

Efficacy of Particle Repositioning Manoeuvre in Benign Paroxysmal Positional Vertigo – An Observational Study

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ABSTRACT

Background: Dizziness is one of the common complaints in patients presenting to the outpatient clinics. Vertigo was found to be the most common cause of dizziness. Vertigo is defined as an illusion of motion and is most commonly caused by Benign Paroxysmal Positional Vertigo (BPPV). This study focuses on the association of BPPV with other related diseases and the role of particle repositioning manoeuvre in the treatment of benign paroxysmal positional vertigo. **Methods:** The prospective Hospital based study was done in the Department of Physical Medicine and Rehabilitation, Medical College, Thiruvananthapuram for the period of 2 years on 35 subjects of either gender above 18 years with vertigo presenting to the outpatient clinics. Disability scale evaluation was done prior to the manoeuvre and at 7 days, 4 weeks and 6 months after the Particle Repositioning manoeuvre. **Results:** Particle Repositioning Maneuver resulted in reversal of disability. Disability scales changed to zero in 91% of patients after first week of PRM. No statistically significant association was found between idiopathic Benign Paroxysmal Positional Vertigo and conditions like diabetes mellitus and hypertension in this study. **Conclusion:** This study establishes the efficacy of Particle Repositioning Maneuver in the management of Benign Paroxysmal Positional Vertigo.

Keywords: Particle repositioning manoeuvre, Benign paroxysmal positional vertigo, Disability scale.

INTRODUCTION

Dizziness is one of the common complaints in patients presenting to the outpatient clinics. Vertigo was found to be the most common cause of dizziness. Vertigo is defined as an illusion of motion and is most commonly caused by Benign Paroxysmal Positional Vertigo (BPPV).^[1] BPPV patients present with symptoms which may suggest a multitude of diagnostic possibilities. Several vertigo patients were referred to our OP clinics at the department of Physical Medicine and Rehabilitation, as vertigo due to cervical spondylosis. Though many patients had radiographic features suggestive of cervical spondylosis, we noticed that most of them did not have neck pain or limitation of range of motion. After considering various diagnostic possibilities we found that many of them had symptoms and signs which pointed to a diagnosis of BPPV. Literature reviews suggested that Dix Hallpike manoeuvre was the standard diagnostic test for

BPPV and complete relief of symptoms was attainable with a simple, non-invasive outpatient procedure known as the Particle Repositioning manoeuvre.^[2-6]

Considering the long list of economically taxing investigations which these patients with vertigo had undergone, Dix Hallpike manoeuvre was a no cost technique for the diagnosis of BPPV. Once the diagnosis of BPPV was made, management was based on an outpatient procedure, the Particle Repositioning manoeuvre which was simple, cost effective, non invasive and that which can be repeated.^[7-10]

We found that this simple clinical test would be immensely beneficial to the patients with BPPV. No previous studies were done in our Department on BPPV. Hence we decided to conduct a study on the efficacy of particle repositioning manoeuvre in BPPV.

Approximately 25% of cases with dizziness are due to BPPV, a condition that can be chronic and severely incapacitating. The causative mechanism is usually abnormal dense particles (Canalith) in semicircular canal. These particles can be repositioned and the symptoms completely resolved in a high percentage of cases by means of canalith repositioning manoeuvre (CRP), a non invasive series of manoeuvres.^[11-15]

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BPPV has been associated with various disorders of the labyrinth including head trauma, viral labyrinthitis, prior surgery and suppurative otitis media, but most cases are thought to be idiopathic.¹⁶ This study focuses on the association of BPPV with other related diseases and the role of particle repositioning manoeuvre in the treatment of benign paroxysmal positional vertigo.

MATERIAL AND METHODS

The prospective Hospital based study was done in the Department of Physical Medicine and Rehabilitation, Medical College, Thiruvananthapuram for the period of 2 years from January 2006 to December 2007.

35 subjects of either gender above 18 years with vertigo presenting to the outpatient clinics were included in the study.

