BA, Whitney SL, Mucha A, Morris LO, Furman JM, Sparto PJ. Exercise prescription patterns in patients treated with vestibular rehabilitation after concussion. Physiother Res Int. 2013;18(2):100-8.
36. Wu P, Cao W, Hu Y, Li H. Effects of vestibular rehabilitation, with or without betahistine, on managing residual dizziness after successful repositioning manoeuvres in patients with benign paroxysmal positional vertigo: a protocol for a randomised controlled trial. BMJ Open. 2019;9(6):26711.
37. West N, Hansen S, Bloch SL, Møller MN, Klokker M. Benign paroxysmal positional vertigo treatment. Ugeskr Laeger. 2017;179(23):11160784.
38. Luryi AL, Lawrence J, Bojrab DI, LaRouere M, Babu S, Zappia J, et al. Recurrence in Benign Paroxysmal Positional Vertigo: A Large, Single-Institution Study. Otol Neurotol. 2018;39(5):622-7.
39. Griech SF, Carroll MA. The use of mastoid vibration with canalith repositioning procedure to treat persistent benign paroxysmal positional vertigo: A case report. Physiother Theory Pract. 2018;34(11):894-9.
40. Alcocer R, Ledezma RJG, Navas RA, Cardenas JL, Rodríguez MV, Deschamps JJ, et al. Use of betahistine in the treatment of peripheral vertigo. Acta Otolaryngol. 2015;135(12):1205-11.
41. Jalali MM, Gerami H, Saberi A, Razaghi S. The Impact of Betahistine versus Dimenhydrinate in the Resolution of Residual Dizziness in Patients with Benign Paroxysmal Positional Vertigo: A Randomized Clinical Trial. Ann Otol Rhinol Laryngol. 2020;129(5):434-40.
42. Cavaliere M, Mottola G, Iemmi M. Benign paroxysmal positional vertigo: a study of two manoeuvres with and without betahistine. Acta Otorhinolaryngol Ital. 2005;25(2):107-12.
43. Berisavac II, Pavlović AM, Trajković JJ, Šternić NM, Bumbaširević LG. Drug treatment of vertigo in neurological disorders. Neurol India. 2015;63(6):933-9.

Cite this article as: Banerjee TK. Repositioning maneuvers in benign paroxysmal positional vertigo: how do we improve outcomes?. Int J Res Med Sci 2021;9:3764-8.