Exclusion criteria

- Evidence of ongoing central nervous system disease
- Unstable Heart disease
- Severe cervical spondylosis
- Alternative diagnosis of peripheral vertigo

Procedure for the study group

The diagnosis of BPPV and the identification of the offending ear were established by the Dix – Hallpike test .The patient was seated on the examination table close enough to the end so that the neck may be extended over the edge of the table when the patient becomes supine.

Position 1: The patient was seated and subsequently placed into supine position with the head rotated 45 degrees from the vertical plane toward the affected ear. The head was allowed to subtend an angle of 30 degrees to the horizontal plane. Various characteristics of nystagmus (latency, duration, type and direction) and vertigo were recorded.

Position 2: The head was turned by 90 degrees toward the contralateral side from the position 1 (ie, 45 degrees to the vertical plane towards the opposite ear)

Position 3: Later on, the head was rotated by a further 90 degrees in the same direction. To ease the head movement, the body was rotated by 90 degrees towards the opposite ear, thus making the head to attain 135 degrees from supine position.

Position 4: The patient was brought back to sitting position with the head in the same position as in position 3.

Position 5: The patient's head was later turned by 45 degrees to bring it in line with the rest of the body.

In each position, the patient was allowed to rest for 2 minutes after the cessation of nystagmus.

Post procedural Instructions

All patients who had undergone PRM were asked to sleep in an upright position with the head elevated at an angle no less than 45 degrees from the bed for the next 48 hours. A rigid two piece cervical collar was given for 48 hours to ensure an upright position. The patients were allowed to resume normal activities after 2 days.

Follow up

The period of follow up for all cases was for 6 months. Patients were reviewed after one week, four weeks and 6 months after the procedure. At each visit the Dix-Hallpike manoeuvre was repeated and the symptomatic status revised.

Assessment

Disability scale evaluation was done prior to the manoeuvre and at 7 days, 4 weeks and 6 months after the manoeuvre. Patients were asked to describe the specific activity that could not be performed as a result of symptoms (self care, home management, vocation, community activity, leisure).

Disability scale

- 0 - No disability
- 1 - Botherome symptoms
- 2 - Mild disability, performs usual duties, symptoms interfere with social activity
- 3 - Moderate disability, disrupts usual duties
- 4 - Recent severe disability, on medical leave or had to change job
- 5 - Long term disability, unable to work for extended period

Symptomatic status at each visit was graded as Grade 1 – complete resolution of symptoms, Grade 2 – partial resolution of symptoms and Grade 3 – no resolution or worsening of symptoms.

Statistical Analysis

Data was analysed using computer software EPI 2000 for Windows to elucidate the associations between different variables. For all statistical analysis, a two tailed probability of value less than 0.05 were considered significant. Paired test was used to measure the statistical significance of vertigo and disability scales.

RESULTS

35 patients who had symptoms and signs of benign paroxysmal positional vertigo were studied. Dix Hallpike manoeuvre was positive in all the 35 patients studied. Particle repositioning manoeuvre was done in all 35 patients. Mean age for benign paroxysmal positional vertigo was calculated and was found to be 52.14 years.

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Table 1: Distribution of Idiopathic BPPV and BPPV with other related conditions in study population

Benign paroxysmal positional vertigo & associations	Number of Patients
Idiopathic	28
Menier's disease	3
Post traumatic	3
Migraine	1
TOTAL	35

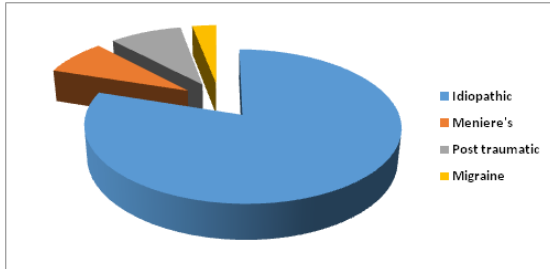


Figure 1: Distribution of Idiopathic BPPV and BPPV with other related conditions in study population.

Of the total 35 benign paroxysmal positional vertigo patients studied, 28 (80 percentage) were idiopathic, 3 (8.5 percentage) cases were associated with Meniere's disease, 3 (8.5 percentage) cases had history of trauma and one (3 percentage) case was associated with migraine [Table 1, Figure 1].

Table 2: Diabetes Mellitus and BPPV

Diabetes Mellitus	Idiopathic BPPV	Others	Total
Present	9	1	10
Absent	19	6	25
Total	28	7	35

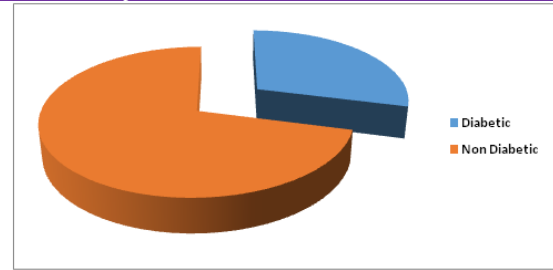


Figure 2: Diabetes Mellitus and BPPV

p value – 0.33, chi square – 0.88

Table 3: Hypertension and BPPV

Hypertension	Idiopathic BPPV	Others	Total
Present	13	1	14
Absent	15	6	21
Total	28	7	35

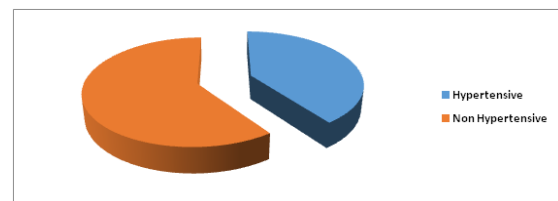


Figure 3: Hypertension and BPPV

p value – 0.26, chi square – 1.26

Table 4: Symptom status at the end of one week, 4 weeks and 6 months

Symptom status	1 week	4 weeks	6 months
Grade 1	32	34	33
Grade 2	3	1	1
Grade 3	0	0	1
TOTAL	35	35	35

Table 5: Disability scales during follow up

Before PRM	5	4	5	3	4	4	5	4	5	4	5	4	4	5	4	5	5	4	4	5	4	5	4	5	4	5	5	4	4	4	5	4	4	4	5
1 week after PRM	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
4 weeks after PRM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 months after PRM	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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At the end of first week $t = 33.5$; p value < 0.001

Of the total 35 patients, there were 10 (29 percentage) with diabetes. Of the 28 with idiopathic benign paroxysmal positional vertigo, 9 had diabetes mellitus (32 percentage) and of the 7 with benign paroxysmal positional vertigo of other causes, one had diabetes mellitus (14 percentage). No statistically significant relation between idiopathic benign paroxysmal positional vertigo and diabetes mellitus was found in this study [Table 2, Figure 2].

Of the total 35 patients studied, 14 (40 percentage) had hypertension and were under treatment. Of the 28 with idiopathic benign paroxysmal positional vertigo, 13 had hypertension (46 percentage) and of the 7 with benign paroxysmal positional vertigo of other causes, one had hypertension (14 percentage). There was no statistically significant association between hypertension and idiopathic benign paroxysmal positional vertigo in this study [Table 3, Figure 3].

32, Grade 1 symptomatic patients out of the total 35 patients (91%) had complete relief of symptoms at the end of one week. At the end of 4 weeks, 34 out of the 35 patients (97%) had complete resolution of symptoms with one patient (3 percentage) who continued to have partial symptoms (Grade 2). At the end of 6 months, one person had recurrence of symptoms (Grade 3) and one patient continued to have partial symptoms (Grade 2). Thus, 94 percentage patients had complete resolution at the end of six months [Table 4].

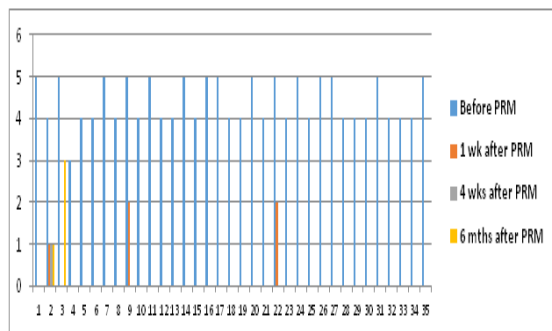


Figure 4: Efficacy of PRM at first week, 4 weeks and 6 months – Disability scale

Paired t test was used to evaluate the changes in the disability scales before the particle repositioning maneuver and at one week after the maneuver.

At the first visit, out of 35 patients, 15 patients (42.8 percentage) had a disability scale of 5; 19 patients (54.2 percentage) had disability scale of 4; 1 patient (3 percentage) had disability scale of 3.

At the end of one week, 32 out of 35 (91 percentage) patients had disability scale zero with 2 patients (6 percentage) disability scale of 2 and one patient (3 percentage) had disability scale of 1.

At the end of four weeks, 34 out of 35 (97 percentage) patients had disability scale zero while one patient (3 percentage) continued to have disability scale 1. One person (3 percentage) had recurrence of symptoms at the end of six months with disability scale 3 and one continued to have disability scale 1.

Paired t test was used to evaluate the changes in disability scales before the PRM and at one week after the maneuver. At the end of one week, $t = 33.5$; p value < 0.001 . Thus, PRM resulted in statistically significant changes in disability scale [Table 5, Figure 4].

DISCUSSION

Until recently, BPPV was believed to be a self-limiting condition and hence it required no treatment. Histological demonstration of canaliths in the posterior semicircular canal made many consider repositioning maneuvers. The addition of various types of head maneuvers, particularly Modified Epley's maneuver or Particle Repositioning Maneuver for the treatment of BPPV has been very successful.

Literature reports wide range of response rates ranging from 44% to 100%. Epley recorded 97.7% to 100% success rate after canalith repositioning maneuver.^[17-19]

In a single blinded case control study¹⁰ conducted in 40 subjects, Canalith Repositioning Maneuver was much better than placebo in treatment of benign paroxysmal positional vertigo. After the first week, 95% subjects showed complete resolution of symptoms. Results remained more or less the same at the end of four weeks. Six months after PRM, 19 out of 20 patients had non vertigo with a meagre 5% showing recurrence. At the end of one year, 18 out of 20 patients had complete relief from symptoms with only 10% showing Dix Hallpike maneuver positive.

A study reported that in 71 patients whom they studied, the Canalith Repositioning Maneuver was very effective in primary and secondary BPPV.^[15]

In our prospective hospital based study, success rate was between 91% and 97% at different periods of follow up. Dix Hallpike maneuver and symptom status was considered as a standard for assessment of recurrence rate.

Success rate after one week and four weeks after PRM was at 91% and 97% respectively. Of the 35 patients who underwent PRM, 32 had complete relief of symptoms at one week after the maneuver. Two more had complete relief of symptoms after repeating the maneuver at four weeks. Only one patient continued to have some symptoms after four weeks; though Dix Hallpike test was negative. One person had recurrence of symptoms by the end of six months after the PRM. PRM was repeated

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and he had complete resolution of symptoms. This establishes the fact that PRM is an easy, simple procedure which can be repeated as and when required.

In a review of 187 patients by Schuknecht HF 36 patients were felt to be benign paroxysmal positional vertigo secondary to another ear disease. In 151 cases, 34% had a diagnosis of Meniere's disease. In our study, there were three cases of BPPV associated with Meniere's disease. A patient with Meniere's disease, who begins to describe episodes uncharacteristic of his Meniere's symptoms such as vertigo of short duration elicited by changes in position, may be experiencing BPPV and should be tested accordingly. If examination demonstrated typical positional nystagmus and vertigo and the patient meets further criteria for BPPV, a diagnosis of BPPV is likely. This distinction is important to the patient in that the BPPV component of the disorder can be successfully treated with CRP and vestibular rehabilitation.

It has been suggested that the free floating otoconial debris could obstruct the flow of endolymph and affect re absorption, thus producing hydrops. Herdman SJ.^[12] found that hydrops could be produced by blockage of endolymphatic duct and sac in animal studies.

Many researchers found that co morbid conditions, particularly diabetes,^[3,8,16] mild head trauma, and sinus disease are unusually prevalent in BPPV patient. Patients with co morbid diseases are at risk for having increased vertigo, anxiety and disequilibrium compared to other patients. Most cases of BPPV are primary or idiopathic (50-70%). Secondary causes include head trauma(7-17%), viral labyrinthitis (15%), Miniere's disease (5%) , migraine(5%), inner ear surgery(<1%).

Rarely, benign paroxysmal positional vertigo can be caused by particles that enter the horizontal canal.^[11] These patients however present with intense symptoms and demonstrate non fatigable horizontal nystagmus with the head turned in either direction. None of the patients encountered in this study were believed to have horizontal canal variant.

To conclude, PRM is a very easy and effective procedure in the management of patients suffering from Benign Paroxysmal Positional Vertigo. Patients experiencing later recurrences can be subjected to a repeat maneuver. This study also emphasizes the importance and validity of Dix Hallpike maneuver in the diagnosis of the disease and its recurrence. It establishes the efficacy of PRM in the management of BPPV.

CONCLUSION

- This study establishes the efficacy of Particle Repositioning Maneuver in the management of Benign Paroxysmal Positional Vertigo.

- Particle Repositioning Maneuver resulted in reversal of disability. Disability scales changed to zero in 91% of patients after first week of PRM.
- No statistically significant association was found between idiopathic Benign Paroxysmal Positional Vertigo and conditions like diabetes mellitus and hypertension in this study.

REFERENCES

1. Von Brevern M Radtke A Lezius F, et al. . Epidemiology of benign paroxysmal positional vertigo: a population based study. *J Neurol Neurosurg Psychiatry*. 2007;78:710–715.
2. Oghalai JS Manolidis S Barth JL, et al. . Unrecognized benign paroxysmal positional vertigo in elderly patients. *Otolaryngol Head Neck Surg* . 2000;122:630–634.
3. Fife D FitzGerald JE. Do patients with benign paroxysmal positional vertigo receive prompt treatment? Analysis of waiting times and human and financial costs associated with current practice. *Int J Audiol* . 2005;44:50–57.
4. Schuknecht HF. Cupulolithiasis. *Arch Otolaryngol* . 1969;90:765–778.
5. Hall SF Ruby RR McClure JA. The mechanics of benign paroxysmal vertigo. *J Otolaryngol* . 1979;8:151–158.
6. Dix MR Hallpike CS. The pathology, symptomatology, and diagnosis of certain common disorders of the vestibular system. *Proc R Soc Med* . 1952;45:341–354.
7. Bhattacharyya N Baugh RF Orvidas L, et al. . Clinical practice guideline: benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* . 2008;139(5 suppl 4):S47–S81.
8. Fife TD Iverson DJ Lempert T, 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;70:2067–2074.
9. Aw ST Todd MJ Aw GE, et al. . Benign positional nystagmus: a study of its three-dimensional spatio-temporal characteristics. *Neurology* . 2005;64:1897–1905.
10. Brandt T Daroff RB. Physical therapy for benign paroxysmal positional vertigo. *Arch Otolaryngol* . 1980;106:484–485.
11. Epley JM. New dimensions of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* . 1980;88:599–605.
12. Herdman SJ. Treatment of benign paroxysmal positional vertigo. *Phys Ther* . 1990;70:381–388.
13. Baloh RW Jacobson K Honrubia V. Horizontal semicircular canal variant of benign positional vertigo. *Neurology* . 1993;43:2542–2549.
14. Halker RB Barrs DM Wellik KE, et al. . Establishing a diagnosis of benign paroxysmal positional vertigo through the Dix-Hallpike and side-lying maneuvers: a critically appraised topic. *Neurologist* . 2008;14:201–204.
15. Blau P Shoup A. Reliability of a rating scale used to distinguish direction of eye movement using infrared/video ENG recordings during repositioning maneuvers. *Int J Audiol* . 2007;46:427–432.
16. Harada Y. Metabolic disorder, absorption area and formation area of the statoconia. *J Clin Electron Microsc* . 1982;18:1–18.
17. Lim DJ. Formation and fate of the otoconia: scanning and transmission electron microscopy. *Ann Otol Rhinol Laryngol* . 1973;82:23–35.
18. Epley JM. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* . 1992;107:399–404.
19. Faldon ME Bronstein AM. Head accelerations during particle repositioning manoeuvres. *Audiol Neurootol* . 2008;13:345–356.

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